Orthodontics in Public Health System – German Experience and Perspectives in Brazil

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Contents

Abbreviations

ASA	American Society of Anesthesiology
CHERRIES	Checklist for Reporting Results of Internet E-Surveys
CLP	Cleft lip palate
COHRQOL	Children Oral Health Related Quality of life
CPQ	Children Perception Questionnaire
CPQ-11-14	Children Perception Questionnaire 11-14-years-old
CPQ-8-10	Children Perception Questionnaire 8-10-years-old
CPQ-G11-14	Children Perception Questionnaire 11-14-years-old German
df	degrees of freedom
IOTN	Index of Orthodontic Treatment Need
OHIP	Oral Health Impact Profile
OHIP-G14	Oral Health Impact Profile German – 14 Items
OHRQoL	Oral Health Related Quality of Life
OQLQ	Orthognathic Quality of Life Questionnaire
OQLQ-G	Orthognathic Quality of Life Questionnaire German
QoL	Quality of Life
SF-36	Short form Health Survey
WHO	World Health Organization
WHOQOL	World Health Organization Quality of Life
X^2	Chi-squared statistics

1 Introduction

Nowadays it is observed in industrialized countries and also in development process, significant gains in levels of oral health. This is mainly due to the increase and universalize the population's exposure to fluoride, resulting in a decrease in the number of teeth extracted (Pinto 1997; Weyne 1997). A fluoridation provides a high chance of reduction or even elimination of tooth decay and also of malocclusion. According to Wichelhaus (2018), the function together with decays play an important influencing factor in the occlusion and development of jaws. Furthermore, it is imperative to identify and localize occlusal developmental problems during the active growth in order to avoid not only functional problems, but also jaw discrepancies in the future (Bittencourt and Machado 2010). The elimination of malocclusion is related to the loss of teeth and inter-proximal severe caries (Salzmann 1968). In a study about the income inequality effect on public policy, an evidence from oral health in Brazil, the authors affirm that "the public policy effect on missing and decayed teeth was of the stronger among those with higher education and income" (Celeste and Nadanovsky 2010, p. 250). Despite improvement in this field in Brazil has been identified in the last decades, it can be noticed that the constitutional principles of universalization, integrity and equity were not promptly implemented (Maciel 2008).

Due to the nature and existence of morphogenetic and numerous other etiological factors of dental malocclusion, it will demand for a long period of time, the best orthodontics can offer. If the malocclusion is caused by extrinsic factors, the orthodontic treatment can be prevented and even treated by orthodontics therapy (Wichelhaus 2018). That is, the demand for orthodontic services will continue to grow with the public appreciation of the benefits of dental care, regardless of the universal use of fluoride (de Almeida et al. 1970). Such as decays and periodontal disease, malocclusion is a public health problem (Marques 2005) of great importance because it affects a large segment of the population. It deserves, therefore,

epidemiological studies that aim to describe and analyze accurately its prevalence and incidence (Christopherson et al. 2009).

Christopherson et al. (2009) stated that children are a segment of the population in which the need of oral health care are not well achieved and that they have less opportunity to have access to services in orthodontics. This problem is more evident when the children represent the minority and/or disadvantages socioeconomically background as the individuals economically deprived have less chance to undergo orthodontic treatment (Badran and Al-Khateeb 2013). Furthermore, Guarnizo-Herreno and Wehby (2012) affirm that there is an association between dental problems and the reduction of school performance and psychosocial well-being. So that if the children have their dental problems prevented and treated, benefiting dental health, it may improve academic performance and psychosocial and cognitive development.

Therefore, to objective understanding the orthodontic treatment's need, it is very important to oral health care and also the Oral Health Related Quality of Life's (OHRQoL), psychological conditions of the children affected by malocclusion (Christopherson et al. 2009). The OHRQoL is the relationship between oral health and quality of life in dentistry. So it can be stated that the quality of life may be considered as a potential and important factor that influences the population health as quality of life (QoL), which nowadays is recognized an important outcome in orthodontics by many authors (Ashari and Mohamed 2016; de Oliveira and Sheiham 2003, 2004; Feu et al. 2013; Jamilian et al. 2016; Kolenda et al. 2016; Mansor et al. 2012; Schmidt et al. 2013; Zheng et al. 2015; Zhou et al. 2014).

