UiT
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Faculty of Health Sciences
Department of Community Medicine

Oral health in Russian young adults

A study on determinants of dental health, dental anxiety, and oral health-related quality of life in medical and dental students in North-West Russia

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Sergei N. Drachev

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Preface

I am a dentist, and in 2002 I graduated with honours from the Northern State Medical University (NSMU), Arkhangelsk, North-West Russia. After graduating from the Dental Faculty, I completed an internship in dentistry, then a clinical residency at the Prosthodontics Department of the NSMU. I was interested in research, and in 2005 I enrolled in postgraduate courses at the NSMU. In 2008, I defended my Russian candidate thesis at Tver State Medical Academy, Tver, Russia, and received the Russian scientific degree of Candidate of Medical Sciences. Although I defended my thesis successfully, I wanted to increase my knowledge of scientific methodology in order to plan and conduct my own study, and analyse its results using international standards. For this reason, in 2010 I enrolled in the Master of Public Health (MPH) programme at the International School of Public Health in Arkhangelsk (ISPHA). This school was established as a result of a cooperation between the NSMU, the University of Tromsø (now UiT The Arctic University of Norway), and several other universities of Norway, Sweden, and Finland. Combining my education at the ISPHA and work as an Associate Professor in the Prosthodontics Department, I defended my MPH thesis in 2012. The knowledge I obtained in epidemiology and biostatistics during my MPH training changed my life. Although I was involved in both clinical dental practice and teaching, I was interested in research and wanted to continue my education in this field. In 2015-2016, I was the recipient of a PhD position at UiT within the joint Arkhangelsk-Tromsø PhD Programme. While in this programme, I decided to focus on oral health in Russian young adults, as they represent an insufficiently studied age group in this regard. I planned the study described in this thesis in collaboration with my PhD supervisors, and I collected data from medical and dental students of the NSMU during the 2015-2016 academic year. I consider this small study a significant point in my education and an important step in my scientific career.

Tromsø, November 2018 Sergei N. Drachev (SND)

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Summary (in English)

Background: Dental caries and periodontal diseases are the most common oral diseases, affecting millions of people worldwide. These diseases are highly preventable; therefore any measures that promote oral health (OH) should be implemented at the community and individual level. Although programmes designed to prevent OH problems often focus on children, young adults aged 18-25 years are also an important target group for such programmes. Indeed, this age range comprises periods of biological, psychological, and social development and is a transition between adolescence and adulthood, when persons take responsibility for their health and may still change their health behaviour. Studying factors which may influence OH is extremely important to develop effective preventive programmes for young adults. In Russia, there is little information on OH and factors associated with OH in young adults. Thus, we conducted a study in a group of young medical and dental undergraduate students in North-West Russia.

Objective: The study aimed to: i) investigate dental caries experience and determinants (socio-demographic factors, socioeconomic factors, and OH behaviour); ii) assess the prevalence of dental anxiety (DA) and to explore the association between DA and socio-demographic factors, socioeconomic factors, OH behaviour, general health, and OH; and iii) investigate how socio-demographic factors, socioeconomic factors, OH behaviour, self-reported OH characteristics, and clinically-assessed OH are related to OH-related quality of life (OHRQoL).

Methods: This cross-sectional study included 474 medical and 333 dental undergraduate students of Russian nationality aged 18-25 years from the Northern State Medical University (NSMU), Arkhangelsk, North-West Russia. Information on socio-demographic factors, socioeconomic factors, OH behaviour, general health, and OH was obtained from a

structured, self-administered questionnaire. Corah's Dental Anxiety Scale (DAS) was applied to measure DA. OHRQoL was measured by the short version of the OH Impact Profile with 14 items. A clinical dental examination was performed to assess dental caries experience, Simplified Oral Hygiene Index, and Gingival Index. Dental caries experience was based on the decayed (D) missing (M) filled (F) teeth (T) index (DMFT index).

Results: The prevalence of dental caries (DMFT >0) was 96.0%, overall mean DMFT index was 7.58 (DT 0.61, MT 0.12, and FT 6.84). Older age, being a female, high subjective socioeconomic status, and skipping tooth-brushing were associated with a higher DMFT index. DMFT index also increased among students who reported regular dental visits, and these students also had lower odds of being in the dental caries-free group. High DA (DAS score ≥13) was found in 13.7% and 2.2% of medical and dental students, respectively. Female sex, lower mother's education, and poor self-assessed OH were associated with DA in medical students. Corresponding factors in dental students were female sex, irregular dental visits, infrequent tooth-brushing, pain in mouth, and number of missing teeth due to dental caries. More than half of the students (53.6%) reported low OHRQoL during the last 12 months. Female sex, rural place of childhood residence, poor self-assessed dental aesthetic, dissatisfaction with mouth and teeth, and a higher DMFT index, were all significantly, independently associated with low OHRQoL.

Conclusions: High prevalence of dental caries and high DMFT index, with a dominance of FT, were found among our Russian medical and dental undergraduate students. The level of DA was higher in medical than in dental students. The study also showed that OH affects students' quality of life. Public health measures should focus on promoting dental literacy, increasing knowledge on the prevention of dental diseases, and motivating good OH habits to improve OH and OHRQoL in young adults in North-West Russia.

Summary (in Russian)

Введение. Кариес и заболевания пародонта являются наиболее распространенными заболеваниями полости рта, которые поражают миллионы людей во всем мире. Эти заболевания легко поддаются профилактике, поэтому профилактические меры по укреплению здоровья полости рта должны осуществляться на общественном и индивидуальном уровнях. Хотя программы по укреплению стоматологического здоровья часто ориентированы на детей, молодые люди в возрасте 18-25 лет также являются важной целевой группой для таких программ. Действительно, этот возраст охватывает периоды биологического, психологического и социального развития личности и представляет собой переходный период между подростковым и взрослым возрастом, когда молодые люди сами становятся ответственными за свое здоровье и могут изменить свое собственное поведение в отношении здоровья. Изучение факторов, которые могут влиять на здоровье полости рта чрезвычайно важно для разработки эффективных профилактических программ для молодых людей. В России представлено мало информации о стоматологическом здоровье молодежи и факторах, связанных с ним. Поэтому мы провели исследование в группе молодых студентов-медиков и студентов-стоматологов, обучающихся в одном из университетов на Северо-Западе России.

Цели исследования. Были сформулированы следующие цели: i) исследовать интенсивность и распространенность кариеса и его детерминанты (социально-демографические, социально-экономические и поведенческие факторы); ii) оценить распространенность стоматологической тревожности и изучить ее взаимосвязь с социально-демографическими и социально-экономическими факторами; поведенческими факторами, имеющими отношение к стоматологическому здоровью; состоянием общего здоровья и стоматологического здоровья; iii) исследовать, каким

образом социально-демографические и социально-экономические факторы; поведение, связанное со стоматологическим здоровьем; а также показатели стоматологического здоровья, оцененные с помощью опросника и клинического стоматологического обследования, взамосвязаны с качеством жизни, имеющим отношение к здоровью полости рта.

Методы. В поперечном исследовании приняли участие 474 студента-медика и 333 студента-стоматолога в возрасте 18-25 лет, русские по национальности, обучающиеся в Северном государственном медицинском университете, город Архангельск, Северо-Запад России. Информация о социально-демографических и социально-экономических факторах; поведенческих факторах, имеющих отношение к стоматологическому здоровью; состоянии общего здоровья и стоматологического здоровья была получена из структурированного опросника, который заполняли участники исследования. Для оценки стоматологической тревожности была применена шкала стоматологической тревожности Corah (1969). Качество жизни, связанное со здоровьем полости рта, было оценено с помощью опросника OHIP-14 (1997). Было проведено клиническое стоматологическое обследование для оценки кариеса зубов, индекса упрощенной гигиены полости рта Green и Vermillion (1964) и десневого индекса Loe и Silness (1963). Кариес оценивался на основании индекса КПУ зубов (К-кариозные, П-пломбированные, У-удаленные зубы).

Результаты. Распространенность кариеса (КПУ >0) была 96.0% со средним показателем КПУ 7.58 (К 0.61, П 6.84, и У 0.12). Старший возраст, женский пол, высокий субъективный социально-экономический статус и пропуск чистки зубов были взаимосвязаны с более высоким показателем КПУ. Индекс КПУ был выше среди тех студентов, кто посещал стоматолога регулярно, при этом шансы иметь

КПУ=0 у данной группы студентов уменьшались. Высокая стоматологическая тревожность (оценка по шкале Corah ≥13) отмечалась у 13.7% студентов-медиков и 2.2% студентов-стоматологов. Женский пол, более низкое образование матери, плохая самооценка своего стоматологического здоровья были связаны со стоматологической тревожностью студентов-медиков. У студентов-стоматологов соответствующие факторы включали женский пол, нерегулярное посещение стоматолога, нечастую чистку зубов, боль во рту, и количество удаленных вследствие кариеса зубов. Более половины студентов (53.6%) отметили низкое качество жизни, связанное со здоровьем полости рта, за последние 12 месяцев. Женский пол, проживание в детстве в сельской местности, плохая самооценка стоматологической эстетики, неудовлетворенность полостью рта и зубами, а также более высокий индекс КПУ - все эти факторы были статистически значимо и независимо связаны с низким качеством жизни, имеющим отношение к здоровью полости рта.

Выводы. Высокая распространенность и интенсивность кариеса по индексу КПУ с доминированием пломбированных зубов были обнаружены у русских студентов-медиков и студентов-стоматологов. Уровень стоматологической тревожности был выше у студентов-медиков, чем у студентов-стоматологов. Исследование показало, что здоровье полости рта влияет на качество жизни студентов. Чтобы улучшить стоматологическое здоровье и качество жизни, связанное с ним, у молодых людей на Северо-Западе России, меры общественного здравоохранения должны быть направлены на повышение стоматологической грамотности, расширение знаний о профилактике стоматологических заболеваний и мотивацию к поддержанию гигиены полости рта.

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List of abbreviations

CI: confidence interval

DA: dental anxiety

DAS: dental anxiety scale

DMFT index: decayed missing filled teeth index

DT: decayed teeth

FT: filled teeth

GI: Gingival Index

IRR: incidence rate ratio

ISPHA: International School of Public Health in Arkhangelsk

MDAS: modified dental anxiety scale

MPH: Master of Public Health

MCAR: missing completely at random

MT: missing teeth

NSMU: Northern State Medical University

OH: oral health

OHI-S: Simplified Oral Hygiene Index

OHIP-14: Oral Health Impact Profile with 14 items

OHRQoL: oral health-related quality of life

OR: odds ratio

SD: standard deviation

SES: socioeconomic status

SiC index: Significant Caries index

SND: Sergei Nikolaevich Drachev

WHO: World Health Organisation

List of papers

This thesis is based on the following original papers, to which we hereafter refer by their Roman numerals (I-III).

Paper I

Drachev SN, Brenn T, Trovik TA. Dental caries experience and determinants in young adults of the Northern State Medical University, Arkhangelsk, North-West Russia: a cross-sectional study. BMC Oral Health. 2017;17(1):136.[1]

Paper II

Drachev SN, Brenn T, Trovik TA. Prevalence of and factors associated with dental anxiety among medical and dental students of the Northern State Medical University, Arkhangelsk, North-West Russia. Int J Circumpolar Health. 2018;77(1):1454786.[2]

Paper III

Drachev SN, Brenn T, Trovik TA. Oral health-related quality of life in young adults: A survey of Russian undergraduate students. Int J Environ Res Public Health. 2018;15(4):719.[3]

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Chapter 1. Introduction

1.1. Global burden of oral conditions

Oral diseases remain a major public health challenge worldwide. In 1990, nearly half of the world population (age-standardised prevalence: 48.4%) suffered disabilities due to oral conditions, such as untreated dental caries, severe periodontitis, and total tooth loss [1]. In 2015, the global age-standardised prevalence of oral conditions remained static (48.0%), but the number of people with oral conditions increased by 40% between 1990 and 2015 due to demographic changes, including population growth and aging [1]. Untreated dental caries in permanent teeth is the most prevalent oral disease, affecting 1.7, 2.4, and 2.5 billion people worldwide in 1990, 2010, and 2015, respectively [1, 2].

There are considerable variations in the prevalence and incidence of untreated dental caries between regions and countries. In 2010, the age-standardised prevalence and incidence of untreated dental caries in permanent teeth in individuals aged 5 years or older varied from 12.2% in Singapore to 68.0% in Lithuania, and from 9945 cases per 100,000 person-years in Nigeria to 76,472 cases per 100,000 person-years in Iceland, respectively [2]. In Russia, the corresponding figures were 42.6% and 35,178 cases per 100,000 person-years [2]. Dental caries is a chronic disease that can cause considerable economic and quality of life burdens [3]. Globally, the total cost of dental diseases was estimated at $544.41 billion in 2015 [4]. Nonetheless, if dental caries is left untreated, it may cause severe dental pain and tooth loss [5], leading to functional, social, and psychological problems. Nevertheless, dental caries is a highly preventable disease [3] that has essential implications for oral health (OH) policy, which should focus on the prevention of oral diseases.

1.2. Young adulthood as an important age group in which to study oral health

A systematic review published in 2015 showed that the burden of untreated dental caries is shifting from children to adults, with peaks in prevalence at ages 6, 25, and 70 years [2]. Researchers hypothesise that the peak prevalence at age 25 years may be explained by insufficient OH promotion activities in young adults [2]. Indeed, according to the World Health Organisation (WHO), children aged 6, 12, and 15 years are key groups that need to be monitored for dental caries and periodontal disease. Nevertheless, promoting OH in schoolchildren may not have lasting effects into adulthood, and cannot guarantee lifetime low levels of oral disease. Between the ages of 18-25 years, young adults go through periods of biological, psychological, and social development and transition from adolescence to adulthood, when they take responsibility for their health and may still change their own health behaviour [6]. Therefore, studying the socio-behavioural factors which may influence OH is extremely important to develop effective preventive programmes for young adults.

1.2.1. Dental health in young adult populations: epidemiological findings

The DMFT index reflects the sum of decayed (D), missing (M), and filled (F) teeth (T) and is one of the most commonly used tools to assess dental health and quantify dental caries experience [7]. Epidemiological studies on dental health in young adults have been conducted in many countries (Table 1) and showed a wide variation in DMFT index and prevalence of dental caries (DMFT index >0): from 1.4 [8] to 7.6 [9] and from 59.0% [8] to 93.9% [9], respectively. Within the structure of DMFT index, DT constituted from 21.4% [8] to 44.5% [10]; MT from 0.4% [11] to 12.3% [12]; and FT from 47.4% [12] to 78.6% [8].

Previously reported risk factors associated with dental health in young adults include socioeconomic factors (income, education, occupation) [10, 12-17], socio-demographic factors (age, sex, place of residence) [10, 16-19], OH behaviour and attitudes [8, 11, 14, 15, 18, 20], and exposure to fluoridated drinking water [10, 13, 16].

Table 1. Overview of dental studies in young adults

Country, year, [reference]	Participants, age, sample size	Results			
		Prevalence of dental caries (DMFT index >0)	Mean DMFT index	Structure of DMFT index	Main findings
Hungary, 2001, [9]	Adolescents, 18 years, n=710	93.9%	7.64	no data	High prevalence of dental caries, high DMFT index, and poor periodontal status.
Australia, 2003, [13]	Army recruits, 17-35 years, n=499	84.8% in overall sample; 81.0% in age group of 17-20 years	17-20 years – 3.59; 21-25 years – 4.63	17-20 years: DT 1.43 (39.8%) MT 0.07 (1.9%) FT 2.09 (58.2%) 21-25 years: DT 1.69 (36.5%) MT 0.21 (4.5%) FT 2.72 (58.7%)	Dental caries experience was lower in persons from the highest socioeconomic group. Subjects with lifetime exposure to fluoridated water had a lower DMFT index.
Israel, 2004, [11]	Army recruits, 18-19 years, n=123	87.0%	6.77	DT 2.68 (39.6%) MT 0.03 (0.4%) FT 4.05 (59.8%)	Participants with low levels of dental caries had more positive OH attitudes and behaviour.
Brazil, 2005, [12]	Male conscripts, 18 years, n=473	88.6%	5.7	DT 2.3 (40.4%) MT 0.7 (12.3%) FT 2.7 (47.4%)	Lower socioeconomic indicators were associated with high dental caries status. Mother's education could be a good predictor for dental caries.
Australia, 2005, [10]	Army recruits, 17-51 years, n=973	67.2% in age group of 17-20 years; 73.5%	17-20 years – 2.43; 21-25 years – 3.44	17-20 years: DT 0.95 (39.1%) MT 0.03 (1.2%) FT 1.45 (59.7%) 21-25 years: DT 1.53 (44.5%) MT 0.07 (2.0%)	A decline in the prevalence of dental caries and dental caries experience was observed between 1996 and 2002-2003. Age, level of education, and lifetime exposure to fluoridated drinking water had a significant effect on dental caries experience.

		in age group of 21-25 years		FT 1.84 (53.5%)	
Australia, 2008, [14]	Young adults, 20-25 years, n=644	79.4%	3.68	data presented for DMFS index: DS 0.92 MS 1.03 FS 4.10	Socioeconomic factors, patterns of dental visits, and health behaviours were risk indicators for dental caries.
Turkey, 2008, [19]	Patients attending a dental school, 18-25 years, n=416	no data	5.7 in females, 5.8 in males	no data	Plaque accumulation, age, and sex were the significant variables related to DMFT index.
Mexico, 2009, [21]	Adolescents and young adults, 16-25 years, n=1027	74.4%	4.04	DT 1.01 (25.0%) MT 0.46 (11.4%) FT 2.57 (63.6%)	High prevalence of dental caries and dental caries experience were found. Restorative experience was high compared to other studies conducted in Latin America.
Australia, 2010, [15]	Follow-up of a cohort, 17-34 years, n=925	68.2% in age group of 17-25 years	no data	no data	Dental caries and dental treatment experience were associated with dental visits and socioeconomic factors.
Finland, 2013, [16]	Male conscripts, 19-21 years, n=13,564	78.7%	4.11	DT 1.4 (34.1%) MT no data FT no data	There were regional/geographical differences in the prevalence of dental caries. Dental caries protective factors were Swedish as the main language (indicating higher SES), high fluoride content in water, and living in urban areas (indicating higher educational status). There was no association between dentist density and the prevalence of dental caries.

Japan, 2013, [6]	University students, 18-19 years, n=2087	no data	2.1 in males, 2.6 in females	no data	Self-rated OH was influenced by subjective symptoms of temporomandibular disorders and stomatitis, OH behaviour, DMFT index, and malocclusion.
China, 2013, [8]	Hong Kong young adults, 18 years, n=324	59%	1.4	DT 0.3 (21.4%) MT <0.1 (<7.1%) FT 1.1 (78.6%)	A higher DMFT index was associated with utilisation of dental services during past 3 years. Tooth-brushing frequency and OH knowledge were associated with the number of sextants with healthy gums.
Lithuania, 2016, [17]	Adolescents attending school, 18 years, n=1063	78.3%	2.93	DT 0.79 (27.0%) MT 0.15 (5.1%) FT 1.99 (67.9%)	There were differences in dental caries experience between urban and rural areas and between counties, which could be explained by the socioeconomic differences in the country.

Abbreviations: DMFT index, decayed missing filled teeth index; DT, decayed teeth; MT, missing teeth; FT, filled teeth; DMFS index, decayed missing filled surface index; DS, decayed surface; MS, missing surface; FS, filled surface; SES, socioeconomic status.

1.2.2. Dental health in Russian young populations

In 2001, an epidemiological survey from the Arkhangelsk Region of North-West Russia investigated the dental health of 447 conscripts aged 18-19 years and reported a prevalence of dental caries of 94.3% and a mean DMFT index of 5.9 [22]. In the structure of DMFT index, DT, MT, and FT accounted for 45.8%, 8.5%, and 45.8%, respectively. The authors also reported low fluoride, calcium, and magnesium content in the drinking water of most areas of the Arkhangelsk Region. In 2009, a study of 432 students aged 16-25 years was conducted in Moscow [23], which reported a prevalence of dental caries of 97.1% and 99.3% in age groups 16-20 years and 21-25 years, respectively. The overall mean DMFT index was 10.4 (DT 5.7, MT 0.8, FT 3.9), with DT accounting for 54.8% of dental caries experience. A high DMFT index (8.9) was also found in Russian young adults aged 24 years who attended dental treatment at a dental school and a private clinic in Moscow [24].

Thus, epidemiological studies conducted in Russian young adults have shown a high prevalence of dental caries and high DMFT index with high need for dental treatment. These studies presented dental status in a descriptive manner, and despite the poor dental health observed, no determinants were studied. Nevertheless, the high number of teeth with untreated dental caries may reflect a low availability of dental treatment or an unwillingness of the part of Russian young people to seek dental care, for instance, due to dental anxiety (DA).

1.3. Dental anxiety and dental health

DA remains an important problem in clinical dentistry, despite increased awareness among dentists and patients of preventive approaches to oral diseases, and innovations in dental equipment and pain reduction [25]. In studies, DA, which is frequently used interchangeably with the term “dental fear”, is described as “strong negative feelings associated with dental treatment” [25, 26]. Several psychometric tests have been developed

to differentiate people with and without DA. Along with single-item questions, Corah's Dental Anxiety Scale (DAS) [27], the Modified Dental Anxiety Scale (MDAS) [28], and Kleinknecht's Dental Fear Survey [29] are the most commonly used tools in epidemiological studies to measure DA in adults [30, 31], although none of the existing instruments are regarded as a gold standard [30]. The prevalence of high DA varies from 2% to 30% worldwide, depending on the study population and the methods applied to measure DA [25, 32]. There is strong evidence that DA is associated with frequency of dental visits: it has been reported that individuals with higher DA tend to visit the dentist irregularly [33-36], which in turn may lead to a deterioration in OH. Studies have demonstrated that DA is associated with poor self-reported and clinically-assigned OH [33, 34, 37-40], more DT and MT [36, 38], fewer FT [36, 41], and worse periodontal health [40, 42]. Moreover, according to the model of the vicious cycle of dental fear, "people with high dental fear are more likely to delay treatment, leading to more extensive dental problems and symptomatic visiting patterns which feed back into the maintenance or exacerbation of existing dental fear" [34]. DA has been found to be related to psychological health [43, 44], personality traits [45], and general health [32]. Previous studies have also shown that the level of DA depends on socio-demographic and socioeconomic factors. A higher level of DA has been reported among females than males [35, 46-48], among rural than urban populations [41, 49], and among persons with lower education [32, 41].

1.3.1. Dental anxiety and associated factors in young adults

Several reports showed that younger individuals are more likely to experience DA than middle-aged and elderly adults [36, 41]. Moreover, another study demonstrated an increase in DA over an 8-year study period among participants aged 18-26 years [50]. Many studies have focused on DA in young university students [51-62]. Lower DA has been found in

dental than in non-dental students [51-53], and further reductions were shown among dental students during their dental training [53, 54]. Reported predictors for DA have included self-perceived need for dental treatment, tobacco use, abnormal attitudes toward food, insufficient oral hygiene, less frequent dental visits, and the anticipation of pain [55, 60, 61]. No relationships between DA and clinically-assigned OH have been studied in young university students, but studies on other factors showed that female students had a higher DA than male students [52, 55-58], whereas other studies found no sex differences [51, 59, 60].

1.3.2. Dental anxiety in Russian young adults

We found only one study on DA, which was conducted in St. Petersburg in 1992, more than 25 years ago [63]. The study included 288 urban schoolchildren aged 13-18 years and yielded a 12.6% prevalence of high DA. Sex, treatment and toothache experience, dental fear in the family, and fear at first dental visit were associated with high DA. At present, there is no information available on the prevalence of DA and associated factors in Russian young adults aged 18-25 years.

1.4. Oral health and quality of life

In addition to objective methods of OH evaluation performed by dental professionals, patient perception of OH is also important in the assessment of treatment needs and clinical outcome [64, 65]. The concept of OH-related quality of life (OHRQoL) uses patient-centred outcome measures to identify the impact of OH on aspects of everyday life in terms of a person's functional, social, and psychological well-being [66]. Over the past decades, a set of psychometric instruments has been developed to assess OHRQoL. The OH Impact Profile is widely used to measure OHRQoL in adults and dentate elderly

people [65]. The short version of the OH Impact Profile includes 14 items (OHIP-14), which represent the negative consequences that oral diseases have on OHRQoL [67].

1.4.1. Oral health-related quality of life in young adults

Studies have shown that young and middle-aged adults report worse OH than older adults, despite the fact that oral problems tend to increase with age [68-70]. The factors that affect self-reported OH are not well understood, but it has been suggested that oral diseases have a deleterious effect on subjective OH, and that this effect is likely higher at younger ages [70]. Moreover, the attitude toward OH acquired in young life manifests as life goes on and may affect OHRQoL. Previously reported factors associated with OHRQoL in young adult populations, including young university students, are negative life events [71], education [72, 73], self-rated OH [72, 74], and subjective symptoms of temporomandibular disorders and oral pain [74]. The influence of clinical factors (dental caries, MT, and periodontal status) on OHRQoL is inconsistent, with some studies showing no relationship [75, 76] and others showing that poor clinically-assessed OH is associated with worse OHRQoL [72, 74, 77]. It was also found that malocclusion has a negative impact on OHRQoL in young adults [73, 77]. Almost all aforementioned studies used OHIP-14 to measure OHRQoL in young adult populations. Few studies on OHRQoL targeted dental students [78-80]. Self-reported OH problems and aspects related to previous dental experience were found to have a greater impact on OHRQoL [78, 79], although no clinical factors were studied.

1.4.2. Oral health-related quality of life in Russian young adults

To our knowledge, there has been little research on OHRQoL in Russian adults. We found only two studies that assessed OHRQoL in middle-aged Russians with periodontal diseases [81, 82]. One study validated the Russian version of the OHIP-14, and the researchers

reported good face and content validity of the OHIP-14 items [81]. Another study assessed the effectiveness of periodontal treatment on OHRQoL in patients with various forms of periodontitis [82]. No epidemiological studies assessing OHRQoL in Russian young adults were performed.

1.5. Medical and dental students as specific groups in which to study oral health

Medical and dental students are expected to have specific knowledge about disease prevention and hygiene, and therefore are expected to show better health behaviour, including OH behaviour, compared to their counterparts in the general population. In addition, students from medical and dental faculties may have high socioeconomic status (SES), which in turn may lead to better OH [18]. Nevertheless, the results of studies are mixed. For instance, studies have shown that the proportions of non-smokers among German physicians and medical students [83] and Polish dental students [84] are higher than among the respective general populations. On the other hand, a high prevalence of smoking was observed among medical students in India [85] and among male medical and dental students in Nepal [86]. Moreover, medical students in Saudi Arabia [87] and Italy [88] demonstrated a low knowledge of the health risks associated with tobacco use. A Russian study published in 2016 also found a high prevalence of tobacco smoking in both medical doctors (68.4% of males and 25.3% of females) and medical students (52.4% of males and 34.1% of females) [89]. Dental studies found more positive OH behaviour in dental students than in civil engineering students in Columbia [90] and technology students in Lithuania [91]. Nevertheless, an Indian study revealed that only 54.6% and 38.5% of the included dental and medical students, respectively, brushed their teeth twice a day, and more than 80% of the study participants had never used dental floss [20]. Moreover, Yemeni medical and dental students attending a private university (which may reflect a

higher SES) had poorer attitudes and OH behaviour compared to their peers from a public university [92]. Studies have also shown that dental students have more positive OH behaviour than their medical counterparts [20, 93], and further improvement was found among dental students during their dental training [91, 94]. A longitudinal Spanish study revealed that dental students receive more dental treatment than medical students [93]. Nonetheless, the medical students had a lower DMFT index than the dental students both at the start (3.4 vs. 5.0) and at the end (4.3 vs. 5.9) of the study. In contrast, an Indian study found a mean DMFT index of 1.2 in dental students vs. 2.0 in medical students [20]. In 2008-2009, Halboub et al. examined a sample of students from the faculties of medicine, dentistry, and literature at Sana'a University, Yemen, and found no statistically significant differences in overall DMFT index between the faculties (3.9, 4.3, and 4.2, respectively) [18]. There is also strong evidence that the level of self-reported OH behaviour in dental students varies by country [95-97]. One may speculate that underlying cultural and socioeconomic factors and differences in educational systems across countries may play important roles in health behaviour, including OH behaviour, among medical and dental students, which in turn may be reflected in OH.

In Russia, we found one study performed in 1987 that examined the dental health of medical students [98]. The authors observed a high prevalence of dental caries (98.5%) and a mean DMFT index of 9.3, reflecting poor OH. In the structure of DMFT index, DT, MT, and FT accounted for 28.5%, 10.8%, and 60.7%, respectively. Only 38.2% of the study participants had good oral hygiene. The researchers reported that the most important risk factors of dental caries are hereditary predisposition and oral hygiene, although no risk estimates were presented.

1.6. Conceptual framework of the thesis

Figure 1 shows the conceptual framework of the thesis. The study focuses on the three main outcomes: clinically-assessed OH, DA, and OHRQoL. Taking into consideration the model of the vicious cycle of dental fear, DA and OH are supposed to be related to each other. Whereas self-reported OH characteristics are associated with OHRQoL, the influence of clinically-assessed OH on OHRQoL is inconsistent. In addition, four groups of factors (socio-demographic factors, socioeconomic factors, OH behaviour, and self-reported general characteristics) may be associated with the studied outcomes. These associations have been investigated in many international studies, but no information has been presented in Russian young adults, including Russian medical and dental students.

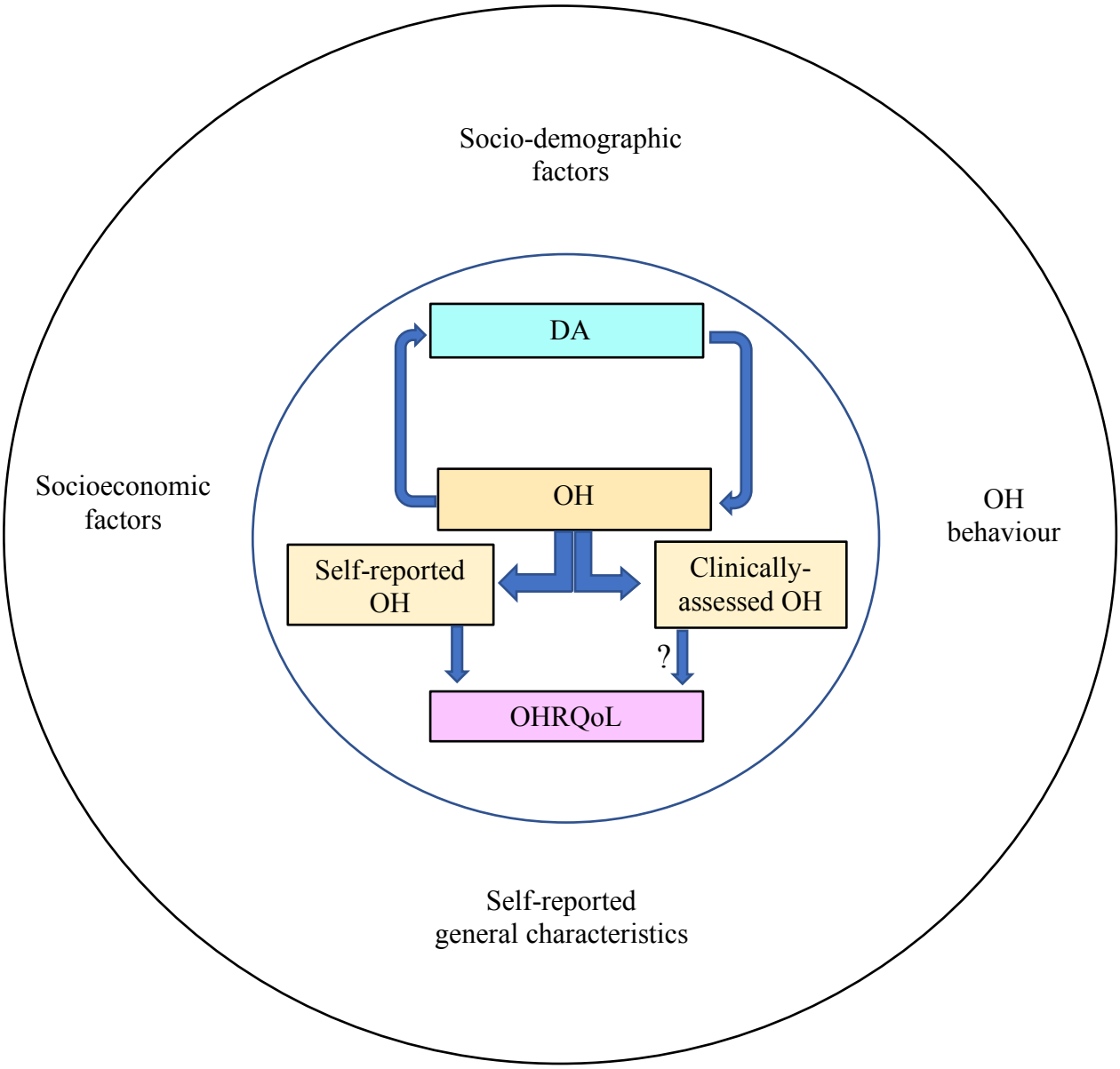

Figure 1. Conceptual framework of the thesis

Abbreviations: DA, dental anxiety; OH, oral health; OHRQoL, oral health-related quality of life.

1.7 Research questions

The following research questions were formulated:

1. How are socio-demographic factors, socioeconomic factors, and OH behaviour related to dental caries experience in Russian medical and dental undergraduate students aged 18-25 years?
2. How do Russian medical undergraduate students differ from Russian dental undergraduate students in terms of DA?
3. What factors impact DA in Russian medical and dental undergraduate students?
4. How does OH affect OHRQoL in Russian medical and dental undergraduate students?
5. What factors impact OHRQoL in Russian medical and dental undergraduate students?

Chapter 2. Aims of the thesis

The overall aim of this thesis was to study OH and its associated factors in medical and dental undergraduate students aged 18-25 years attending the NSMU in Arkhangelsk, North-West Russia. The following specific objectives were formulated in relation to this study group:

- To investigate dental caries experience and determinants (socio-demographic factors, socioeconomic factors, and OH behaviour).

- To assess the prevalence of DA in medical and dental students and to explore the association between DA and socio-demographic factors, socioeconomic factors, OH behaviour, general health, and OH.

- To assess OHRQoL and to investigate how socio-demographic factors, socioeconomic factors, OH behaviour, self-reported OH characteristics, and clinically-assessed OH are related to OHRQoL.

Figure 2 reflects the structure of Papers I-III, on which the current thesis is based.

