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Oral Health Quality of Life in Adolescents and Young Adults

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Abstract: Background/Objectives: To examine the relationship between quality of life and oral health in adolescents and young adults in the area of the city of Zagreb. **Methods:** 250 examinees, in the area of the city of Zagreb, between the ages of 14 and 25 participated in this research. All examinees were examined by a doctor of oral medicine with a probe and mirror in a dental unit and their DMFT status has been determined. All examinees filled out a specially crafted questionnaire about their socioeconomic status (SES) as well as a questionnaire about the influence of their life quality on dental health (OHIP-14). **Results:** Caries is the most common dental issue among adolescents (2.23±2.58) and restoration (54%) is the most common treatment performed by dentist. Endodontic treatment and tooth extraction are more common among people with a lower socioeconomic status (24.1%) and their DMFT scores are worse (8.09±5.56). Prophylaxis is equally distributed based on socioeconomic status and gender. Male patients have more carious teeth (2.75±3.07) than female patients (1.85 ±2.08), while the female patients show poorer scores on the OHIP-14 (10.97±8.77) scale in comparison to men (8.81±8.11). Age positively correlates with both OHIP-14 and DMFT scales. **Conclusion:** DMFT scores of adolescents and young adults in the area of the city of Zagreb are very poor. OHIP-14 scores are also worse. It could be concluded that young people in the area of the city of Zagreb have a poorer DMFT status and poorer life quality in regards to their oral health. Considering that DMFT and OHIP-14 scores get higher with age, the importance of oral health should be emphasized more among this population. The acquired results showcase the importance and need of implementing preventative measures for adolescents.

Keywords: adolescents; oral health; quality of life; DMFT

1. Introduction

The World Health Organisation (WHO) provides a simple definition of health: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or illness "." Social well-being "is an important aspect of this definition that is often overlooked when considering our health [1]. According to WHO, an individual's quality of life (QoL) is defined as the perception of one's position in life in the context of the cultural and value system in which the individual lives and in relation to one's goals, norms, expectations, and values. Quality of life is subject to the complex influence of physical health, mental status, degree of independence, social relationships, and personal attitudes toward the general characteristics of the environment [2-4].

Oral health is multi-layered and includes the ability to speak, laugh, smell, taste, touch, chew, swallow, and convey a variety of emotions through facial expressions with confidence and without pain, discomfort, and any disorders of the craniofacial complex (the head, face and oral cavity) [3-5].

Regardless of age, oral health is critical to overall health and well-being [3,5]. Oral diseases affect the well-being of the individuals, as well as the well-being of the general population. From birth, the maxillofacial system plays a key role in the physical, psychological, and social aspects of a person's life [6]. According to WHO, oral diseases, especially caries and periodontal diseases, are among the most common diseases worldwide [7].

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The situation regarding dental caries has improved in the last few decades, however, the number dental visits among adolescents is still stagnant. Periodontitis is less common among adolescents, but plaque and gingivitis, as well as poor oral hygiene, are widespread, especially in the male population [7,8]. Dietary habits have changed, and young people increasingly consume processed foods that are high in sugar, refined carbohydrates and fats. These habits lead to a higher number of carious teeth and a worse DMFT status [8].

Adolescence is a time of change when a person leaves the role of dependence on his or her parents or guardians and transforms into an individual who makes his or her own decisions [9]. It is a time of important biological, emotional, and social change, a time when individuals become independent and take responsibility for their behavior and attitudes toward their health [10].

The influence of society and socioeconomic status in the early years of life on oral health persists throughout life. Adolescents raised in poorer socioeconomic circumstances are at higher risk of exposure to infections, becoming smokers, and often have poorer oral hygiene. All of these increase the risk of oral diseases [11]. An important consideration in adolescence is the actual impact of oral problems on quality of life, such as perceptions of oral health, tooth loss, aesthetics, and general appearance. The most common problems reported by adolescents in previous surveys were related to their diet, smile, halitosis, and mild pain [12].

Poor oral health in adolescence leads to poor oral status and poorer quality of later in life [13]. Regular dental visits are associated with a better subjective assessment of one's oral health [11]. To determine the impact of oral health on overall quality of life, certain parameters are needed to help determine these values [14].