Germany has one of the best and highest living standards in Europe and the QoL of its population seems also to be related to the oral health. German's health system is based on solidarity, in which health people finance the costs of the sick ones. Therefore, the study of QoL related to the oral health is probably an excellent method to determine the needs of

German's population in dentistry. Then, the factors which influence the oral health in dentistry, specifically in orthodontic patients, have apparently great importance in determining the OHRQoL of this specific population.

According to Cunha-Cruz and Miguel (2007) it is not common to treat the malocclusion through government-financed dental services and by limited dental insurance in Brazil. This fact seems to be true in Germany, which motivated us to realize this study. General speaking, the World Health Organization has one of its priority to implement efforts to democratize the oral health system by offering quality services to the population, independently of people's social and financial background (Ladeia Jr 2013).

2 Literature Review

2.1 Oral Health Related Quality of Life (OHRQoL)

According to the Charta of the World Health Organization "health" is defined as a "complete state of physical, mental and social well-being and not just the absence of disease" (World Health Organization (WHO) 1948, p. 1). As a result, a new concept of health status was developed which includes the Quality of Life (QoL) as an integral part of a state of health. According to the WHO Quality of Life Group (WHOQOL) this is defined as individuals` "perceptions of their positions in life in the context of culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns" (WHOQOL Group 1995, p. 1405). This parameter is nowadays valid in many areas of physical and mental care, including oral health (Sischo and Broder 2011). In this field of studies, a great effort has been made in order to develop valid instruments to measure Oral Health Related Quality of Life (OHRQoL) (Broder et al. 2000; Cunningham et al. 2000; John et al. 2002; Jokovic et al. 2002; Slade and Spencer 1993). Many researchers postulated how oral health is related to health-related quality of life (OHRQoL) (Gift and Atchison 1995). The subjective evaluation of OHRQoL reflect "people`s comfort when eating, sleeping and engaging in social interactions; their self-esteem; and their satisfaction with respect to oral health" (U.S. Department of Health and Human Services 2000, p. 7). "Theoretically, OHRQoL is a function of various symptoms and experiences and represents the person's subjective experience" (Sischo and Broder 2011, p. 1265). According to Sischo and Broder (2011), OHRQoL comprises of five dimensions: i) oral health; ii) function; iii) treatment expectations; iv) environment and v) social/ emotional dimensions. It "has important implications for the clinical practice of dentistry and dental research [as the patient's] subjective evaluation of the healthcare decision-making process is changing the dynamics of clinical [practices] and health outcomes monitoring and research" (Inglehart and Bargramian 2002; cited after Sischo and Broder 2011). In epidemiological

researches, the examined trends in OHRQoL, identified individual and environmental characteristics that affect it and aided in needs assessment and also health planning for population-based policy initiatives (Sischo and Broder 2011). “Including OHRQoL in survey research adds a powerful dimension in the planning and development of health promotion programs” (Sischo and Broder 2011, p. 1267). Therefore, its study in Orthodontics is important not only the for the treatment needs and outcomes (Cunningham and O’Brien 2007), but also to “provide evidence to the National Health Service that treatment should be funded” (Cunningham and Hunt 2001, p. 156). In epidemiological researches, the examined trends in OHRQoL, identified individual and environmental characteristics that affect it and aided in needs assessment and also health planning for population-based policy initiatives (Sischo and Broder 2011).

Orthodontic treatment is strictly connected to oral health-related quality of life (OHRQoL), and some of the key motives to looking for orthodontic treatment are associated to the relevant results of aesthetics, oral-facial functionality and psychological well-being (de Oliveira and Sheiham 2004). These results are pertinent to the patients with malocclusion discrepancies or facial disharmony. Consequently, reviewing these characteristics is likewise important when considering patients’ perceptions of the treatment and could be connected to the recognition of treatment needs (Cunningham and O’Brien 2007).

The use of it as an outcome measure allows the oral healthcare professionals to evaluate the efficacy of treatment protocols from patient’s perspectives (Wright et al. 2009). It also “can be used as ‘informed consent’, which might increase patient’s compliance as they are aware of what to expect from initial orthodontic treatment” (Mansor et al. 2012, p. 98).