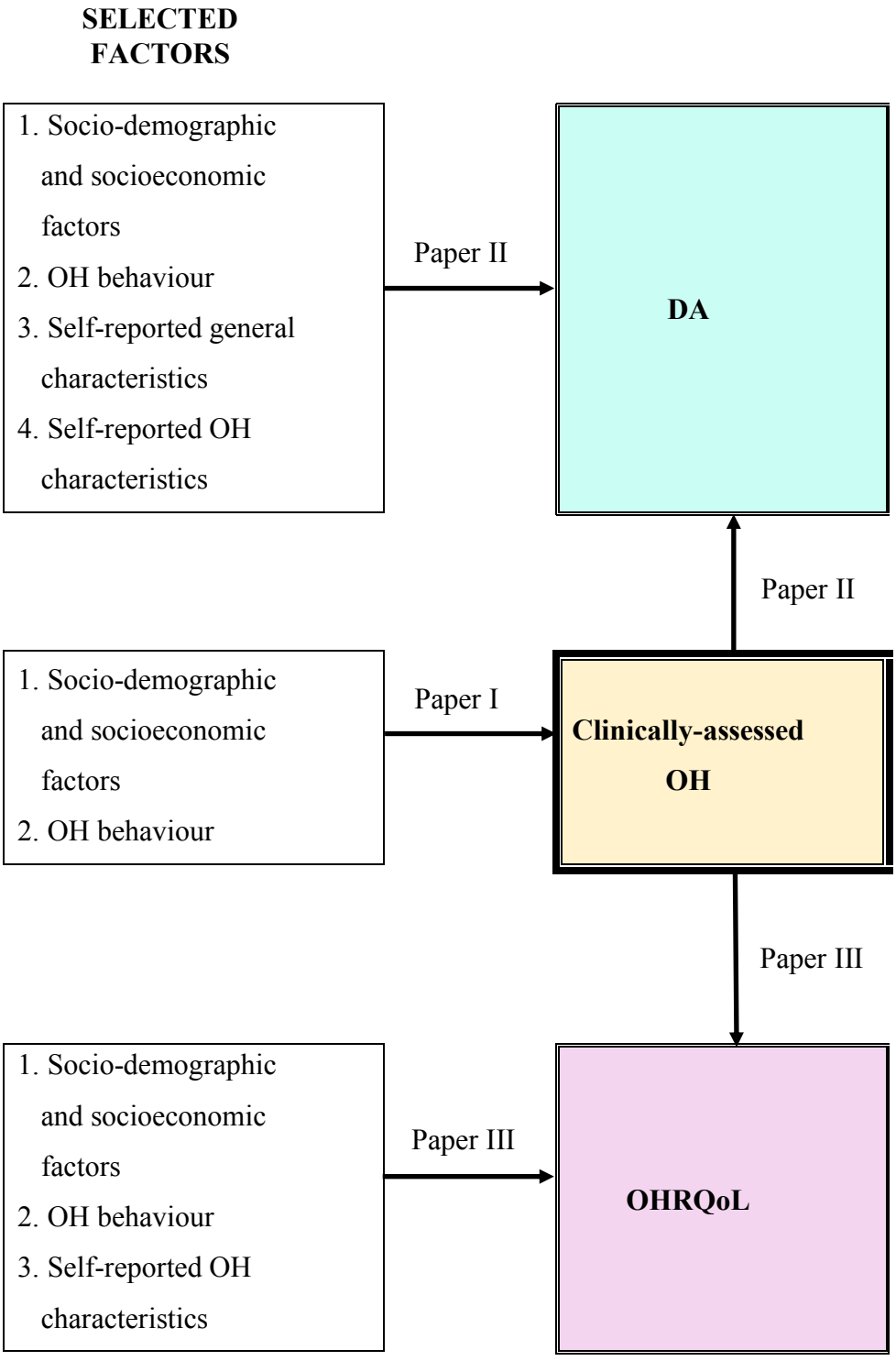

Figure 2. Structure of Papers I-III

Abbreviations: OH, oral health; DA, dental anxiety; OHRQoL, oral health-related quality of life.

Chapter 3. Materials and methods

3.1 Study setting and population

This cross-sectional study was conducted at the NSMU, Arkhangelsk, North-West Russia, during the 2015-2016 academic year. NSMU students are mainly from the European North-West of Russia, which includes the regions of Arkhangelsk, Vologda, Murmansk, the Komi Republic, the Republic of Karelia, and the Nenets Autonomous Okrug (Fig. 3). Altogether, these regions cover an area of approximately 1.5 million km^2 and have a population of 4.6 million (78.9% urban in 2016) [99].

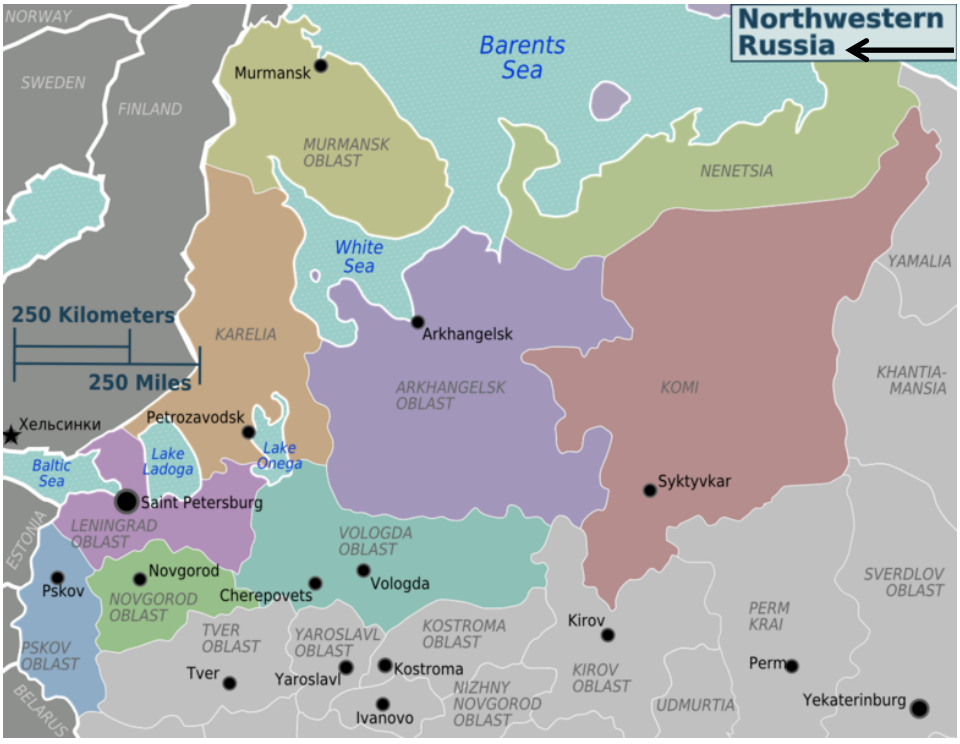

Figure 3. Map of North-West Russia

From https://wikitravel.org/upload/shared//6/68/Northwestern_Russia_regions2.png.

We invited full-time undergraduate students from two faculties: 1) medical (n=1482), which included students from the departments of general medicine (n=981) and paediatric medicine (n=501); and 2) dental (n=524). Combined, these faculties make up approximately 51.4% of the total number of students at the NSMU. For convenience,

students from other non-medical faculties and smaller medical faculties and departments (medical biochemistry, medical prophylaxis, pharmacy) were not considered. Students from the international faculty of general practitioners were also not invited, as we focused on students of Russian nationality only (Fig. 4).

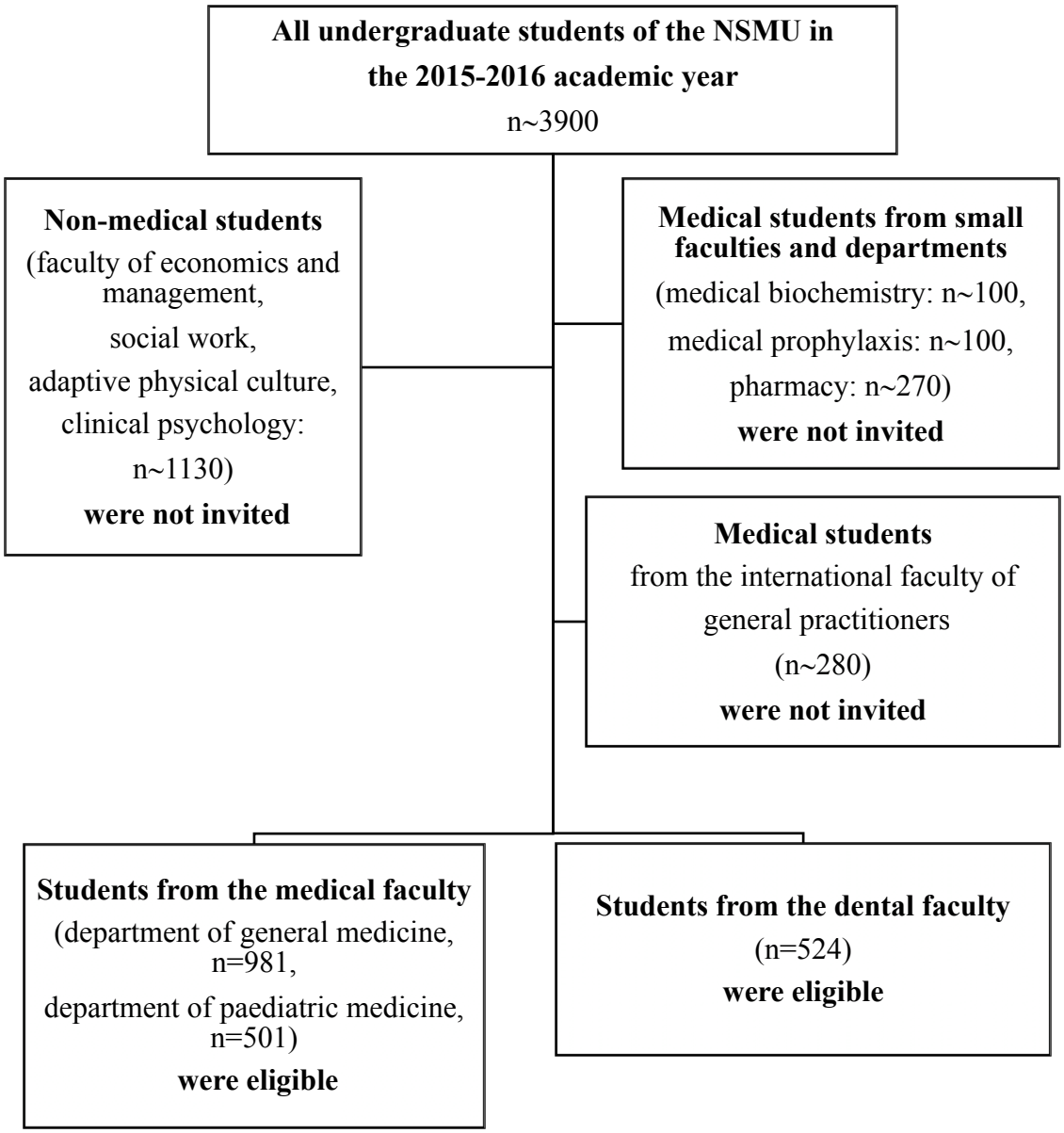

Figure 4. Flow chart of the NSMU students eligible for the study

Abbreviations: NSMU, Northern State Medical University.

3.2 Sampling

The study included two stages. In Stage 1, which was conducted in November-December 2015, all students from the medical and dental faculties and each year of education were

informed verbally and in an invitation letter (Appendix A) about the study and invited to participate at the end of a randomly-selected, scheduled classroom lecture. Before coming to the lecture, the researcher (SND) received permission in advance from both the university administration and each lecturer. According to the rules and regulations of the NSMU, attending lectures is a mandatory part of education. It is permissible to skip a lecture due to illness or another serious reason. Altogether, 1579 students attended the recruitment lectures. The overall attendance rate of the lectures was 78.7% and varied from 55.1% (6^{th}-year medical students from the department of general medicine) to 100% (4^{th}-year medical students from the department of general medicine). No attempt was undertaken to follow up with students who did not attend the lecture. Of the invited students, 1385 agreed to participate (overall response rate 87.7%). The response rates were similar across the faculties and years of education (>83.3%), except for 4^{th}-year medical students from the department of general medicine (57.8%). During the last 15 minutes of the lecture, students signed an informed consent form (Appendix A) and completed a structured, self-administered, anonymous questionnaire in Russian. All students participating in Stage 1 gave their mobile phone number so they could be contacted for Stage 2.

Stage 2 was performed in February-May 2016 and included completion of a second, structured, self-administered, anonymous questionnaire and a clinical dental examination. In order to get comparable groups of medical and dental students, and taking into account an outcome prevalence of 0.50, a confidence interval (CI) of 95%, and an error margin of 5%, the necessary sample size was calculated as ~380 students in each group. Assuming that medical students may not be as supportive of the OH study as dental students, and allowing for refusals, no-shows, and exclusions, we invited 420 dental students and 823 medical students to attend Stage 2. For medical students, a stratified, random, proportionate sample was selected, taking into consideration the distribution of medical

students across the departments (general medicine and paediatric medicine) and years of education. Altogether, 62 students refused to participate in Stage 2, 135 students did not answer their phone at two separate calls on two separate days, and 145 students did not attend Stage 2. We also excluded 94 students who were outside the target age (18-25 years), were not of Russian nationality, had fixed orthodontic bands, or were pregnant. The Stage 2 response rate was 57.6% and 79.3% in medical and dental students, respectively, and varied across years of education (41.5-69.1% and 70.3-85.4%, respectively). A total of 807 students (overall response rate of 64.9%) participated in Stage 2. Details regarding the lecture attendance and response rates for Stage 1 and Stage 2 in medical and dental students of different years of education are presented in Table 2. The students with no missing data in questionnaires were included in statistical analyses: n=751 in Paper I; n=707 in Paper II; n=666 in Paper III (Fig. 5).

To increase the response rate, a drawing was created to give modest financial motivation to participate. At the end of the data collection period, students who agreed to participate, filled in the Stage 1 questionnaire, and gave their phone number, were entered into a drawing to win 2500 Norwegian kroner. Another drawing for the same amount was done among students who participated in Stage 2. For the drawing, identification numbers and the software «Research Randomizer», which is available online, were used.

Table 2. Lecture attendance and response rates for Stage 1 and Stage 2

Faculty/ department	Year of education (total number of students)	Lecture attendance n (%) *	Response rate for Stage 1 (%) **	Response rate for Stage 2 (%) ***
Medical/ general medicine	1st (n=213)	182 (85.4)	85.7	41.5
	2nd (n=181)	122 (67.4)	93.4	62.5
	3rd (n=150)	138 (92.0)	83.3	63.1
	4th (n=180)	180 (100.0)	57.8	60.6
	5th (n=121)	78 (64.5)	89.7	59.7
	6th (n=136)	75 (55.1)	86.7	64.1
	All (n=981)	**775 (79.0)**	**80.5**	**57.1**
Medical/ paediatric medicine	1st (n=116)	98 (84.5)	94.9	52.2
	2nd (n=104)	74 (71.2)	90.5	69.1
	3rd (n=91)	61 (67.0)	90.2	58.0
	4th (n=83)	50 (60.2)	86.0	55.8
	5th (n=45)	37 (82.2)	100.0	68.0
	6th (n=62)	47 (75.8)	97.9	52.6
	All (n=501)	**367 (73.3)**	**92.9**	**58.6**
Dental	1st (n=127)	98 (77.2)	84.7	78.3
	2nd (n=109)	105 (96.3)	99.0	83.7
	3rd (n=115)	89 (77.4)	100.0	85.4
	4th (n=92)	81 (88.0)	98.8	75.0
	5th (n=81)	64 (79.0)	100.0	70.3
	All (n=524)	**437 (83.4)**	**96.1**	**79.3**
	Total (n=2006)	**1579 (78.7)**	**87.7**	**64.9**

* Lecture attendance = $\frac{\text{number of the students who attended the recruiting lecture}}{\text{total number of the students}}$.

** Response rate for Stage 1 = $\frac{\text{number of the students who participated in Stage 1}}{\text{number of the students who attended the recruiting lecture}}$.

*** Response rate for Stage 2 = $\frac{\text{number of the students who participated in Stage 2}}{\text{number of the students who were invited to Stage 2}}$.

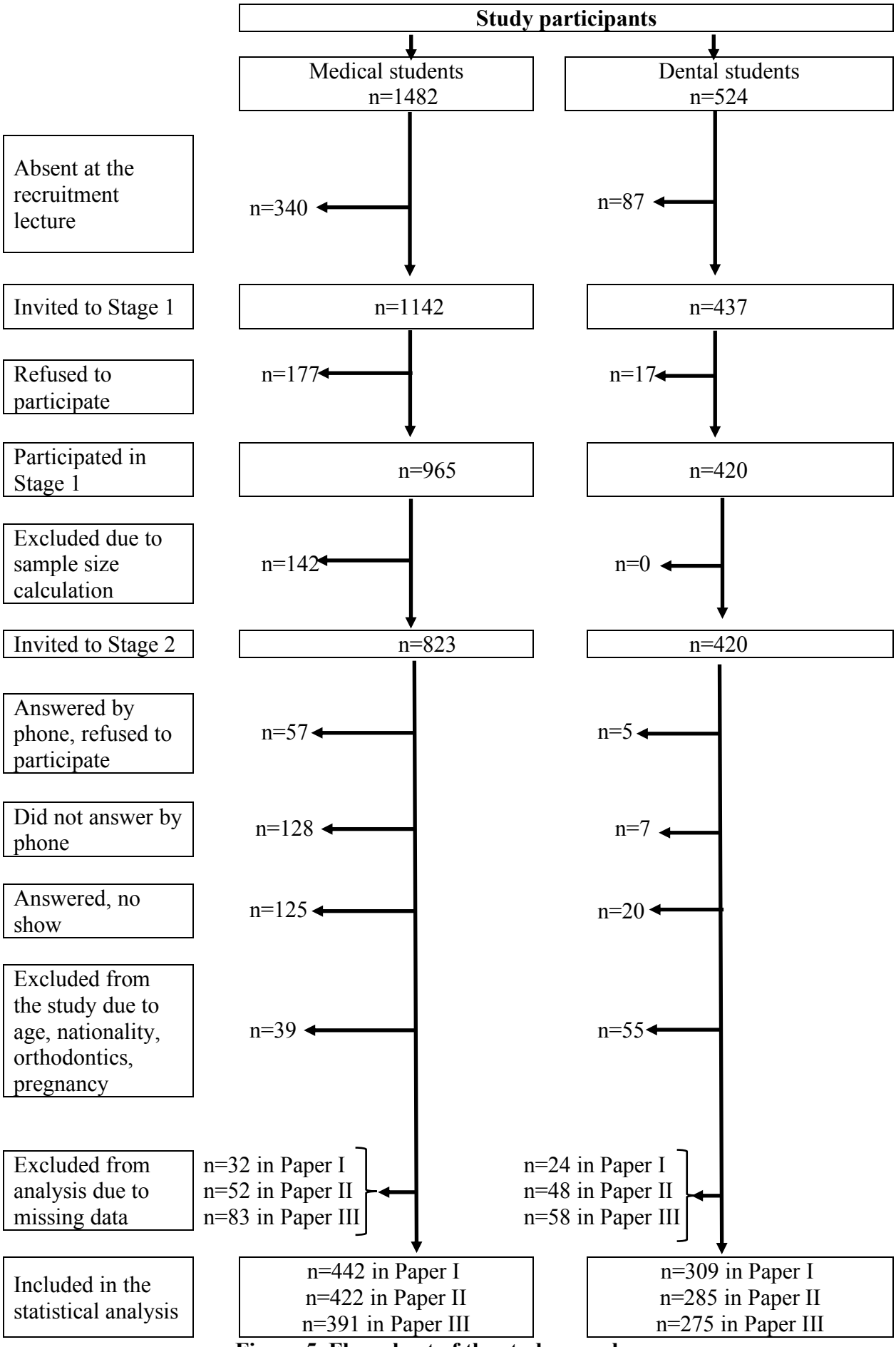

Figure 5. Flow chart of the study sample

3.3 Data collection

3.3.1 Questionnaires

We developed two questionnaires, one for Stage 1 and one for Stage 2, within the project "Oral health and occupational stress in undergraduate students". The full versions of these questionnaires are presented in Appendix B and Appendix C. For Papers I-III and for the thesis, we did not use information on occupational stress in medical and dental students, but focused on OH, DA, OHRQoL, and selected factors, in accordance with our aims.

The Stage 1 questionnaire gathered information on socio-demographic factors, socioeconomic factors, OH behaviour, and self-reported OH characteristics. Age group (18-20, 21-25 years), sex, faculty (medical, dental), place of childhood residence (urban, rural), location of finishing school (Arkhangelsk City, Arkhangelsk Region, other regions), and type of accommodation (hostel, flat/house) were considered as socio-demographic variables. The questionnaire also asked the students to report whether they were eligible for free education (yes, no), which is generally representative of students with higher grades on their entrance exams, and this was used as a socioeconomic variable. A university applicant who does not qualify for free education at the NSMU can still study there, but they must pay annual tuition, usually covered by their parents.

Questions on OH behaviour included frequency of tooth-brushing (infrequent, i.e., never/less than once a week/once every few days/once a day; or frequent, i.e., twice a day/more than twice a day), and skipping tooth-brushing (no, i.e., never or almost never; and yes, i.e., sometimes during a week/every day or almost every day). The students were also asked to report how often they visit a dentist. Responses were given on a 4-point scale: (1) regularly, at least once every 6 months, (2) regularly, at least once a year, (3) occasionally, and (4) no visits in the last 3 years. For analysis, the variable "regularity of dental visits" was categorised as regular (1, 2) and irregular (3, 4). The variable

"toothpaste" was dichotomised into two categories: with fluoride and without fluoride/difficult to answer.

Self-assessed OH, self-assessed dental aesthetic, experienced pain in mouth, experienced gum bleeding during tooth-brushing, and satisfaction with mouth and teeth were considered as self-reported OH characteristics. Self-assessed OH and self-assessed dental aesthetic were categorised as "good" (excellent, very good, or good) and "poor" (fair or poor). The variables "experienced pain in mouth" and "experienced gum bleeding during tooth-brushing" were split into "no" when students responded never or rarely, and "yes" when students responded sometimes, often, or always. Satisfaction with mouth and teeth was assessed by one item with the response options "yes", "no", and "difficult to answer".

The Stage 2 questionnaire collected additional information on socioeconomic variables, as well as self-reported general health characteristics, DA, and OHRQoL. Mother's education was categorised as lower than university (high school: 9-11 years of school; specialised secondary: professional medical or pedagogical college, technicum), and university. Subjective SES was assessed using the MacArthur Scale [100], in which students were asked to report the ranking of their family in Russian society on a ladder with 10 rungs in accordance with socioeconomic indicators (education, income, occupation): 10 was 'best off' and 1 was 'worst off'. Given the skewed distribution of SES and using the median SES (6.0) as the cut-off, this variable was split into "low SES" (1-5) and "high SES" (6-10). Self-reported general health characteristics included three global questions: "Overall, how would you rate your general health/your psychological health/your ability to cope with different aspects of life?" Responses were given on a 5-point scale: (1) excellent, (2) very good, (3) good, (4) fair, and (5) poor. For analysis, each variable was categorised as "good" (1-3) and "poor" (4, 5).

The questions on regularity of dental visits, self-reported general health, self-reported OH characteristics, and mother's education included the additional response option "difficult to answer". When that response was chosen, the data were considered missing, and the students were excluded from the analysis (except for the variable "satisfaction with mouth and teeth").

To assess DA, the four-item Corah's DAS was applied [27]. Students answered each item on a 5-level scale, and the total DAS score was calculated as the sum of the four items (range: 4-20). A DAS score of 13 or more was considered a high DA [101]. OHRQoL was measured by the OHIP-14 [67]. Students rated the frequency with which they experienced negative impacts on their OHRQoL in the last 12 months using a 5-point Likert scale (0) never, (1) hardly ever, (2) occasionally, (3) fairly often, and (4) very often. In addition, each item had the response option "I do not know". If that response was chosen for at least one item, the data were considered missing in the further analysis. The severity of impact on OHRQoL was determined by computing the sum of all items in the OHIP-14, with a maximum possible score of 56 points. A higher score indicated a lower OHRQoL. The prevalence of low OHRQoL was defined as the proportion of students who responded "occasionally", "fairly often", or "very often" for at least one item on the OHIP-14, as was previously applied in other studies among young populations [71, 76, 78].

The questionnaires were developed in English and translated/back-translated to Russian/English by two independent bilingual persons. The conceptual and functional equivalence of the translated questionnaires was verified by colleagues at the NSMU. The final versions were discussed and judged to concur with the original. Before the study began, the questionnaires were pilot-tested on 12 students aged 18-25 years who did not participate in the study, after which only minor changes were required. The Russian version of the OHIP-14 was previously published [81], and the same items were used in the present study without modifications.

3.3.2 Clinical dental examination

A non-invasive clinical dental examination, performed in accordance with WHO recommendations [7], was done at the Dental Clinic of the NSMU. Students were examined in a dental chair under a professional light, using a dental plain mirror and a dental probe without radiographs. One researcher (SND) executed all clinical examinations, and an assistant filled in the details on the clinical sheet (Appendix D). All permanent teeth, excluding third molars, were taken into consideration during the clinical examination. Before the study start, the researcher was carefully calibrated on examination technics and diagnostic thresholds at the Dental Clinic of UiT The Arctic University of Norway in Tromsø. In June 2016, 54 of the examined students were selected randomly for clinical re-examination. The time interval between these two examinations ranged from 1 to 77 days.

Dental caries experience was measured by the DMFT index, and only permanent teeth were considered for its calculation. In accordance with WHO recommendations, a tooth was recorded as DT when:

- a lesion of the tooth's surface had an unmistakable cavity, undermined enamel, or a detectably softened floor or wall;
- a tooth had a temporary filling;
- a tooth had one or more permanent restorations and one or more areas that were decayed;
- a tooth was sealed but also decayed.

Whenever there was doubt, DT was not recorded as present. A tooth was considered filled when one or more permanent restorations were present and there were no carious lesions. Teeth extracted due to dental caries were coded as MT.

The Significant Caries (SiC) index was computed as the mean DMFT index in the tertile of participants with the highest DMFT index [102]. The Simplified Oral Hygiene

Index (OHI-S) proposed by Green and Vermillion (1964) was used to assess oral hygiene [103]. The six preselected surfaces of the index teeth (four posterior and two anterior teeth) were examined for debris and calculus detection. The following scores were used for classifying debris:

0 – no debris or stain present;

1 – soft debris covering not more than one-third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered;

2 – soft debris covering more than one-third, but not more than two-thirds, of the exposed tooth surface;

3 – soft debris covering more than two-thirds of the exposed tooth surface.

The scores for classifying calculus were:

0 – no calculus present;

1 – supragingival calculus covering not more than one-third of the exposed tooth surface;

2 – supragingival calculus covering more than one-third, but not more than two-thirds, of the exposed tooth surface or presence of individual flecks of subgingival calculus around the cervical portion of the tooth or both;

3 – supragingival calculus covering more than two-thirds of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth or both.

The total score of the OHI-S was calculated as the sum of the average debris and calculus scores.

For the assessment of qualitative changes in the gingival soft tissue, we employed the Gingival Index (GI) of Loe and Silness [104]. Six index teeth (44/32/36/24/12/16) and four areas for each tooth (mesial, distal, buccal, and lingual) were examined applying the following scores:

0 – normal gingiva;

1 – mild inflammation – slight change in colour and slight oedema, but no bleeding on probing;

2 – moderate inflammation – redness, oedema and glazing, bleeding on probing;

3 – severe inflammation – marked redness and oedema, ulceration with tendency toward spontaneous bleeding.

The scores of the four areas of the tooth were summed and divided by four to calculate the GI for the tooth. The GI of the individual was obtained by adding the values of each examined tooth and dividing by the number of teeth (6).

3.4 Statistical analysis

The dependent and independent variables used in Papers I-III are presented in Table 3 and Table 4, respectively.

Table 3. List of the dependent variables used in Papers I-III

Paper	Dependent variable	Type of dependent variable
I	1. DMFT index (dental caries experience)	discrete (the sum of DT, MT, and FT)
	2. SiC group	binary (0=not in the SiC group; 1=in the SiC group)
II	DAS score	discrete (the sum of the four DAS items)
III	OHIP-14 score	binary (0=without low OHRQoL*; 1=with low OHRQoL)

***** Students who responded "occasionally", "fairly often", or "very often" for at least one item on the OHIP-14 were categorised as having low OHRQoL.

Abbreviations: DMFT index, decayed missing filled teeth index; DT, decayed teeth; MT, missing teeth; FT, filled teeth; SiC, Significant Caries; DAS, dental anxiety scale; OHIP-14, Oral Health Impact Profile with 14 items; OHRQoL, oral health-related quality of life.

Table 4. List of the independent variables used in Papers I-III

Groups of independent variables	Independent variables	Papers
Socio-demographic and socioeconomic variables	1. Age group (years)	I-III
	2. Sex	I-III
	3. Faculty	I-III
	4. Place of childhood residence	I-III
	5. Location of finishing school	I
	6. Eligible for free education	I, II
	7. Subjective SES	I-III
	8. Type of accommodation	I
	9. Mother's education	I-III
OH behaviour	1. Regularity of dental visits	I-III
	2. Frequency of tooth-brushing	I-III
	3. Toothpaste	I-III
	4. Skipping tooth-brushing	I-III
Self-reported general characteristics	1. Self-assessed general health	II
	2. Self-assessed psychological health	II
	3. Coping with different aspects of life	II
Self-reported OH characteristics	1. Self-assessed OH	II, III
	2. Experienced pain in mouth	II
	3. Experienced gum bleeding during tooth-brushing	II
	4.Self-assessed dental aesthetic	III
	5.Satisfaction with mouth and teeth	III
Clinically-assessed OH	1. DMFT index or DT, MT, and FT	II, III
	2. OHI-S	II, III
	3. GI	II, III

Abbreviations: SES, socioeconomic status; OH, oral health; DMFT index, decayed missing filled teeth index; DT, decayed teeth; MT, missing teeth; FT, filled teeth; OHI-S, Simplified Oral Hygiene Index; GI, Gingival Index.

The statistical methods applied in Papers I-III are summarised in Table 5. All statistical tests were two-sided, and a p-value less than 0.05 was considered statistically significant.

Table 5. Overview of the statistical analyses applied in Papers I-III

Statistical method	Paper I	Paper II	Paper III
Mann-Whitney U test	+	+	+
Kruskal-Wallis test	+	-	-
Chi-square test	+	-	+
Negative binomial hurdle model	+	-	-
Multivariable binary logistic regression	+	-	+
Simple and multivariable Poisson regression	-	+	-
Statistical programme package	IBM SPSS Statistics for Macintosh version 23.0 (IBM Corp., Armonk, New York, USA) and STATA version 14.0 (StataCorp, College Station, Texas, USA)		

To ensure reliability of the obtained clinical data, Cohen's Kappa and intraclass correlation coefficients were calculated for dichotomous (DT and non-DT) and quantitative data (DMFT index and GI), respectively. To assess the reliability of the DAS and OHIP-14 scores, the inter-item correlation coefficient (Cronbach's alpha), the average of the inter-item correlation, and the corrected item-total correlations were determined. For missing values analysis, Little's missing completely at random (MCAR) test was used [105].

3.5 Ethical considerations

Before enrolment into the study, the students received verbal information from the researcher (SND) and written information in the form of an invitation letter, which included the objectives of the study, the criteria for participation, the description of study stages, the potential advantages and disadvantages for study participants, utilisation of the

information collected, a statement of voluntary participation, the right of the study participants to access and delete data, the study schedule, funding, and how results would be reported (Appendix A). In Stage 1, written informed consent was obtained from every participant. The researcher (SND) also gave assurance of confidentiality and stressed that participation was voluntary and participants could withdraw from the study at any time without giving any reason. In Stage 2, clinical dental examinations were executed free of cost and with minimal of pain or discomfort. All participants received the results of their dental health check and instructions for oral hygiene immediately. Students in need of dental treatment were given individualised referrals for further dental health care. Ethical approval for this study was obtained from the Regional Ethical Committee of Norway (2015/1788/REK nord) and the Ethical Committee of the NSMU, Russia (№ 05/10-15 from 19.10.2015).

Chapter 4. Main results

This chapter describes the key results of the thesis based on the study aims. Figure 6 shows the main findings presented in Papers I-III.

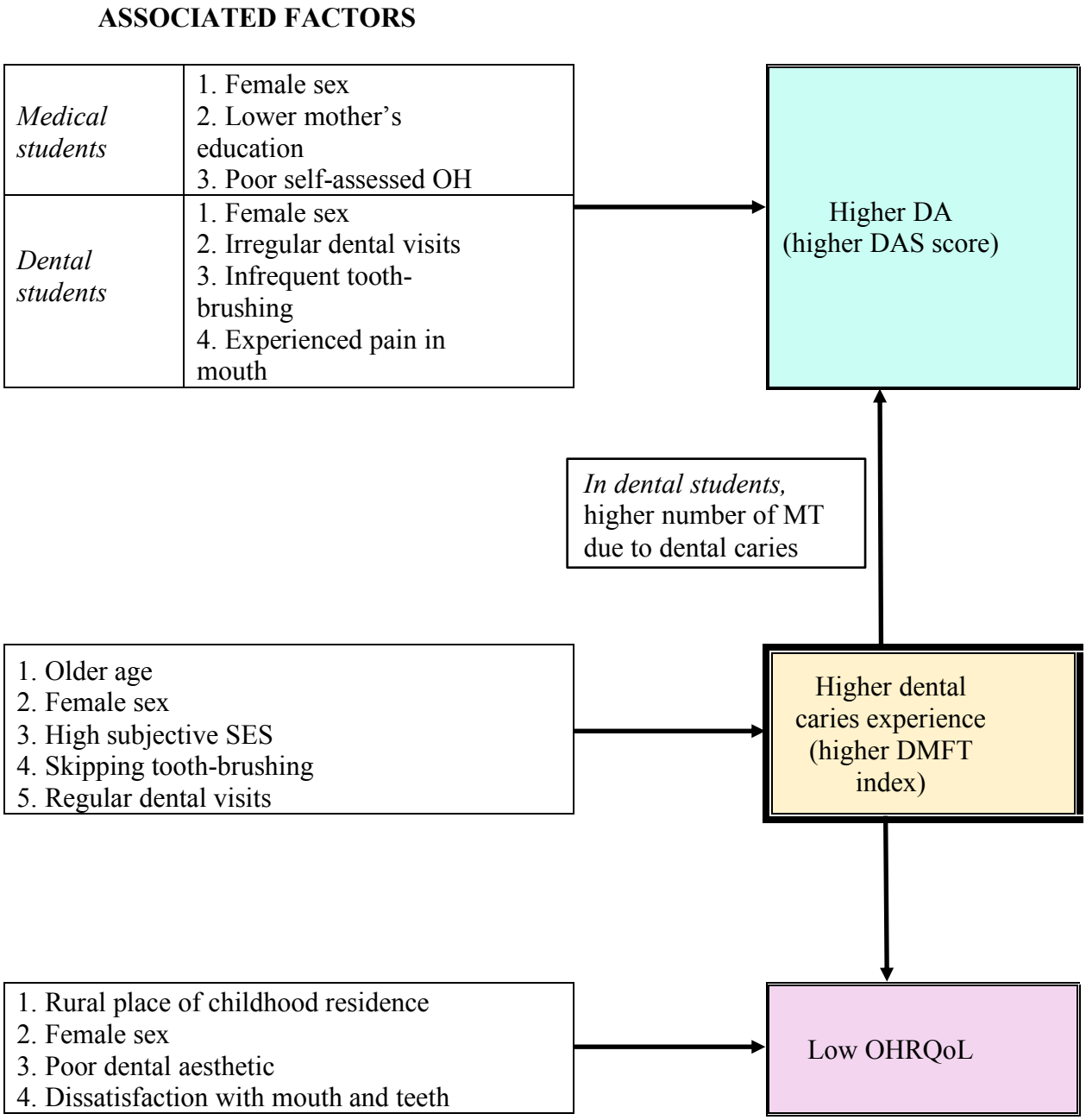

Figure 6. Main findings of Papers I-III.