The World Health Organization defines quality of life as an individual’s perception of his or her position in life, in the context of the cultural and value-based systems in which he or she lives, and of his or her goals, expectations, norms, and doubts [15].

Our most important goals are to cure disease and extend life expectancy. But, quality of life is also important. There are some ways to determine the degree of oral health and quality of life. The need for such measurement stems from the need to improve life and achieve a certain level of quality of life, and life satisfaction [16]. Better understanding the OHRQoL can contribute to the development of strategies aimed at improving health education to achieve better prevention [2].

The aim of this study is to determine the influence of oral health on the quality of life of adolescents and young adults. To date, there are no similar researches in Croatia and only a few in the European Union that specifically address the group of adolescents.

2. Materials and Methods

The ethical committees of the School of Dental Medicine in Zagreb and of the Medical center Zagreb – Centre have approved this research. The examinees are people aged 14 to 25, that were selected randomly, from the area of the city of Zagreb. The research was conducted in 3 locations: in a private dispensary in Zagreb, in the School of Dental Medicine in Zagreb, and in the Medical center Zagreb – Centre. In total, 250 examinees participated in this research: 105 (42%) male and 145 (58%) female. The age average of the male examinees is 19.7 (SD=3.44), as well as for the female examinees (SD=3.69). All intraoral exams were performed by a doctor of dental medicine with a probe and mirror in a dental office and their DMFT status was determined.

The decision to conduct the research across three different locations was driven by the need to capture a diverse and representative sample population, reflecting a broader range of socioeconomic, cultural, and environmental factors that may influence dental anxiety and oral health outcomes.

Conducting the research in three distinct locations likely introduced a degree of variability in the sample population. This variability could enhance the generalizability of the study’s findings, as it allows for the inclusion of subjects from different backgrounds and living conditions. However, it may also lead to differences in the prevalence of dental anxiety and oral health outcomes due to location-specific factors, such as the quality of local healthcare systems, cultural attitudes toward dental care, and socioeconomic disparities. These differences should be considered when interpreting

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the results, as they may reflect the unique influences of each location rather than a uniform trend across the entire population studied.

The questionnaires used in this research are:

In this study, we used the Croatian version of the OHIP questionnaire – 14, which was translated according to accepted methods of the profession. The original version of the questionnaire consists of 49 questions, but a shortened version is most commonly used [17]. OHIP – 14 is one of the questionnaires evaluated to determine how quality of life depends on oral health. It is an abbreviated version that contains 14 questions about oral health [18].

OHIP–14 questionnaire was originally developed by Slade and Spencer [1994] for the measurement of disability and discomfort due to oral conditions and is one of the most widely known OHRQoL instruments. It consists of 14 items derived from 49-items of the original version [Slade 1997b]. The OHIP-14 questionnaire was used in this study to examine the level of oral health. It consists of 14 questions divided into 7 domains: functional limitations, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The answers are rated on a scale ranging between 0 – 4: 0 – never, 1 – very rarely, 2 – occasionally, 3 – often, 4 – very often. The highest possible score is 56. A higher total score indicates poorer life quality in relation to oral health [19,20].

SES – socioeconomic status

Determining the values of the SES scale is based on a questionnaire whose content is set out in Table 1. Since there are many modified variations of the SES questionnaire, we limited the questions in this research to a minimum number of questions that appear in most questionnaires. SES indicator is a sum of points to all 11 questions. To make the questionnaire more precise, instead of the total score, a categorization of the total score is used in this questionnaire and it is divided into 3 categories: 1 – low, 2 – middle and 3 – high.

Table 1. Socio-economic status questionnaire.