According to Tsichlaki and O'Brien (2014), orthodontic treatment aims to improve a person`s dentofacial appearance. However, it has been suggested that the report outcomes in orthodontic researches methodology appear to be mostly relevant to clinicians and not to our

patients. They largely overlook the important issues to the patients (Tsichlaki and O'Brien 2014). Quality of Life is one of the outcomes that are measured infrequently in studies of orthodontic treatment (Lee et al. 2007; Tsichlaki and O'Brien 2014). Vig et al. (1999) describe, however, that "advances in the development and validation of scales and questionnaires to measure patient-reported outcomes should encourage the use of such outcome measure" (cited according to Tsichlaki and O'Brien 2014, p. 283).

2.2 Oral Health Impact Profile (OHIP)

The literature shows us that exists generic and condition-specific measures of OHRQoL and both have its advantages and disadvantages. For example, the disease-specific Oral Health Impact Profile (OHIP) is more highly correlated to oral health conditions than is the generic QoL measure the Short Form Health Survey (SF-36) (Lee et al. 2007). The frequently remaining question was which factors do influence OHRQoL and little is known about this. Technically, the Oral Health Impact Profile (OHIP) (Slade and Spencer 1993) is a tool commonly used to assess the patient's subjective awareness of oral well-being. The attention of using this tool in adolescents patients in orthodontic dentistry has increased as a result of its capability to answer a variety of scientifically questions (Ashari and Mohamed 2016; de Oliveira and Sheiham 2003, 2004; Feu et al. 2013; Jamilian et al. 2016; Mansor et al. 2012; Zheng et al. 2015; Zhou et al. 2014). According to de Oliveira and Sheiham (2004) and Andiappan et al. (2015), young adolescents who were undergoing orthodontic treatment had improved OHRQoL than those who were not. Some authors have made comparisons of OHRQoL before and after orthodontic treatment (Silvola et al. 2014) or of the OHRQoL's control group with a group in the retention phase (Jamilian et al. 2016), but few authors have investigated OHRQoL during treatment (Chen et al. 2010; Feu et al. 2013; Kang and Kang 2014; Mansor et al. 2012). Moreover, there is deprived evidence on research designs and on

describing OHIP 14 rates (Andiappan et al. 2015) and tiny is known about the features that influence OHRQoL.

Despite the OHIP is developed to a senior population and originally for prosthodontic patients (Slade and Spencer 1993) it has been well accepted by many authors that utilizes it to the orthodontic population and also for adolescents (Ashari and Mohamed 2016; de Oliveira and Sheiham 2003, 2004; Feu et al. 2013; Jamilian et al. 2016; Mansor et al. 2012; Zheng et al. 2015; Zhou et al. 2014), which comprises the highest number of this population.

2.3 Children Perception Questionnaire (CPQ)

Clefting is an imperfection which, according to Parker et al (2010), is the second most common birth problem in the USA (Broder et al. 2014). It was suggested that there were few scientific researches reporting tools and instruments measuring the quality of life in patients with cleft lip and palate (CLP) (Locker et al. 2005; Piombino et al. 2014). Furthermore, most of the designed OHRQol instruments were developed for adults (Jokovic et al. 2002). Before Jokovic et al. (2002; 2004) developed the Children Perception Questionnaire for 8- to 10-years-old (CPQ8-10) and 11- to 14-years-old (CPQ11-14) children, the only available OHRQoL measures for children was Child Oral Health Related Quality of Life Questionnaire (COHRQoL) (Jokovic et al. 2002, 2003; Jokovic et al. 2004). Later, Jokovic et al. (2006) developed the short version of CPQ11-14 that was very well accepted in the scientifically community and translated to other languages through cross-cultural adaptation (Bekes et al. 2011a; Bekes et al. 2011b; Carvalho et al. 2013; Foster Page et al. 2005, 2008; Foster Page et al. 2013; Goursand et al. 2008; Olivieri et al. 2013; Pires et al. 2006; Torres et al. 2009).

Bekes et al. (2011a; 2011b) developed the German version of CPQ-G11-14 and stablished the norm rates in the general German children population. They performed a national survey with a sample of 1.597 children (mean age 12.5 ± 1.2; 49.3% females) using the CPQ-G11-14 through personal interview (Bekes et al. 2011a). Recently, it was concluded that the

method of questionnaire administration of the CPQ-G11-14 in Germany (self-administered, face-to-face interview or telephone interview) resulted in any influence significantly the scores of 11- to 14-year-old children and young adolescents.