Abbreviations: OH, oral health; DA, dental anxiety; DAS, dental anxiety scale; MT, missing teeth; SES, socioeconomic status; DMFT index, decayed missing filled teeth index; OHRQoL, oral health-related quality of life.

4.1. Dental caries experience and its determinants (Paper I)

The prevalence of dental caries (DMFT index >0) among the medical and dental students was 95.7% and 96.4%, respectively. The overall mean DMFT index was 7.58 (standard deviation [SD] 4.4): DT 0.61 (SD 1.2), MT 0.12 (SD 0.4), and FT 6.84 (SD 4.1). FT accounted for 89.8% and 91.0% of dental caries experience in medical and dental students, respectively. The SiC index was 12.50 (SD 3.0): DT 0.99 (SD 1.5), MT 0.26 (SD 0.6), and FT 11.25 (SD 2.9), with FT accounting for 90.0%. The DMFT cut-off point in this subgroup was 9, thus all students with a DMFT index ≥9 were placed in the SiC group.

In negative binomial hurdle analysis, regular dental visits were significantly associated with lower odds of being in the dental caries-free group (odds ratio [OR]=0.38, 95% CI: 0.18-0.82). Furthermore, students who reported regular dental visits had an adjusted DMFT index that was 1.22 (95% CI: 1.10-1.36) times higher than that observed in those who did not report such visits. The DMFT index of students aged 21-25 years was 1.09 (95% CI: 1.01-1.18) times higher than that predicted in their younger counterparts, after adjustment for other variables in the model. Being female (incidence rate ratio [IRR]=1.10, 95% CI: 1.01-1.20), skipping tooth-brushing (IRR=1.09, 95% CI: 1.00-1.19), and high subjective SES (IRR=1.11, 95% CI: 1.02-1.21) were also found to be significant independent determinants of high DMFT index. Significant predictors of being placed in the SiC group were older age (OR=1.41, 95% CI: 1.03-1.92), high subjective SES (OR=1.57, 95% CI: 1.13-2.19), and regular dental visits (OR=2.34, 95% CI: 1.56-3.51).

4.2. Dental anxiety: assessment of prevalence and associated factors (Paper II)

Medical students had a higher mean DAS score than dental students: 8.81 (SD 3.23) vs. 6.73 (SD 2.36), $p<0.001$. The prevalence of high DA (DAS score ≥13) was 13.7% and 2.2% in medical and dental students, respectively ($p<0.001$). Compared to dental students,

medical students were older (44.8% vs. 35.4% in the age group of 21-25 years; p=0.013), were more often eligible for free education (87.9% vs. 67.7%; p<0.001), and reported mother's education as university level less often (50.2% vs. 58.9%; p=0.023). When looking at OH behaviour, differences were found between medical and dental students who reported regular dental visits (77.5% vs. 84.9%; p<0.001), brushed their teeth twice a day or more (75.4% vs. 86.7%; p<0.001), skipped tooth-brushing (37.9% vs. 28.1%; p=0.007), and used a toothpaste with fluoride (40.3% vs. 56.5%; p<0.001). Compared to dental students, medical students more often reported poor OH, experienced pain in their mouths, and experienced gum bleeding during tooth-brushing (45.3% vs. 25.6%, p<0.001; 53.3% vs. 34.0%, p<0.001; 47.9% vs. 36.5%, p=0.003, respectively). Dental students had fewer DT than medical students (0.49 vs. 0.68; p=0.020), but no differences were found in the number of MT, FT, or the DMFT index. The OHI-S and GI were higher in medical than in dental students: 1.21, SD 0.53 vs. 1.01, SD 0.49, p<0.001 and 0.32, SD 0.25 vs. 0.22, SD 0.22, p<0.001, respectively.

The multivariable Poisson analysis with DAS score as the dependent variable showed that, in medical students, poor self-assessed OH (IRR=1.15, 95% CI: 1.08-1.23), lower mother's education (IRR=1.13, 95% CI: 1.05-1.20), and female sex (IRR=1.11, 95% CI: 1.02-1.20) were associated with higher DAS score when adjusted for regularity of dental visits, experienced pain in mouth, and GI. In dental students, being female (IRR=1.16, 95% CI: 1.06-1.26), reporting irregular dental visits (IRR=1.19, 95% CI: 1.07-1.32), infrequent tooth-brushing (IRR=1.17, 95% CI: 1.04-1.32), having experienced pain in one's mouth (IRR=1.09, 95% CI: 1.01-1.18), or having a higher number of MT due to dental caries (IRR=1.13, 95% CI: 1.03-1.24), were independently associated with a higher mean DAS score, adjusted for self-assessed general health and number of DT. All variables in the final models explained 12.7% of the variation in the response variable in both medical and dental students.

4.3. Oral health-related quality of life in medical and dental students (Paper III)

The mean OHIP-14 score was 4.63 (SD 4.90, range: 0-34). More than half of the students (53.6%) reported low OHRQoL; the mean number of items with a reported frequency of "occasionally" or more often was 1.27 (SD 1.77; range: 0-11). The highest mean scores were observed for the dimensions physical pain and psychological discomfort, which were also the most frequently reported dimensions with an impact on OHRQoL. With respect to single OHIP-14 items, the prevalence of low OHRQoL varied from 1.7% (for the item "unable to function" in the dimension handicap) to 37.0% (for the item "painful aching in mouth" in the dimension physical pain).

Multivariable logistic regression with the dependent binary variable (0=without low OHRQoL and 1=with low OHRQoL) showed that female sex (OR=1.48, 95% CI: 1.00-2.19), rural place of childhood residence (OR=1.56, 95% CI: 1.06-2.28), poor self-assessed dental aesthetic (OR=1.75, 95% CI: 1.16-2.64), dissatisfaction with mouth and teeth (OR=2.51, 95% CI: 1.68-3.77), and high DMFT index (OR=1.05, 95% CI: 1.01-1.09) were associated with higher odds of having low OHRQoL when adjusted for age group, faculty, self-assessed OH, and OHI-S. The most important predictors of low OHRQoL were satisfaction with mouth and teeth and self-assessed dental aesthetic. All independent variables in the final model explained 20.6% of the variation in the dependent variable.

4.4. Additional results not included in Papers I-III

In the present study, from a total of 807 students who participated in Stage 2, 56 (6.9%), 100 (12.4%), and 141 (17.5%) students had missing data in Papers I, II, and III, respectively. Little's MCAR tests were insignificant (p=0.214, p=0.274, and p=0.162, for the sets of variables with missing values included in Papers I, II, and III, respectively,

assuming that the data are MCAR). We also explored the associations between clinically-assessed OH (DMFT index) and self-reported OH characteristics (Table 6).

Table 6. Association between clinically-assessed OH (DMFT index) and self-reported OH characteristics

Self-reported OH characteristics	All n*	DMFT index=0, (%)	p**	DMFT index >0, mean (SD)	p***
Self-assessed OH			0.001		< 0.001
Good	478	(5.9)		6.87 (3.73)	
Poor	275	(0.7)		9.52 (4.54)	
Experienced pain in mouth			< 0.001		< 0.001
No	411	(6.8)		7.27 (3.94)	
Yes	342	(0.6)		8.56 (4.49)	
Self-assessed dental aesthetic			0.031		0.010
Good	461	(5.2)		7.44 (3.80)	
Poor	292	(2.1)		8.53 (4.79)	
Satisfaction with mouth and teeth			0.169		< 0.001
Yes	326	(5.5)		7.06 (3.99)	
No	320	(2.8)		8.78 (4.52)	
Difficult to answer	107	(2.8)		7.56 (3.62)	
Experienced gum bleeding during tooth-brushing			0.065		0.210
No	429	(5.1)		7.68 (4.18)	
Yes	324	(2.5)		8.12 (4.34)	

* total number of the students included in the analysis is 753 due to missing data in the categories of self-reported OH characteristics;

** p-value from the Chi-square test; ***p-value from the Mann-Whitney U test for two independent groups and the Kruskal-Wallis test for three independent groups.

Abbreviations: OH, oral health; DMFT index, decayed, missing, and filled teeth index.

Students who reported poor self-assessed OH, poor self-assessed dental aesthetic, and experienced pain in mouth had a higher mean DMFT index and were placed in the dental caries-free group less frequently compared to those who reported good self-assessed OH, good self-assessed dental aesthetic, and did not experience pain in mouth, respectively.

There were also statistically significant differences in the mean DMFT index in students with dental caries experience between categories of satisfaction with mouth and teeth.

Chapter 5. Discussion

5.1. Methodological challenges

5.1.1. Students as a vulnerable group for research: assessment of ethical issues

Students in secondary education, university students, children, pregnant women, and prisoners may be considered a vulnerable group for research [106, 107]. Although students are a convenient and available study sample, there are several potential ethical issues to consider when enrolling students into a study, such as voluntary participation, conflict of interest, informed consent, confidentiality, and costs-benefit ratios.

"Voluntary participation is only truly voluntary if not participating has no consequences for the student" [108]. If students are recruited for research by the same persons who are responsible for their education, the risk of coercion to participate should be taken into consideration [106, 108, 109]. In such circumstances, the researcher may exert pressure on students to participate, and retaliate against those who refuse to participate by giving lower grades, or poorer learning opportunities, which could lead to slower student progress [110]. This pressure may be especially sensitive in relation to medical and dental students, as their study situation is highly dominated by one-to-one instruction in the clinic. Moreover, if a student agrees to participate in a study in order to obtain extra credits, better grades, better recommendations, a better workplace situation, etc., it makes their participation not fully voluntary [107, 108]. There is an opinion that, in order to avoid a conflict of interest, researchers should only perform the role of researcher, not the role of researcher and teacher simultaneously [108, 111]. For the present project, these challenges were discussed by researchers at the NSMU and UiT at the planning stage, and all relevant comments were taken into consideration to the best of our ability.

The current PhD project involved medical and dental students of the NSMU, and recruitment was carried out at the end of a randomly-selected curriculum lecture for each

year of education. The researcher (SND) in this study is not responsible for giving lectures or practical classes to medical students, nor does he have any position of power in the researcher-participant relationships. Moreover, by the time students had to decide whether or not to participate in the study, the lecturer had left the lecture hall, thus (s)he could not influence the students' choice. In contrast, theoretically, the dental students might be vulnerable to being coerced into participation in the study, but such probability was minimal. One reason for that was that at Stage 1, the invitation to participate was addressed to the group of students (37-182 students) who attended the lecture, not to each student individually. This approach meant that researcher was not able to determine which students declined to participate, as in individual recruitment [112], and provided for greater anonymity. Students were informed that only those who agreed to participate needed to sign an informed consent form and fill in the questionnaire, while students who refused to participate could return the unfilled questionnaire and informed consent form, and leave the lecture hall freely. Moreover, even if the students completed the questionnaire, if they did not sign the informed consent form or give their mobile phone numbers, they were considered to have refused to participate. Therefore, the researcher could not identify who agreed to participate in the study and who did not when the students completed the questionnaire. No attempt was undertaken to follow up with students who were absent from the lecture or who refused to participate at Stage 1. Nevertheless, group recruitment may violate the privacy of students and increase peer pressure when the student's decision becomes evident to his/her fellow students [108]. For Stage 2, which included the clinical dental examination, we applied an individual approach, inviting students using their mobile phone numbers. We did not know their names, and students were still able withdraw from the study despite their agreement to participate in Stage 1. Therefore, we may conclude that voluntary participation in this study was not violated.

Another important point is reward policy. To increase the response rate, at the end of the data collection period (June 2016) a small prize drawing was held for study participants, with the winners picked randomly by the researcher (SND). To ensure transparency in determining the winners, all participating students were informed in advance about the date and place of the drawing, so they could come and monitor the process. Three medical students and three dental students were present during the selection of winners. Two students who participated in Stage 1 and two other students who participated in Stage 2 won 10,000 Russian rubles (about 1200-1300 Norwegian kroner) each.

Obtaining informed consent for study participation is one of the fundamental ethical aspects of any research involving human subjects [113]. Informed consent includes the information component and the consent component. The information provided should be comprehensible and adequate according to the study protocol. The consent must be voluntary (without any pressure) and decision-competent [107]. To participate in the present study, students had to sign the informed consent form (Appendix A). An important issue is the time needed for a student to make a decision about participation. In our study, we did not perform any invasive procedures that are associated with health risks which would have required a lot of time for study participants to make the right decision for them. Moreover, students could withdraw from the study at any time, without stating any particular reason. Withdrawal would not have any consequences for her/his further training, and that fact was also stated in the invitation letter (Appendix A).

Research must ensure the confidentiality of information received from study participants [107]. Anonymity may be considered a possible guarantee of confidentiality. Full anonymity can be achieved when a researcher does not link the information obtained from a study with any specific participant [110]. Nevertheless, in many studies, researchers have linked information on study participants from different sources (for example, in the

present study, information from the structured, self-administered questionnaires and the results from the clinical dental examination). In such cases, identification may be required. In our study, to ensure confidentiality, we used the following measures:

- Selection of participants from a large group; the invitation to participate in the study was addressed to all students who attended the recruitment lecture, not to each student individually. Applying this approach, we did not know exactly who agreed to participate and who did not.
- As we did not use the names of participants, we used identification numbers to link the information obtained from the questionnaires to that from the clinical dental examination.
- Students who agreed to participate were asked to give their mobile phone numbers so we could contact them and set a date and time for Stage 2. The mobile phone numbers were recorded on paper only; they were not included in the dataset. The Regional Ethical Committee of Norway and the Ethical Committee of the NSMU, Russia, accepted the method of selecting potential participants to Stage 2. Only the researcher (SND) had access to the phone numbers. Moreover, according to Russian law, special permission from security services is needed to identify someone using his/her phone number.
- Registered data were used in accordance with the study objectives. No personal information on study participants, including their mobile phone numbers, was given to any other organisation or person.
- The completed questionnaires with the mobile phone numbers are stored in a locked room at the NSMU and will be destroyed when the project is finished.

The costs-benefit ratio is another important issue in the evaluation of ethical problems in research. A study may be considered ethical if there is a favourable costs-benefit ratio [107]. From an individual perspective, our participants received the results of their OH

check-ups immediately. The clinical dental examination was free of cost for the student and comprised minimal pain or discomfort; students in need of dental treatment were referred to the necessary services. All study participants also received individual oral hygiene instructions. Participation in Stage 1 and Stage 2 did not require a lot of participant's time, lasting approximately 15-20 and 40-45 minutes, respectively. Although student participation in research implies no guarantee of improved education, because the students did not receive detailed information on the research questions, study design, applied statistical methods, etc. [108], it cannot be ruled out that the experience obtained from study participation may have a positive future impact on health professionals who go into research (voluntary participation, need for informed consent, etc.). From the social and scientific perspectives, the obtained information on OH and factors associated with OH in Russian young adults are necessary for planning and executing preventive measures.

5.1.2. Study design

This is a cross-sectional study, which was conducted to estimate the prevalence of investigated characteristics (dental caries, DA, and low OHRQoL) in Russian medical and dental undergraduate students in North-West Russia. Alongside data about the outcomes, information was also collected on individual factors (socio-demographic, socioeconomic, OH behaviour, self-reported general health and OH characteristics). The current study provided a "snapshot" of the outcomes and the associated factors over a short time period (during the 2015-2016 academic year). The estimated associations between risk factors and the outcomes may be useful in generating hypotheses for future research [114]. Nevertheless, no causal relationships in the association between outcome variables and independent factors, nor trends in the prevalence of outcomes over time, can be determined.

5.1.3. Internal validity

Validity is an important consideration in the interpretation of results from epidemiological studies [115]. There are two types of validity: internal and external [116, 117]. Internal validity refers to the strength of the study inferences, which are related to the absence of systematic errors: selection bias, information bias, and confounding [115-117].

Selection bias is present when study participants have different probabilities of being included in the study [115]. For the current study, we selected medical and dental students from two faculties who attended the recruitment lectures. It cannot be argued with certainty that there are systematic differences in relevant study characteristics between the students who did and did not attend the recruitment lectures. The same may be assumed in relation to the medical students who were invited to participate and those from other, smaller faculties and departments of the NSMU who were not invited. For Stage 2, to achieve the desired statistical power, we invited all dental students and a stratified random proportionate sample of medical students (who were a group nearly double in size compared to dental students) from Stage 1. Nonetheless, the final sample was not well balanced, with a lower response rate in medical students (57.6%) than dental students (79.3%) in Stage 2. This may have led to an underestimation of DA and OH problems in medical students. Moreover, the OHIP-14 scores might be positively overestimated due to the overall response rate of 64.9% for Stage 2.

Information bias results from errors in the measurement of study variables [117, 118]. In the present study, data were obtained from the clinical dental examination and from the structured, self-administered questionnaires. The clinical dental examination was performed on all study participants, and information on dental caries experience, oral hygiene, and gingival soft tissue status was recorded. Dental caries experience was measured by the DMFT index, which was documented during the examination according to WHO recommendations [7]. Although the DMFT index has been used for 80 years and

is one of the most common tools used in epidemiological dental studies, it has several limitations [119]. The DMFT index only counts teeth with carious lesions extending into the dentin; enamel carious lesions are not counted, nor is the activity level of carious lesions recorded. Moreover, it was difficult to confirm the reason for tooth extraction at the time of the clinical dental examination. The DMFT index does not count sealants, but can overestimate dental caries experience by taking into consideration teeth with cosmetic restorations. The DMFT calculation gives equal weight to MT, restored teeth, and teeth with untreated dental caries. In addition, in the current study, only visual and tactile methods were applied to detect dental caries; radiographs were not taken, which could lead to an underestimation of dental caries. An Israeli study conducted among participants aged 18-20 years showed that average DMFT index and DT with radiographs were 1.42 and 1.75 higher, respectively, than values obtained without radiographs [120]. Indeed, when radiographs are used, early and secondary proximal dental caries, as well as aesthetic restorations, may be more frequently detected. Nevertheless, radiographic equipment is not always available in many epidemiological studies. Finally, DMFT index may have a skewed distribution in the general population. To solve this problem and focus on individuals with the highest DMFT index, the SiC index can be calculated [102], and that was done in the present study. Oral hygiene was assessed by the OHI-S [103], which has been previously validated and is one of the most commonly used tools in epidemiological studies and clinical practice [103, 121]. The GI was applied to evaluate qualitative changes in the gingival soft tissue [104]. The GI has also gained wide acceptance as a simple, accurate method to assess gingival health in epidemiological and clinical research [122].

When considering the instruments available to measure DA, the DAS and MDAS are the most frequently used tools in young university students. Compared to the DAS, the MDAS has identical response options for all questions (from not anxious to extremely anxious) and includes one additional question about anxiety of dental injection. This item

on injection will probably also reflect general syringe phobia among respondents and blend in with the total score. As the distribution of any kind of phobia is unknown in the young population of North-West Russia, we considered the DAS to be the most appropriate measurement for the present population of medical and dental students. Nevertheless, some researchers maintain that Corah's DAS does not consider the theoretical structure of DA and that its response categories are not mutually exclusive [30]. In the current study, the Russian version of the DAS seemed to have acceptable psychometric properties. The fact that only three of the 807 DAS respondents omitted one item adds support to the face validity of the instrument, implying that it subjectively appears to measure what it is supposed to measure [123]. Moreover, students who confirmed DA as their reason for not scheduling dental visits had significantly higher DAS scores than students who reported "other" reasons for not going to a dentist (12.5 vs. 8.5, $p<0.001$), which provided evidence of criterion validity, i.e., "the degree of correspondence between a test measure and one or more external referents (criteria)" [123].

To assess OHRQoL, we used the Russian language version of the OHIP-14, an instrument that has been validated in another adult Russian population [81]. Although the instrument was validated among middle-aged adults with periodontal diseases, the results of the present study also provide evidence of the good construct validity of OHIP-14 items when applied to young adults; the OHIP-14 scores discriminated significantly between students with good and poor self-assessed OH (mean 3.6 and 6.6, respectively). Nevertheless, OHRQoL measures, including OHIP-14, have some limitations, as they focus on negative impacts only and define the frequency of impacts of oral diseases, but do not demonstrate their true significance with regard to quality of life [66, 124]. Finally, in the present study, information on OH behaviours, SES, general health, psychological health, and dental aesthetic was self-reported; thus, the possibility of social desirability bias due to under- or over-reporting cannot be ruled out.

When an association between an exposure X and an outcome Y is investigated, we need to assume and check whether there is a third variable (or group of variables) that is associated with both X and Y, and that thus may influence the observed X-Y association. This third variable is usually designated as a confounding variable (or confounder) [115]. Interaction (or effect modification) exists when the relationship between two variables is different for different levels (or presence/absence) of a third variable [115]. To control for confounders and to assess interactions, multivariate analysis (modelling) and stratification are often used [115]. In all three papers that comprise this thesis, we used multivariable analysis to find adjusted associations between the outcomes of interest (DMFT index, DA, and OHRQoL) and the selected predictors. Moreover, as expected, we found a different level of DA in medical and dental students, and significant interactions between "faculty" and "mother's education", and "faculty" and "regularity of dental visits" in relation to the DAS scores. Given that, we performed the statistical analysis for medical and dental students separately. Nevertheless, the selection of predictors, which should be included in multivariable analyses, is controversial and represents a difficult task in epidemiological analysis [125]. Theoretical or empirical strategies may be used to identify potential confounders or effect modifiers. While theoretical identification is based on results of previous studies or expert knowledge, empirical strategies select factors from the current working dataset [126]. In the present study, we endeavoured to apply both strategies, taking into consideration factors which were found to be significant in other studies, as well as results of univariable analyses, in which the crude associations between outcomes and predictors were determined. Nevertheless, we did not take into account other factors that are potentially associated with the outcomes studied, for example, consumption of sugars including soft drinks, content of fluoride in drinking water, and smoking.

5.1.4. External validity

External validity or generalisability reflects the extent to which the obtained results from the study sample (study population) are applicable to the target population or other persons in other places and at other times [116, 117]. Although internal validity is a prerequisite to generalise findings, the internal validity of a study does not guarantee its external validity [118]. In the present study, we included only medical and dental students from the NSMU; therefore the generalisability of the results to other young adults in North-West Russia may be questioned. Medical and dental students are, to some extent, a prosperous group of young people with regard to SES and health-related issues, including OH. However, our participants reported a subjective SES of regular/good (median on the MacArthur scale was 6.0), indicating that they perceived their family to belong to a group not far from the average in Russian society. In addition, although more than three-quarters of the students reported regular dental visits, one-third of the students reported skipping tooth-brushing, which, to some extent, may reflect poorer OH behaviour than we expected. Nevertheless, information on SES in the present study was self-reported; thus the possibility of bias due to under- or over-reporting cannot be excluded.

5.1.5. Reliability

Along with validity or lack of bias, reliability is another concern in when looking at the quality of a study [115]. Reliability (precision, reproducibility, repeatability) reflects "consistency of measurement over time or stability of measurement over a variety of conditions" [123]. Typical methods to assess reliability are inter-rater (or intra-rater) reliability, test-retest reliability, and internal consistency [115, 123]. In the present study, data from the clinical dental examination were obtained by one calibrated clinical investigator (SND). To ensure intra-rater reliability, 54 of the study participants were clinically re-examined. The resulting Kappa statistic for DT and non-DT teeth was 0.804

(95% CI: 0.641-0.967), signifying a strong agreement [127]. Intraclass correlation coefficients for the DMFT index and GI were 0.989 (95% CI: 0.981-0.993) and 0.828 (95% CI: 0.721-0.896), respectively, which implies that the data are reliable. Given the short amount of time set aside for each re-examination, we did not ask the re-examined participants to complete the Stage 1 and Stage 2 questionnaires a second time. Therefore, we could not assess the test-retest reliability of the information given by the students. Internal consistency measures the reliability within the instrument by assessing how well test components that reflect the same construct give similar results. These estimates are based on the intercorrelations among all the single test components (items) within the instrument [123]. We assessed the internal consistency of the DAS and OHIP-14, and the results showed good reliability, with a high inter-item correlation coefficient (Cronbach's alpha=0.85) for both instruments. In addition, we found average inter-item correlations of 0.59 (range: 0.47-0.72) and 0.28 (range: 0.10-0.66) for the DAS and OHIP-14 items, respectively, with no negative correlations. Moreover, for the DAS and OHIP-14 items, the corrected item-total correlations ranged from 0.63 to 0.78 and from 0.27 to 0.66, respectively, and all values were above the minimum recommended level of 0.20 for including an item into a scale [128].

5.1.6. Statistical analysis

Missing data are a challenge in almost all biomedical research; they can reduce statistical power and produce biased estimates that in turn may lead to invalid conclusions [129]. The risk of bias depends on the reasons for missing data, which are commonly considered to be MCAR, missing at random, and missing not at random [105, 130, 131]. When the assumption of MCAR is fulfilled, i.e., when there are no systematic differences between the missing values and the observed values, and the sample size is large enough, complete-case analyses will not lead to bias [129]. In the current study, the data may be assumed to

be MCAR given the insignificant Little's MCAR tests. Therefore, we applied a complete-case analysis, where only students with no missing data in questionnaires were included in the statistical analyses. Moreover, in Paper I, all missing values were in the predictor variables. In these circumstances, and under the assumption that the reasons for the missing data are unrelated to the outcome, we might get unbiased estimates [130]. The same applies to Paper II, in which only three students had missing values for the outcome variable. However, in Paper III there was missing data for both the outcome and the predictors, and thus the possibility of biased estimates cannot be ruled out. The fact that students with missing OHIP-14 data (9.7%) more often had poor self-assessed dental aesthetic, dissatisfaction with their mouth and teeth, and poor clinically-assessed OH might have biased our estimates.

In the present study, we assessed how the selected factors were associated with the outcomes using regression analysis. The choice of regression model depended on the type of outcome and its distribution. The Poisson model, the negative binomial model, the zero-inflated models, and the hurdle models were taken into account. In Paper I, over-dispersion and an excess of zeros were found in the outcome (DMFT index) distribution, given the significant likelihood-ratio test of alpha and the significant Vuong test, respectively [132]. In these cases, the zero-inflated negative binomial model or the negative binomial hurdle model is recommended [133]. Differences between the zero-inflated negative binomial model and the negative binomial hurdle model are often small, but the negative binomial hurdle model has an easier and less misleading interpretation [133]. Interestingly, despite many earlier citations, a recent work by Wilson has shown that the Vuong test is inappropriate for testing zero inflation [134]. Nevertheless, the Akaike information criterion and the Bayesian information criterion may also be used to choose between a standard model and a zero-inflated model; the model with lower values of these criteria is the one that fits the data better. In the present study, the lowest values of the information

criteria were found for the zero-inflated negative binomial model and the negative binomial hurdle model among other models considered. In Paper II, the DAS score was the dependent count variable, with observed values from 4 to 19. Multivariable Poisson regression was used, given the non-significant test for alpha; in this case, negative binomial regression did not fit our data better than Poisson regression. In Paper III, the dichotomised dependent variable was the outcome variable, therefore multivariable binary logistic regression was applied. The same type of regression analysis was also used in Paper I to evaluate the ORs of being placed in the SiC group.

5.2. Discussion of main results

5.2.1. Prevalence of dental caries and dental caries experience

The prevalence of dental caries among medical and dental students in the present study (95.7% and 96.4%) was higher than that reported in Yemen (81.7% and 85.0%) [18] and in a longitudinal study in Spain (82.2% and 83.0% at the start and 91.1% and 87.2% at the end of the study) [93]. A similar pattern was observed in relation to dental caries experience, as measured by the high mean DMFT index of 7.6, which shows that the dental health of medical and dental students in North-West Russia is worse than that reported in Spain (3.38-5.91) [93], India (1.16-1.96) [20], and Yemen (3.92-4.27) [18].

Other Russian studies among Perm medical students published in 1987 and Moscow students published in 2009 found that only 1.5% [98] and 0.7% [23] were dental caries-free, respectively, and the DMFT index was even higher than ours: 9.3 and 10.4, respectively. Direct comparison of these results with our data must be done with caution due to differences in population characteristics, recruitment, and the area covered. Nonetheless, one may speculate that dental health in young adults in Russia has not significantly improved despite positive socioeconomic changes in Russia over the past 20-30 years [135].

In the current study, FT constituted the main fraction of the DMFT index in both medical (89.8%) and dental (91.0%) students. This fraction was much higher than that in medical and dental students from India (21.4% and 34.5%) [20] and Yemen (54.6% and 49.9%) [18]. Other Russian studies revealed that FT constituted only 60.7% and 42.0% of the DMFT index in Perm medical students [98] and in Moscow students [23], respectively. The relatively high availability of dental treatment and willingness of our medical and dental students to seek dental care is one possible explanation for the high fraction of FT we observed. Indeed, in the current study 77.8% of the students reported regular dental visits. This might be explained to some extent by the fact that medical and dental students at NSMU undergo medical examinations, including dental check-ups, before they start the clinical aspect of their education. Moreover, the threshold for dental caries treatment among dentists in Russia should be investigated to better understand the high fraction of FT in our study population.

5.2.2. Dental anxiety in medical and dental students

The present study revealed that the prevalence of high DA and mean DAS score were higher in medical than in dental students of the NSMU. This was expected and agrees with results from other studies [52, 53, 57]. One obvious explanation is that the level of knowledge about dentistry, severity of dental diseases, and possible inconvenience while receiving dental treatment is higher among dental students. They get more information about DA during their training, they learn how to communicate with fearful dental patients and help them cope with DA, which may result in a better understanding of their own DA, as well as help them cope with it. Our findings may also indicate that the curriculum of medical studies at the NSMU does not include enough information on dental diseases and treatment.

Researchers have used global questions [55], different scales [51, 52, 60, 62], or different DAS score cut-offs to assess DA [57]. This may complicate the comparability of these studies with our results, although conversion tables can be used to compare our findings with MDAS results from other studies [136]. Nonetheless, levels of DA in our medical and dental students were found to be lower [52, 54, 57, 59] or comparable [51] with those reported in studies among other medical or dental students. To some extent, that might be expected given the dominance of FT in the structure of the DMFT index (overall, more than 90%) in our medical and dental students.

5.2.3. Oral health-related quality of life

More than half of the medical and dental students in our study sample had low OHRQoL. The severity (mean OHIP-14 score 4.6) and prevalence of low OHRQoL (53.6%) in our medical and dental students is similar to that reported in Brazilian dental students (4.5 and 45.0%) [78] and Chinese young adults (6.3 and 50.6%) [76]. In contrast, an Indian study found a mean OHIP-14 score of 13.4 and 10.7 in 1st- and 4th- year dental students, respectively [79], while a Japanese study reported a mean OHIP-14 score of 1.9 in 1st-year university students [74]. Evaluation of quality of life, including OHRQoL, depends on an individual's expectations and experiences, which vary according to social, psychological, socioeconomic, demographic, and other cultural factors [137]. Someone with poor OH and low expectations may not consider themselves to have low OHRQoL and report being satisfied. In contrast, individuals who have good OH and high expectations may experience low OHRQoL due to even minor oral problems and report being dissatisfied [137]. Previous studies showed that 80.0% of Brazilian dental students were satisfied with their mouth and teeth [78]; only 15.1% of Chinese young adults [76] and 36.8% of Japanese university students [74] reported good OH, while 44.4% and 63.8% of our medical and dental students were satisfied with their mouth and teeth and reported good OH,

respectively. To compare these results, we need to know the frames of reference of the respective study samples, i.e., their level of knowledge and the expectations and experiences they used when assessing their OH, satisfaction, and OHRQoL. Qualitative research should be designed to answer these questions [138]. Nevertheless, in the present study we found that the OHIP-14 dimensions of physical pain and psychological discomfort were the biggest drivers of low OHRQoL, which is in line with all aforementioned studies [74, 76, 78, 79]. Therefore, one may assume a similar pattern of OHRQoL exists in young adults in different countries.

5.2.4. Socio-behavioural factors associated with dental caries experience, dental anxiety, and oral health-related quality of life

In agreement with the world trend, the DMFT index in the present study increased significantly with age (Paper I), as dental caries is an irreversible, accumulative disease. Also in line with international findings [6, 17, 21], female sex was found to be associated with a higher DMFT index (Paper I). Researchers explain this fact through a complex aetiology, including hormonal fluctuations, genetic variations, different saliva composition and flow rate, dietary habits, and social roles in the family [139, 140]. Moreover, previous studies [52, 55-58] have documented that female students have higher DAS scores than male students, and this was the case in the present study (Paper II) among students from both faculties. It has also been postulated that women are more susceptible to perceived threats or danger, and that they may describe their fears more openly; while men may be more emotionally stoic and hide their anxieties [141]. In addition, female students showed higher odds of having low OHRQoL than male students (Paper III). This is in contrast with other studies, which found no sex differences in OHRQoL in young adults [71, 73, 76-78, 80]. One possible explanation is that women are more likely to report more severe and frequent pain than men, although the mechanisms behind this phenomenon remain

understudied [142]. Moreover, one may speculate that women have a higher expectation of good OHRQoL and are more concerned about their appearance, thus they may describe their psychological discomfort more openly than men.

OH inequalities associated with SES have been widely observed in different age groups [143]. It has also been reported that persons with low SES have a higher risk of poor dental health in terms of dental caries [144, 145]. We found the opposite association, as those with higher subjective SES had a higher DMFT index (Paper I). We cannot rule out the possibility that our results might be biased compared to other studies that used education, occupation, or income as more objective indicators of SES. Nonetheless, a panel study that followed Russian adults from 1994 to 2013 showed little consistency between SES, as defined with objective indicators, and self-assessed health status [146]. The authors suggested that subjective SES may be more related to self-perceived health. One possible explanation for our findings may be that students with higher SES tend to adapt more to a Westernised lifestyle, with frequent consumption of foods and beverages containing added sugar. Moreover, these students may seek dental treatment more often, as they may have less DA and concerns about cost. Indeed, according to the findings from Paper II, a higher SES was associated with a lower DA in medical students (although the association was statistically significant only in the univariable analysis). Moreover, in medical students, mother's education was associated with DA – students whose mothers had a lower level of education had higher DAS scores. Although we did not find any comparable results from other studies of medical and dental students, one may assume that more educated parents, characterised by high SES, maintain a positive attitude toward dentists and dental treatment indirectly, through their own experience [31]. In contrast, in our dental students, whose mothers were more educated compared to our medical students, we did not observe any differences in DA according to level of mother's education. It also cannot be ruled out

that dental students base their attitudes on their own knowledge and experience, and less on any transferred scepticism.

Our study also showed that students who lived in rural areas during childhood had higher odds of reporting low OHRQoL compared to those who lived in urban areas (Paper III). Geographical remoteness, socioeconomic deprivation, and limited access to OH services have been discussed by other researchers to explain these differences [147]. Indeed, the European North-West of Russia has a low population density: it covers approximately 1.5 million km^2 but has a population of only 4.6 million (78.9% urban in 2016) [99]. In addition, the inhabitant-to-dentist ratio in North-West Russia is high; much higher, for example, than in the neighbouring Nordic countries (2294 inhabitants per dentist in North-West Russia vs. 1262 in Norway and 1101 in Sweden) [148]. The corresponding figure in rural areas of North-West Russia is even higher (approximately 3700 inhabitants per dentist in the Arkhangelsk Region) [22].