Variables	Categories	
	Code	Name
Father's education	1	Lower and medium
	2	faculty
Mother's education	1	lower and medium
	2	faculty
Father's employment	1	other
	2	employed
Mother's employment	1	other
	2	employed
People you live with	1	other
	2	with both parents and siblings
Number of brothers and sisters	0	none
	1	one
	2	two
	3	three or more
Housing	1	rental or other
	2	own apartment
	3	own house
Own room	1	Shared with children or adults
	2	Yes, own room
Vacation	1	none
	2	one
	3	two

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	4	more than two
Financial condition of the family	1	Below average
	2	average
	3	well-off

Life quality was estimated with one of the evaluated methods for determining life quality in relation to oral health visible in Table 1.

DMFT index

DMFT is the sum of the number of decayed, missing due to caries, and filled teeth in the permanent teeth. The mean number of DMFT is the sum of individual DMFT values divided by the sum of the population [1]. Determining the DMFT index is a method used often in epidemiological and clinical researches. It is one of the simplest and most common methods of determining the number of caries, removed or filled teeth in clinical and epidemiological researches [21,22]. We determined the index with intraoral examination using a probe and mirror.

Along with total scores of DMFT index and OHIP-14, the analysis also contains age and gender of the examinees, SES divided into 3 categories (low, medium, and high) and the last treatment the examinee had when visiting a dentist, divided into 4 categories (restoration, prophylaxis, endodontics, and extraction).

Statistical analysis:

The necessary sample size was estimated using the most demanding method applied to test the set hypotheses: the χ^2 test. Using GPower 3.1 software, the minimum sample size was calculated to be 220 participants, assuming a medium effect size (0.3), an alpha error probability (α) of 0.05, a power (1 - β error probability) of 0.95, and 5 degrees of freedom. In addition to describing individual research variables, the following methods were used to test the hypotheses.

Nominal variables (gender) and scales (socio-economic status and applied treatment) are described by frequencies and the relationship between them was tested by the $\chi 2$ test. Continuous variables (DMFT and OHIP-14) were tested for normality by the Kolmogorov-Smirnov test, described by mean and standard deviation. The reliability of the OHIP-14 scale was checked by Cronbach's alpha coefficients. The interdependence of age, DMFT, and OHIP-14 was tested with the Pearson correlation coefficient. Differences among subgroups, determined by gender of respondents, categories of socioeconomic status and treatment, were tested by t-test for independent samples and one-way analysis of variance. The default significance level is set to 0.05. STATISTICA version 10 and SPSS 18 was used for data processing and analysis [23].

3. Results

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

3.1. The socio-economic status

The socio-economic status of the respondents is equal to the total share in the categories of the same: low 23.2%, medium 55.6% and high 21.2% status. The test result and the corresponding contingency table are listed in Table 2.

Table 2. Distribution of socioeconomic status (SES) of respondents by gender.

SES	Male N(%)	Female N(%)	Total N(%)
Low	26 (24.8)	32 (22.1)	58 (23.2)
Middle	56 (53.3)	83 (59.7)	139 (55.6)
High	23 (21.9)	30 (20.7)	53 (21.2)
Total	105 (42.0)	145 (58.0)	250 (100.0)

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Pearson Chi-Square Value = 0.400, df = 2, P = 0.819. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 22.26.

3.2. Dental treatment

The frequency of treatment also did not differ according to the sex of the subjects. Prophylaxis was used in 29.6% of respondents (31.4% of male and 28.3% of female). The applied treatments are dominated by restorative, which was used in 54% of respondents (52.4% of male and 55.2% of female). Endodontics and extraction were performed in 16.4% of subjects (16.2% of male and 16.6% of female). The very division of treatment categories indicates the fact that the applied treatment is equal according to the sex of the respondents, which is confirmed by the test result listed in Table 3.

Table 3. Distribution of respondents' treatment by gender.

Treatment	Male N(%)	Female N(%)	Total N(%)
Prophylaxis	33 (31.4)	41 (28.3)	74 (29.6)
Restauration	55 (52.4)	80 (55.2)	135 (54.0)
Endodontics and extraction	17 (16.2)	24 (16.6)	41 (16.4)
Total	105 (42.0)	145 (58.0)	250 (100.0)

Pearson Chi-Square Value = 0.297, df = 2, P = 0.862. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.22.