2.4 Orthognathic Quality of Life Questionnaire (OQLQ)

Dental treatment and surgery are recognized methods to correct the dentofacial deformities (Corso et al. 2016), specifically orthodontic treatment and orthognathic surgery. According to Murphy et al. (2011) orthognathic surgery has the aim to improve the aesthetics of the face regarding the skeletal appearance and to improve the function of jaws. The outcomes resulting from the treatment in dentistry have been measured assessing the quality of life of the patient, specifically the OHRQoL using some tools (Bekes et al. 2011a; Bekes et al. 2011b; Benson et al. 2016; Bock et al. 2009; Cunningham et al. 2000, 2002; John et al. 2002; John et al. 2006; Jokovic et al. 2002; Jokovic et al. 2004; Jokovic et al. 2006; Patel et al. 2016; Schmidt et al. 2013; Slade and Spencer 1993; Slade 1997). Nevertheless, the scientific community perceived that there were general instruments to assess the QoL (Jenkinson et al. 1993a; Jenkinson et al. 1993b), general instruments to assess the OHRQoL (John et al. 2002; Slade and Spencer 1993; Slade 1997) and some condition-specific to evaluate the OHRQoL (Jokovic et al. 2002; Jokovic et al. 2004; Jokovic et al. 2006). In a systematic review Kanatas and Rogers (2010) reviewed a total of 511 studies and concluded that there is an uncountable diversity of validated questionnaires suitable for oral and maxillofacial surgery, but they encountered only one for orthognathic surgery.

The Orthognathic Quality of Life Questionnaire (OQLQ) is a condition-specific questionnaire which focus on this particular condition of severe dentofacial discrepancy that requires orthognathic surgery (Cunningham et al. 2000, 2002). Many authors from different countries recognized its importance and performed several researches with this instrument (Abdullah 2015; Bock et al. 2009; Bortoluzzi et al. 2015; Choi et al. 2010; Feu et al. 2017;

Jung 2015, 2016; Kilinc and Ertas 2015; Lee et al. 2008; Murphy et al. 2011; Park et al. 2015; Silva et al. 2016) Particularly for Germany, Bock et al. (2009) adapted the original OQLQ to German language including a primary section of socio-demographic questions that we also used in this study to evaluate the OHRQoL of our sample.

3 Aim of the Study

This research project was designed to explore the OHRQoL during orthodontic treatment with the enclosure of multiple variables, e.g., age, gender, reason for orthodontic treatment in three different study groups:

1. traditional orthodontic patients,
2. cleft-lip palate (CLP) patients and
3. ortho-surgical patients.

The null hypothesis states that all variables have the same influence on OHRQoL. Furthermore, the epidemiologic study related to QoL of patients undergoing treatment in Germany aimed to describe the profile of Orthodontics in Public Health System in Germany.

I structured the presentation of patients and methods and the results of the aforementioned three study groups in two parts. In Part I starting on the next page I'll report on OHRQoL in traditional orthodontic patients. Part II covers the cleft-lip palate (CLP) and ortho-surgical patients. The discussion will be then on all three study groups.

Part I – Orthodontic Patients

4 Patients and Methods

4.1 Orthodontic Patients

This study was conducted anonymously and self-administered. The Ethics Committee of the Ludwig-Maximillian-University Medical Center (LMU) in Munich (project number 114-14), of the Johannes-Gutenberg-University in Mainz (project number 10807), of the Hannover Medical School (project number 3476-2017) and at the Heinrich Heine University in Dusseldorf (project number 59095R), approved the project. In this study the reporting was improved by application of the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) statement (Eysenbach 2004).

4.1.1 Study Population

Altogether 898 patients (50.6% females, 49.4% males; mean age 16.89 years) took part in this study. They were under orthodontic treatment at the Departments of Orthodontics of the Ludwig-Maximilians-University in Munich (502 subjects), at the Johannes-Gutenberg-University in Mainz (123 subjects), at the Medicine University of Hannover (117 subjects) and at the Heinrich Heine University in Dusseldorf (156 subjects). Giving to the inclusion criteria, the sample contained two sub-groups, the first of 6- to 17-year-old of healthy orthodontic patients (ASA status 1) who used fixed or removable appliances and the second one of patients with the similar inclusion criteria being 18-year-old or older. Patients younger than 6 years were omitted. Additionally, patients with any medical problems, syndromes, craniofacial abnormalities, orofacial clefts or orthognathic surgery were not considered. The enrollment period took in Munich from March until September 2016, in Mainz in February 2017, Hannover in May 2017 and finally Dusseldorf in June 2017. Informed consent for study contribution was assumed by the caretakers as well as by the children and young adolescent patients.