The importance of OH behaviour in maintaining good OH and dental health is well established. In our study, 80.8% of the medical and dental students reported brushing their teeth twice a day or more (Paper I). This is higher than the percentage reported for the past 5-10 years in university students from 26 countries across Asia, Africa, and America (67.2%) [149]; Yemen students (38.1%) [18]; and Indian medical students (24.4%) [150]. Nevertheless, the dental health of our study participants was worse than that reported in the aforementioned studies. Our medical students had poorer OH behaviour in terms of regularity of dental visits, frequency of tooth-brushing, skipping tooth-brushing, and using toothpaste with fluoride than their dental counterparts (Paper II). Although dental students had less DT than medical students (Paper II), we found no differences in the DMFT index between faculties (Papers I and II). Over-reporting of good dental behaviour by the participants, especially by the dental students, given their educational background, cannot be excluded. Indeed, 34% of the students reported skipping tooth-brushing, which was a

significant determinant of higher DMFT index (Paper I). In Paper II, less frequent tooth-brushing in dental students was associated with a higher DAS score, which was also reported in a previous study of undergraduate students [55]. In agreement with prior studies [36], our study did not support the hypothesis that students who avoid dental visits develop good OH habits on their own.

Our finding that students who visit a dentist regularly have a higher DMFT index (Paper I) is in agreement with previous Chinese [8] and Australian [14] studies. More than 90% of DMFT in our study were FT, which may suggest that dental services in Russia are focused on treatment, not on the prevention of dental caries. Moreover, in line with previous studies [58, 61], our study showed that irregular dental visits is a significant predictor of higher DA (Paper II).

5.2.5. Associations between oral health and dental anxiety

Poor self-assessed OH was significantly associated with higher DAS scores in medical students in both univariable and multivariable analyses. We also found a similar association in the univariable analysis for dental students, but after adjustment for other factors these differences were no longer significant (Paper II). Poor self-assessed OH may reflect dental problems students have, which in turn may result in DA. This corresponds to findings from other studies [32, 34]. Moreover, having experienced pain in mouth was an independent significant factor associated with higher DA in dental students. When looking at clinically-assessed OH, a higher number of DT in dental students and MT in medical and dental students was associated with a higher DAS score; but after adjustment, only MT remained as a significant predictor of DAS score in the multivariable model in dental students. Although causality in the present study cannot be established, one may assume that OH problems led to toothache and subsequent, painful tooth extractions. Our sample is first and foremost characterised by high FT values, but we did not find any differences in

the DAS score by the number of FT in medical or dental students. DA in our study showed a better association with components of the DMFT index (in our case, MT due to dental caries) than with gingivitis. GI in medical students was significantly associated with DA in the univariable analysis but became insignificant after adjustment. Gum inflammation in young adults is usually accompanied by gum bleeding only and is unlikely to result in pain. In contrast, extraction of teeth due to dental caries when dental infection results in a pulp inflammation and destruction of periapical tissues is more likely to be associated with pain than gum problems or even restorative treatment (FT) that may lead to DA.

5.2.6. Associations between oral health and oral health-related quality of life

We found that poor self-reported OH characteristics had the strongest association with low OHRQoL. This was expected and is in line with results from other studies [74, 76, 78, 79]. One obvious explanation is that the concept of OHRQoL is based on outcome measures from the patients' perspective rather than from a dental professional's viewpoint [64-66]. Indeed, dissatisfaction with mouth and teeth and poor self-assessed dental aesthetic may best reflect the OHIP-14 dimensions of psychical pain and psychological discomfort, which were the biggest drivers of low OHRQoL in our study. Physical pain is often considered easy to remember [78]. Psychological discomfort may result from poor dental aesthetic and dissatisfaction with mouth and teeth; a Malaysian study showed that psychological discomfort had the highest reported impact on OHRQoL in young adults with malocclusion [73]. Moreover, in our study a higher DMFT index was also associated with low OHRQoL. In contrast, a Swedish study did not find any differences in OHRQoL between young adults at high risk (DMFT index >8) and low risk (DMFT index=0) of dental caries [75]; nor were differences in DMFT index found in young adults in China [76]. Nevertheless, Japanese university students with a higher DMFT index had lower OHRQoL [74]. In the current study, the mean DMFT index was 7.5 (Paper III), while in

China and in Japan the corresponding values were 1.4 [76] and 2.0 [74], respectively. At present, the mechanisms of the relationship between dental caries experience and OHRQoL are unclear [74]. Given that physical pain was the OHIP-14 dimension most frequently reported, one may assume that the dental caries experience in our medical and dental students was likely associated with pain in mouth. Indeed, associations between DMFT index and experienced pain in mouth were found in the present study (Table 6).

Chapter 6. Conclusions

- A high prevalence of dental caries (96.0%) and high DMFT index (7.58), with FT accounting for 90.2% of dental caries experience, were observed among Russian medical and dental undergraduate students aged 18-25 years in North-West Russia.
- Older age, female sex, higher SES, regular dental visits, and skipping tooth-brushing were significant determinants of dental caries experience.
- Prevalence of high DA was lower in dental than in medical students (2.2% vs. 13.7%).
- DAS score in medical students was positively associated with sex (females), lower mother's education, and poor self-assessed OH. In dental students, being female, irregular dental visits, infrequent tooth-brushing, experienced pain in the mouth, and a higher number of MT were found to be significant, independent factors associated with higher DA.
- More than half of the students (53.6%) reported low OHRQoL. Physical pain and psychological discomfort were the most frequently reported OHIP-14 dimensions that impacted OHRQoL.
- Poor self-reported OH characteristics (poor self-assessed dental aesthetic and dissatisfaction with mouth and teeth) were the strongest factors associated with low OHRQoL. Socio-demographic factors (rural place of childhood residence and female sex) and clinically-assessed OH (high DMFT index) were also found to be significant predictors of low OHRQoL in medical and dental students of the NSMU. Socioeconomic factors (subjective SES, mother's education) and OH behaviour were insignificant variables in relation to OHRQoL.

Chapter 7. Final remarks and future perspectives

When assessing OH in Russian young adults, we included only medical and dental students from the NSMU. Therefore, to validate our results, a representative sample drawn from the general young adult population is needed. Moreover, to better understand the high dental caries experience in our study population, further studies that include information on the threshold for dental caries treatment among Russian dentists may be warranted.

Motivation to maintain good OH behaviour among students should be investigated. Indeed, more than 80% of our study participants reported brushing their teeth twice a day or more; however, 34% of students reported skipping tooth-brushing once a week, every day, or almost every day. Moreover, consumption of sugars, including soft drinks, needs to be studied in Russian young adults. In addition, the association between subjective SES and objective indicators of SES (education, occupation, income) should be investigated in Russia to better understand the socioeconomic inequalities in OH among Russian young adults.

Taking into account the substantially lower level of DA in dental students than medical students and the factors associated with DA in these two student groups, public health measures should focus on promoting dental literacy, increasing knowledge on the prevention of dental diseases, and motivating good OH habits in young adults in North-West Russia. The fact that more than 90% of DMFT in our study were FT may suggest that dental services in Russia are focused on treatment, not on the prevention of dental caries. Moreover, dental caries experience was associated with experienced pain in mouth, which affected OHRQoL. Therefore, public health measures should focus on the development of preventive strategies to improve OH and OHRQoL in Russian young adults. Finally, qualitative research should be developed to understand how Russian young adults describe their experience of OH, satisfaction with mouth and teeth, OHRQoL, and what they expect from good OH.

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Paper I

Dental caries experience and determinants in young adults of the Northern State Medical University, Arkhangelsk, North-West Russia: a cross-sectional study.

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Dental caries experience and determinants in young adults of the Northern State Medical University, Arkhangelsk, North-West Russia: a cross-sectional study

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Abstract

Background: Little information exists about the experience of and risk factors for dental caries in young adults in Russia. We investigated dental caries experience and determinants in medical and dental students in North-West Russia.

Methods: This cross-sectional study included 442 medical and 309 dental undergraduate students of Russian nationality aged 18–25 years from the Northern State Medical University, Arkhangelsk, Russia. Information on socio-demographic factors and oral health behaviour (regularity of dental visits, frequency of tooth-brushing, using toothpaste with fluoride, and skipping tooth-brushing) was obtained from a structured, self-administered questionnaire. Dental caries experience was based on the decayed (D) missing (M) filled (F) teeth (T) index and the Significant Caries (SiC) index, which were assessed through dental examination. Students with a DMFT index ≥9 were placed in the SiC group. Negative binomial hurdle and multivariable binary logistic regressions were used for statistical analyses.

Results: The prevalence of dental caries (DMFT >0) was 96.0%, overall mean DMFT index was 7.58 (DT: 0.61, MT: 0.12, and FT: 6.84), and the corresponding SiC index was 12.50. Age 21–25 years (incidence rate ratio [IRR] = 1.09, 95% confidence interval [CI]: 1.01–1.18), being a female (IRR = 1.10, 95% CI: 1.01–1.20), high subjective socioeconomic status (SES) [IRR = 1.11, 95% CI: 1.02–1.21], and skipping tooth-brushing (IRR = 1.09, 95% CI: 1.00–1.19) were associated with a higher DMFT index. DMFT index also increased among students who reported regular dental visits (IRR = 1.22, 95% CI: 1.10–1.36), but their odds of being in the dental caries-free group decreased (odds ratio [OR] = 0.38, 95% CI: 0.18–0.82). Significant predictors of being categorised to the SiC group were older age (OR = 1.41, 95% CI: 1.03–1.92), high subjective SES (OR = 1.57, 95% CI: 1.13–2.19), and regular dental visits (OR = 2.34, 95% CI: 1.56–3.51).

Conclusions: A high prevalence of dental caries and high DMFT index, with a dominance of FT, were observed in our Russian medical and dental students. Age, sex, subjective SES, regular dental visits, and skipping tooth-brushing were determinants of dental caries experience.

Keywords: DMFT, Young adults, Medical and dental students, North-West Russia

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Background

Dental caries is a widespread chronic disease that affects billions of people worldwide. In the last decades, marked improvements in dental health have been reported in developed countries, along with an increasing proportion of dental caries-free populations, likely due to the implementation of preventive programmes such as water fluoridation, introduction of fluoride in toothpaste, and positive changes in oral health behaviour [1]. Nonetheless, global problems related to dental caries persist in most industrialised countries. The prevalence of dental caries ranges from 60 to 90% in schoolchildren and is almost 100% in adults [2]. According to the World Health Organisation (WHO), children aged 12 years are a key group that need to be monitored for dental caries. Dental caries experience at this age, expressed using the decayed (D) missing (M) filled (F) Teeth (T) index, varies from 0.2 to 7.8 across countries [3]. In Russia, the prevalence of dental caries (DMFT >0) is still high; considerably higher than in neighbouring Nordic countries. In 2009, the proportion of 12-year-olds with no dental caries experience (DMFT = 0) was 52% in Norway and 16% in Russia [4].

Young adults aged 18–25 years are also a particularly important group in the study of dental health and its determinants. Indeed, this age range comprises periods of biological, psychological, and social development and is a transition between adolescence and adulthood, when persons take responsibility for their health and develop their own health behaviour [5]. Conscripts and students are often targeted in studies of dental health in young adults, and previous studies in these populations have been conducted in many countries, including Japan [5], Israel [6], Brazil [7], Norway [8], Australia [9, 10], Finland [11], and China [12]. Previously reported risk factors associated with dental health include socioeconomic factors (income, education, occupation) [7, 10, 11], socio-demographic factors (age, sex, place of residence, ethnicity) [5, 10, 11], oral health behaviour and attitudes [6, 12], and exposure to fluoridated drinking water [10, 11, 13].

However, to our knowledge, there is little information on dental caries experience and determinants in young adults in Russia. In 2006–2008, a group of researchers conducted a study among 432 students in Moscow aged 16–25 years. They reported a high mean DMFT index (10.4) and mean DT (5.7), and the reported prevalence of dental caries was 100% and 98.3% in females and males, respectively [14]. An epidemiological survey from the Arkhangelsk Region of North-West Russia investigated the dental health of 447 conscripts aged 18-19 years and reported a prevalence of dental caries of 94.3% and a mean DMFT of 5.9 [15]. However, both of these studies presented dental status in a descriptive manner; no determinants were studied.

Medical and dental students are expected to have specific knowledge about disease prevention and hygiene, and thereby are expected to show better oral health behaviour compared to their counterparts in the general population. In addition, students from medical and dental faculties may have high socioeconomic status (SES), which in turn may lead to better dental health [16]. Nevertheless, in 2008, an Indian study revealed that only 54.6% and 38.5% of the dental and medical students, respectively, brushed their teeth twice a day. Moreover, more than 80% of the study participants had never used dental floss [17]. In Russia, there is only one study that examined medical students, which was performed in 1987 [18]. The authors observed a high prevalence of dental caries (98.5%) and a mean DMFT of 9.3, reflecting poor oral health.

The present study aimed to investigate dental caries experience and determinants in medical and dental students in North-West Russia.

Methods

The Northern State Medical University (NSMU) is located in Arkhangelsk, Russia. Students at the NSMU are mainly from the European North-West of Russia, which includes the regions of Arkhangelsk, Vologda, Murmansk, the Komi Republic, the Republic of Karelia, and the Nenets Autonomous Okrug. Altogether, these regions cover an area of approximately 1.5 million km^2 and have a population of 4.6 million (78.9% urban in 2016) [19].

We selected our participants from the approximately 3900 students that attended the NSMU in the 2015-2016 academic year. We invited students from two faculties to participate: 1) the medical faculty, which included students from the departments of general medicine and paediatric medicine; and 2) the dental faculty. For convenience, students from four other, smaller faculties and departments (medical prophylaxis, medical biochemistry, pharmacy, and clinical psychology) were not considered; nor were students from the international faculty of general practitioners, as we focused on students of Russian nationality only.

This cross-sectional study included two stages. At Stage 1, students from in both faculties and all years of education (6 years for medical students and 5 years for dental students) were informed about the study and invited to participate at the end of a scheduled curriculum classroom lecture. Altogether, 1579 students attended this lecture and were invited to Stage 1. The overall attendance rate of the lectures was 78.7% and varied from 55.1% (6th-year medical students) to 100% (4th-year medical students). Of the invited students, 1385 agreed to participate (overall response rate 87.7%). During the last 15 min of the lecture, they signed the informed consent form and completed a structured, self-administered,

anonymous questionnaire in Russian under the supervision of the main researcher (SND). The response rates were similar across the faculties and years of education (>83.3%), except for 4th-year medical students (57.8%). All students participating in Stage 1 gave their mobile phone number so they could be contacted for Stage 2.

Stage 2 included the completion of a second, structured, self-administered, anonymous questionnaire and a clinical dental examination. In order to get comparable groups of medical and dental students and taking into account an outcome prevalence of 0.50, a confidence interval (CI) of 95%, and error margin of 5%, the necessary sample size was calculated as ~380 students in each group. Assuming that medical students may not be as supportive of the oral health study as dental students, and allowing for refusals, no-shows, and exclusions, we invited 420 dental students and 823 medical students to attend Stage 2. For medical students, a stratified random proportionate sample was selected, taking into consideration the distribution of medical students across the departments (general medicine and paediatric medicine) and years of education. Sixty-two students (57 medical and 5 dental) refused to participate in Stage 2 after invitation. We excluded 135 students (128 medical and 7 dental) who did not answer their phone at two separate calls on two separate days and 145 students (125 medical and 20 dental) who did not attend the clinical dental appointment. Ninety-four students (39 medical and 55 dental) were also excluded due to the exclusion criteria for the clinical dental examination (age under 18 or over 25 years, non-Russian nationality, presence of fixed orthodontics bands, and pregnancy). The response rate was 57.6% and 79.3% in medical and dental students, respectively, and varied across years of education (41.5-69.1% and 70.3–85.4%, respectively). Finally, 56 students with missing data in the questionnaires were excluded. Thus the final sample for analysis consisted of 442 medical and 309 dental students (Fig. 1).

Data collection

The Stage 1 questionnaire collected information on socio-demographic variables, as well as data on oral health behaviour. Age was categorised as 18–20 and 21-25 years in order to get results that could be compared with those of other studies. Other socio-demographic variables included sex, faculty (medical/dental), childhood place of residence (urban/rural), and location of finishing school (Arkhangelsk City/Arkhangelsk Region/other regions). The questionnaire also asked the student to report whether they were eligible for free education (no/yes) and their type of accommodation (hostel/flat or house). A university applicant who does not qualify for free education at the NSMU can still study there, but they must pay tuition each year.

Questions on oral health behaviour included frequency of tooth-brushing (infrequent, i.e., never/less than once a week/once every few days/once a day; or frequent, i.e., twice a day/more than twice a day), using toothpaste with fluoride (without fluoride/difficult to answer; or with fluoride), and skipping tooth-brushing (no, i.e., never or almost never; and yes, i.e., sometimes during a week/every day or almost every day). Regularity of dental visits was categorised as regular (at least once every 6 months/at least once a year) and not regular (occasionally/no visits during the last 3 years). The option 'difficult to answer' was chosen only twice in response to regularity of dental visits and thus was considered as missing in the analysis.

The Stage 2 questionnaire collected additional information on socio-demographic variables. Mother's education was categorised as lower than university (high school: 9–11 years of school; specialised secondary: professional, medical, or pedagogical college, technicum) and university. The response 'difficult to answer' was considered as a missing value. Subjective SES was assessed using the MacArthur Scale [20], in which students self-reported the ranking of their family in Russian society on a ladder with 10 rungs in accordance with socioeconomic indicators (education, income, occupation): 10 was 'best off' and 1 was 'worst off'. Given the skewed distribution of SES and using the median SES (6.0) as the cut-off, those who gave a rating of 1–5 were categorised as having low subjective SES and those responding 6–10 as having high subjective SES.

The authors developed the questionnaire in English and two independent persons translated/back-translated to Russian. The final versions were discussed and were judged to concur with the original. Before the study began, the questionnaires were tested on 12 students randomly selected from the target age group who did not participate in the study. No adjustments were necessary.

A non-invasive clinical dental examination was performed at the Dental Clinic of the NSMU from February to May 2016. The students were examined in a dental chair under a professional light, using a dental plain mirror and a dental probe without radiographs. One researcher (SND) executed all clinical examinations and dictated observations to an assistant in the room, who recorded them on a clinical form. Clinical criteria for dental caries were applied in accordance with WHO recommendations (i.e., when a lesion of the tooth's surface had an unmistakable cavity, undermined enamel, or a detectably softened floor or wall) [21]. All permanent teeth, excluding wisdom teeth, were taken into consideration during the clinical examination. The researcher was carefully calibrated on examination technics and diagnostic thresholds at the Dental Clinic of UiT The Arctic University of Norway, Tromsø,

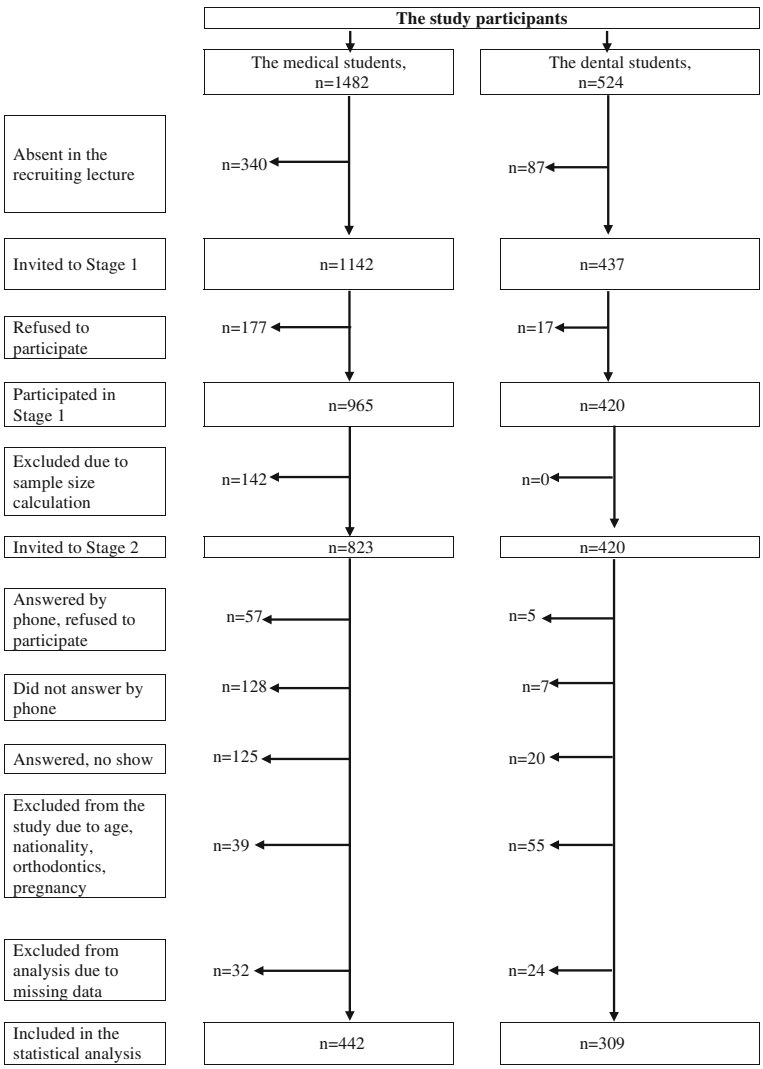

Fig. 1 Flow chart of the study participants

Norway, before the study start. Information from the dental clinical examination was used to calculate DMFT index. The Significant Caries (SiC) index was computed as the mean DMFT index in the tertile of participants with the highest DMFT index [22]. The DMFT cut-off point in this subgroup was 9, thus all students with a DMFT index ≥9 were placed in the SiC group.

Fifty-four (7%) of the examined students were selected randomly for clinical re-examination in June 2016. To ensure reliability, Cohen's Kappa and intra-class correlation coefficients (ICC) were calculated for dichotomous and quantitative data, respectively. The Kappa statistic for DT and non DT teeth was 0.804 (95% CI: 0.641-0.967), signifying a strong agreement [23]. For DMFT index, the ICC was 0.989 (95% CI: 0.981–0.993).

Statistical analysis

Data analysis was performed with IBM SPSS Statistics for Macintosh version 23.0 (IBM Corp., Armonk, New York, USA) and STATA version 14.0 (StataCorp, College Station, Texas, USA). Given the skewed distribution of the DMFT index, the Mann-Whitney U and Kruskal-Wallis tests were used to compare two and more than two independent groups, respectively. For qualitative data, the chi-square test was applied.

The Poisson model, the negative binomial model, the zero-inflated (ZI) models, and the hurdle models were taken into consideration to explore the effects of socio-demographic factors and oral health behaviour on DMFT index. The significant likelihood-ratio test of alpha (chi-square = 267.2, $p < 0.001$) indicated that the data were over-dispersed and that negative binomial

regression fitted the data better than Poisson regression. Moreover, the significant Vuong test (z = 3.10, $p = 0.001$) showed an excessive number of zeros. For outcome distributions with over-dispersion and an excess of zeros, the zero-inflated negative binomial model or the negative binomial hurdle (NBH) model are recommended [24]. Both ZI and hurdle models consist of a zero part and a count distribution part. In ZI models, zeros can be specified in either the zero part (structural zeros) or in the count distribution part (sampling zeros), which often leads to an incorrect or imprecise interpretation of the results [25]. In contrast, the two parts of hurdle models are clearly separated, and all zeros are modeled only in the zero part, while the count part (or zero-truncated part) deals with values over zero. For this reason, hurdle models have an easier and less misleading interpretation [24]. Therefore, we applied NBH analysis that included two separate models: a logistic regression and a zero-truncated negative binomial regression. The first model predicts whether or not a student experiences dental caries (i.e., DMFT >0 vs. DMFT = 0). The second model was generated to predict the DMFT index for students with dental caries experience. Two sets of predictors were used for different parts of the NBH regression model. The selection of variables included in logistic and zero-truncated parts of the NBH model was determined by their level of significance (less than 0.2) in univariable analysis for the proportion of dental caries-free students (DMFT = 0) and mean DMFT index (DMFT >0), respectively. To adjust for heterogeneity, Huber-White sandwich estimates for standard errors (robust estimates) were applied.

In addition to the NBH analysis, we used multivariable binary logistic regression to evaluate the odds ratios (OR) of being categorised to the SiC group in relation to selected socio-demographic and oral behavioural determinants. Whether a student was in the SiC group or not was considered as the dependent variable. All variables with a level of significance less than 0.2 in the univariable analysis were included in the multivariable regression model simultaneously. The level of significance for testing all statistical hypotheses was set at $p = 0.05$.

Results

A total of 751 students were included in the statistical analysis, and the majority were women ($n = 564$). Mean age of the students was 20.2 years (standard deviation [SD] 1.6). Seventy-two percent of the participants reported an urban childhood area of residence, and more than 80% of the students came from the Arkhangelsk Region or other regions of North-West Russia. Almost 80% of the participants were eligible for free education and 64% lived in flat or house. The mothers of 45% of the participants had an education level that was lower than university. When looking at oral health behaviour, 78% of participants reported regular dental visits, 47% reported using a toothpaste with fluoride, and 81% reported frequent tooth-brushing. However, 34% of the students reported skipping tooth-brushing once a week, every day, or almost every day.

The prevalence of dental caries (DMFT >0) among the participants was 96.0%. The overall mean DMFT index was 7.58 (SD 4.4); DT: 0.61 (SD 1.2), MT: 0.12 (SD 0.4), and FT: 6.84 (SD 4.1), with FT accounting for 90.2% of dental caries experience. FT constituted the main fraction of the DMFT index, both in medical (89.8%) and dental (91.0%) students. The SiC index was 12.50 (SD 3.0); DT: 0.99 (SD 1.5), MT: 0.26 (SD 0.6), and FT: 11.25 (SD 2.9), with FT accounting for 90.0%. There were 283 students (37.7%) in the SiC group (DMFT ≥9) (Fig. 2).

There were no statistically significant differences in the prevalence of dental caries across the socio-demographic characteristics considered. The mean DMFT in students with dental caries experience and the proportion of students in the SiC group (DMFT ≥9) were significantly higher among participants aged 21-25 years than among their younger counterparts (8.3 vs. 7.6 and 43% vs. 34%, respectively). Students with dental caries experience who were not eligible for free education had a lower DMFT index compared to those who were eligible for free education. Students with higher subjective SES had a significantly higher DMFT index (8.2 vs. 7.4) and presented in the SiC group more frequently (41% vs. 31%). No statistically significant differences in the mean DMFT index and proportion of students in the SiC group were observed across age, sex, faculty, place of childhood residence, location of

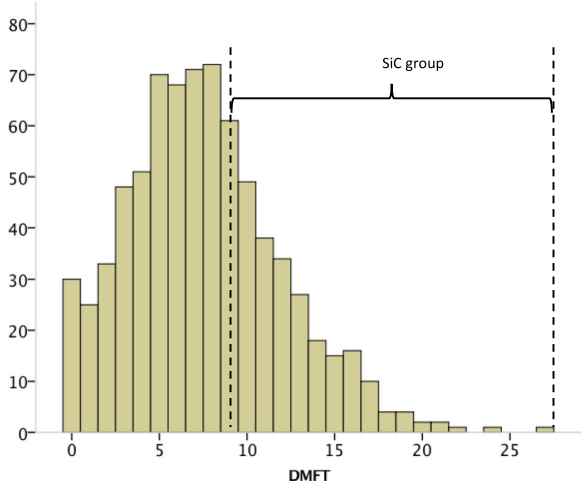

Fig. 2 Histogram of the Decayed Missing Filled Teeth (DMFT index) in the overall study sample ($n = 751$) and in the Significant Caries (SiC) group ($n = 283$)

finishing school, accommodation, and level of mother's education (Table 1).

Students who reported regular dental visits had a higher prevalence of dental caries and a higher DMFT index, fewer DT (0.56 vs. 0.81, $p = 0.025$), more FT (7.28 vs. 5.33, p<0.001), and were more frequently in the SiC group compared to those who did not report such visits. No statistically significant differences were found in the prevalence of dental caries or the DMFT index among categories of tooth-brushing, skipping tooth-brushing, or toothpaste (Table 2).

The results of NBH are shown separately for the logistic and zero-truncated negative binomial parts (Table 3). Regular dental visits were significantly associated with lower odds of being in the dental caries-free group (OR = 0.38, 95% CI: 0.18–0.82). Furthermore, students who reported regular dental visits had an adjusted DMFT index that was 1.22 (95% CI: 1.10–1.36) times higher than that observed in those who did not report such visits. The DMFT index of students aged 21–25 years was 1.09 (95% CI: 1.01–1.18) times higher than that predicted in their younger counterparts, after adjustment for other variables in the model. Being a female, skipping tooth-brushing, and high subjective SES were also found to be significant independent determinants of high DMFT index.

Significant predictors of being categorised to the SiC group were older age (OR = 1.41, 95% CI: 1.03–1.92), high subjective SES (OR = 1.57, 95% CI: 1.13–2.19), and regular dental visits (OR = 2.34, 95% CI: 1.56–3.51) (Table 4).

Table 1 Socio-demographic characteristics associated with dental caries experience in the study sample

	All n	DMFT = 0 (%)	*p**	DMFT >0, mean (SD)	*p***	SiC gr n (%)	*p**
Age group (years)			0.054		0.028		0.020
18–20	449	(5.1)		7.62 (4.10)		154 (34.3)	
21–25	302	(2.3)		8.30 (4.33)		129 (42.7)	
Sex			0.657		0.053		0.068
Male	187	(4.8)		7.31 (3.79)		60 (32.1)	
Female	564	(3.7)		8.09 (4.32)		223 (39.5)	
Faculty			0.611		0.062		0.149
Medical	442	(4.3)		8.12 (4.26)		176 (39.8)	
Dental	309	(3.6)		7.58 (4.13)		107 (34.6)	
Place of childhood residence			0.398		0.725		0.821
Urban	537	(4.5)		7.91 (4.18)		201 (37.4)	
Rural	214	(2.8)		7.86 (4.30)		82 (38.3)	
Location of finishing school			0.547		0.951		0.485
Arkhangelsk City	146	(5.5)		7.92 (4.56)		49 (33.6)	
Arkhangelsk Region	302	(3.3)		7.84 (4.09)		119 (39.4)	
Other regions of North-West Russia[a]	303	(4.0)		7.94 (4.17)		115 (38.0)	
Eligible for free education			0.408		0.016		0.164
Yes	593	(4.4)		8.07 (4.17)		231 (39.0)	
No	158	(2.5)		7.26 (4.29)		52 (32.9)	
Subjective SES			0.598		0.013		0.005
Less than 6.0	259	(3.5)		7.36 (3.97)		80 (30.9)	
6.0 and more	492	(4.3)		8.18 (4.31)		203 (41.3)	
Accommodation			0.149		0.454		0.345
Hostel	268	(2.6)		7.80 (4.15)		107 (39.9)	
Flat/house	483	(4.8)		8.05 (4.31)		176 (36.4)	
Mother's education			0.084		0.095		0.199
Lower than university	341	(2.6)		7.70 (4.42)		120 (35.2)	
University	410	(5.1)		8.06 (4.02)		163 (39.8)	

Abbreviations: *DMFT* Decayed Missing and Filled Permanent Teeth, *SD* Standard Deviation, SiC *gr* Significant Caries group, *SES* socioeconomic status
[a]Vologda Region, Komi Republic, Murmansk Region, Republic of Karelia or Nenets Autonomous Okrug
* *p*-value from the Chi square test; ***p*-value from the Mann-Whitney U test for two independent groups and the Kruskal-Wallis test for three independent groups

Table 2 Oral health behaviours associated with dental caries experience in the study sample

	All n	DMFT = 0 (%)	*p**	DMFT >0, mean (SD)	*p***	SiC gr n (%)	*p**
Regularity of dental visits			0.030		<0.001		<0.001
Regularly	584	(3.1)		8.21 (4.18)		244 (41.8)	
Not regularly	167	(7.2)		6.75 (4.13)		39 (23.4)	
Tooth-brushing			0.723		0.904		0.532
Infrequent	144	(4.9)		7.74 (4.09)		51 (35.4)	
Frequent	607	(3.8)		7.93 (4.24)		232 (38.2)	
Toothpaste			0.122		0.159		0.334
Without fluoride or difficult to answer	397	(5.0)		8.12 (4.27)		156 (39.3)	
With fluoride	354	(2.8)		7.64 (4.13)		127 (35.9)	
Skipping tooth-brushing			0.100		0.179		0.347
No	496	(4.8)		7.74 (4.19)		181 (36.5)	
Yes	255	(2.4)		8.18 (4.23)		102 (40.0)	

Abbreviations: *DMFT* Decayed Missing and Filled Permanent Teeth, *SD* Standard Deviation, SiC *gr* Significant Caries group
*p-value from the Chi square test; **p-value from the Mann-Whitney U test for two independent groups

Discussion

Our study showed high dental caries prevalence and high dental caries experience with dominance of FT among undergraduate medical and dental Russian students aged 18–25 years in North-West Russia. Age, sex, subjective SES, skipping tooth-brushing, and regular dental visits were found to be significant determinants of DMFT index.

This is the first study in North-West Russia in almost 20 years to investigate dental caries experience and its determinants in young adults aged 18–25 years. The dental health status reported in this study was based on clinical dental examination and reliability tests showed the consistency of the obtained data. The overall response rate was quite high: 87.7% and 64.9% for Stages 1 and 2, respectively.

However, this study does have some limitations. Firstly, due to its cross-sectional design, this study does not allow us to evaluate causal relationships, risk of dental caries development, or trends in the prevalence of dental caries and dental caries experience over time. Secondly, we included only medical and dental students from the NSMU; therefore the generalisability of the results to other young adults may be questioned. We assume that medical and dental students are, to some extent, a prosperous group of young people with regard to SES and health-related issues, including dental health. However, the participants reported a subjective SES of regular/good (median of MacArthur scale is 6.0), indicating that they perceived themselves to belong to a group not far from the average. On the other hand, information on SES and oral health behaviour in the present study was self-reported; thus the possibility of bias due to under- or over-reporting cannot be excluded. Thirdly, only visual and tactile methods were applied for dental caries detection; radiographs were not taken, which could lead to an underestimation of dental caries.