The share of individual categories of treatment is equal in all three categories of socio-economic status. As can be seen from the contingency table given in Table 4, the restorative was slightly less applied in respondents with low socio-economic status (46.6%), and in respondents with high socio-economic status slightly more (66%) compared to the share of 54% in all respondents. Endodontics and extraction were used predominantly in subjects with low socioeconomic status (in 23.2%). These differences in the relationship between treatment and socioeconomic status, however, have not been statistically significantly proven since the probability of independence of these two variables is 0.168. The smallest difference is among the categories of socio-economic status in the application of prophylaxis, which was applied in 29.8% of all respondents (Table 4).

Table 4. Distribution of treatment of respondents according to their socio-economic status

Treatment	Low N(%)	Middle N(%)	High N(%)	Total N(%)
Prophylaxis	17 (29.3)	44 (31.7)	13 (24.5)	74 (29.8)
Restauration	27 (46.6)	73 (52.5)	35 (66.0)	135 (54.0)
Endodontics and extraction	14 (24.1)	22 (15.8)	5 (9.4)	41 (16.4)
Total	58 (23.2)	139 (55.6)	53 (21.2)	250 (100.0)

Pearson Chi-Square Value = 6.449, df = 4, P = 0.168. 0 cells (0.0%) have expected count less than 5.The minimum expected count is 8.69.

3.2. Oral health status

The status of the examinee's teeth, i.e., the number of healthy, extracted, filled and healthy teeth per person and the DMFT index did not differ statistically significantly according to the sex of the subjects, except in the case of caries, as shown by their average values and t-test results for independent samples (Table 5). Namely, the number of carious teeth per person is on average for male almost three (2.76) and such teeth in female are statistically significantly lower (1.85). This difference did not result in statistically significant differences in the DMFT index by gender. The average values of the total number of individual categories of teeth are listed in Table 6.

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Table 5. The difference between the number of carious teeth per person and the DMF index by gender.

Variables	Gender	N	Mean	SD	t-value	df	p*
Caries	Male	105	2.76	3.07	2.804	248	0.009
	Female	145	1.85	2.08			
	Total	250	2.23	2.58			
DMFT	Male	105	6.77	5.50	0.261	248	n.s
	Female	145	6.94	4.56			
	Total	250	6.87	4.97			
DMFT index	Male	105	21.16	17.18	0.261	248	n.s
	Female	145	21.68	14.25			
	Total	250	21.46	15.52			

* Independent Samples t Test.

Table 6. The difference between the number of extracted teeth and the DMF index according to socio-economic status.

Variables	SES	N	Mean	SD	F-value	df_1/df_2	P*
DMFT	Low	58	8.09	5.56	2.548	2/247	n.s
	Middle	139	6.65	4.93			
	High	53	6.09	4.15			
	Total	250	6.87	4.97			
DMFT index	Low	58	25.27	17.39	2.548	2/247	n.s
	Middle	139	20.80	15.41			
	High	53	19.04	12.96			
	Total	250	21.46	15.52			

One –Way ANOVA Test.

The status of teeth expressed by their number per person does not differ statistically significantly even by categories of socio-economic status. Therefore, Table 5 lists the test results for the DMFT index only. The number of DMFT teeth on average by almost two teeth is higher in subjects with low socioeconomic status than those with higher status, but this difference can be accepted only with an error of 8%.

The performed dental treatment of the subjects is statistically significantly reflected in the number of healthy, carious, extracted, filled teeth per person and in the DMFT index. In the case of the number of healthy teeth per person there is a significant decrease in the categories of treatment in the order of prophylaxis – restorative – endodontics and extraction, while in other categories of teeth per person, there is a significant increase as in the case of DMFT index, except for (Table 7).

Table 7. The difference between the number of healthy, carious, extracted, filled, missing teeth per person and the DMF index according to the treatment.