4.1.2 Questionnaire

This study was conducted using a computer based electronic questionnaire provided online on the website of SoSci-Survey (URL: https://www.soscisurvey.de). The questionnaire comprised of 26 questions organized in 3 subsections related to the following topics: A) German short version of the Oral Health Impact Profile (OHIP-G14); B) demographic information of the subject and his/her family, such as age, gender, insurance and immigration status (Fritz and Gehricke 2012); and C) general questions about the orthodontic treatment, such as the reason for treatment, the type of appliance and the duration of orthodontic treatment. The full questionnaire is shown in Appendix 11.1.1.

4.1.3 Oral Health Impact Profile (OHIP-G14)

The German version of the Oral Health Impact Profile (OHIP) was used to evaluate the OHRQoL in German population. This validated tool was principally settled for adults (Slade and Spencer 1993). Here, the German version of this questionnaire with 14 questions, the OHIP-G14 (John et al. 2006), is used. This questionnaire has been used originally amongst adults in the prosthodontics field (John et al. 2002; Slade and Spencer 1993). Lately, it has also been used for patients in orthodontic field (Ashari and Mohamed 2016; de Oliveira and Sheiham 2003, 2004; Feu et al. 2013; Jamilian et al. 2016; Kolenda et al. 2016; Mansor et al. 2012; Schmidt et al. 2013; Zheng et al. 2015; Zhou et al. 2014) Particularly, the OHIP-G14's 14 questions are attributed to seven subscales (Slade 1997): 1) functional limitation, 2) physical pain, 3) psychological discomfort, 4) physical disability, 5) psychological disability, 6) social disability and 7) handicap. For each of the 14 OHIP items, patients were inquired how often they had perceived some characteristics of the OHRQoL in the last month. The responses were coded as "0" ("never"), "1" ("hardly ever"), "2" ("occasionally"), "3" ("fairly often") and "4" ("very often") (John et al. 2002). The answers were summed into a score ranging from 0 to 56.

A value of 0 specified no noticeable oral health impairment, and a value of 56 specified highest impairment.

4.1.4 Pilot Phase

The complete questionnaire was presented as a paper-based version to 45 orthodontic patients before the study formally started. The sample consisted of 20 young adolescents using removable orthodontic appliances (mean age 14.3 years) and 25 patients using fixed appliances (mean age 15.6 years) from the Department of Orthodontics at the LMU. The paper-based questionnaire contained all items on the OHIP-G14 and an extra item regarding probable complications in understanding the questionnaire. Only four patients reported complications to answer the questionnaire. As an outcome of the pilot testing, a few amendments were made to improve contributors understanding of the questionnaire. Additionally, it was shown that child and adolescent contributors needed caregiver's assistance while responding the questionnaire (Abreu et al. 2015; Ferreira et al. 2012).

4.1.5 Patient Recruitment

Patients that were under orthodontic treatment at the Departments of Orthodontics of the above mentioned four university hospitals were asked to contribute to this research. This was done personally by the dental staff or by written informational materials. Patients and their caregivers who agreed to participate, received an explanation by the research project's staff in detail and included an access code for the online questionnaire the possibility to interrupt at any time. The majority of patients accepted to join the research and gave written consent; for all four study centers together, the rejection rate was low (N = 40; 4.5 %). The individuals under orthodontic treatment were asked personally by the author in the clinic or in the waiting room to join the research. At the end of the appointment or at the waiting time they responded the on-line based questionnaire. The self-administered questionnaires were responded anonymously in available computers or tablets. If there were doubts or questions involving the

survey itself, the author was continuously accessible to explain them for the participants. Eight patients interrupted the questionnaire and did not finish it. These cases were not considered and excluded for further analysis.

4.2 Statistics

The data from the online based questionnaires were exported from Sosci-Survey into Microsoft Excel 2010® (Microsoft Corporation, Redmond, Washington, USA). Patients under 6 years of age were not considered for evaluation. Descriptive analysis, most of the figures and explorative statistics were done using SPSS for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Multiple linear modeling as additional explorative statistics was evaluated and analyzed using R, version 3.5.1 (R Core Team 2018).