The prevalence of dental caries among medical and dental students in the present study (95.7% and 96.4%) was higher than that reported in Spain (82.2% and 83.0% at the start and 91.1% and 87.2% at the end of study) [26] and in Yemen (81.7% and 85.0%) [16]. A similar pattern was observed in relation to the extent of dental caries experience, as measured by the high mean DMFT index of 7.6, which shows that the dental health of medical and dental students in North-West Russia is worse than that reported in Spain [26], India [17], and Yemen [16]. We did not find differences in the DMFT index of medical and dental students, which is in contrast with other studies. In 2002, Spanish researchers performed a longitudinal study and reported that medical students had a lower DMFT index than dental students: 3.4 vs. 5.0 in the third year, and 4.3 vs. 5.9 in the fifth year of education [26]. In contrast, an Indian study found a mean DMFT index of 1.2 in dental students vs. 2.0 in medical students [17]. Nevertheless, in 2008–2009, Halboub et al. examined a sample of students from the faculties of medicine, dentistry, and literature at Sana'a University, Yemen, and also found no statistically significant differences in overall DMFT index between the faculties (3.9, 4.3, and 4.2, respectively) [16]. Our finding may be explained by the fact that dental caries is a slow

Table 3 Association between the DMFT index and selected determinants in the negative binomial hurdle model

Determinants[a]	Logistic regression[b]		Zero-truncated negative binomial regression[c]	
	OR (95% CI)	*p*-value	IRR (95%CI)	*p*-value
Age group (years)		0.164		0.031
21–25	0.52 (0.21–1.30)		1.09 (1.01–1.18)	
18–20	Reference		Reference	
Sex				0.037
Female			1.10 (1.01–1.20)	
Male			Reference	
Faculty				0.283
Dental			0.95 (0.88–1.04)	
Medical			Reference	
Eligible for free education				0.172
No			0.93 (0.83–1.03)	
Yes			Reference	
Subjective SES				0.015
6.0 and more			1.11 (1.02–1.21)	
Less than 6.0			Reference	
Accommodation		0.361		
Hostel	0.65 (0.25–1.64)			
Flat or house	Reference			
Mother's education		0.093		0.287
University	1.99 (0.89–4.42)		1.04 (0.96–1.13)	
Lower than university	Reference		Reference	
Skipping tooth-brushing		0.061		0.047
Yes	0.41 (0.16–1.04)		1.09 (1.00–1.19)	
No	Reference		Reference	
Toothpaste		0.143		0.117
With fluoride	0.56 (0.26–1.22)		0.94 (0.87–1.02)	
Without fluoride or difficult to answer	Reference		Reference	
Regularity of dental visits		0.013		<0.001
Regularly	0.38 (0.18–0.82)		1.22 (1.10–1.36)	
Not regularly	Reference		Reference	

Abbreviations: *DMFT* Decayed Missing and Filled Permanent Teeth, *IRR* incidence rate ratio, *CI* confidence interval, *OR* odds ratio, *SES* socioeconomic status

[a]Accommodation was included only in the logistic regression. Sex, Faculty, Eligible for free education, and Subjective SES were included only in the zero-truncated negative binominal regression

[b]The dependent variable was whether a student was dental caries-free (coded as 1) or not (coded as 0)

[c]The dependent variable was the count zero-truncated variable (DMFT >0)

Table 4 Adjusted odds ratio of being in the Significant Caries group for selected determinants

Determinants[a]	Adjusted OR (95% CI)	*p*-value
Age group (years)		0.030
18–20	Reference	
21–25	1.41 (1.03–1.92)	
Sex		0.271
Male	Reference	
Female	1.23 (0.85–1.77)	
Faculty		0.120
Medical	Reference	
Dental	0.77 (0.56–1.07)	
Subjective SES		0.008
Less than 6.0	Reference	
6.0 and more	1.57 (1.13–2.19)	
Eligible for free education		0.412
Yes	Reference	
No	0.85 (0.57–1.26)	
Mother's education		0.308
Lower than university	Reference	
University	1.18 (0.86–1.61)	
Regularity of dental visits		<0.001
Not regularly	Reference	
Regularly	2.34 (1.56–3.51)	

Abbreviations: *DMFT* Decayed Missing and Filled Permanent Teeth, *CI* confidence interval, *OR* odds ratio, *SES* socioeconomic status

[a]Results from the multivariable binary logistic regression; all listed variables were included in the model simultaneously; p-value of the Hosmer-Lemeshow goodness of fit test =0.474; Negelkerke R square = 6.9%

disease and its development may start long before persons decide on dental or medical education.

Other Russian studies among Perm medical students aged 19–20 years and students from Moscow aged 21-25 years found that only 1.5% [18] and 0.7% [14] were dental caries-free, respectively. In these Russian studies, published in 1987 [18] and 2009 [14], the DMFT index was even higher than ours: 9.3 and 10.4, respectively. Direct comparison of these results with our data must be done with caution due to differences in population characteristics, recruitment of the participants, and the area covered. Nonetheless, one may speculate that dental health in young adults in Russia has not significantly improved despite positive socio-economic changes in Russia over the past 30 years.

In the current study, FT constituted the main fraction of the DMFT index, both in medical (89.8%) and dental (91.0%) students. This fraction was very high compared to medical and dental students from India (21.4% and 34.5%) [17] and Yemen (54.6% and 49.9%) [16]. A Spanish study reported that FT accounted for 60.4% and 56.4% of dental caries experience in 3rd- and 5th-year

medical students, respectively. In contrast, the FT fraction in dental students constituted 81.5% of the DMFT index at the start of the study and 88.5% and at the end of the study, reflecting that dental students received more dental treatment than their medical peers [26]. Other Russian studies revealed that FT scores constituted only 42.0% and 60.7% of the DMFT index in students studying in Moscow [14] and in medical students in Perm [18], respectively. High availability of dental treatment and willingness of our medical and dental students to seek such care is one possible explanation for the high fraction of FT in the DMFT index in our study sample. Indeed, in the current study 77.8% of the students reported regular dental visits.

In agreement with the world trend, the DMFT index in the present study increased significantly with age, as dental caries is an irreversible, accumulative disease. According to previous international findings, women tend to have a higher DMFT index than men [5, 27, 28]. In our study, we also found sex differences in the DMFT index in multivariable analysis. Researchers explain this fact through a complex aetiology, including hormonal fluctuations, genetic variations, different saliva composition and flow rate, dietary habits, and social roles in the family [29, 30].

Oral health inequalities associated with SES are widely observed, as persons with low SES have a higher risk of poor dental health in terms of dental caries [31]. We found the opposite association both in the univariable and multivariable analyses, as those with higher subjective SES had a higher DMFT index and were more likely to be in the SiC group. One possible explanation for our findings may be that students with higher SES tend to adapt more to a Westernised lifestyle, with frequent consumption of foods and beverages containing added sugar. Moreover, these students may seek dental treatment more often, as they have less concerns about cost. Nevertheless, as we used self-reported measures of SES, our results might be biased compared to other studies that used education, occupation, or income as more objective indicators of SES.

The importance of oral health behaviour in maintaining good oral and dental health is well established. In our study, 80.8% of the medical and dental students reported brushing their teeth twice a day or more. This is higher than the percentage reported for the past 5-10 years in university students from 26 countries across Asia, Africa, and the Americas (67.2%) [32], Turkish dental students (49.7%) [33], Yemen students (38.1%) [16], and Indian medical students (24.4%) [34]. Nevertheless, the dental health of our study participants was worse than that reported in the aforementioned studies. Over-reporting of good dental behaviour by the participants, given their educational background, cannot be excluded. The fact that 34% of the students reported skipping tooth-brushing and the lack of significant differences in mean DMFT index by tooth-brushing frequency support this assumption, as do the results of the multivariable analysis: skipping tooth-brushing was a significant determinant of higher DMFT index.

Our finding that those who visit a dentist regularly have a higher DMFT is in agreement with previous Chinese [12] and Australian [35] studies. The fact that more than 90% of DMFT in our study were FT may suggest that dental services in Russia are focused on treatment, not on dental caries prevention.

The SiC index was introduced to focus on persons with the highest DMFT index and to solve the problem of a skewed dental caries distribution [22]. We did not find any publications on SiC index among medical and dental students in Russia or other countries that can be compared with our results. Nevertheless, the SiC index of 12.5 (with FT accounting for 90.0%) in our study reflects a high number of students with a high DMFT index (with high FT component). The variables associated with the odds of being categorised to the SiC group (dental visits, subjective SES, age) were the same as those associated with high DMFT index. One may speculate that students have a lack of knowledge regarding a healthy diet and/or appropriate oral hygiene habits, which in turn may lead to frequent dental visits for dental treatment. Further studies that include information on the threshold for dental caries treatment among Russian dentists are warranted to better understand the high DMFT in our study population.

Conclusions

High dental caries prevalence and high DMFT index, with a dominance of FT, were observed among undergraduate medical and dental Russian students aged 18-25 years in North-West Russia. Age, sex, subjective SES, regular dental visits, and skipping tooth-brushing were found to be significant determinants of dental caries experience.

Abbreviations

CI: Confidence interval; DMFT: Decayed missing filled teeth; DT: Decayed teeth; FT: Filled teeth; ICC: Intraclass correlation coefficient; IRR: Incidence rate ratio; MT: Missing teeth; NBH: Negative binomial hurdle model; NSMU: Northern State Medical University; OR: Odds ratio; SD: Standard deviation; SES: Socioeconomic status; SiC index: Significant caries index; WHO: World health Organisation; ZI: Zero-inflated model

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Availability of data and materials
The dataset used and analysed during the current study is available from the corresponding author on reasonable request.

Authors' contributions
SND and TAT created the study concept, design and methodology. SND carried out data collection and data entry. TB and TAT supervised data collection and data entry. SND, TB, and TAT analysed and interpreted the data. SND, TB, and TAT drafted, critically reviewed, commented on and revised the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate
The study was approved by the Regional Ethical Committee of Norway (2015/1788/REK nord) and the Ethical Committee of the NSMU, Russia (№ 05/10–15 from 19.10.2015). Verbal and written informed consent was obtained from every participant at Stage 1. For those willing and interested to participate in the study, the main researcher also gave assurance of confidentiality of the obtained information and stressed that the participant could withdraw from the study at any time.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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Paper II

Prevalence of and factors associated with dental anxiety among medical and dental students of the Northern State Medical University, Arkhangelsk, North-West Russia.

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Prevalence of and factors associated with dental anxiety among medical and dental students of the Northern State Medical University, Arkhangelsk, North-West Russia

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ABSTRACT

The objective was to assess the prevalence of and factors associated with dental anxiety (DA) in medical and dental students in North-West Russia. This cross-sectional study included 422 medical and 285 dental undergraduate Russian students aged 18–25 years from the Northern State Medical University in Arkhangelsk. Corah's Dental Anxiety Scale (DAS) was applied to measure DA. Information on socio-demographic and socioeconomic factors, oral health behaviour and general and oral health was obtained from a structured, self-administered questionnaire. A clinical examination was performed to assess caries experience, Simplified Oral Hygiene Index, and Gingival Index. DAS score ≥13 was found in 13.7% and 2.2% of medical and dental students, respectively. Female sex (incidence rate ratio [IRR] = 1.11, $p = 0.013$), lower education of mother (IRR = 1.13, $p = 0.001$), and poor self-assessed oral health (IRR = 1.15, $p < 0.001$) were associated with DA in medical students. Corresponding factors in dental students were female sex (IRR = 1.16, $p = 0.001$), irregular dental visits (IRR = 1.19, $p = 0.001$), infrequent tooth-brushing (IRR = 1.17, $p = 0.007$), pain in mouth (IRR = 1.09, $p = 0.031$) and number of missing teeth (IRR = 1.13, $p = 0.007$). The prevalence of high DA was lower in dental students than in medical students. DA was associated with sex, mother's education, poor oral health behaviour and self-assessed and clinically assessed oral health.

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Introduction

Oral health is an integral part of general well-being and a significant public health issue. Despite increased awareness among dentists and patients of preventive approach to oral diseases, and innovations in dental equipment and pain reduction, dental anxiety (DA) remains an important problem in clinical dentistry [1]. DA is described as a state of excessive and unreasonable apprehension that "something dreadful is going to happen in relation to dental treatment, and it is coupled with a sense of losing control" [2]. Dental fear is related to DA and is described as a normal unpleasant emotional reaction to perceived threat or danger in a dental situation [1]. The concepts of dental fear and DA are frequently used interchangeably in dental studies, implying "strong negative feelings associated with dental treatment" [1,2]. Several psychometric tests have been developed to differentiate people with and without DA. Along with single-item questions, Corah's Dental Anxiety Scale (DAS) [3], the Modified Dental Anxiety Scale (MDAS) [4], and Kleinknecht's Dental Fear Survey [5] are the most commonly used tools in epidemiological studies to measure DA in adults [6,7], although none of the existing instruments are regarded as a gold standard [6]. The prevalence of high DA varies from 2% to 30% worldwide depending on the study population, the methods applied, and the cut-off scores used [1,8]. There is strong evidence that DA is associated with dental attendance; it has been reported that individuals with higher DA tend to visit the dentist irregularly [9,10], which in turn may lead to a deterioration in oral health. Studies have demonstrated that DA is associated with poor self-reported [8,9] and clinically assigned [11,12] oral health, more decayed and missing teeth [10,11], fewer filled teeth [10,12] and worse periodontal health [13]. In addition, DA has been related to poor self-reported general health [8], psychological disorders [14], particular temperamental or psychological traits [7] and lower education [8,12].

Several reports showed that younger individuals are more likely to experience DA than middle-aged and

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elderly adults [10,12]. Many studies have focused on DA in young university students [15–26]. Lower DA has been found in dental than in non-dental students [15–17], and further reductions were shown among dental students during their dental training [17,18]. Reported predictors for DA have included self-reported need for dental treatment, tobacco use, abnormal attitudes towards food, insufficient oral hygiene, less frequent dental visits and the anticipation of pain [19,24,25]. No relationships between DA and clinically assigned oral health have been studied in young university students, but some studies on other factors showed that female students had higher DA than male students [16,19–22], whereas other studies found no sex differences [15,23,24].

Epidemiological studies have shown considerably poorer oral health among populations living in Russian circumpolar areas than in other Russian areas [27]. Nevertheless, we found only one study on DA in Russia, which was conducted in St. Petersburg in 1992, more than 20 years ago [28]. The study included 288 urban schoolchildren aged 13 to 18 years and yielded a 12.6% prevalence of high DA. Sex, treatment and toothache experience, dental fear in the family and fear at first dental visit were associated with high DA. At present, there is no information available on the prevalence of DA and the association between DA and oral health behaviour, general health and oral health status in young adults living in the northern parts of Russia.

The aims of this study are to assess the prevalence of DA and to explore the association between DA and socio-demographic and socioeconomic factors, oral health behaviour and general and oral health in medical and dental students attending the Northern State Medical University (NSMU) in Arkhangelsk, North-West Russia.

Material and methods

Study setting and population

During the 2015–2016 academic year, approximately 3900 students, mainly from the European North-West of Russia (the regions of Arkhangelsk, Vologda and Murmansk; the Komi and Karelia Republics; and the Nenets Autonomous Okrug), attended the NSMU. In this cross-sectional study, we invited full-time undergraduate students from two faculties: 1) medical (n = 1482), which included students from the departments of general medicine and paediatric medicine; and 2) dental (n = 524). Combined, these faculties make up ~51.4% of the total number of students at the NSMU. For convenience, students from other non-medical faculties and smaller medical faculties and departments (medical biochemistry, medical prophylaxis, pharmacy) were not considered. Students from the international faculty of general practitioners were also not invited, as we focused on students of Russian nationality only.

Sampling

We applied a two-stage sampling technique for enrolment. In Stage 1 (recruitment + questionnaire 1 [Q1]), medical and dental students from each year of education (6 years for medical students; 5 years for dental students) were informed about the study and invited to participate at the end of a randomly selected scheduled classroom lecture. Altogether, 1579 students (1142 medical and 437 dental students) attended the lectures, of whom 1385 (965 medical and 420 dental students) agreed to participate, signed the informed consent and completed the self-administered, anonymous Q1 in Russian.

In Stage 2 (questionnaire 2 [Q2] + dental examination), all dental students (n = 420) and a stratified, random sample of medical students (n = 823) were invited by phone, using the contact mobile numbers collected in Stage 1. If a student did not answer at the first call, one additional call was placed on a different day. Students who agreed to participate completed a second, self-administered, anonymous Q2 and underwent a dental examination (total n = 807). The exclusion criteria were: age under 18 or over 25 years, non-Russian nationality, presence of fixed orthodontics bands and pregnancy. The response rate was 57.6% (range: 41.5–69.1% within different years of education) and 79.3% (range: 70.3–85.4%) in medical and dental students, respectively. Only students with no missing data (n = 707) were included in statistical analysis. The sampling has been described previously in detail [29].

Instruments

Q1 gathered information on socio-demographic factors, socioeconomic factors and oral health behaviours. Age group (18–20/21–25 years), sex, faculty (medical/dental) and place of childhood residence (urban/rural) were considered as socio-demographic variables. Whether the students were eligible for free education (yes/no), which is generally representative of students with higher grades on their entrance exams, was used as a socioeconomic variable. A university applicant who has failed in competition to be admitted at the NSMU can still study there, but they have to pay tuition each year. Students reporting dental visits at least once every 6 months or once a year were categorised as having regular dental visits, and those who said they visited the dentist occasionally or

had no visits in the last 3 years were categorised as having irregular dental visits. Frequency of tooth-brushing was categorised as less than twice a day (consisting of the responses: never, less than once a week, once every few days and once a day) and twice a day or more. The variable "skipping tooth-brushing" was categorised as *no* when students reported skipping tooth-brushing never or almost never, and as *yes* when skipping tooth-brushing was reported sometimes during a week, every day or almost every day. The variable "toothpaste" was split into two categories: with fluoride and without fluoride/difficult to answer. The students were also asked about their oral health. Students who rated their oral health as excellent, very good or good were categorised as having good self-reported oral health, and those who rated their oral health as fair or poor were categorised as having poor self-reported oral health. The variables "experienced pain in mouth" and "experienced gum bleeding during tooth-brushing" were also dichotomised into *no* when students responded never or rarely, and *yes* when students responded sometimes, often or always.

In Q2, students were asked three global questions about their health: "Overall, how would you rate your general health/your psychological health/your ability to cope with different aspects of life?" Responses were given on a 5-point scale: (1) excellent, (2) very good, (3) good, (4) fair and (5) poor. For analysis, each variable was dichotomised as "good" (1–3) and "poor" (4,5). Information was also gathered about mother's education and subjective socioeconomic status (SES). Mother's education was split into lower than university (high school: 9–11 years of school; specialised secondary: professional medical or pedagogical college, technicum) and university. The respondents rated the SES of their family in accordance with socioeconomic indicators (education, occupation, income) using the 10-step MacArthur Scale of Subjective Social Status, for which 10 indicates "best off" and 1 indicates "worst off" [30]. The median SES (6.0) was used as the cut-off to dichotomise this variable into "low SES" (1–5) and "high SES" (6–10). The questions on regularity of dental visits; self-reported oral and general health characteristics; and mother's education included the response option "difficult to answer". When that response was chosen in either questionnaire (Q1: $n = 48$, Q2: $n = 11$), this data was considered missing and the participants were excluded from the analysis.

Validity and reliability of dental anxiety scale inventory

In Q2, the four-item Corah's DAS was used to assess DA [3]. The English version of DAS was translated/back-translated into Russian/English by two bilingual individuals independently, and the conceptual and functional equivalence of the instrument was verified by colleagues at the NSMU. Before the study began, the questionnaire was pilot-tested on 12 students aged 18 to 25 years who did not participate in the study, after which only minor changes were required. Students answered each item on a 5-level scale, and the total DAS score was calculated as the sum of the four items and ranged from 4 to 20. A DAS score of 13 or more was considered a high DA [31].

That fact that only three of the 807 respondents who answered the DAS questions omitted one item adds support to the face validity. Students who confirmed DA as their reason for not getting a dentist appointment had significantly higher DAS scores, compared to students who reported "other" reasons for not going to a dentist (12.5 vs. 8.5, $p < 0.001$), which provided evidence of criterion validity. Good reliability of the DAS in terms of the inter-item correlation coefficient (Cronbach's alpha = 0.85) was determined. If a single item was removed, the Cronbach's alpha value decreased compared to its original undeleted value. The average of the inter-item correlation among the DAS items was 0.59 (range: 0.47–0.72), with no negative correlations. The corrected item-total correlations ranged from 0.63 to 0.78, and all values were above the minimum recommended level of 0.20 for including an item into a scale [32].

Clinical dental examination

A clinical dental examination without radiographs was performed at the Dental Clinic of the NSMU from February to May 2016. One researcher (SND) executed all clinical examinations in accordance with World Health Organization (WHO) recommendations [33], and an assistant filled in the details on the clinical sheet. All permanent teeth, excluding third molars, were taken into account during the clinical examination. Dental caries experience was measured by the DMFT index, which is the sum of decayed teeth (DT), missing teeth due to caries (MT) and filled teeth (FT). The Simplified Oral Hygiene Index (OHI-S) proposed by Green & Vermillion (1964) was used to assess oral hygiene [34]. The total score of this index was calculated as the sum of the average individual debris and calculus scores. For the assessment of the qualitative changes in the gingival soft tissue, we employed the Gingival Index (GI) of Loe & Silness [35]. Six index teeth (44/32/36/24/12/16) and four areas for each tooth (mesial, distal, buccal and lingual) were considered to calculate GI.

Before the study start, the researcher was calibrated at the Dental Clinic of UiT The Arctic University of Norway, Tromsø, Norway, according to WHO standards [33]. In June 2016, 54 students were selected randomly

for clinical re-examination. Intraclass correlation coefficients for DMFT and GI were 0.989 (95% confidence interval [CI]: 0.981–0.993) and 0.828 (95% CI: 0.721–0.896), respectively.

Statistical analysis

Given the skewed distribution of the DAS score, the Mann-Whitney U test was used for two independent groups of studied variables. Simple Poisson regression was carried out to assess crude associations between DAS scores (dependent count variable) and scores from clinical dental examinations. Given the non-significant test for alpha, negative binomial regression did not fit our data better than Poisson regression.

Multivariable Poisson regression with robust estimates was used, with the DAS score as the dependent variable. Only independent variables with *p*-values less than 0.2 in univariable analysis were included in the multivariable model. Backward stepwise selection was used to find significant independent variables associated with the DAS score. Significance levels for removal and addition to the final model were chosen as 0.2 and 0.1, respectively. Given the significant interactions between "faculty" and "mother's education" and "faculty" and "regularity of dental visits", analyses were performed for medical and dental students separately.

Descriptive statistics and univariable analyses were performed with IBM SPSS Statistics for Macintosh version 23.0 (Armonk, NY: IBM Corp.). Poisson regression was done with STATA version 14.0 (StataCorp, College Station, Texas, USA). The level of significance for testing all statistical hypotheses was set at $p = 0.05$.

Ethical considerations

The study was approved by the Regional Ethical Committee of Norway (2015/1788/REK nord) and the Ethical Committee of the NSMU, Russia (№ 05/10–15 from 19.10.2015).

Results

There were no significant differences in age nor sex between students participating in Stage 1 ($n = 1385$) and Stage 2 ($n = 807$). Likewise, the 707 students included in the analysis did not differ by age, sex, or subjective SES from students who were excluded from the analysis due to missing data ($n = 100$). Mean age was 20.2 years (standard deviation [SD] 1.6).

Medical students had a higher mean DAS score than dental students (8.81, SD 3.23 vs. 6.73, SD 2.36; $p < 0.001$). The prevalence of high DA (DAS ≥13) was 13.7% and 2.2% in medical and dental students, respectively ($p < 0.001$) (Figure 1). Compared to dental students, medical students were older (44.8% vs. 35.4% in the age group of 21–25 years; $p = 0.013$), were more often eligible for free education (87.9% vs. 67.7%; $p < 0.001$), and reported a university mother's education less often (50.2% vs. 58.9%; $p = 0.023$). In medical students, women had a higher mean DAS score than men, whereas students from urban areas, those with higher subjective SES, and those whose mothers had a university education had a lower mean DAS score. There were no differences in DAS score among medical students in different age groups or among those who were and were not eligible for free education. In dental students, no statistically significant differences in DAS score were observed across all socio-demographic and socioeconomic characteristics considered (Table 1).

When looking at oral health behaviour, differences were found between medical and dental students who reported regular dental visits (77.5% vs. 84.9%; $p < 0.001$), brushed their teeth twice a day or more (75.4% vs. 86.7%; $p < 0.001$), skipped tooth-brushing (37.9% vs. 28.1%; $p = 0.007$) and used a toothpaste with fluoride (40.3% vs. 56.5%; $p < 0.001$). Both medical and dental students who reported regular dental visits had a lower DAS score compared to those who reported irregular dental visits. No differences in DAS score were found between categories of tooth-brushing, skipping tooth-brushing and using toothpaste with fluoride (Table 2).

Compared to dental students, medical students more often reported poor oral health, experienced pain in their mouths and experienced gum bleeding during tooth-brushing (45.3% vs. 25.6%, $p < 0.001$; 53.3% vs. 34.0%, $p < 0.001$; 47.9% vs. 36.5%, $p = 0.003$, respectively). Medical students who reported poor general health had a higher DAS score compared to those who reported good general health, while there were no differences in dental students. No statistically significant differences in DAS score were observed between categories of self-assessed psychological health, coping with different aspects of life, and experiencing gum bleeding during tooth-brushing. Both medical and dental students who reported poor oral health or who had experienced pain in their mouths had higher DAS scores (Table 3).

The mean DMFT index was 7.78 (SD 4.54) and 7.31 (SD 4.34) in medical and dental students, respectively. Dental students had less DT compared to medical students (0.49 vs. 0.68; $p = 0.020$), but no differences were found in the number of MT, FT or the DMFT index. FT constituted the main fraction of dental caries experience in both medical (89.6%) and dental (91.7%) students. The OHI-S and GI were higher in medical

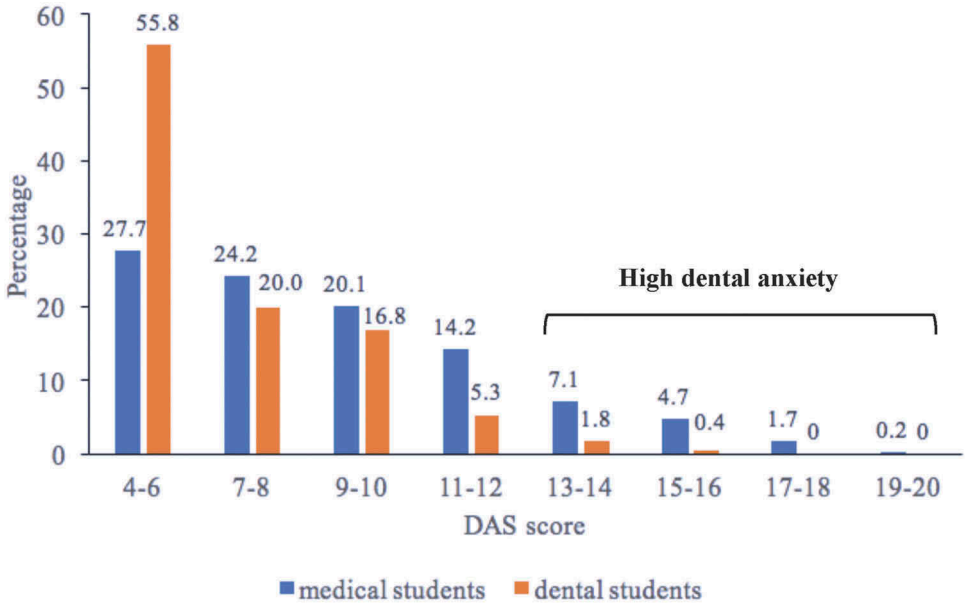

Figure 1. Distribution of the Dental Anxiety Scale (DAS) score in medical students (n = 422) and dental students (n = 285).

Table 1. Socio-demographic and socioeconomic characteristics associated with dental anxiety among medical and dental students in Arkhangelsk, Russia.

	Medical students (n = 422)			Dental students (n = 285)		
	n	DAS score (SD)	p*	n	DAS score (SD)	p*
Age group (years)			0.470			0.382
18–20	233	8.67 (3.13)		184	6.85 (2.50)	
21–25	189	8.97 (3.34)		101	6.50 (2.08)	
Sex			0.005			0.091
Male	97	8.04 (3.01)		81	6.31 (2.09)	
Female	325	9.04 (3.26)		204	6.89 (2.44)	
Place of childhood residence			0.019			0.729
Urban	304	8.62 (3.29)		202	6.72 (2.30)	
Rural	118	9.29 (3.01)		83	6.73 (2.52)	
Eligible for free education			0.764			0.114
Yes	371	8.82 (3.22)		193	6.84 (2.31)	
No	51	8.71 (3.30)		92	6.48 (2.46)	
Subjective SES			0.030			0.868
Less than 6.0	146	9.21 (3.17)		93	6.73 (2.46)	
6.0 and more	276	8.59 (3.24)		192	6.72 (2.32)	
Mother's education			<0.001			0.854
<University	210	9.39 (3.25)		117	6.74 (2.40)	
University	212	8.23 (3.10)		168	6.71 (2.34)	

DAS: Dental Anxiety Scale; SD: Standard Deviation; SES: socioeconomic status.
*p from the Mann-Whitney U test.

than in dental students, (1.21 (SD 0.53) vs. 1.01 (SD 0.49), $p < 0.001$ and 0.32 (SD 0.25) vs. 0.22 (SD 0.22), $p < 0.001$, respectively). In the univariable Poisson regression, the number of MT in both groups of students, the number of DT in dental students and GI in medical students were positively associated with DAS score. For instance, every one-unit increase in MT led to a 16% increase in DAS score in dental students. No differences in DAS score by number of FT, DMFT index or OHI-S were found in medical or in dental students (Table 4).

The variables which remained in the multivariable Poisson analysis with DAS score as the dependent variable showed that a poor self-assessed oral health, lower mother's education and sex (females) were associated with higher DAS score in medical students. For instance, medical students who reported poor oral health had an adjusted DAS score that was 1.15 (95% CI: 1.08–1.23) times higher than that found in those with good self-assessed oral health. In dental students, being female, reporting irregular dental visits and infrequent tooth-brushing, having experienced pain in one's mouth or

Table 2. Oral health behavioural characteristics associated with dental anxiety among medical and dental students in Arkhangelsk, Russia.

	Medical students (n = 422)			Dental students (n = 285)		
	n	DAS score (SD)	p*	n	DAS score (SD)	p*
Regularity of dental visits			0.040			<0.001
Irregular	116	9.39 (3.43)		43	8.12 (2.91)	
Regular	306	8.59 (3.12)		242	6.48 (2.16)	
Tooth-brushing			0.112			0.061
<Twice a day	104	9.11 (2.89)		38	7.50 (2.74)	
≥Twice a day	318	8.71 (3.33)		247	6.61 (2.28)	
Skipping tooth-brushing			0.989			0.294
No	262	8.80 (3.24)		205	6.78 (2.27)	
Yes	160	8.83 (3.22)		80	6.60 (2.58)	
Toothpaste			0.659			0.314
Without fluoride/difficult to answer	252	8.77 (3.24)		124	6.81 (2.21)	
With fluoride	170	8.87 (3.21)		161	6.66 (2.47)	

DAS: Dental Anxiety Scale; SD: Standard Deviation.
*p from the Mann-Whitney U test.

Table 3. Self-assessed general and oral health characteristics associated with dental anxiety among medical and dental students in Arkhangelsk, Russia.

	Medical students (n = 422)			Dental students (n = 285)		
	n	DAS score (SD)	p*	n	DAS score (SD)	p*
Self-assessed general health			0.016			0.150
Good	348	8.61 (3.11)		235	6.59 (2.20)	
Poor	74	9.73 (3.59)		50	7.38 (2.94)	
Self-assessed psychological health			0.986			0.381
Good	366	8.81 (3.24)		244	6.79 (2.40)	
Poor	56	8.79 (3.16)		41	6.37 (2.10)	
Coping with different aspects of life			0.213			0.670
Good	367	8.74 (3.22)		236	6.69 (2.32)	
Poor	55	9.29 (3.24)		49	6.92 (2.57)	
Self-assessed oral health			<0.001			0.032
Good	231	8.14 (2.81)		212	6.51 (2.18)	
Poor	191	9.62 (3.51)		73	7.34 (2.75)	
Experienced pain in mouth			0.015			0.014
No	197	8.35 (2.94)		188	6.40 (2.04)	
Yes	225	9.21 (3.41)		97	7.35 (2.78)	
Experienced gum bleeding during tooth-brushing			0.089			0.192
No	220	8.59 (3.26)		181	6.57 (2.25)	
Yes	202	9.04 (3.18)		104	6.99 (2.53)	

DAS: Dental Anxiety Scale; SD: Standard Deviation.
*p from the Mann-Whitney U test.

having a higher number of MT due to caries were independently associated with a higher mean DAS score. All variables in the final models explained 12.7% of the variation in the response variable in both medical and dental students (Table 5).

Discussion

The present study found that both the prevalence of high DA and mean DAS score were higher in medical than in dental students of the NSMU. In medical students, DAS score was positively associated with sex (females), lower mother's education and poor self-assessed oral health. In dental students, sex, irregular dental visits, infrequent tooth-brushing, experienced pain in mouth and a higher number of MT due to caries were found to be significant factors associated with higher DA.

Researchers have used global questions [19], different scales [15,16,24,26] or different DAS score cut-offs to assess DA [21], which may complicate the comparability of these studies with our results. The DAS and MDAS are the most frequently used tools to measure DA in university students. The MDAS includes one additional question about anxiety of dental injection, while the other four questions are identical to those in the DAS. This item on

Table 4. Clinical oral health status in association with dental anxiety among medical and dental students in Arkhangelsk, Russia.

	Medical students (n = 422)		Dental students (n = 285)	
	Crude IRR (95% CI)	p*	Crude IRR (95% CI)	p*
DT	1.03 (1.00–1.06)	0.059	1.06 (1.01–1.11)	0.030
MT	1.10 (1.02–1.18)	0.013	1.16 (1.06–1.27)	0.001
FT	1.00 (0.99–1.01)	0.477	1.00 (0.99–1.01)	0.880
DMFT	1.01 (1.00–1.01)	0.104	1.01 (0.99–1.02)	0.319
OHI-S	1.05 (0.98–1.11)	0.152	0.97 (0.88–1.06)	0.463
GI	1.15 (1.01–1.31)	0.029	0.88 (0.71–1.08)	0.220

IRR: incidence rate ratio; CI: confidence interval; DAS: Dental Anxiety Scale; DT: Decayed Teeth; MT: Missing Teeth due to caries; FT: Filled Teeth; DMFT: Decayed Missing and Filled Permanent Teeth; OHI-S: Simplified Oral Hygiene Index; GI: Gingival Index; SD: Standard Deviation.
*p from simple Poisson regression (DAS score is the dependent variable).

injection will probably also reflect general syringe phobia among respondents and blend in with the total score. As the distribution of any kind of phobia is unknown in the young population of North-West Russia, we considered the DAS to be the most appropriate measurement for the present population of medical and dental students. In addition, conversion tables can be used to compare our findings with results of MDAS from other studies [36]. Nonetheless, levels of DA in our medical and dental students were found to be lower [16,18,21,23] or comparable [15] with that reported in studies among other medical or dental students.

In the present study, the dental students had a significantly lower level of DA compared to the medical students. This was expected and is in agreement with results from other studies [16,17,21]. One obvious explanation is that the level of knowledge about dentistry, severity of dental diseases and possible inconvenience while receiving dental treatment is higher among dental students. They get more information about DA during their training, they learn how to communicate with fearful dental patients and help them cope with DA, which may result in a better understanding of their own DA as well as help them cope with it. Our findings may also indicate that the curriculum of medical studies at the NSMU does not include enough information on dental diseases and treatment.

Female students from both faculties showed higher DAS scores than men, which is in line with previous studies [16,19–22]. It has been postulated that women are more susceptible to perceived threats or danger, and that they may describe their fears more openly; while men may be more emotionally stoic and hide

Table 5. Association between DAS score and independent variables in multivariable Poisson regression among medical and dental students in Arkhangelsk, Russia.

	Medical students (n = 422)		Dental students (n = 285)	
Variables	Adjusted IRR (95% CI)	p*	Adjusted IRR (95% CI)	p**
Sex		0.013		0.001
Male	Reference		Reference	
Female	1.11 (1.02–1.20)		1.16 (1.06–1.26)	
Mother's education		0.001		
University	Reference			
<University	1.13 (1.05–1.20)			
Regularity of dental visits		0.057		0.001
Regular	Reference		Reference	
Irregular	1.07 (1.00–1.15)		1.19 (1.07–1.32)	
Tooth-brushing				0.007
≥Twice a day			Reference	
<Twice a day			1.17 (1.04–1.32)	
Self-assessed general health				0.176
Good			Reference	
Poor			1.07 (0.97–1.19)	
Self-assessed oral health		<0.001		
Good	Reference			
Poor	1.15 (1.08–1.23)			
Experienced pain in mouth		0.163		0.031
No	Reference		Reference	
Yes	1.05 (0.98–1.12)		1.09 (1.01–1.18)	
DT			1.03 (0.99–1.08)	0.119
MT			1.13 (1.03–1.24)	0.007
GI	1.11 (0.97–1.27)	0.121		

DAS: Dental Anxiety Scale; IRR: incidence rate ratio; CI: confidence interval; DT: Decayed Teeth; MT: Missing Teeth due to caries; GI: gingival index.
*p from the final multivariable Poisson regression with backward stepwise selection of variables; Cragg & Uhler's R square = 12.7%; Experienced gum bleeding during tooth-brushing, Simplified Oral Hygiene Index, DMFT index, Place of childhood residence, Tooth-brushing, Self-assessed general health, Missing teeth due to caries, Decayed teeth, Subjective socioeconomic status were removed from the final model;
**p from the final multivariable Poisson regression with backward stepwise selection of variables; Cragg & Uhler's R square = 12.7%; Experienced gum bleeding during tooth-brushing, Self-assessed oral health, Eligible for free education were removed from the final model.

their anxieties [37]. Nevertheless, some studies found no sex differences [15,23,24] and mentioned cultural characteristics as a possible explanation [24].