Tooth number	Treatment	N	Mean	SD	F-value	df_1/df_2	p*
Healthy	Prophylaxis	74	25.03	3.25	28.494	2/247	<0.001
	Restauration	135	21.21	4.29			
	Endodontic and extraction	41	19.88	4.60			
	Total	250	22.12	4.49			
Caries	Treatment	74	0.57	1.25	33.397	2/247	<0.001
	Prophylaxis	135	2.61	2.36			

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	Restauration	41	4.00	3.32			
	Endodontic and extraction	250	2.23	2.58			
Extracted	Treatment	74	0.18	0.69	4.159	2/247	0.017
	Prophylaxis	135	0.41	0.99			
	Restauration	41	0.71	1.23			
	Endodontic and extraction	250	0.39	0.97			
Filling	Treatment	74	2.88	2.78	8.051	2/247	<0.001
	Prophylaxis	135	4.81	3.73			
	Restauration	41	4.85	3.80			
	Endodontic and extraction	250	4.24	3.59			
DMFT	Treatment	74	3.62	3.29	30.060	2/247	<0.001
	Prophylaxis	135	7.83	4.60			
	Restauration	41	9.56	5.72			
	Total	250	6.87	4.97			
DMFT index	Treatment	74	11.32	10.29	30.060	2/247	<0.001
	Prophylaxis	135	24.47	14.38			
	Restauration	41	29.88	17.88			
	Endodontic and extraction	250	21.46	15.52			

* One –Way ANOVA Test.

3.2. The quality of life

Reliability and internal consistency of the OHIP-14 questionnaire is satisfactory because the corresponding Cronbach's α coefficient of 0.878 is well above the minimum required 0.7. The internal agreement of the questionnaire was checked by Cronbach's α coefficients and in the case when individual particles were omitted, it resulted in almost the same Cronbach's α coefficients as the complete questionnaire. As can be seen from the results listed in Table 8, the averages of OHIP-14 scores do not differ statistically significantly by SES categories. However, in the case of sex, statistically significantly higher values were observed in the subjects (P = 0.049), and in the case of treatment, statistically significant growth (P <0.001) in the direction of the categories of prophylaxis, restorative, endodontics and extraction. The Welch test confirms the results of OHIP-14 by sex and treatment, but cancels out the significance of differences with an error of 8% for the impact of SES.

Table 8. Differences in OHIP by gender, SES and treatment.

Gender	N	Mean	SD	t-value	df	P*
Male	105	8.81	8.11	-1.979	248	0.049
Female	145	10.97	8.77			
Total	250	10.06	8.55			
SES	N	Mean	SD	F-value	df_1/df_2	P**
Low	58	12.67	10.81	3.656	2/247	0.027
Middle	139	9.14	7.21			
High	53	9.60	8.59			
Total	250	10.06	8.55			
Treatment	N	Mean	SD	F-value	df_1/df_2	P**
Prophylaxis	74	7.53	6.74	22.491	2/247	<0.001
Restauration	135	9.21	7.91			

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Endo. and ex.	41	17.44	10.21
Total	250	10.06	8.55

* Independent Samples t Test ** One –Way ANOVA Test.

The age of the respondents is expected to be statistically significantly correlated with the DMFT index and with OHIP-14. The DMFT index and OHIP-14 are also, similarly to the age of the respondents, in a significant positive correlation. Because the correlation is positive DMFT increases significantly with the age of the subjects. In subjects aged 14 to 20 years, the average DMFT was 5.19 teeth (SD = 3.71). In subjects aged 21 to 25 years, the average DMFT was 8.90 teeth (SD = 5.52). The difference is statistically significant: t = -6.328, df = 248, p <0.001. According to the regression analysis, in male the DMFT increases by 0.782 with each year of life, and in female it goes somewhat slower, 0.496.

4. Discussion

Authors should discuss the results and how they can be interpreted from the perspective of previous studies and of the working hypotheses. The findings and their implications should be discussed in the broadest context possible. Future research directions may also be highlighted. Oral health was assessed by examining all patients with a dental mirror and probe and by determining the DMFT index. The results show that the distribution of treatments when visiting the dentist does not differ by gender: prophylaxis (31.4% male, 28.3% female), restorative: (52.4% male, 55.2% female) and endodontics / extraction: (16.2% male, 16.6% female). This fact may suggest that dental services in our country are focused on treatment, not on dental caries prevention. DMFT status of respondents is (6.87 ± 4.9), and no statistically significant difference was found between genders. Males have more carious teeth (2.75 ± 3.07) compared to females (1.85 ± 2.08).