4.2.1 Descriptive Statistics

Descriptive statistics was evaluated for OHIP's diverse domains and categories of items (i.e. subscales) and influencing variables. For each participant it's individual total OHIP score was calculated by summation of all OHIP items.

Categorical data (i. e. qualitative variables, like gender, age group, self-esteem, etc.) was visualized using grouped bar graphs and mosaic plots. The latter one aims to visualize data from two up to four qualitative variables (features) similar to multidimensional cross tables. In contrast to a pie chart, the area of each rectangular field is proportional to the number of observations that have this combination of features. The mosaic plots were generated using the R package "vcd" (Meyer et al. 2006). The shading corresponds to the Pearson's standardized residuals, i.e. "standardized deviations of observed from expected values" (Meyer et al. 2006).

4.2.2 Explorative Statistics

To test for age group and/or gender specific of the OHIP total score and its subscales Student's T-test was applied. A two-tailed significance level of 0.05 was used. Cross-tabulated

categorical data was analyzed using Pearson's Chi squared test (χ^2) and/or Fisher's exact test if applicable using SPSS. "Pearson's Chi squared test (χ^2) tests the independency of two cross-tabulated variables and therefore the direct connection between both attributes. Two variables of a cross-table are independent of each other, if the observed frequencies in each row equal the expected frequencies (H_0)." (Bühl 2010, p. 292; translation by Dr. Uwe Baumert) One of the requisites of this test is, that the expected frequencies in all cells being ≥ 5. To overcome this issue, cells were combined if possible.

Multiple linear regression was applied to model the influence of several explanatory variables (age, gender, reason for orthodontic treatment, type of appliance, duration of treatment, and the nationality/immigration status of the patient) onto the patient's total OHIP score. The following tabulation gives for each of the explanatory variables the included levels in this model:

Age group	6…17 years; ≥ 18 years
Gender	Male, Female
Reason for orthodontic treatment	aesthetic, function, pain, aesthetic and function, aesthetic and pain, or function and pain
Type of appliance	fixed or removable
duration of treatment	<1 year, 1-2 years, 2-3 years, >3 years
Nationality/immigration status of the patient	German, immigration background, missing/incomplete

The adjusted estimates, their corresponding 95 % confidence intervals, and p-values were calculated. A two-tailed α significance level of 0.05 and a 95 % confidence level (CI 95 %) were used for all analyses (Paes da Silva, Pitchika, et al, manuscript submitted).

5 Results

5.1 Descriptive Statistics

5.1.1 Variables Overview

The complete descriptive statistics is shown in Appendix 11.1.2. Herein, only selected variables are described.

Gender distribution in the orthodontic treatment patient group was found to be equal in both the total sample and the age groups (Appendix 11.1.2). The distance between the residence and office was twice as high for adult patients (mean 28.05 ± 67.65 km) than for young adolescent patients (mean 15.95 ± 26.91 km). Orthodontic treatment needs were reported by 70.5 % of the patients in the total sample. Similar findings were found in both age groups: 67.8 % for young adolescent and 76.8 % for adults. Almost one quarter of the patients have chosen the combined aesthetic, function and other reasons for the orthodontic treatment: 22.3 % of the total sample, 18.3 % of adolescents and 31.4 % of adults sample. More than half of the patients in each sample was supported by a governmental health insurance for the orthodontic treatment (59.0 % of total sample, 61.9 % of adolescents and 52.4 % of adults). Almost half of patients reported one appointment for treatment per month (47 % of total sample, 46.4 % of young adolescents and 48.3 % of adults). More than 80 % of the patients were Germans (82.2 % of total sample, 82.0 % of adolescents and 82.7 % of adults).

5.1.2 OHIP

Each item of the OHIP-G14 and their respectively registered frequencies and percentages are listed in Table 1 and shown in Figure 1. Ratings of “often” and “very often” to OHIP-G14 items increase the total OHIP-G14 score and therefore decrease oral health related quality of life. For this reason, the following considerations are focused on these two levels.