In medical students, mother's education was associated with DA both in univariable and multivariable analysis: students whose mothers had a lower level of education had higher DAS scores. We did not find any comparable results from other studies of medical and dental students; a similar association between education and DA was found among adults in Iceland [12], while differences in DA according to parents' education level were not statistically significant in 18-year-old Norwegian students [38]. More educated parents, characterised by high SES and less oral health problems, may maintain a positive attitude towards dentists and dental treatment indirectly, through their own experience [7]. Moreover, in medical students a higher SES was associated with a lower DA, although the association was statistically significant only in the univariable analysis. In contrast, in dental students, whose mothers were more educated compared to medical students, we did not observe any differences in DA according to level of mother's education. It also cannot be ruled out that dental students base their attitudes on their own knowledge and experience, and less on any transferred skepticism.

Poor self-assessed oral health status was significantly associated with higher DAS scores in medical students in both univariable and multivariable analysis. In dental students, we also found a similar association in univariable analysis, although after adjustment for other factors these differences were no longer significant. Poor self-assessed oral health may reflect dental problems students may have, which in turn may result in DA. This corresponds to findings from other studies [8,9].

Our study has shown that irregular dental visits is a significant predictor of higher DA, which is in line with previous studies [22,25]. In addition, less frequent toothbrushing was associated with a higher DAS score, which was also reported in previous studies of undergraduate students [19]. In agreement with prior studies [10], our study did not support the hypothesis that students who avoid dental visits develop good oral health habits on their own. Nevertheless, we did not find any differences in DA based on high-risk behaviours like skipping toothbrushing or using toothpaste without fluoride. Interestingly, dental visits and frequency of tooth-brushing remained as statistically significant in the final multivariable model for dental students only. We did not find obvious explanations for these results, although one may speculate that proximity to scientific knowledge on good dental health, and resultant differences in oral health behaviour between medical and dental students, might partly explain these findings.

When data from clinical dental examinations were considered, a higher number of DT in dental students and MT in medical and dental students were associated with a higher DAS score, but after adjustment, only MT remained as a significant predictor of DAS score in the multivariable model in dental students. Moreover, having experienced pain in the mouth was an independent significant factor of a higher DA in dental students. The model of the vicious cycle of dental fear, postulated by Armfield et al. in 2007, hypothesised that "people with high dental fear are more likely to delay treatment, leading to more extensive dental problems and symptomatic visiting patterns which feed back into the maintenance or exacerbation of existing dental fear" [9]. Although causality in the present study cannot be established, and we only assessed factors associated with DA, one might assume that our findings are in line with this model. We cannot exclude the possibility that poor oral health habits in combination with irregular dental visits may have led to toothache and subsequent, painful tooth extractions. On the other hand, our sample is first and foremost characterised by high FT values, but we did not find any differences in the DAS score by the number of FT in medical or dental students. Nevertheless, DA in our study showed a better association with components of DMFT (in our case, MT due to caries) than with gingivitis. GI in medical students was significantly associated with DA in univariable analysis, but became an insignificant variable after adjustment. Gum inflammation in young adults is usually accompanied by gum bleeding only and is unlikely to result in pain. In contrast, extraction of teeth due to caries is more likely to be associated with inflammation and pain than gum problems or even restorative treatment (F component) that may lead to DA.

Given the relatively low prevalence of DA and high frequency of regular dental visits observed in the present study of medical and dental students at the NSMU, one might speculate that DA is not an obvious explanation of poor oral health in this population [29]. Nevertheless, our findings regarding factors associated with DA agree with those of other international studies. Taking into account the substantially lower level of DA in dental students than in medical students and the factors associated with DA in the two student groups investigated, public health measures should be focus on promoting dental literacy, increasing knowledge on the prevention of dental diseases, and motivating good oral health habits in young adults in North-West Russia.

Strengths of the study

This is the first study in North-West Russia to investigate DA and factors associated with DA in young adults aged

18–25 years. We applied Corah's DAS, an instrument commonly used for adults [6,7], and the results provide evidence of face and criterion validity for the DAS questions. Good internal consistency for the DAS was also determined. Oral health status was assessed clinically and reliability tests showed good consistency of the obtained clinical data.

Limitations of the study

This is a cross-sectional study; thus, no causal relationships in the association between DA and the factors studied or trends in the prevalence of DA over time can be determined. Our study may be limited by the fact that only university medical and dental students of the NSMU participated in the study, which makes it challenging to generalise our findings to the young Russian population at large in North-West Russia. Moreover, our sample was not balanced with respect to response from the two student groups investigated, with a lower response rate in medical students (57.6%) compared to dental students (79.3%) in Stage 2. This may have led to an underestimation of DA and oral health problems in medical students. Although the DAS seems to have acceptable psychometric properties in the Russian version, a more thorough testing of the instrument's reliability and validity is warranted. Nevertheless, some researchers maintain that Corah's DAS does not consider the theoretical structure of DA and that its response categories are not mutually exclusive [6]. Only visual and tactile methods were applied during the dental examination, no radiographs were taken, which could lead to an underestimation of dental caries. Information on oral health behaviours, SES, general health and psychological health in the present study was self-reported; thus, the possibility of social desirability bias due to under- or over-reporting cannot be ruled out.

Conclusions

In general, medical and dental students at the NSMU have a lower prevalence of high DA and lower DAS scores, as measured with the translated Russian version of Corah's DAS, than most other medical and dental students. Level of DA was higher in medical than in dental students. DAS score in medical students was positively associated with sex (females), lower mother's education and poor self-assessed oral health. In dental students, being female, irregular dental visits, infrequent tooth-brushing, experienced pain in the mouth and a higher number of MT were found to be significant, independent factors associated with higher DA. Public health measures should be focus on promoting dental literacy, increasing knowledge on the prevention of dental diseases and motivating good oral health habits in young adults in North-West Russia.

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Authors' contributions

SND and TAT created the study concept, design and methodology. SND carried out data collection and data entry. TB and TAT supervised data collection and data entry. SND, TB and TAT analysed and interpreted the data. SND, TB and TAT drafted, critically reviewed, commented on and revised the manuscript. All authors read and approved the final manuscript.

Disclosure statement

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Paper III

Oral Health-Related Quality of Life in Young Adults: A Survey of Russian Undergraduate Students.

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Article

Oral Health-Related Quality of Life in Young Adults: A Survey of Russian Undergraduate Students

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Abstract: Background: Oral health (OH) is poor among young adults in Russia, but there is little information on OH-related quality of life (OHRQoL) in this population. We investigated how socio-demographic factors, self-reported OH characteristics, oral health behaviour, and clinically-assessed OH are related to OHRQoL in medical and dental students in North-West Russia. Methods: This cross-sectional study included 391 medical and 275 dental Russian undergraduate students aged 18–25 years. Information on socio-demographic, self-reported OH characteristics, and oral health behaviour was obtained from a structured, self-administered questionnaire. A clinical examination was performed to assess dental caries experience based on the decayed (D) missing (M) filled (F) teeth (T) index; Simplified Oral Hygiene Index; and Gingival Index. OHRQoL was measured by the OH Impact Profile (OHIP-14). Results: 53.6% of students reported low OHRQoL during the last 12 months. Female sex (odds ratio [OR] = 1.48, 95% confidence interval [CI]: 1.00–2.19), rural place of childhood residence (OR = 1.56, 95% CI: 1.06–2.28), poor self-assessed dental aesthetic (OR = 1.75, 95% CI: 1.16–2.64), dissatisfaction with mouth and teeth (OR = 2.51, 95% CI: 1.68–3.77), and DMFT index (OR = 1.05, 95% CI: 1.01–1.09), were all significantly, independently associated with low OHRQoL. Conclusion: Socio-demographic factors (rural place of childhood residence, female sex), poor self-reported OH characteristics, and high DMFT index were associated with low OHRQoL.

Keywords: oral health-related quality of life; medical and dental students; North-West Russia

1. Introduction

Dental caries and periodontal diseases are the most common oral diseases, affecting millions of people worldwide. In addition to objective methods of oral health (OH) evaluation performed by dental professionals, patient perception of oral disease is also important in the assessment of treatment needs and clinical outcome [1,2]. The concept of OH-related quality of life (OHRQoL) uses patient-centred outcome measures to identify the impact of OH on aspects of everyday life in terms of a person's functional, social, and psychological well-being [3]. Over the past decades, a set of psychometric instruments has been developed to assess OHRQoL. The OH Impact Profile (OHIP) is widely used to measure OHRQoL in adults and dentate elderly people [2]. The short version of the OHIP includes 14 items (OHIP-14), which are based on Locker's conceptual model for measuring OH [2,4,5]. These items represent the consequences of oral diseases and the negative impact they have on OHRQoL. The validity and reliability of OHIP-14 has been shown in many studies, and the instrument has been translated into several languages, including Russian [3,6].

Studies have shown that young and middle-aged adults report worse OH than older adults, despite the fact that oral problems tend to increase with age [7–9]. The factors that affect self-reported OH are not well understood, but it has been suggested that oral diseases have a deleterious effect on

subjective OH, and that this effect is likely higher at younger ages [9]. Moreover, the attitude toward OH acquired in young life manifests as life goes on and may affect OHRQoL. Several studies on OHRQoL in young adult populations, including young university students, have been conducted in Japan [10], Sweden [11], Tanzania [12], Malaysia [13], Australia [14], China [15], and Korea [16]. Previously reported factors associated with OHRQoL include negative life events [14]; education [12,13]; self-rated OH [10,12]; and subjective symptoms of temporomandibular disorders and oral pain [10]. The influence of clinical factors (dental caries, missing teeth, and periodontal status) on OHRQoL is inconsistent, with some studies showing no relationship [11,15] and others showing that poor clinically-assessed OH is associated with worse OHRQoL [10,12,16]. It was also found that malocclusion has a negative impact on OHRQoL in young adults [13,16]. Few studies on OHRQoL targeted dental students [17–19]. Medical and dental students are expected to be more conscious of health-related issues, including dental health. Moreover, these students tend to have a higher socioeconomic background, which in turn, may lead to better self-reported OH and clinically-assessed OH and, eventually, to a higher OHRQoL. Nevertheless, in a Brazilian study nearly half of participating dental students reported negative impacts on their OHRQoL [17]. Self-reported OH problems and aspects related to previous dental experience were found to have a greater impact on OHRQoL [17,18], although no clinical factors were studied. Almost all of the aforementioned studies used OHIP-14 to measure OHRQoL in young adult populations.

To our knowledge, there has been little research on OHRQoL in Russian populations. Nonetheless, in 2007, Barer et al. validated the Russian version of OHIP-14 in patients with evidence of chronic generalized periodontitis [6]. The English version of OHIP-14 was translated/back-translated into Russian/English by two bilingual persons, independently. The final version of the questionnaire was developed, pilot-tested on 25 middle-aged Russian adults (8 men, 17 women), and published in Russian [6]. The psychometric properties of the instrument were examined, and the authors reported good face and content validity of the OHIP-14 items. Another Russian study assessed the effectiveness of periodontal treatment on OHRQoL in patients with various forms of periodontitis [20]. We found no epidemiological studies that assessed OHRQoL in Russian young adults. Nevertheless, OH has been observed to be poor in this age group in Russia; high prevalence of dental caries and high dental caries experience were found among students aged 16–25 years in Moscow [21] and among medical and dental students aged 18–25 years in Arkhangelsk [22].

The aim of this study was to investigate how socio-demographic factors, self-reported OH characteristics, oral health behaviour, and clinically-assessed OH are related to OHRQoL measured by OHIP-14 in medical and dental students in North-West Russia.

2. Materials and Methods

2.1. Study Setting and Population

This cross-sectional study was conducted at the Northern State Medical University (NSMU), Arkhangelsk, North-West Russia, during the 2015–2016 academic year. Approximately 3900 students, mainly from the European North-West of Russia, which includes the regions of Arkhangelsk, Murmansk and Vologda; the Komi and Karelia Republics; and the Nenets Autonomous Okrug attended the NSMU. We invited full-time undergraduate students from two faculties: (1) medical (n = 1482), which included students from the departments of general medicine and paediatric medicine; and (2) dental (n = 524). For convenience, students from other non-medical and smaller medical faculties and departments of the NSMU (medical biochemistry, pharmacy, and medical prophylaxis) were not invited, nor were students from the international faculty of general practitioners, as the study targeted Russian students only.

2.2. Sampling

The study included two stages. In Stage 1, all students from the medical and dental faculties and each year of education (6 and 5 years for medical and dental students, respectively) were informed about the study and invited to participate at the end of a scheduled classroom lecture. Altogether, 1579 students (78.7%) attended the recruitment lectures, of whom 1385 (87.7%) agreed to participate, signed the informed consent, completed a self-administered questionnaire in Russian, and gave their mobile phone number so they could be contacted for Stage 2.

All dental students (n = 420) participating in Stage 1 and a stratified, random, proportionate sample of medical students (n = 823) were invited to Stage 2. Altogether, 62 students refused to participate in Stage 2, 135 students did not answer their phone at two separate calls on two separate days, and 145 students did not attend Stage 2. We also excluded 94 students who were outside the target age (18–25 years), were not of Russian nationality, had fixed orthodontic bands, or were pregnant. A total of 807 students (overall response rate of 64.9%) agreed to participate in Stage 2, completed a second, self-administered questionnaire in Russian, and underwent a clinical dental examination. The students with no missing data (n = 666) were included in statistical analysis. Details regarding the sample size calculation for Stage 2 have been described previously [22].

2.3. Questionnaires

The Stage 1 questionnaire collected information on socio-demographic variables, which included age group (18–20/21–25 years), sex, faculty (medical/dental), and place of childhood residence (urban/rural). The questionnaire also collected information on self-assessed OH, self-assessed dental aesthetic, satisfaction with mouth and teeth, and oral health behaviour. Self-assessed OH and self-assessed dental aesthetic were dichotomized as "good" (excellent, very good, good) and "poor" (fair, poor). The applied cut-off level reflects public health perspectives and treatment needs, rather than detailed individual statements of symptoms. Satisfaction with mouth and teeth was assessed by one item with response options "yes", "no", and "difficult to answer". Questions on oral health behaviour included regularity of dental visits (irregular, i.e., occasionally/no visits during the last 3 years; or regular, i.e., at least once every 6 months/at least once a year) and using toothpaste with fluoride (without fluoride/difficult to answer; or with fluoride). Frequency of tooth-brushing was categorized as infrequent (never/less than once a week/once every few days/once a day) and frequent (twice a day/more than twice a day). Moreover, students were asked to report how often they skipped tooth-brushing. Responses were given on a 3-point scale: (1) never or almost never, (2) sometimes during a week, and (3) every day or almost every day. For analysis, the variable "skipping tooth-brushing" was dichotomized as no (1) and yes (2,3).

The Stage 2 questionnaire gathered information on subjective socioeconomic status (SES), mother's education, and included the OHIP-14 to measure OHRQoL. The respondents rated the SES of their family (according to education, income, and occupation) using the 10-step MacArthur Scale of Subjective Social Status, for which 10 was "best off" and 1 was "worst off" [23]. The median SES (6.0) was used as the cut-off, and SES was dichotomized as "low" (from 1 to 5) and "high" (from 6 to 10). Mother's education was categorized as lower than university (high school: 9–11 years of school; specialized secondary: professional medical or pedagogical college, technicum), and university.

The questions on self-assessed OH, dental aesthetic, and regularity of dental visits in the Stage 1 questionnaire and the question on mother's education in the Stage 2 questionnaire had the response option "difficult to answer". When that response was chosen (n = 31 and n = 7 in the Stage 1 and 2 questionnaires, respectively), this data was considered missing and the students were excluded from the analysis.

Oral Health-Related Quality of Life as Measured by the Oral Health Impact Profile-14: Validity and Reliability

OHRQoL was measured by the Russian version of the OHIP-14, which was previously validated and published in Russian [6]. The same items were used in the present study without any modifications (Table S1 in the Supplementary Materials). The instrument considers seven dimensions of negative impact on OHRQoL: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. There are two items for each dimension, for a total of 14 items. Participants rated the frequency with which they experienced each of these items in the last 12 months using a 5-point Likert scale ("never" = 0, "hardly ever" = 1, "occasionally" = 2, "fairly often" = 3, and "very often" = 4). In addition, each item had the response option "I do not know". When that response was chosen for at least one item, the data was considered missing, and the student was excluded from the analysis.

The severity of impact on OHRQoL was determined by computing the sum of all items in the OHIP-14, with a maximum possible score of 56 points. A higher score indicated a lower OHRQoL. Based on clinical relevance, the prevalence of low OHRQoL was defined as the proportion of students who responded "occasionally", "fairly often", or "very often" for at least one item on the OHIP-14, as was previously applied in other studies among young populations [14,15,17].

In the present sample, OHIP-14 scores discriminated significantly between students with good self-assessed OH (mean OHIP-14 score 3.6) and poor self-assessed OH (mean OHIP-14 score 6.6), thus demonstrating good construct validity. Cronbach's alpha based on standardized items was 0.85, indicating good internal consistency of the OHIP-14. The average inter-item correlation for the OHIP-14 items was 0.28 (range: 0.10–0.66), with no negative correlations. The corrected item–total correlations ranged from 0.27 to 0.66, and all values were above the minimum recommended level of 0.20 for including an item into a scale [24].

2.4. Clinical Dental Examination

From February to May 2016, a clinical dental examination was performed by one dentist (SND), calibrated to World Health Organization standards [25]. Dental caries was detected visually, and no radiographs were taken. All permanent teeth, excluding third molars, were taken into consideration to measure dental caries experience by the DMFT index, which is the sum of decayed teeth (DT), missing teeth due to caries (MT), and filled teeth (FT). The Simplified Oral Hygiene Index (OHI-S) was calculated as the sum scores of the average individual amount of debris (range 0–3) and calculus (range 0–3) found on the preselected tooth surfaces on four posterior and two anterior teeth [26]. To assess the qualitative changes in gingival soft tissue, the Gingival Index (GI) was applied [27]: four areas (mesial, distal, buccal, and lingual) of each of the six index teeth (44/32/36/24/12/16) were examined to calculate GI. In order to test reliability, 54 randomly-selected students underwent another clinical examination in June 2016. Intraclass correlation coefficients for DMFT and GI were 0.989 (95% confidence interval (CI): 0.981–0.993) and 0.828 (95% CI: 0.721–0.896), respectively.

2.5. Statistical Analysis

The chi-square test was applied to compare the proportion of students with/without low OHRQoL between categories of socio-demographic factors, self-reported OH characteristics, and oral health behaviour. When comparing data on clinically-assessed OH (DMFT index, OHI-S index, GI), the Mann–Whitney U test was used for the two independent groups (with and without low OHRQoL).

Multivariable binary logistic regression with robust estimates was used, with the dichotomized dependent variable coded as 0 = without low OHRQoL and 1 = with low OHRQoL, and independent variables that showed p-values < 0.2 in univariable analysis. Backward stepwise selection was used to find significant associations, and levels for removal and addition to the final model were applied as 0.2 and 0.1, respectively. Data was analysed with IBM SPSS Statistics for Macintosh version 23.0

(IBM Corp., Armonk, NY, USA) and STATA version 14.0 (StataCorp, College Station, TX, USA). p-values < 0.05 were considered as statistically significant.

2.6. Ethical Considerations

All students participating in the study gave their verbal and written informed consent at Stage 1. The participants were informed that they could withdraw from the study at any time. Ethical approval for this study was obtained from the Regional Ethical Committee of Norway (2015/1788/REK nord) and the Ethical Committee of the NSMU, Russia (No 05/10-15 from 19.10.2015).

3. Results

Of the 807 students who answered the OHIP-14, 20 omitted one item, one did not answer all items, and 57 students chose the response option "I do not know" for at least one item. There were no significant differences across socio-demographic variables between students without missing OHIP-14 data (n = 729) and those with missing data (n = 78). Nevertheless, students with missing data more often reported poor self-assessed dental aesthetic, dissatisfaction with mouth and teeth/or difficult to answer, and had poor clinically-assessed OH (high DMFT, MT, and OHI-S).

A total of 666 students were included in the statistical analysis, and the mean OHIP-14 score was 4.63 (standard deviation [SD] 4.90; range = 0–34) (Figure 1). More than half of the students (53.6%) reported low OHRQoL; the mean number of items with a reported frequency of "occasionally" or more often was 1.27 (SD = 1.77; range = 0–11). The highest mean scores were observed for the dimensions physical pain and psychological discomfort (Figure 2), which were also the most frequently reported dimensions with impact on OHRQoL (Table 1). With respect to single OHIP-14 items, the prevalence of low OHRQoL varied from 1.7% (for the item "unable to function" in the dimension handicap) to 37.0% (for the item "painful aching in mouth" in the dimension physical pain).

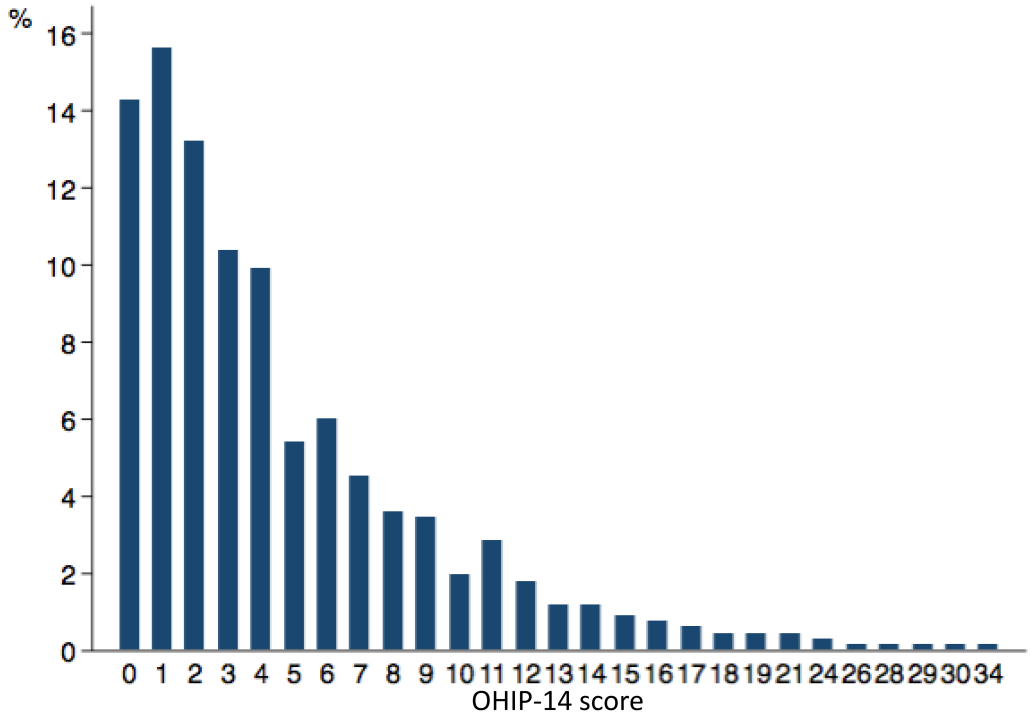

Figure 1. Histogram of the Oral Health Impact Profile 14 (OHIP-14) score in the overall study sample (n = 666).

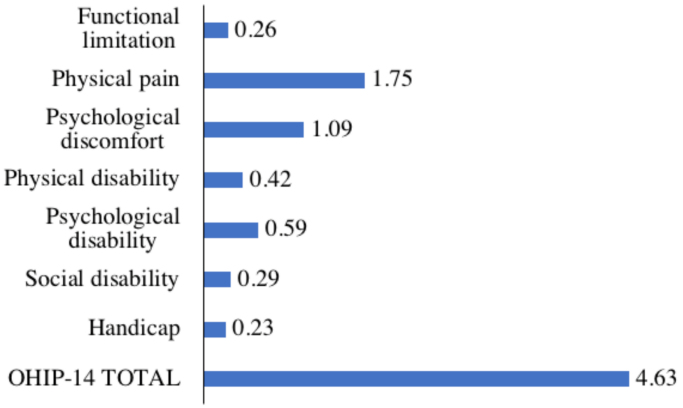

Figure 2. Mean Oral Health Impact Profile 14 (OHIP-14) score (by dimensions and total) in the study sample (n = 666).

Table 1. Frequency of responses to items in the Oral Health Impact Profile 14 (OHIP-14) in the study sample.

Dimension	Item	*n* (%)				
		Never (OHIP-14 = 0)	Hardly Ever (OHIP-14 = 1)	Occasionally (OHIP-14 = 2)	Fairly Often (OHIP-14 = 3)	Very Often (OHIP-14 = 4)
Functional limitations	Trouble pronouncing words	562 (84.4)	77 (11.6)	21 (3.2)	5 (0.8)	1 (0.2)
	Worsened sense of taste	637 (95.6)	23 (3.5)	4 (0.6)	2 (0.3)	0 (0.0)
Physical pain	Painful aching in mouth	164 (24.6)	256 (38.4)	225 (33.8)	17 (2.6)	4 (0.6)
	Uncomfortable to eat food	410 (61.6)	139 (20.9)	98 (14.7)	17 (2.6)	2 (0.3)
Psychological discomfort	Being self-conscious	465 (69.8)	95 (14.3)	83 (12.5)	16 (2.4)	7 (1.1)
	Feeling tense	414 (62.2)	144 (21.6)	84 (12.6)	17 (2.6)	7 (1.1)
Physical disability	Unsatisfactory diet	597 (89.6)	54 (8.1)	11 (1.7)	3 (0.5)	1 (0.2)
	Interrupting meals	522 (78.4)	103 (15.5)	36 (5.4)	4 (0.6)	1 (0.2)
Psychological disability	Difficulty relaxing	559 (83.9)	77 (11.6)	25 (3.8)	3 (0.5)	2 (0.3)
	Embarrassed	509 (76.4)	85 (12.8)	58 (8.7)	10 (1.5)	4 (0.6)
Social disability	Irritable with other people	593 (89.0)	51 (7.7)	20 (3.0)	1 (0.2)	1 (0.2)
	Difficulty doing usual jobs	593 (89.0)	51 (7.7)	20 (3.0)	2 (0.3)	0 (0.0)
Handicap	Life less satisfying	594 (89.2)	49 (7.4)	22(3.3)	1 (0.2)	0 (0.0)
	Unable to function	624 (93.4)	31 (4.7)	10 (1.5)	1 (0.2)	0 (0.0)

Mean age of the students was 20.2 years (SD 1.6); 75.4% were women, 71.9% reported urban place of childhood residence, and 53.8% had mother with a university education. The prevalence of low OHRQoL was higher in older students than in younger students; in females than in males; in medical students than in dental students; and in those who reported rural place of childhood residence than in those who reported urban place of childhood residence. No differences in the proportion of students with low OHRQoL were observed between categories of subjective SES or mother's education. Nearly two-thirds of the students had good self-assessed OH and self-assessed dental aesthetic, while there was an approximately equal number of students who were satisfied and dissatisfied with their mouth and teeth. Students with poor self-assessed OH, poor self-assessed dental aesthetic, and who reported dissatisfaction with mouth and teeth were more frequently in the group with low OHRQoL (Table 2).

Table 2. Socio-demographic and self-reported oral health characteristics of the study sample and proportion of students with low oral health-related quality of life (OHRQoL).

Variable	*n* (%)	Low OHRQoL [1], *n* (%)	*p* [2]
Age group (years)			0.027
18–20	390 (58.6)	195 (50.0)	
21–25	276 (41.4)	162 (58.7)	
Sex			0.004
Male	164 (24.6)	72 (43.9)	
Female	502 (75.4)	285 (56.8)	
Faculty			<0.001
Medical	391 (58.7)	232 (59.3)	
Dental	275 (41.3)	125 (45.5)	
Place of childhood residence			0.011
Urban	479 (71.9)	242 (50.5)	
Rural	187 (28.1)	115 (61.5)	
Subjective SES			0.323
Low (less than 6.0)	222 (33.3)	125 (56.3)	
High (6.0 and more)	444 (66.7)	232 (52.3)	
Mother's education			0.445
<University	308 (46.2)	170 (55.2)	
University	358 (53.8)	187 (52.2)	
Self-assessed oral health			<0.001
Good	425 (63.8)	187 (44.0)	
Poor	241 (36.2)	170 (70.5)	
Self-assessed dental aesthetic			<0.001
Good	415 (62.3)	180 (43.4)	
Poor	251 (37.7)	177 (70.5)	
Satisfaction with mouth and teeth			<0.001
Yes	296 (44.4)	109 (36.8)	
No	279 (41.9)	196 (70.3)	
Difficult to answer	91 (13.7)	52 (57.1)	

Abbreviations: OHIP-14 Oral Health Impact Profile 14; SES Socioeconomic status. [1] Low OHRQoL is defined as the proportion of students who responded "occasionally", "fairly often", or "very often" for at least one item on the OHIP-14; [2] *p* from the chi-square test.

When looking at oral health behaviour, 77.0% and 47.0% of the students reported regular dental visits and using a toothpaste with fluoride, respectively. Although 80.2% of the students reported frequent tooth-brushing, 33.3% reported skipping tooth-brushing sometimes during a week, every day, or almost every day. No differences in the proportion of students with low OHRQoL were observed between categories of regularity of dental visits, using toothpaste with fluoride, and tooth-brushing. Students who reported skipping tooth-brushing were more frequently in the group with low OHRQoL (Table 3).

The mean DMFT index was 7.46 (SD 4.43), with FT accounting for 90.6% of the dental caries experience. The mean OHI-S index and GI was 1.09 (SD 0.50) and 0.27 (SD 0.24), respectively. A higher number of DT, MT, FT, high DMFT index, and high OHI-S index were associated with low OHRQoL (Table 4).

Table 3. Oral health behaviour of the study sample and proportion of students with low oral health-related quality of life (OHRQoL).

Variable	*n* (%)	Low OHRQoL [1], *n* (%)	*p* [2]
Regularity of dental visits			0.462
Irregular	153 (23.0)	86 (56.2)	
Regular	513 (77.0)	271 (52.8)	
Toothpaste			0.457
Without fluoride/difficult to answer	353 (53.0)	194 (55.0)	
With fluoride	313 (47.0)	163 (52.1)	
Tooth-brushing			0.527
Infrequent	132 (19.8)	74 (56.1)	
Frequent	534 (80.2)	283 (53.0)	
Skipping tooth-brushing			0.021
Yes	222 (33.3)	133 (59.9)	
No	444 (66.7)	224 (50.5)	

Abbreviations: OHIP-14 Oral Health Impact Profile 14. [1] Low OHRQoL is defined as the proportion of students who responded "occasionally", "fairly often", or "very often" for at least one item on the OHIP-14; [2] *p* from the chi-square test.

Table 4. Clinically-assessed oral health variables among students with and without low oral health-related quality of life (OHRQoL).

Variable	Without Low OHRQoL [1]	With Low OHRQoL [1]	*p* [2]
	Mean (SD)	Mean (SD)	
DT	0.49 (1.02)	0.69 (1.25)	0.020
MT	0.07 (0.29)	0.15 (0.47)	0.017
FT	6.08 (3.98)	7.34 (4.18)	<0.001
DMFT	6.63 (4.14)	8.18 (4.55)	<0.001
OHI-S	1.04 (0.51)	1.14 (0.49)	0.012
GI	0.26 (0.24)	0.28 (0.24)	0.082

Abbreviations: OHIP-14 Oral Health Impact Profile 14; DT decayed teeth; MT missing teeth due to caries; FT filled teeth; DMFT decayed, missing and filled permanent teeth; OHI-S Simplified Oral Hygiene Index; GI Gingival Index; SD standard deviation; [1] Low OHRQoL is defined as the proportion of students who responded "occasionally", "fairly often", or "very often" for at least one item on the OHIP-14; [2] *p* from the Mann-Whitney U test.

Multivariable logistic regression with the dependent binary variable showed that female sex, rural place of childhood residence, poor self-assessed dental aesthetic, dissatisfaction with mouth and teeth, and high DMFT index were associated with higher odds of having low OHRQoL. For instance, the odds of having low OHRQoL among students with poor self-assessed dental aesthetic was 1.75 (95% CI: 1.16–2.64) times higher than that found in those with good self-assessed dental aesthetic after adjustment for other variables in the model. The most important predictors of low OHRQoL were satisfaction with mouth and teeth and self-assessed dental aesthetic. All independent variables in the final model explained 20.6% of the variation in the dependent variable (Table 5).

Table 5. Adjusted odds ratio of having low oral health-related quality of life in the study sample by selected variables.

Variables	Adjusted OR (95% CI)	p [1]
Age group (years)		0.187
18–20	Reference	
21–25	1.26 (0.89–1.77)	
Sex		0.050
Male	Reference	
Female	1.48 (1.00–2.19)	
Faculty		0.164
Medical	Reference	
Dental	0.78 (0.55–1.11)	
Place of childhood residence		0.023
Urban	Reference	
Rural	1.56 (1.06–2.28)	
Self-assessed dental aesthetic		0.008
Good	Reference	
Poor	1.75 (1.16–2.64)	
Satisfaction with mouth and teeth		
Yes	Reference	
No	2.51 (1.68–3.77)	<0.001
Difficult to answer	1.74 (1.04–2.90)	0.034
Self-assessed oral health		0.184
Good	Reference	
Poor	1.34 (0.87–2.05)	
DMFT	1.05 (1.01–1.09)	0.019
OHI-S	1.41 (1.00–2.00)	0.052

Abbreviations: OR odds ratio; CI confidence interval; DMFT decayed missing and filled permanent teeth; OHI-S Simplified Oral Hygiene Index. [1] p from the final multivariable binary logistic regression with backward stepwise selection of variables; Cragg & Uhler's R square = 20.6%; Gingival Index and skipping tooth-brushing were removed from the final model.

4. Discussion

4.1. Main Findings

The present study found that more than half of the medical and dental students aged 18–25 years attending the NSMU in Arkhangelsk, North-West Russia had low OHRQoL. Socio-demographic factors (rural place of childhood residence, female sex), poor self-reported OH characteristics, and high DMFT index, were associated independently with low OHRQoL.