A 2014 study in a similar age group (16–25) in Mexico shows a lower DMFT index (4.24 ± 3.85). In contrast to our results, here the females showed a greater propensity for caries, while the components of the extracted tooth and the filled one were equal in both sexes [23]. In 2022 study in Kosovo, 15-year-olds show decay teeth component higher among boys, while filling and missing teeth were approximately the same among the ganders [24].

The 2018 study on adolescents (15–24 years) in Uruguay shows a significantly lower DMFT index than the index obtained in this study (3.60 ± 1.36) [25]. Post adolescents (18–25 years) in Russia (Drachev et al., 2017) show a slightly higher DMFT index (7.58 ± 0.61) than our study. Socio-economic status was not statistically significant [26]. Results obtained in this study show that the DMFT in young people between the ages of 21 and 25 is higher by as much as 3.71 out of those between the ages of 14 and 20, which is a great indicator of how rapidly DMFT grows with age. In agreement with the other findings, the DMFT index in the present study increased with age, as dental caries is an irreversible, accumulative disease.

From Table 8 we can see that DMFT and OHIP-14 positively correlate with age, as well as with each other as expected. Based on the obtained results, we can conclude that oral health affects the subjective perception of quality of life depending on oral health. Similar results were obtained by Garcia-Cortes et al, 2014, where they proved that the number of filled teeth is proportional to age [23]. Both Drachev et al. from 2017 confirm that DMFT correlates with age. Respondents between the ages of 21-25 had a 1.09 higher DMFT than those between the ages of 18-20, and females also had a higher DMFT [26].

Respondents in Uruguay (Goettems, 2018) of poorer socio-economic status and poorer education showed poorer DMFT, and a higher number of tooth decay similar to our results listed in Table 4 [25].

The results of OHIP-14 scores correlate positively with the complexity of the treatment required. Subjects who underwent a prophylactic procedure such as descaling or polishing had the lowest OHIP-14 score (7.53 ± 6.74). Patients who required restorative treatment, which was the majority, had a slightly higher average OHIP-14 value (9.21 ± 7.91). The respondents who had the most demanding

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treatments had the worst scores. This group includes those who needed dental treatment - endodontics or tooth extraction. Their average OHIP-14 is (17.44 ± 10.21). Patients receiving more demanding treatment in addition to OHIP-14 show worse results in DMFT.

The Hong Kong results show that the impact of oral health on quality of life is low in 18-year-olds. Their results also show a very low DMFT index (1.4), which explains this result [27]. Oscarson, in a 2007 study, states that young people in Sweden score very well on quality of life and oral health. The results of the OHIP-14 study show little difference between the high caries risk group (OHIP-14 3.7±52) and the low caries risk group (OHIP-14, 2.2±3.3) [28].

The results of Papaioannou et al. (2011), showed significantly lower OHIP-14 scores (1.24 ± 2.04) in the adolescent population (15-18 years), with no difference between genders [29]. Although their age range was lower than ours, we can conclude that the research results are even significantly worse among respondents in the adolescent population in the Republic of Croatia, where the DMFT of individuals aged 14 - 18 years was found to be 5.19 ± 3.71. Colussi et al. (2017) showed OHIP-14 scores showed OHIP-14 scores of 7.25 ± 6.78 among respondents in Brazil (15-19 years) [12]. Although the results are worse than of Papaioannou's, they are still better than the average results of our adolescents and post adolescents (10.06 ± 8.55).

The findings of this study reveal interesting gender differences in oral health outcomes. While males exhibited a higher prevalence of tooth decay, the quality of life related to oral health, as measured by OHIP-14 scores, was worse among females. This discrepancy could be attributed to cultural factors, where women may be more critical of their appearance and more sensitive to oral health issues. However, it contrasts with some prior studies, such as those by Sun et al. (2018), which found that females had more tooth decay but did not differ in quality-of-life outcomes by gender [8]. These findings underscore the need for gender-specific public health strategies that address both the clinical and psychosocial aspects of oral health.