4.2. Data Interpretation and Comparisons with Previous Studies

The severity (mean OHIP-14 score) and prevalence of low OHRQoL in medical and dental students in the present study (4.6 and 53.6%) are similar to that reported in Brazilian dental students (4.5 and 45.0%) [17] and Chinese young adults (6.3 and 50.6%) [15]. By contrast, an Indian study found a mean OHIP-14 score of 13.4 and 10.7 in dental students in their first and fourth year of education, respectively [18], while a Japanese study reported a mean OHIP-14 score of 1.9 in first-year university students [10]. Direct comparison of these results with our data must be done with caution. Evaluation of quality of life, including OHRQoL, depends on an individual's expectations and experiences, which vary according to social, psychological, socioeconomic, demographic, and other cultural factors [28]. Someone with poor OH and low expectations may not consider themselves to have low OHRQoL and report being satisfied. By contrast, individuals who have good OH and high expectations may experience low OHRQoL, due to even minor oral problems and report being dissatisfied [28]. Previous studies showed that 80.0% of Brazilian dental students were satisfied with their mouth and teeth [17]; only 15.1% of Chinese young adults [15] and 36.8% of Japanese university

students [10] reported good OH, while 44.4% and 63.8% of our medical and dental students were satisfied with their mouth and teeth and reported good OH, respectively. To compare these results, we need to know the frames of reference, i.e., the expectations and experiences these people used, when assessing their OH, satisfaction, and OHRQoL. Qualitative research should be designed to answer these questions [29]. Nevertheless, in the present study, we found that the OHIP-14 dimensions of physical pain and psychological discomfort were the biggest drivers of low OHRQoL, which is in line with all aforementioned studies [10,15,17,18]. Therefore, one may assume a similar pattern of OHRQoL exists in young adults in different countries.

We found that the strongest factors associated with low OHRQoL were poor self-reported OH characteristics. This was expected and is in line with results from other studies [10,15,17,18]. One obvious explanation is that the concept of OHRQoL is based on outcome measures from the patients' perspective, rather than from a dental professional's viewpoint [1–3]. Indeed, dissatisfaction with mouth and teeth and poor self-assessed dental aesthetic may best reflect the OHIP-14 dimensions of psychical pain and psychological discomfort, which were the biggest drivers of low OHRQoL in our study. Physical pain is often considered easy to remember [17]. Psychological discomfort may result from poor dental aesthetic and dissatisfaction with mouth and teeth; a Malaysian study showed that psychological discomfort had the highest reported impact on OHRQoL in young adults with malocclusion [13]. These findings may have important implications in dental practice by allowing dentists to assume the OHRQoL of young adults asking them about their dental aesthetic and satisfaction with their mouth and teeth.

In our study, a higher DMFT index was associated with low OHRQoL. In contrast, a Swedish study did not find any differences in OHRQoL between young adults at high risk (DMFT > 8) and low risk (DMFT = 0) of caries [11]; nor were differences in DMFT index found in young adults in China [15]. Nevertheless, Japanese university students with a higher DMFT index had lower OHRQoL [10]. In the present study, the mean DMFT index was 7.5, while in China and in Japan, the corresponding values were 1.4 [15] and 2.0 [10], respectively. At present, the mechanisms of the relationship between dental caries experience and OHRQoL are unclear [10]. Given that physical pain was the OHIP-14 dimension most frequently reported, one may assume that the dental caries experience in our medical and dental students was likely associated with pain in mouth. Public health measures, as well as dental practitioners, should focus on the prevention of dental diseases to decrease dental pain and DMFT index and improve OHRQoL in young Russian adults.

Our study also showed that students who lived in rural places during childhood had higher odds of reporting low OHRQoL compared to those who lived in urban places. Geographical remoteness, socioeconomic deprivation, and limited access to OH services have been discussed by other researchers to explain these differences [30]. Indeed, the European North-West of Russia has a low population density, covering an area of approximately 1.5 million km^2, but with a population of only 4.6 million (78.9% urban in 2016) [31]. In addition, the inhabitant-to-dentist ratio in North-West Russia is high; much higher, for example, than in the neighbouring Nordic countries (2294 inhabitants per dentist in North-West Russia vs. 1262 in Norway and 1101 in Sweden) [32]. The corresponding figure in rural areas of North-West Russia is even higher (~3700 inhabitants per dentist in the Arkhangelsk Region) [33].

Female students showed higher odds of having low OHRQoL than male students. One possible explanation is that women are more likely to report more severe and frequent pain than men, although mechanisms behind this phenomenon remain understudied [34]. Moreover, one may speculate that women are more concerned about their appearance, and thus may describe their psychological discomfort more openly than men. Nevertheless, other studies found no sex differences in OHRQoL in young adults [13–17,19].

4.3. Strengths of the Study

This is the first study in North-West Russia to investigate OHRQoL and its associated factors in young adults aged 18–25 years. We applied the Russian version of the OHIP-14, an instrument commonly used for adults and elderly people, which was validated in another adult Russian population [6]. Although the instrument was validated among middle-aged adults with periodontal diseases, the results of the present study also provide evidence of good internal consistency, with sufficient face and construct validity of the OHIP items when applied to young adults. Along with self-assessed OH outcomes, clinical dental examinations were performed on all study participants, and reliability tests showed good consistency of the obtained clinical data.

4.4. Limitations of the Study

Due to the cross-sectional study design, no causal relationships in the association between OHRQoL and the factors studied or trends in the prevalence of low OHRQoL over time can be determined. Only medical and dental students from the NSMU participated in the study, which may limit the generalization of our findings to the young Russian population at large in North-West Russia. One may speculate that medical and dental students are a fortunate group of young adults in terms of SES and general and oral health-related issues. Nevertheless, in the present study, the subjective SES values students reported were close to average (median was 6.0 on the MacArthur Scale). In addition, one-third of the students reported skipping tooth-brushing, which, to some extent, may reflect poor oral health behaviour. The OHIP-14 scores may be positively overestimated due to the 64.9% response rate for Stage 2. Moreover, students who were excluded due to missing data in the OHIP-14 (9.7%) more often had poor self-assessed dental aesthetic, dissatisfaction with their mouth and teeth, and poor clinically-assessed OH, which might have biased our ORs, resulting in an underestimation of the OR estimates. Only visual and tactile methods were applied during the clinical dental examination; radiographs were not taken, which could lead to an underestimation of dental caries. Information on SES and dental aesthetic was self-reported; thus, the possibility of social desirability bias due to under- or over-reporting cannot be ruled out.

5. Conclusions

OH affects the quality of life of medical and dental students aged 18–25 years attending the NSMU in Arkhangelsk, North-West Russia. Physical pain and psychological discomfort were the most frequently reported OHIP-14 dimensions with impact on OHRQoL. Poor self-reported OH characteristics (poor self-assessed dental aesthetic and dissatisfaction with mouth and teeth) were the strongest factors associated with low OHRQoL. Clinically-assessed OH (high DMFT index) and socio-demographic factors (female sex, rural place of childhood residence) were also found to be significant predictors of low OHRQoL in medical and dental students of the NSMU. Public health measures should focus on the prevention of dental caries and the development of strategies to promote oral health in young Russian adults, specifically in those who live in rural areas.

Supplementary Materials: The following is available online at http://www.mdpi.com/1660-4601/15/4/719/s1, Table S1: The Russian version of OHIP-14.

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Supplementary Materials

Oral Health-Related Quality of Life in Young Adults: A Survey of Russian Undergraduate Students

Sergei N. Drachev, Tormod Brenn and Tordis A. Trovik

Table S1. The Russian version of Oral Health Impact Profile-14 (OHIP-14)*

	никогда	почти никогда	иногда	достаточно часто	очень часто	не знаю
1. Испытываете ли Вы затруднения при произношении слов из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
2. Вы потеряли вкус к пище из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
3. Испытываете ли Вы болевые ощущения в полости рта?						
4. Вызывает ли у Вас затруднение прием пищи из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
5. Чувствуете ли Вы себя стесненным в общении с людьми из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
6. Испытываете ли Вы неудобства из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
7. Питаетесь ли Вы неудовлетворительно из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
8. Приходится ли Вам прерывать прием пищи из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
9. Мешают ли Вам проблемы с зубами, слизистой оболочкой полости рта или протезами отдыхать, расслабляться?						

10. Ставят ли Вас проблемы с зубами, слизистой оболочкой полости рта или протезами в неловкое положение?						
11. Приводят ли Вас проблемы с зубами, слизистой оболочкой полости рта или протезами к повышенной раздражительности при общении с людьми?						
12. Испытываете ли Вы затруднения в обычной работе из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
13. Становится ли Ваша жизнь менее интересной из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
14. Приходится ли Вам полностью «выпадать из жизни» из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						

* the items were taken from the paper Barer, G.M.; Gurevich, K.G.; Smirniagina, V.V.; Fabrikant, E.G. Validation of oral health impact profile (OHIP) quality of life questionnaire in Russian patients with evidence of chronic generalized periodontitis. *Stomatologiia (Mosk)* **2007**, *86*, 27-30. (In Russian).

Appendix A

Invitation letter and informed consent form (English and Russian versions)

Request for participation in the research project

«Oral health and occupational stress in undergraduate students»

Information about the study

Background and purpose

This is a request for you to participate in a study that intends to evaluate oral health, risk factors associated with oral health, and occupational risk factors in medical and dental undergraduate students of the Northern State Medical University (NSMU), Arkhangelsk. So far, no studies have been conducted to assess determinants of oral health in young adults in North-West Russia. In addition, the present study will allow us to understand better the different aspects of stress among undergraduate students.

Criteria for participation

All students who attend the current lecture are invited to participate in Stage 1 of the study.
The following students will be invited to participate in Stage 2 of the study:

- ✓ undergraduate Russian medical (from the departments of general medicine and paediartic medicine) and dental students of NSMU from the first to the sixth year of education;
- ✓ students aged from 18 to 25 years;
- ✓ students who gave their phone numbers so they could be contacted to appoint date/time for a free clinical dental examination;
- ✓ students with oral and written informed consent to participate in the study;
- ✓ students without fixed orthodontic bands;
- ✓ not pregnant women;
- ✓ students without complaints on any systemic chronic /acute diseases.

What does the study entail?

The study will be performed in two stages. Today is Stage 1. All students who attend the lecture will be asked to fill in a self-administered structured questionnaire (Q1) for assessment of socio-demographic and socioeconomic factors, self-reported oral health outcomes, and oral health behaviour, attitudes and knowledge. Dental students will also be asked to answer on questions concerning sources of stress. At Stage 2, all dental students and a randomly selected subsample among the medical students from Stage 1 will be invited for the clinical dental examination. Presence of dental diseases, dental caries status, oral hygiene, and gum status will be registered. In Stage 2, the participant will also be invited to fill in a questionnaire (Q2) for assessment of general background information, life style variables, socio-economic status, and stress levels and coping strategies. The first and the second stage of the study will last approximately 15-20 minutes and approximately 40-45 minutes, respectively.

Potential advantages and disadvantages

Clinical dental examinations will be executed free of costs. All participants will receive the results of their dental health check immediately. Oral hygiene instructions will be given individually to all Stage 2 participants. Please note that the examination does not include any treatment for the participants. Students in need of dental treatment will be referred to the dental health care. All dental instruments for the clinical examination will be sterilised. The clinical dental examination will not include any pain or inconvenience. There are no known potential adverse events.
At the end of the data collection period (approximately May 2016), among those students who filled in Q1 and gave their phone number, a grant (NOK 2500) will be raffled off. In addition, a grant (NOK 2500) will be raffled off among those students who actually took part in the clinical examination and filled in questionnaire 2. The winners will be determined by a random selection through a computer program.

What will happen to the information collected about you?
Data registered about you will only be used in accordance with the purpose of the study as described above. The received information will be processed anonymous, without any names. We ask you today to give your phone number, so we can contact you and give you the date/time for Stage 2 and inform you if you win the grant. We will not give the information you share with us further to other organisations or persons. It will not be possible to identify you in the results of the study when these are published.

Voluntary participation
Participation in this study is voluntary. You can withdraw your consent to participate at any time and without stating any particular reason. This will not have any consequences for your further training. If you wish to participate, sign the declaration of consent on this page. Even if you agree to participate at this time, you may later on withdraw your consent. For further information, we invite you to contact Sergei Drachev (researcher, dentist) by phone +78182285785.

Right to access and right to delete your data
If you agree to participate in the study, you are entitled to have access to what information is registered about you. You are further entitled to correct any mistakes in the information we have registered. If you withdraw from the study, you are entitled to demand that the collected data are deleted, unless the data have already been incorporated in analyses or used in scientific publications.

Schedule – what happens and when does it happen?
Stage 1 of the study will be conducted today (in November and December 2015). The clinical dental examination will be executed at the Dental Clinic of NSMU from February to May 2016. One researcher (Sergei Drachev) will perform all dental examinations. An assistant will fill in the details into a clinical sheet. The researcher will be carefully calibrated on examination style and diagnostic thresholds at the Dental Clinic of UiT The Arctic University of Norway, Tromsø, Norway in January 2016.

Funding and the role of the Department of Community Medicine, UiT The Arctic University of Norway, Tromsø, Norway.
The study is funded by a research grant from the Department of Community Medicine, UiT The Arctic University of Norway, Tromsø. The results from this study will be reported at scientific conferences, published in a Doctoral Thesis and in Master Theses at UiT The Arctic University of Norway and in international research journals.

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Consent for participation in the study

I have received the information and I am willing to participate in the study

«Oral health and occupational stress in undergraduate students»

(Signed by you - the project participant, date)

Запрос на участие в исследовательском проекте

«Стоматологическое здоровье и профессиональный стресс у студентов»

Информация об исследовании

Предпосылки и цель исследования

Мы хотели бы пригласить Вас принять участие в исследовании, целью которого является оценка стоматологического здоровья и факторов, связанных с ним, а также изучение факторов риска профессионального стресса у студентов-медиков и студентов-стоматологов, обучающихся в Северном государственном медицинском университете (г. Архангельск). До настоящего времени исследований, направленных на оценку детерминант стоматологического здоровья у молодых людей на Северо-Западе России, не выполнялось. Кроме того, данное исследование позволит лучше понять различные аспекты стресса у студентов.

Кто может принять участие в исследовании?

Все студенты, которые присутствуют сегодня на лекции, могут участвовать в первой стадии исследования. Следующие студенты будут приглашены для второй стадии исследования:

- ✓ русские студенты лечебного, педиатрического и стоматологического факультетов СГМУ, с первого по шестой курс обучения;
- ✓ студенты в возрасте 18-25 лет;
- ✓ студенты, которые предоставили свой номер телефона для возможности связаться с ними и назначить дату и время для бесплатного клинического стоматологического обследования;
- ✓ студенты, согласившиеся участвовать в исследовании и подписавшие информированное согласие;
- ✓ студенты без брекетов на зубах;
- ✓ небеременные женщины;
- ✓ студенты без жалоб на системные хронические/острые заболевания.

Что включает в себя данное исследование?

Исследование будет выполнено в 2 стадии. Сегодня проводится 1-ая стадия. Всем студентам, которые присутствуют сегодня на лекции, будет предложено заполнить анкету для самооценки социально-демографических и социально-экономических факторов; стоматологического здоровья; стоматологических привычек, установок и знаний. Студентам-стоматологам будет предложено также ответить на вопросы относительно источников стресса. На 2-ой стадии, все участвующие в исследовании студенты-стоматологи и случайно выбранные студенты лечебного и педиатрического факультета из числа тех, кто принял участие в первой стадии исследования, будут приглашены на клиническое стоматологическое обследование. В ходе обследования будут определяться наличие стоматологических заболеваний; кариес; гигиена полости рта; состояние десен. Участнику будет также предложено заполнить анкету с общими вопросами относительно своего здоровья и образа жизни, социально-экономического статуса, уровня стресса и стратегий по его преодолению. Первая стадия исследования займет у Вас ~15 минут, вторая- ~40-45 минут.

Потенциальные преимущества и недостатки участия в исследовании

Клиническое стоматологическое обследование будет выполнено бесплатно. Результаты исследования будут сообщены участнику сразу же. Все участники второй стадии исследования получат советы по гигиене полости в индивидуальном порядке. Исследование не включает в себя проведения лечения. Студенты, которые нуждаются в лечении, будут направлены к соответствующему специалисту. Все стоматологические инструменты будут стерильные. Данное обследование не будет сопровождаться какой-либо болью или неудобством для его участника. Каких-либо нежелательных (побочных) эффектов от стоматологического обследования нет.

В конце периода сбора данных (предположительно, май 2016 года) среди тех студентов, кто заполнил первую анкету и оставил свой номер телефона, будет разыгран грант (2500 норвежских крон). Аналогичный грант будет разыгран и среди тех участников, кто придет на клиническое

обследование и заполнит вторую часть опросника. Победители будут определены путем случайного отбора с помощью компьютерной программы.

Что случится с информацией, которая будет получена от Вас?
Полученная информация будет использована только в соответствии с обозначенными целями исследования, описанными выше. Информация будет обрабатываться в анонимном виде, без имен. Сегодня мы попросим Вас оставить свой мобильный телефон для того, чтобы мы смогли связаться с Вами и определить для Вас дату и время второй стадии исследования, а также информировать Вас в случае победы в розыгрыше. Предоставленная информация не будет передаваться другим лицам (организациям). Будет невозможно определить информацию, предоставленную именно Вами, в результатах исследования, когда они будут опубликованы.

Добровольное участие
Участие в исследовании является добровольным. Вы можете отказаться от участия в любое время без особых на то причин. Это не будет иметь каких-то последствий для Вашего обучения. Если Вы согласны участвовать, подпишите Согласие на участие. Даже если Вы согласитесь участвовать сейчас, Вы можете отказаться позднее. Для более подробной информации, Вы можете связаться с исследователем (Драчев Сергей Николаевич, исследователь, стоматолог) по телефону: +78182285785

Право получить доступ и удалить данные
Если Вы согласились участвовать в исследовании, значит, Вы имеете право на доступ к той информации, которая касается лично Вас. В дальнейшем Вы можете провести коррекцию той информации, которая была предоставлена. Если Вы отказываетесь от исследования впоследствии, Вы имеете право потребовать, чтобы вся полученная от Вас информация была удалена. Это возможно до тех пор, пока информация не будет включена в анализ или использована в научных публикациях.

График исследования
Первая стадия исследования будет проведена сегодня (в ноябре и декабре 2015 года). Клиническое стоматологическое обследование будет проводиться в стоматологической клинике СГМУ с февраля по май 2016. Все обследования будут выполнены одним исследователем (Драчевым Сергеем). Ассистент будет заносить информацию в карту стоматологического обследования. До начала исследования исследователь будет откалиброван на проведение клинического стоматологического обследования в стоматологической клинике Арктического Университета Норвегии, г. Тромсе, Норвегия.

Финансирование и результаты проекта
Исследование поддерживается научно-исследовательским грантом Арктического Университета Норвегии, г. Тромсе, Норвегия. Результаты исследования будут доложены на научно-практических конференциях, опубликованы в докторской и магистерских диссертациях в Университете Тромсе и международных журналах.

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Согласие на участие в исследовании

Я получил информацию об исследовании «Стоматологическое здоровье и профессиональный стресс у студентов» и желаю в нем участвовать

_____

(Подписывается Вами - участником проекта, дата)

Appendix B

Stage 1 questionnaire (English and Russian versions)

Date_____

QUESTIONNAIRE 1

"Oral health and occupational stress in undergraduate students"

Give only one answer to each question if no other information is given

Your phone number: ☐

Section A

Personal background information

1. Sex

1 ☐ male
2 ☐ female

2. Year of birth?

☐

3. Year of undergraduate education?

1 ☐ 1st year
2 ☐ 2nd year
3 ☐ 3rd year
4 ☐ 4th year
5 ☐ 5th year
6 ☐ 6th year

4. In which topic/direction are your studies?

1 ☐ General medicine
2 ☐ Dentistry
3 ☐ Paediatric medicine

5. Your education at NSMU is:

1 ☐ free
2 ☐ fee-based

6. Do you receive scholarship/funds to support your studies at NSMU?

1 ☐ yes
2 ☐ no

7. What is your marital status?

1 ☐ single
2 ☐ married
3 ☐ living with a partner
4 ☐ other, please specify

☐

8. What is your nationality?

1 ☐ Russian
2 ☐ other, please specify

☐

9. Where did you live during childhood and adolescence?

1 ☐ urban area
2 ☐ rural area

10. Where did you finish school?

1 ☐ Arkhangelsk City
2 ☐ Arkhangelsk Region
3 ☐ other, please specify:

☐

ID-number:

11. Where do you stay during your student years (this year)?

1 ☐ in a hostel
2 ☐ in a flat/house without parents
3 ☐ in a flat/house with parents

12. Do you have additional paid work during your student years (this year)?

1 ☐ yes
2 ☐ no
3 ☐ difficult to answer

13. How many hours do you watch TV on a daily basis?

1 ☐ less 0.5 hour
2 ☐ 0.5-1 hour
3 ☐ 1-2 hours
4 ☐ 2-3 hours
5 ☐ more than 3 hours

14. How many hours do you use internet on a daily basis?

1 ☐ less 0.5 hour
2 ☐ 0.5-1 hour
3 ☐ 1-2 hours
4 ☐ 2-3 hours
5 ☐ more than 3 hours

Section B

Self-reported oral health

15. Are you presently in need for any dental treatment? (A dentist told you)

1 ☐ yes
2 ☐ no
3 ☐ difficult to answer

16. Are you presently in need for any dental treatment? (Your personal opinion)

1 ☐ yes
2 ☐ no
3 ☐ difficult to answer

17. Have you ever experienced pain in the mouth?

1 ☐ never
2 ☐ rarely
3 ☐ sometimes
4 ☐ often
5 ☐ always
6 ☐ difficult to answer

18. Have you ever experienced dental pain?

1 ☐ never
2 ☐ rarely
3 ☐ sometimes
4 ☐ often
5 ☐ always
6 ☐ difficult to answer

19. Have you ever noticed gum bleeding during tooth brushing?

1 ☐ never
2 ☐ rarely
3 ☐ sometimes
4 ☐ often
5 ☐ always
6 ☐ difficult to answer

20. Have you ever had your teeth restored?

1 ☐ yes
2 ☐ no
3 ☐ difficult to answer

ID-number:

21. Have you ever been informed, that you have periodontal gum disease?

1 ☐ yes
2 ☐ no
3 ☐ difficult to answer

22. If you have extracted teeth, what was the main reason for the extraction(s)? (Give more answers, if several apply)

1 ☐ I have never extracted teeth
2 ☐ periodontal disease
3 ☐ pain
4 ☐ trauma
5 ☐ orthodontic reasons
6 ☐ dental caries
7 ☐ difficult to answer

23. In whole, would you say that your oral health is?

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

24. How do you evaluate your dental aesthetic?

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

25. Are you satisfied with the state of your mouth and teeth?

1 ☐ yes
2 ☐ no
3 ☐ difficult to answer

Section C

Oral health behaviours, attitudes and knowledge

26. How often do you see a dentist?

1 ☐ regularly, at least once every 6 mth
2 ☐ regularly, at least once a year
3 ☐ occasionally
4 ☐ no visits in the last 3 years
5 ☐ difficult to answer

27. Why did you visit the dentist last time you saw him/her?

1 ☐ it was a regular check-up
2 ☐ because of pain
3 ☐ other reason (please specify)

28. Is it difficult for you to get a dentist appointment if you need it?

1 ☐ no → -go to Q30
2 ☐ possibly
3 ☐ yes
} -go to Q29

29. If you have difficulties with getting a dental appointment, what is the most important reason?

1 ☐ economic reason (cost)
2 ☐ no time
3 ☐ waiting list
4 ☐ fear of dental treatment
5 ☐ hope the problem disappear
6 ☐ other reason (please specify)

ID-number:

30. How often do you brush your teeth?

1 ☐ never
2 ☐ less than once a week
3 ☐ once every few days
4 ☐ once a day
5 ☐ twice a day
6 ☐ more than twice a day

31. Do you use any tools to clean between your teeth?

1 ☐ no → -go to Q33
2 ☐ yes - tooth pick
3 ☐ yes - dental floss
-go to Q32

32. How often do you use tools to clean between your teeth?

1 ☐ less than once a week
2 ☐ once every few days
3 ☐ once a day
4 ☐ twice a day
5 ☐ more than twice a day

33. What kind of toothpaste do you use?

1 ☐ with fluoride
2 ☐ without fluoride
3 ☐ difficult to answer

34. Do you sometimes skip tooth brushing for some reason?

1 ☐ never or almost never
2 ☐ every day or almost every day
3 ☐ sometimes during a week

35. Have <u>your</u> dental check-ups and treatment been costly for you or your family?

1 ☐ yes
2 ☐ no
3 ☐ difficult to answer

36. Is a good oral health important to you?

1 ☐ very much so
2 ☐ yes
3 ☐ to some degree
4 ☐ not very important
5 ☐ not at all
6 ☐ difficult to answer

37. Do you usually notice the teeth and the oral health hygiene of your friends, family members or colleagues?

1 ☐ very much so
2 ☐ yes
3 ☐ to some degree
4 not very important
5 not at all
6 ☐ difficult to answer

38. What aspect of dental health do you notice the most? (Give more answers, if several apply)

1 ☐ the cleanness
2 ☐ the colour
3 ☐ the smell
4 ☐ the dentition
5 ☐ the appearance as such
6 ☐ difficult to answer

39. Do you think that good teeth and good oral health is an expression of… ? (Give more answers, if several apply)

1 ☐ being happy
2 ☐ high intelligence
3 ☐ cleanliness
4 ☐ good general health
5 ☐ difficult to answer

ID-number:

40. In case the state of your mouth and teeth is not optimum, what is the reason for this? (see Q25, p3)

1 ☐ insufficient dental hygiene habits
2 ☐ insufficient food habits
3 ☐ heritage
4 ☐ insufficient dental treatment
5 ☐ difficult to answer

41. Is your knowledge about dental health and dental hygiene sufficient?

1 ☐ no, not the least
2 ☐ no
3 ☐ yes
4 ☐ yes, absolutely

42. Were your parents (or guardians) strict with you while growing up, with respect to regularly tooth brushing?

1 ☐ no, not the least
2 ☐ no
3 ☐ yes
4 ☐ yes, absolutely
5 ☐ don't remember

43. From which authorities would you prefer to receive the additional knowledge about oral health? (Give more answers, if several apply)

1 ☐ from parents during childhood
2 ☐ from teachers in school
3 ☐ from mass media
4 ☐ from the dentist
5 ☐ from leaflets
6 ☐ difficult to answer

Section D – only applicable for dental students

Dental Environment Stress (DES)

*Please indicate how stressful the following events were to you for **the past month** by circling on a scale below*

	Not stressful at all	**Somewhat stressful**	**Quite stressful**	**Very stressful**	**Nonapplicable item**
	1	**2**	**3**	**4**	**5**
44 Amount of assigned classwork	o	o	o	o	o
45 Lack of cooperation by patients in their home care	o	o	o	o	o
46 Difficulty of classwork	o	o	o	o	o
47 Responsibilities for comprehensive patient care	o	o	o	o	o
48 Competition for grades	o	o	o	o	o
49 Patients being late or not showing for their appointments	o	o	o	o	o

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50 Examinations and grades	o	o	o	o	o
51 Difficulty in learning clinical procedures	o	o	o	o	o
52 Atmosphere created by clinical faculty	o	o	o	o	o
53 Relations with members of the opposite sex	o	o	o	o	o
54 Receiving criticism about work	o	o	o	o	o
55 Difficulty in learning precision manual skills required in preclinical and laboratory work	o	o	o	o	o
56 Lack of confidence to be a successful dental student	o	o	o	o	o
57 Lack of confidence in self to be a successful dentist	o	o	o	o	o
58 Lack of time for relaxation	o	o	o	o	o
59 Amount of cheating in dental school	o	o	o	o	o
60 Rules and regulations of the school	o	o	o	o	o
61 Working on patients with dirty mouths	o	o	o	o	o
62 Lack of home atmosphere in living quarters	o	o	o	o	o
63 Completing graduation requirements	o	o	o	o	o
64 Having children in the home	o	o	o	o	o
65 Marital adjustment problems	o	o	o	o	o
66 Expectations of dental school and what in reality it is like	o	o	o	o	o
67 Lack of input into the decision-making process school	o	o	o	o	o
68 Fear of failing course or year	o	o	o	o	o
69 Insecurity concerning professional future	o	o	o	o	o
70 Financial responsibilities	o	o	o	o	o
71 Lack of time to do assigned school work	o	o	o	o	o
72 Considering entering some other field of work	o	o	o	o	o
73 Forced postponement of marriage or engagement	o	o	o	o	o
74 Personal physical health	o	o	o	o	o
75 Attitudes of school toward women dental students	o	o	o	o	o
76 Necessity to postpone having children	o	o	o	o	o

ID-number:

77 Conflict with partner over career decision	o	o	o	o	o
78 Discrimination due to race, class status, or ethnic group	o	o	o	o	o
79 Having a dual role of wife/mother or husband/father and dental student	o	o	o	o	o
80 Inconsistency of feedback on your work between different instructors	o	o	o	o	o
81 Fear of being unable to catch up if behind	o	o	o	o	o
82 Having reduced holidays compared with other students	o	o	o	o	o
83 Moving away from home	o	o	o	o	o
84 Making friends	o	o	o	o	o

Thank you for your participation!

ID-number:

Дата_____

Анкета 1

«Стоматологическое здоровье и профессиональный стресс у студентов»

Отметьте, пожалуйста, только один ответ, если не указано никакой другой информации

Ваш номер телефона: ☐

Секция А

Персональная информация

1. Ваш пол

1 ☐ мужской
2 ☐ женский

2. Год рождения?

☐

3. Курс обучения в ВУЗе?

1 ☐ 1 год
2 ☐ 2 год
3 ☐ 3 год
4 ☐ 4 год
5 ☐ 5 год
6 ☐ 6 год

4. Направление Вашего обучения?

1 ☐ Лечебное дело
2 ☐ Стоматология
3 ☐ Педиатрия

5. Ваше обучение в СГМУ:

1 ☐ бесплатное
2 ☐ платное

6. Вы получаете стипендию в СГМУ?

1 ☐ да
2 ☐ нет

7. Ваше семейное положение?

1 ☐ не женат /не замужем
2 ☐ женат / замужем
3 ☐ живу с другом/подругой
4 ☐ другое (пожалуйста, уточните):

☐

8. Ваша национальность?

1 ☐ Русский
2 ☐ другое (пожалуйста, уточните):

☐

9. Где Вы проживали в детстве и юности?

1 ☐ город
2 ☐ сельская местность

10. Где Вы закончили школу?

1 ☐ Архангельск
2 ☐ Архангельская область
3 ☐ другое (пожалуйста, уточните):

☐

11. Где Вы живете в студенческие годы (этот год)?

1 ☐ в общежитии
2 ☐ в квартире/доме без родителей
3 ☐ в квартире/доме с родителями

12. У Вас есть дополнительная оплачиваемая работа в период обучения в ВУЗе (в этот год)?

1 ☐ да
2 ☐ нет
3 ☐ затрудняюсь ответить

13. Количество просмотра ТВ в день в среднем

1 ☐ менее получаса
2 ☐ 0.5-1 час
3 ☐ 1-2 часа
4 ☐ 2-3 часа
5 ☐ более чем 3 часа

14. Количество пользования Интернетом в день в среднем

1 ☐ менее получаса
2 ☐ 0.5-1 час
3 ☐ 1-2 часа
4 ☐ 2-3 часа
5 ☐ более чем 3 часа

Секция В

Самооценка стоматологического здоровья

15. В настоящее время Вы нуждаетесь в стоматологическом лечении? (Так сказал стоматолог)

1 ☐ да
2 ☐ нет
3 ☐ затрудняюсь ответить

16. В настоящее время Вы нуждаетесь в стоматологическом лечении? (Ваше персональное мнение)

1 ☐ да
2 ☐ нет
3 ☐ затрудняюсь ответить

17. Вы когда-нибудь испытывали боль в полости рта?

1 ☐ никогда
2 ☐ редко
3 ☐ иногда
4 ☐ часто
5 ☐ всегда
6 ☐ затрудняюсь ответить

18. Вы когда-нибудь испытывали зубную боль?

1 ☐ никогда
2 ☐ редко
3 ☐ иногда
4 ☐ часто
5 ☐ всегда
6 ☐ затрудняюсь ответить

19. Вы когда-нибудь замечали кровоточивость десен во время чистки зубов?

1 ☐ никогда
2 ☐ редко
3 ☐ иногда
4 ☐ часто
5 ☐ всегда
6 ☐ затрудняюсь ответить

20. Вы когда-либо лечили/восстанавливали зубы?

1 ☐ да
2 ☐ нет
3 ☐ затрудняюсь ответить

21. Вас когда-либо информировали, что у Вас есть заболевания десен?

1 ☐ да
2 ☐ нет
3 ☐ затрудняюсь ответить

ID-number:

22. Если у Вас есть удаленный постоянный зуб(ы), какая была главная причина для удаления(ий)?(Возможны несколько вариантов ответов)

1 ☐ Я никогда не удалял(а) постоянные зубы
2 ☐ заболевания десен (подвижность постоянного зуба)
3 ☐ боль
4 ☐ травма
5 ☐ ортодонтические причины
6 ☐ кариес
7 ☐ затрудняюсь ответить

23. В целом, Ваше стоматологическое здоровье

1 ☐ отличное
2 ☐ очень хорошее
3 ☐ хорошее
4 ☐ удовлетворительное
5 ☐ плохое
6 ☐ затрудняюсь ответить

24. Как Вы оцениваете Вашу стоматологическую эстетику (внешний вид зубов, полости рта)?

1 ☐ отличная
2 ☐ очень хорошая
3 ☐ хорошая
4 ☐ удовлетворительная
5 ☐ плохая
6 ☐ затрудняюсь ответить

25. Вы удовлетворены состоянием Вашей полости рта и зубов?

1 ☐ да
2 ☐ нет
3 ☐ затрудняюсь ответить

Секция С

Стоматологические привычки, установки и знания

26. Как часто Вы посещаете стоматолога?

1 ☐ регулярно, по крайней мере, раз в 6 месяцев
2 ☐ регулярно, по крайней мере, раз в год
3 ☐ иногда, время от времени
4 ☐ не было никаких посещений в последние 3 года
5 ☐ затрудняюсь ответить

27. С какой целью Вы посещали стоматолога в последний раз?

1 ☐ это был регулярный осмотр
2 ☐ по причине боли
3 ☐ другое (пожалуйста, уточните):

28. Для Вас сложно записаться к стоматологу, если Вам это требуется?

1 ☐ нет → -переходите к вопросу 30.
2 ☐ возможно
3 ☐ да → -переходите к вопросу 29.

29. Если у Вас есть сложности записаться на прием к стоматологу, то наиболее важная причина этого

1 ☐ экономическая причина (стоимость приема)
2 ☐ недостаток времени
3 ☐ очередь
4 ☐ страх стоматологического лечения
5 ☐ надежда, что проблема исчезнет
6 ☐ другое (пожалуйста, уточните):

30. Как часто Вы чистите зубы?

1 ☐ никогда
2 ☐ менее 1 раза в неделю
3 ☐ раз в несколько дней
4 ☐ один раз в день
5 ☐ два раза в день
6 ☐ более чем 2 раза в день

31. Вы используете какие-либо средства для чистки между зубами?

1 ☐ нет → -переходите к вопросу 33.
2 ☐ да - зубочистка
3 ☐ да - зубная нить
] -переходите к вопросу 32.

32. Как часто Вы используете средства для очищения между зубами?

1 ☐ менее чем 1 раз в неделю
2 ☐ 1 раз в несколько дней
3 ☐ 1 раз в день
4 ☐ 2 раза в день
5 ☐ более чем 2 раза в день

33. Какую зубную пасту Вы используете?

1 ☐ с фтором
2 ☐ без фтора
3 ☐ затрудняюсь ответить

34. Вы когда-нибудь пропускали чистку зубов в силу каких-либо причин?

1 ☐ никогда или почти никогда
2 ☐ каждый день или почти каждый день
3 ☐ иногда в течение недели

35. Стоматологические осмотры и лечение слишком дорогие по стоимости для Вас и Вашей семьи?