The study highlights a strong correlation between oral health status and quality of life, with more severe dental conditions leading to higher OHIP-14 scores, indicating a lower quality of life. This relationship is evident across various studies, including those by Oscarson (2007) and Colussi et al. (2017), although the severity of impact differs [12, 28]. The results suggest that more complex dental treatments, such as endodontics and extractions, are associated with worse quality of life outcomes. This emphasizes the importance of early preventive measures to avoid the progression of dental diseases to a stage requiring invasive procedures. Dental care policies should focus on enhancing preventive services to maintain better overall health and quality of life.

In turn, OH status can be influenced by many personal, local and social factors. Significant differences were also found in oral status between urban and rural areas. The average DMFT index among adolescents and youth in the Republic of Croatia is (6.87 ± 4.97), while it is lower among respondents of the same or similar age group in Hong Kong (1.92 ± 2.37), Mexico (4.24 ± 3.85), Uruguay (3.6 ± 1.36) and in Kosovo (3.21±2.19) [9, 25, 26, 24]. However, respondents of similar age (18-25 years) in north-western Russia show slightly worse results than we do. Namely, their average DMFT is 7.58 ± 0.61 [26]. The OHIP-14 results among adolescents and young people in the Republic of Croatia (10.06 ± 8.55) show worse results than among respondents of this age in the world and in Europe.

Differences in oral health outcomes compared to other countries can be explained by several factors, including cultural practices, variations in healthcare systems, and socioeconomic conditions. Understanding these factors is essential for interpreting the results and tailoring public health interventions to effectively address oral health disparities in different contexts [9, 18].

Cultural Differences: Cultural norms and practices related to diet, oral hygiene, and attitudes toward dental care can significantly impact oral health outcomes. In some cultures, diets high in sugar and carbohydrates, or traditional practices that may not prioritize oral hygiene, could contribute to higher rates of tooth decay and poor DMFT scores. Additionally, cultural attitudes towards dental visits—such as viewing them as unnecessary unless there's a problem—can result in less frequent preventive care, leading to worse oral health outcomes. These cultural differences could explain why

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the results from this study differ from those in countries where oral health is more strongly emphasized in daily life [2, 3].

Healthcare Systems and the structure and accessibility of healthcare systems play a crucial role in determining oral health outcomes. In countries with universal healthcare that includes comprehensive dental coverage, individuals are more likely to access regular dental care, leading to better overall oral health. Conversely, in countries where dental care is not as easily accessible or affordable, individuals from lower socioeconomic backgrounds may have limited access to preventive services, resulting in poorer outcomes. Discrepancies in oral health outcomes observed in this study compared to others may stem from differences in how dental care is financed and provided in the respective countries [1, 11].

Socioeconomic disparities are a key determinant of oral health, as highlighted by this study. Countries with significant income inequality may see more pronounced differences in oral health outcomes between socioeconomic groups. In contrast, countries with more equitable distribution of wealth and better social safety nets might exhibit smaller disparities. These socioeconomic factors, coupled with access to education and resources, can greatly influence the effectiveness of oral health interventions and the overall health of the population. The observed patterns in this study may differ from previous studies conducted in countries with different levels of income inequality or social support systems [8, 26, 30].

The discrepancies between the findings of this study and those from other countries could also be attributed to methodological differences in study design, data collection, and population sampling. Variations in the age groups studied, the criteria used to assess oral health, and the timing of the studies could lead to differing results. Additionally, the specific public health initiatives and policies in place at the time of the studies could influence the outcomes, making it crucial to consider the local context when comparing results [31].

Socioeconomic status plays a crucial role in determining oral health outcomes. This study found that individuals from lower socioeconomic backgrounds exhibited poorer DMFT scores and higher levels of tooth decay, consistent with global findings. For example, Goettems (2018) observed similar trends in Uruguay, where poorer education and socioeconomic status were linked to worse oral health outcomes. These patterns underscore the significant impact of socioeconomic disparities on access to preventive care and treatment, leading to poorer oral health. Public health interventions must prioritize reducing these disparities by improving access to affordable dental care and education for lower-income populations [26, 30]. Chaffee et al. discovered that subjective quality-of-life measures can vary depending on social contexts, which may impact service utilization, the assessment of oral health interventions, and the measurement of disease morbidity in low-SES populations [32].

The findings of this study have significant implications for oral health policy, public health interventions, and clinical practice. The strong association between lower socioeconomic status and poorer oral health outcomes, as evidenced by higher DMFT scores and increased levels of tooth decay, highlights the urgent need for targeted and equitable strategies to address these disparities [12].

For Oral Health Policy: Policymakers should prioritize the development and implementation of policies that focus on reducing socioeconomic disparities in oral health. This could include increasing funding for public dental health programs, subsidizing preventive dental care, and ensuring that all communities, particularly those in lower socioeconomic brackets, have access to affordable and high-quality dental services. Moreover, policies should emphasize the integration of oral health education into school curriculums, especially in underserved areas, to promote early and consistent oral hygiene practices [1, 3].

For Public Health Interventions: Public health initiatives must aim to improve access to preventive dental care and education for lower-income populations. Targeted prevention programs, such as community-based oral health screenings and mobile dental clinics, can help reach underserved communities. Educational campaigns that raise awareness about the importance of oral health and its connection to overall health should be tailored to address the specific needs of lower

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socioeconomic groups. These campaigns can be delivered through schools, community centre, and digital platforms to maximize reach and impact [8, 26].

For Clinical Practice: Healthcare professionals should be aware of the socioeconomic factors that influence oral health outcomes and tailor their clinical practices accordingly. This includes taking a proactive approach to preventive care, such as offering more frequent check-ups and personalized oral health advice to patients from disadvantaged backgrounds. Dentists and oral health practitioners should also advocate for their patients by connecting them with resources that can improve access to affordable care, such as sliding scale payment options or government assistance programs [6, 11].

However, it is important to acknowledge the limitations of this study. Its cross-sectional design limits the ability to infer causality, and potential biases, such as self-reported data and selection bias, may influence the results. Despite these limitations, the study's findings contribute valuable insights into the relationship between socioeconomic status and oral health, reinforcing the need for targeted public health interventions.

Future research should focus on conducting longitudinal studies to better understand the causal relationships between socioeconomic factors and oral health outcomes. Additionally, exploring the effectiveness of specific interventions aimed at improving access to affordable dental care and education for lower-income populations will be crucial in addressing these disparities and improving overall oral health.

5. Conclusions

The research reveals that young people and adolescents in the Republic of Croatia experience worse DMFT scores and OHIP-14 scores compared to their global peers, indicating poorer oral health and a diminished quality of life. These issues are particularly acute among lower socioeconomic status groups, where poor hygiene practices are often overlooked. This highlights the urgent need for targeted preventive measures and oral health education, particularly for vulnerable adolescents.

To address these challenges, several key recommendations are proposed:

- Policymakers should implement nationwide oral health education programs in schools, focusing on preventive care and the long-term consequences of poor oral hygiene.

- Healthcare Professionals should prioritize early intervention and routine check-ups for young people, particularly those from disadvantaged backgrounds, to prevent the escalation of dental issues.

- Educators should incorporate oral health education into the broader school curriculum, fostering daily hygiene practices and stressing the importance of regular dental visits.

Moreover, oral health promotion should be integrated into broader health promotion initiatives, addressing the underlying social and economic determinants of health. Effective collaboration across sectors - education, healthcare, and public policy - is essential to reducing oral health disparities and improving outcomes for all young people.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, X.X. and Y.Y.; methodology, X.X.; software, X.X.; validation, X.X., Y.Y. and Z.Z.; formal analysis, X.X.; investigation, X.X.; resources, X.X.; data curation, X.X.; writing—original draft preparation, X.X.; writing—review and editing, X.X.; visualization, X.X.; supervision, X.X.; project administration, X.X.; funding acquisition, Y.Y. All authors have read and agreed to the published version of the manuscript." Please turn to the CRediT taxonomy for the term explanation. Authorship must be limited to those who have contributed substantially to the work reported.

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