1 ☐ да
2 ☐ нет
3 ☐ затрудняюсь ответить

36. Хорошее стоматологическое здоровье важно для Вас?

1 ☐ очень важно
2 ☐ да, важно
3 ☐ в некоторой степени
4 ☐ не очень важно
5 ☐ совсем не важно
6 ☐ затрудняюсь ответить

37. Вы обычно обращаете внимание на зубы и гигиену полости рта Ваших друзей, членов семьи или коллег?

1 ☐ очень сильное внимание
2 ☐ да
3 ☐ в некоторой степени
4 ☐ это не очень важно
5 ☐ это совсем не важно
6 ☐ затрудняюсь ответить

38. Какие аспекты состояния зубов Вы отмечаете как самые важные? (Возможны несколько вариантов ответов)

1 ☐ чистота
2 ☐ цвет
3 ☐ запах
4 ☐ расположение
5 ☐ внешний вид как таковой
6 ☐ затрудняюсь ответить

39. Вы думаете, что хорошие зубы и хорошее стоматологическое здоровье - это выражение… ? (Возможны несколько вариантов ответов)

1 ☐ счастья
2 ☐ высокого интеллекта
3 ☐ чистоплотности
4 ☐ хорошего общего здоровья
5 ☐ затрудняюсь ответить

40. В случае, если состояние Вашей полости рта и зубов не оптимальное, в чем причина этого? (см. вопрос 25) (*Возможно несколько вариантов ответов)*

1 ☐ недостаточные привычки в гигиене полости рта
2 ☐ недостаточные привычки в питании
3 ☐ наследственность
4 ☐ недостаточное стоматологическое лечение
5 ☐ затрудняюсь ответить

41. Ваши знания о здоровье зубов и гигиене зубов достаточны?

1 ☐ нет, совсем недостаточны
2 ☐ нет
3 ☐ да
4 ☐ да, абсолютно

42. Ваши родители (опекуны) требовали с Вас, пока Вы росли, регулярной чистки зубов?

1 ☐ нет, совсем нет
2 ☐ нет
3 ☐ да
4 ☐ да, абсолютно
5 ☐ не помню

43. Из каких источников Вы бы предпочли получать дополнительные знания о стоматологическом здоровье?
(Возможно несколько вариантов ответов)

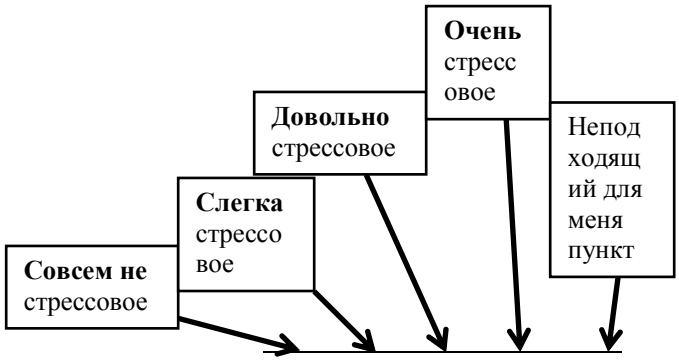
1 ☐ в детстве от родителей
2 ☐ от учителей в школе
3 ☐ из средств массовой информации
4 ☐ от стоматолога
5 ☐ из информационных листов (брошюр)
6 ☐ затрудняюсь ответить

ID-number:

Секция D – только для студентов стоматологического факультета

Оценка стресса

*Укажите, пожалуйста, насколько стрессовыми были для Вас каждое из перечисленных событий в **прошлом месяце,** сделав отметку на предлагаемой шкале*



		1	**2**	**3**	**4**	**5**
44.	*Количество заданного материала по изучаемым предметам*	o	o	o	o	o
45.	*Недостаточное содействие со стороны пациентов в выполнении домашнего ухода*	o	o	o	o	o
46.	*Трудность предметов*	o	o	o	o	o
47.	*Ответственность за комплексный уход за пациентом*	o	o	o	o	o
48.	*Конкуренция за оценки*	o	o	o	o	o
49.	*Опоздания пациентов или неявка на прием*	o	o	o	o	o
50.	*Экзамены и оценки*	o	o	o	o	o
51.	*Сложность освоения клинических методик (процедур)*	o	o	o	o	o
52.	*Атмосфера на факультете*	o	o	o	o	o
53.	*Отношения с противоположным полом*	o	o	o	o	o
54.	*Получение критики о своей работе*	o	o	o	o	o
55.	*Трудность в освоении точности практических навыков на предклинических и лабораторных занятиях*	o	o	o	o	o
56.	*Недостаток уверенности в себе быть успешным студентом-стоматологом*	o	o	o	o	o
57.	*Недостаток уверенности в себе быть успешным стоматологом*	o	o	o	o	o
58.	*Недостаток времени на отдых*	o	o	o	o	o
59.	*Количество нарушений (обмана, мошенничества) на*	o	o	o	o	o

ID-number:

	стоматологическом факультете					
60.	*Правила и нормы стоматологического факультета*	o	o	o	o	o
61.	*Работа на пациентах, не соблюдающих гигиену полости рта*	o	o	o	o	o
62.	*Недостаток домашней атмосферы в месте проживания*	o	o	o	o	o
63.	*Выполнение требований для окончания учебного заведения*	o	o	o	o	o
64.	*Наличие детей в доме*	o	o	o	o	o
65.	*Улаживание семейных проблем*	o	o	o	o	o
66.	*Ожидания от стоматологического факультета и то, какова реальность*	o	o	o	o	o
67.	*Недостаток вклада в процесс принятия решений на стоматологическом факультете*	o	o	o	o	o
68.	*Страх не сдать предмет или не окончить учебный год*	o	o	o	o	o
69.	*Неуверенность относительно профессионального будущего*	o	o	o	o	o
70.	*Финансовые обязательства*	o	o	o	o	o
71.	*Недостаток времени сделать заданное в университете задание*	o	o	o	o	o
72.	*Рассмотрение возможности смены сферы деятельности*	o	o	o	o	o
73.	*Вынужденная отсрочка свадьбы или помолвки*	o	o	o	o	o
74.	*Собственное физическое здоровье*	o	o	o	o	o
75.	*Отношение к студентам женского пола на стоматологическом факультете*	o	o	o	o	o
76.	*Необходимость отложить заведение детей*	o	o	o	o	o
77.	*Конфликт с партнером из-за выбора карьеры*	o	o	o	o	o
78.	*Дискриминация по расе, классовому статусу, или этнической группе*	o	o	o	o	o
79.	*Наличие двойной роли жены/матери (или мужа/отца) и студентки (-та) стоматологического факультета*	o	o	o	o	o
80.	*Противоречивость ответной реакции на Вашу работу между разными наставниками (преподавателями)*	o	o	o	o	o
81.	*Страх не успеть догнать (наверстать) в случае отставания*	o	o	o	o	o
82	*Наличие более коротких каникул в сравнении с другими студентами*	o	o	o	o	o

ID-number:

83	*Переезд из дома*	o	o	o	o	o
84	*Установка дружеских отношений*	o	o	o	o	o

Спасибо за участие!

Appendix C

Stage 2 questionnaire (English and Russian versions)

Date_____ ID number_____

QUESTIONNAIRE 2

"Oral health and occupational stress in undergraduate students"

Give only one answer to each question if no other information is given

Section A

1. In whole, would you say that your general health is:

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

2. In whole, would you say that your social life is:

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

3. In whole, would you say that your psychological health is:

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

4. During one regular week, how many people you actually know, do you meet or hang out with?

1 ☐ nobody
2 ☐ 1-2
3 ☐ 3-5
4 ☐ 6-10
5 ☐ 11-15
6 ☐ > 15

5. Your mother's level of education is:

1☐ high school (9-11 years)
2☐ specialized secondary
3☐ university
4☐ difficult to answer

6. Your father's level of education is:

1☐ high school (9-11 years)
2☐ specialized secondary
3☐ university
4☐ difficult to answer

7. In whole, would you say that your quality of life related to your health is:

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

8. Are you a current smoker?

1 ☐ never smoke → go to Q10
2 ☐ no, ex-smoker
3 ☐ yes, a current-smoker → go to Q9

9. When you smoked – or presently, how many cigarettes per day?

1 ☐ up to 10
2 ☐ more than 10, up to 20
3 ☐ more than 20
4 ☐ difficult to answer

10. Approximately, how many times per week do you perform light physical activity, ie without getting sweaty or breathless?

1 ☐ none
2 ☐ less than 1 time per week
3 ☐ 1-2 times per week
4 ☐ 3 time per week or more
5 ☐ difficult to answer

11. Approximately, how many times per week do you perform hard physical activity, ie getting sweaty and breathless?

1 ☐ none
2 ☐ less than 1 time per week
3 ☐ 1-2 times per week
4 ☐ 3 time per week or more
5 ☐ difficult to answer

12. Please, indicate how often you took any alcohol (beer, wine, vodka, etc.) ***in the last 12 months***

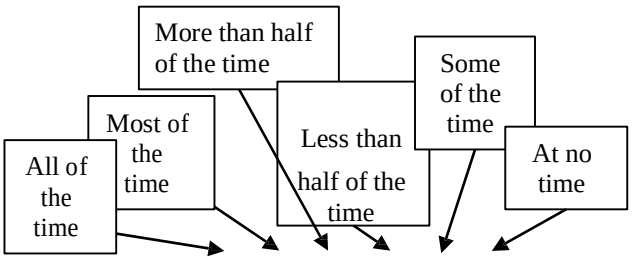
1 ☐ every day or more often
2 ☐ nearly every day
3 ☐ 3-4 times per week
4 ☐ once or twice a week
5 ☐ 1-3 times a month
6 ☐ a few times a year
7 ☐ never or almost never

13. In whole, would you say that you cope with the different aspects of live?

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

Section B

General Wellbeing (WHO-5 Version 2)
Please circle a number on each of the following statements to indicate how often you feel each of them has applied to you

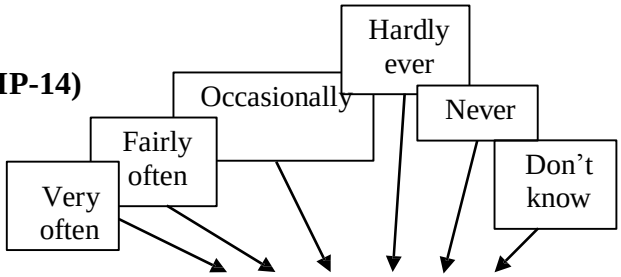


In the ***last few weeks****, how often have you:*

		5	**4**	**3**	**2**	**1**	**0**
14.	*I have felt cheerful and in good spirits*						
15.	*I have felt calm and relaxed*						
16.	*I have felt active and vigorous*						
17.	*I woke up feeling fresh and rested*						
18.	*My daily life has been filled with things that interested me*						

Section C

Quality of Life (Oral Health Impact Profile- OHIP-14)



*In the **last year**, how often have you:*

	4	3	2	1	0	5
19. Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?						
20. Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?						
21. Have you had painful aching in your mouth?						
22. Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?						
23. Have you been self-conscious because of your teeth, mouth or dentures?						
24. Have you felt tense because of problems with your teeth, mouth or dentures?						
25. Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?						
26. Have you had to interrupt meals because of problems with your teeth, mouth or dentures?						
27. Have you found it difficult to relax because of problems with your teeth, mouth or dentures?						
28. Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?						
29. Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?						
30. Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?						
31. Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?						
32. Have you been unable to function because of problems with your teeth, mouth or dentures?						

Section D

Dental Anxiety Scale (Corah's Dental Questionnaire)

33. If you had to go to the dentist tomorrow for a check-up, how would you feel about it?

1 ☐ I would look forward to it as a reasonably enjoyable experience
2 ☐ I would not care one way or the other
3 ☐ I would be a little uneasy about it
4 ☐ I would be afraid that it would be unpleasant and painful
5 ☐ I would be very frightened of what the dentist would do

34. When you are waiting in the dentist's office for your turn in the chair, how do you feel?

1 ☐ Relaxed
2 ☐ A little uneasy
3 ☐ Tense
4 ☐ Anxious
5 ☐ So anxious that I sometimes break out in a sweat or almost feel physically sick

35. When you are in the dentist's chair waiting while the dentist gets the drill ready to begin working on your teeth, how do you feel?

1 ☐ Relaxed
2 ☐ A little uneasy
3 ☐ Tense
4 ☐ Anxious
5 ☐ So anxious that I sometimes break out in a sweat or almost feel physically sick

36. Imagine you are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist or hygienist is getting out the instruments, which will be used to scrape your teeth around the gums, how do you feel?

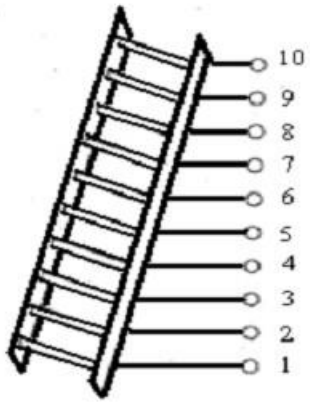
1 ☐ Relaxed
2 ☐ A little uneasy
3 ☐ Tense
4 ☐ Anxious
5 ☐ So anxious that I sometimes break out in a sweat or almost feel physically sick

Section E

MacArthur Scale

37. Subjective socioeconomic status

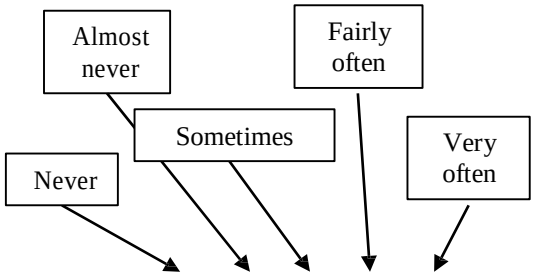
Think of this ladder as representing where people stand in Russian society. At the top of the ladder are the people who are the best off (they have the most money, the highest amount of schooling, and the jobs that bring the most respect), at the bottom are the people who are the worst off (they have the least money, little or no education, no jobs or jobs that no one wants or respects). The higher up you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to the people at the very bottom.
Now think about your family. Fill in the circle that best represents where your family would be on this ladder.



Section F

Perceived Stress Scale (PSS-10)

The questions in this scale ask you about your feelings and thoughts during THE LAST MONTH. In each case, you will be asked to indicate your response by placing an "X" representing HOW OFTEN you felt or thought a certain way. Some questions may seem identical. Nonetheless, the best approach is to answer quickly. Don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate



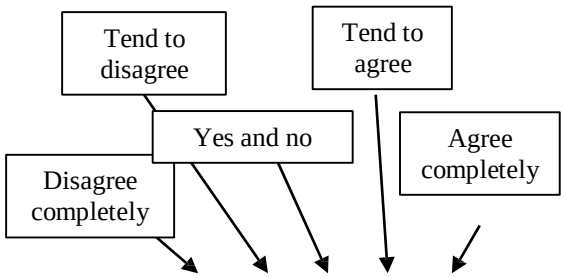
*In the **last month**, how often have you:*

		0	**1**	**2**	**3**	**4**
38.	*Been upset because of something that happened unexpectedly?*					
39.	*Felt that you were unable to control the important things in your life?*					
40.	*Felt nervous and "stressed"?*					
41.	*Felt confident about your ability to handle your personal problems?*					
42.	*Felt that things were going your way?*					
43.	*Found that you could not cope with all the things that you had to do?*					
44.	*Been able to control irritations in your life?*					
45.	*Felt that you were on top of things?*					
46.	*Been angered because of things that were outside of your control?*					
47.	*Felt difficulties were piling up so high that you could not overcome them?*					

Brief Approach/Avoidance Coping Questionnaire (BACQ)

How do you usually cope with problems and illness?

The questions on this page deal with how you usually act in relation to problems and disease. For each item, place a tick in the box that fits best with what you think about yourself just now. The questions are written in 'I' form and you place your tick depending on how much you agree/disagree. The purpose of the questions is to make you think about whether or not you are satisfied with the way you react to problems and illness.



		1	**2**	**3**	**4**	**5**
48.	*I say so if I am angry or sad*					
49.	*I like to talk with a few chosen people when things get too much for me*					
50.	*I make an active effort to find a solution to my problems*					
51.	*Physical exercise is important to me*					
52.	*I think something positive could come out of my complaints/problems*					
53.	*I firmly believe that my problems will decrease (and my situation improve)*					
54.	*I try to forget my problems*					
55.	*I put my problems behind me by concentrating on something else*					
56.	*I bury myself in work to keep my problems at a distance*					
57.	*I often find it dif. cult to do something new*					
58.	*I am well on the way towards feeling I have given up*					
59.	*I withdraw from other people when things get difficult*					

60. In whole, would you say that your harmony of stress/relax is:

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

61. In whole, would you say that your grip on study-progress is:

1 ☐ excellent
2 ☐ very good
3 ☐ good
4 ☐ fair
5 ☐ poor
6 ☐ difficult to answer

*62. Please, indicate the consequences of stress you may have experienced **in the last 12 months** (Give more answers, if several apply)*

1 ☐ headache
2 ☐ sleep disturbance
3 ☐ fatigue/tiredness
4 ☐ eye strain
5 ☐ back pain
6 ☐ abdominal disturbance
7 ☐ oral ulcers
8 ☐ mood alteration
9 ☐ affect performance
10 ☐ other consequences

*63. Please, indicate the most used methods of stress reduction you may have used **in the last 12 months***
(Give more answers, if several apply)

1 ☐ read magazines or books
2 ☐ praying/spiritual activity
3 ☐ physical activity
4 ☐ meditation
5 ☐ listening to music/playing a musical instrument
6 ☐ shopping/window shopping
7 ☐ watching movies at home or at the cinema
8 ☐ smoking cigarettes
9 ☐ drinking alcohol
10 ☐ sleeping
11 ☐ spouse/girlfriend/boyfriend
12 ☐ friends
13 ☐ family
14 ☐ lecturers/mentors/academic advisors
15 ☐ professional help: doctor, psychiatrist, counselor
16 ☐ other

Thank you for your participation!

ID number:

Дата_____

Анкета 2

«Стоматологическое здоровье и профессиональный стресс у студентов»

Отметьте, пожалуйста, только один ответ, если не указано никакой другой информации

Секция А

1. В целом, Вы бы могли сказать, что Ваше общее здоровье:

1 ☐ отличное
2 ☐ очень хорошее
3 ☐ хорошее
4 ☐ удовлетворительное
5 ☐ плохое
6 ☐ затрудняюсь ответить

2. В целом, Вы бы могли сказать, что Ваша социальная жизнь:

1 ☐ отличная
2 ☐ очень хорошая
3 ☐ хорошая
4 ☐ удовлетворительная
5 ☐ плохая
6 ☐ затрудняюсь ответить

3. В целом, Вы бы могли сказать, что Ваше психологическое здоровье:

1 ☐ отличное
2 ☐ очень хорошее
3 ☐ хорошее
4 ☐ удовлетворительное
5 ☐ плохое
6 ☐ затрудняюсь ответить

4. В течение одной обычной недели, сколько людей, которые Вам знакомы, Вы встречаете и общаетесь с ними?

1 ☐ никого
2 ☐ 1-2
3 ☐ 3-5
4 ☐ 6-10
5 ☐ 11-15
6 ☐ > 15

5. Образование Вашей матери:

1 ☐ средняя школа (9-11 классов)
2 ☐ среднее специальное (медицинский или педагогический колледж, техникум и др.)
3 ☐ университет
4 ☐ затрудняюсь ответить

6. Образование Вашего отца:

1 ☐ средняя школа (9-11 классов)
2 ☐ среднее специальное (медицинский или педагогический колледж, техникум и др.)
3 ☐ университет
4 ☐ затрудняюсь ответить

7. В целом, Вы бы могли сказать, что качество Вашей жизни, связанное с Вашим здоровьем:

1 ☐ отличное
2 ☐ очень хорошее
3 ☐ хорошее
4 ☐ удовлетворительное
5 ☐ плохое
6 ☐ затрудняюсь ответить

8. Вы курите?

1 ☐ никогда не курил → -переходите к вопросу 10
2 ☐ нет, курил раньше
3 ☐ да
} -переходите к вопросу 9

9. Когда Вы курили (или сейчас) - сколько сигарет Вы выкуривали(-ите) в день?

1 ☐ до 10
2 ☐ 10-20
3 ☐ более 20
4 ☐ затрудняюсь ответить

ID number:

10. Примерно, сколько раз в неделю Вы выполняете легкую физическую нагрузку (т.е. не сопровождающуюся потливостью или напряжением дыхания)?

1 ☐ ни разу
2 ☐ менее чем 1 раз в неделю
3 ☐ 1-2 раза в неделю
4 ☐ 3 раза в неделю или более
5 ☐ затрудняюсь ответить

11. Примерно, сколько раз в неделю Вы выполняете тяжелую физическую нагрузку (т.е. сопровождающуюся потливостью или напряжением дыхания)?

1 ☐ ни разу
2 ☐ менее чем 1 раз в неделю
3 ☐ 1-2 раза в неделю
4 ☐ 3 раза в неделю или более
5 ☐ затрудняюсь ответить

12. Пожалуйста, укажите, как часто Вы употребляли любой алкоголь (пиво, вино, водка, и тд) ***в последние 12 месяцев?***

1 ☐ каждый день или несколько раз в день
2 ☐ почти каждый день
3 ☐ 3-4 раза в неделю
4 ☐ 1-2 раза в неделю
5 ☐ 1-3 раза в месяц
6 ☐ несколько раз в год
7 ☐ никогда или почти никогда

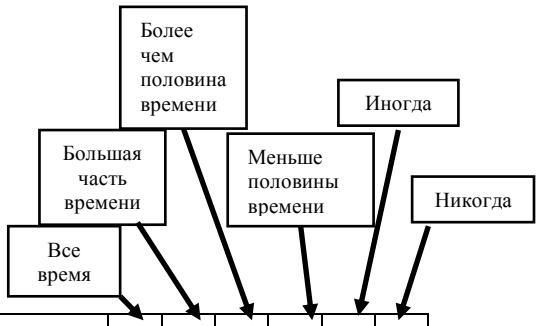
13. В целом, Вы бы могли сказать, что Вы справляетесь с различными жизненными ситуациями

1 ☐ отлично
2 ☐ очень хорошо
3 ☐ хорошо
4 ☐ удовлетворительно
5 ☐ плохо
6 ☐ затрудняюсь ответить

Секция B

Оценка общего благополучия (WHO-5 Version 2)

Отметьте, пожалуйста, цифру, которая соответствует тому, как часто каждое из перечисленных утверждений характерно для Вас



В ***последние несколько недель****, как часто*

		5	4	3	2	1	0
14.	*Я чувствовал(а) себя жизнерадостным и в хорошем настроении*						
15.	*Я чувствовал(а) себя спокойным и расслабленным*						
16.	*Я чувствовал(а) себя активным и энергичным*						
17.	*Я просыпался(-лась) бодрым(ой) и отдохнувшим(ей)*						
18.	*Моя повседневная жизнь была наполнена вещами, которые меня интересовали*						

ID number:

Секция С

Стоматологическое качество жизни (Oral Health Impact Profile- OHIP-14)

Как часто Вы имели проблемы, которые указаны в вопросах,
за последний год?

	очень часто (4)	достаточно часто (3)	иногда (2)	почти никогда (1)	никогда (0)	не знаю (5)
19. Испытываете ли Вы затруднения при произношении слов из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
20. Вы потеряли вкус к пище из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
21. Испытываете ли Вы болевые ощущения в полости рта?						
22. Вызывает ли у Вас затруднение прием пищи из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
23. Чувствуете ли Вы себя стесненным в общении с людьми из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
24. Испытываете ли Вы неудобства из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
25. Питаетесь ли Вы неудовлетворительно из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
26.Приходится ли Вам прерывать прием пищи из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
27.Мешают ли Вам проблемы с зубами, слизистой оболочкой полости рта или протезами отдыхать, расслабляться?						
28.Ставят ли Вас проблемы с зубами, слизистой оболочкой полости рта или протезами в неловкое положение?						
29.Приводят ли Вас проблемы с зубами, слизистой оболочкой полости рта или протезами к повышенной раздражительности при общении с людьми?						
30. Испытываете ли Вы затруднения в обычной работе из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
31. Становится ли Ваша жизнь менее интересной из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						
32.Приходится ли Вам полностью «выпадать из жизни» из-за проблем с зубами, слизистой оболочкой полости рта или протезами?						

ID number:

Секция D

Оценка стоматологической тревожности (Corah's Dental Questionnaire)

33. Если бы Вы должны были завтра идти к стоматологу на осмотр, какие бы чувства Вы испытывали в связи с этим?

1 ☐ Я бы с нетерпением ждал этого, как достаточно приятное событие
2 ☐ Мне было бы все равно
3 ☐ Мне было бы немного тревожно
4 ☐ Мне было бы страшно, что будет неприятно и больно
5 ☐ Я был бы очень испуган тем, что будет делать стоматолог

34. Когда Вы ждете своей очереди в стоматологическом кабинете, как Вы себя чувствуете?

1 ☐ Расслабленно
2 ☐ Немного неловко (беспокойно)
3 ☐ Напряженно
4 ☐ Тревожно
5 ☐ Так тревожно, что иногда меня бросает в пот, или я почти что чувствую себя физически нездоровым

35. Когда Вы находитесь в кресле стоматолога и ждете, пока врач приготовит бормашину, чтобы начать работать с Вашими зубами, как Вы себя чувствуете?

1 ☐ Расслабленно
2 ☐ Немного неловко (беспокойно)
3 ☐ Напряженно
4 ☐ Тревожно
5 ☐ Так тревожно, что иногда меня бросает в пот, или я почти что чувствую себя физически нездоровым

36. Представьте, что Вы находитесь в кресле у стоматолога, чтобы Вам почистили зубы. Пока Вы ожидаете, и стоматолог или гигиенист достают инструменты, которые будут использоваться, чтобы поскоблить Ваши зубы вокруг десен, как Вы себя чувствуете?

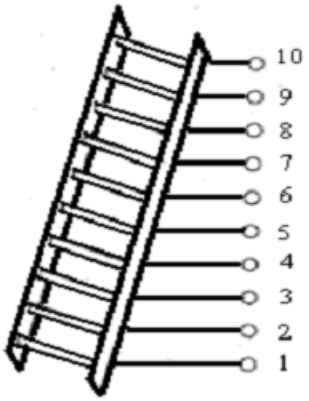
1 ☐ Расслабленно
2 ☐ Немного неловко (беспокойно)
3 ☐ Напряженно
4 ☐ Тревожно
5 ☐ Так тревожно, что иногда меня бросает в пот, или я почти что чувствую себя физически нездоровым

ID number:

Секция E

37. ***Субъективный социально-экономический статус (MacArthur Scale)***

Представьте, что эта лестница представляет положение людей в Российском обществе. На самой верхней ступени находятся состоятельные люди, которые имеют много денег, самое лучшее образование, самую лучшую работу. На самой нижней ступени находятся люди, живущие в нужде (с минимальным количеством денег, минимальным образованием, с наихудшей работой или отсутствием работы). Чем выше Вы находитесь на этой лестнице, тем ближе Вы к людям, кто на самом верху, и чем ниже - тем ближе к тем, кто на самой нижней ступени.

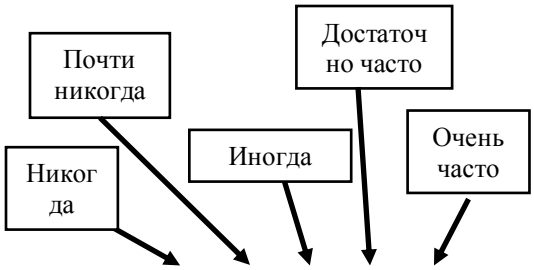


Сейчас подумайте о Вашей семье. Отметьте, пожалуйста, кружок (цифру), где бы находилась Ваша семья на этой лестнице.

Секция F

Шкала восприятия стресса (PSS-10)

Вопросы в этой шкале касаются ваших ощущений и мыслей в течение **ПОСЛЕДНЕГО МЕСЯЦА**. В каждом случае необходимо предоставить ответ, поместив "X" в кружочке, определяющем **КАК ЧАСТО** вы чувствовали или думали определенным образом. Хотя некоторые вопросы подобны, между ними есть разница, и вы должны рассматривать каждый из них, как отдельный вопрос. Самый лучший подход - ответить сравнительно быстро. Другими словами, не пытайтесь подсчитать, сколько раз вы чувствовали себя определенным образом, а лучше укажите вариант, который кажется вам правдоподобным.

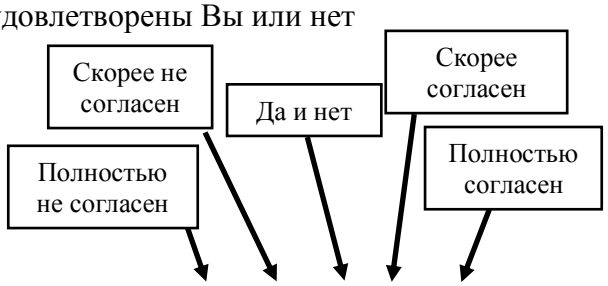


	За последний месяц как часто Вы	**0**	**1**	**2**	**3**	**4**
38.	*Были расстроены из-за чего-то, что произошло неожиданно?*					
39.	*Чувствовали, что не могли контролировать важные вещи в Вашей жизни?*					
40.	*Чувствовали себя нервным и напряженным?*					
41.	*Чувствовали уверенность в способности решать свои личные проблемы?*					

42.	*Чувствовали, что дела идут согласно Вашим планам?*					
43.	*Понимали, что не можете справиться со всеми делами, которые Вы должны были сделать?*					
44.	*Были способны контролировать раздражение?*					
45.	*Чувствовали, что у Вас все под полным контролем?*					
46.	*Злились из-за происходящих событий, которые не были под Вашим контролем?*					
47.	*Чувствовали, что трудности наваливаются на Вас так сильно, что Вы не можете их преодолеть?*					

Как Вы обычно справляетесь с проблемами или болезнью?

Вопросы в этом разделе выясняют, как Вы обычно действуете в отношении проблем и болезней. Для каждого утверждения поставьте в поле галочку, которая лучше всего отразит степень Вашего согласия с данным утверждением на данный момент времени. Цель вопросов - заставить Вас задуматься о том, удовлетворены Вы или нет тем, как Вы реагируете на проблемы и болезни.



		1	**2**	**3**	**4**	**5**
48.	*Я говорю, если я злюсь или мне грустно*					
49.	*Мне нравится говорить с несколькими избранными людьми, когда дел становится слишком много для меня*					
50.	*Я прилагаю активные усилия, чтобы найти решение моих проблем*					
51.	*Физические упражнения важны для меня*					
52.	*Я думаю, что что-то положительное могло бы выйти из моих жалоб / проблем*					
53.	*Я твердо верю, что мои проблемы будут уменьшаться (и моя ситуация улучшится)*					
54.	*Я пытаюсь забыть мои проблемы*					
55.	*Я отодвигаю свои проблемы, концентрируясь на чем-то другом*					
56.	*Я погружаюсь в работу, чтобы держать мои проблемы на расстоянии*					
57.	*Мне часто трудно сделать что-то новое*					
58.	*Я чувствую себя хорошо, осознавая, что сдался*					
59.	*Я отдаляюсь от других людей, когда обстоятельства становятся трудными*					

ID number:

60. В целом, Вы могли бы сказать, что баланс стресс/отдых:

1 ☐ отличный
2 ☐ очень хороший
3 ☐ хороший
4 ☐ удовлетворительный
5 ☐ плохой
6 ☐ затрудняюсь ответить

61. В целом, Вы могли бы сказать, что Ваш контроль над обучением:

1 ☐ отличный
2 ☐ очень хороший
3 ☐ хороший
4 ☐ удовлетворительный
5 ☐ плохой
6 ☐ затрудняюсь ответить

62. Пожалуйста, укажите последствия стресса, которые Вы, возможно, испытали в течение ***последних 12 месяцев*** *(Возможно несколько вариантов ответа)*

1 ☐ головная боль
2 ☐ нарушение сна
3 ☐ усталость
4 ☐ переутомление глаз
5 ☐ боль в спине
6 ☐ абдоминальные нарушения (нарушения в желудочно-кишечном тракте)
7 ☐ язвы в полости рта
8 ☐ изменение настроения
9 ☐ снижение работоспособности
10 ☐ другое (пожалуйста, уточните)

63. Пожалуйста, укажите наиболее часто используемые методы снижения стресса, которые Вы, возможно, использовали ***в течение последних 12 месяцев*** *(Возможно несколько вариантов ответа)*

1 ☐ чтение журналов или книг
2 ☐ молитва/духовная активность
3 ☐ физическая активность
4 ☐ медитация
5 ☐ прослушивание музыки/игра на музыкальных инструментах
6 ☐ шопинг/разглядывание витрин в магазине
7 ☐ просмотр фильмов дома или в кинотеатре
8 ☐ курение
9 ☐ употребление алкоголя
10 ☐ сон
11 ☐ общение с другом/подругой
12 ☐ общение с друзьями
13 ☐ общение с семьей
14 ☐ общение с преподавателями
15 ☐ профессиональная помощь: врач, психиатр, консультант
16 ☐ другое (пожалуйста, уточните)

Спасибо за Ваше участие!

Appendix D

Clinical sheet for clinical dental examination

(English and Russian versions)

ID-number:

Date_____

CLINICAL DENTAL EXAMINATION

"Oral health and occupational stress in undergraduate students"

1. Sex

1 ☐ male
2 ☐ female

2. Year of birth

3. Year of undergraduate education?

1 ☐ 1st year
2 ☐ 2nd year
3 ☐ 3rd year
4 ☐ 4th year
5 ☐ 5th year
6 ☐ 6th year

4. Do you have any of the listed «conditions»?

1 ☐ fixed orthodontic bands
2 ☐ pregnancy
3 ☐ complaints on any systemic chronic /acute diseases

5. Total number of teeth

Total no. of teeth in upper jaw _____

Total no. of teeth in lower jaw _____

6. DMFT

Upper right								*Upper left*							
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Lower right								*Lower left*							

7. OHI-S (*debris+calculus*)

Debris/ calculus	*Right molars*		*Anterior*		*Left molars*	
	Buccal 16	Lingual 46	Labial 11	Labial 31	Buccal 26	Lingual 36
Upper	/		/		/	
Lower		/		/		/

ID-number:

8. Gingival Index (*inflammation*)

N of tooth	GI	
	B	L
44		
32		
36		
24		
12		
16		

ID-number:

Дата_____

Карта стоматологического обследования

«Стоматологическое здоровье и профессиональный стресс у студентов»

1. Пол

1 ☐ мужской
2 ☐ женский

2. Год рождения

3. Курс обучения?

1 ☐ 1
2 ☐ 2
3 ☐ 3
4 ☐ 4
5 ☐ 5
6 ☐ 6

4. Есть ли у Вас перечисленные «состояния»?

1 ☐ несъемные ортодонтические аппараты (брекеты)
2 ☐ беременность
3 ☐ жалобы на системные хронические /или острые заболевания

5. Общее число зубов

на в.ч. _____

на н.ч _____

6. КПУ

верхние правые								*верхние левые*							
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
нижние правые								*нижние левые*							

7. OHI-S (*зубной налет+камень*)

налет+ камень	*Правые моляры*		*Передние зубы*		*Левые моляры*	
	щечная 16	язычная 46	губная 11	губная 31	щечная 26	язычная 36
В.Ч.	/		/		/	
Н.Ч.		/		/		/

ID-number:

8. ГИ-Гингивальный индекс (воспаление)

Зуб	ГИ	
	Вестибулярная сторона	Лингвальная сторона
44		
32		
36		
24		
12		
16