The questions with the highest frequency of patients reporting of these levels (Table 1, Figure 1) were question 7 on “discomfort during eating” (N = 170, 18.9 %), question 13 on “painful aching in the mouth” (N = 117, 13.1 %) and question 5 on “feeling tense” (N = 71, 7.9 %). The questions with the lowest reported frequencies were question 10 on “totally unable to function” (N = 8, 0.9 %), question 2 on “worsening the sense of taste” (N = 18, 2.0 %), question 9 on “difficulties to do usual jobs” (N = 25, 2.8 %), and question 12 on “diet being unsatisfactory” (N = 29, 3.2 %).

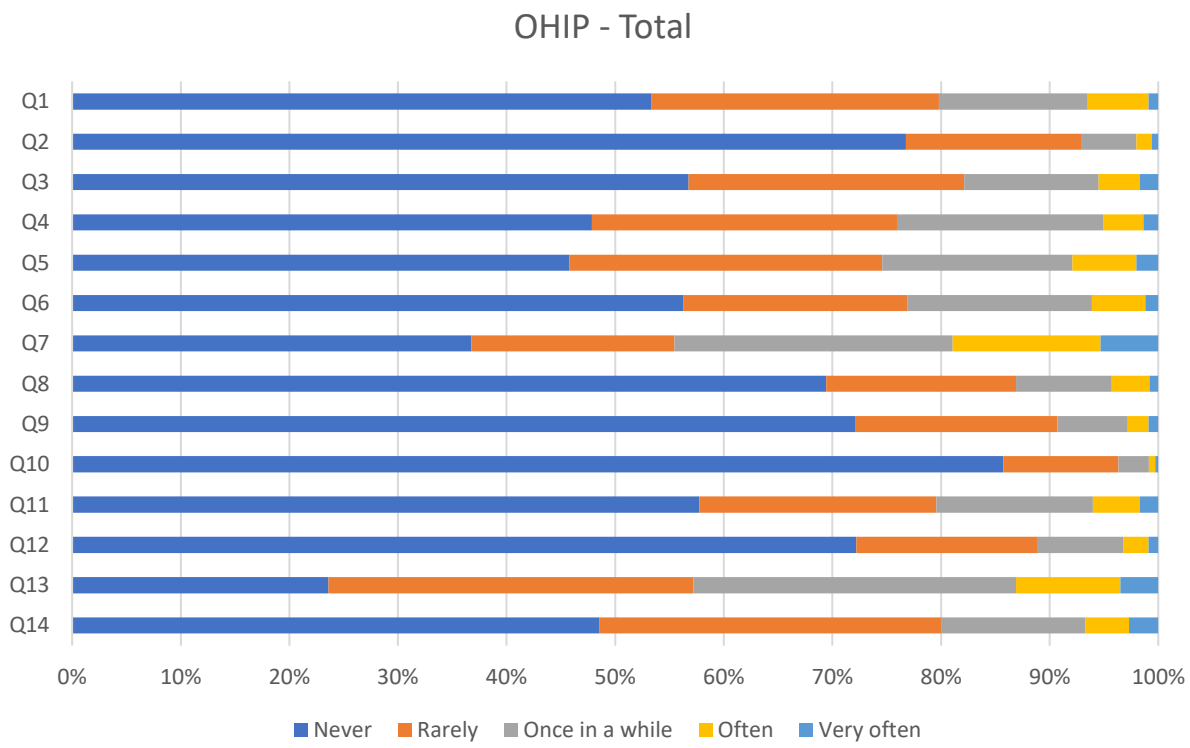

Figure 1. Descriptive OHIP-G14 questions’ rate according to the answer from the total sample (N = 898).

Table 1. Descriptive results of the OHIP G14 of the total sample (N= 898).

Questions from OHIP-14 (Number/%)		Never	Rarely	Once in a while	Often	Very often
Q1	Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?	479 53.3	238 26.5	123 13.7	50 5.6	8 0.9
Q2	Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?	689 76.7	145 16.1	46 5.2	13 1.4	5 0.6
Q3	Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?	510 56.8	228 25.4	111 12.5	34 3.8	15 1.7
Q4	Have you found it difficult to relax because of problems with your teeth, disability mouth or dentures?	430 47.9	252 28.1	171 19.0	33 3.7	12 1.3
Q5	Have you felt tense because of problems with your teeth, mouth or dentures?	411 45.8	259 28.8	157 17.5	53 5.9	18 2.0
Q6	Have you had to interrupt meals because of problems with your teeth, mouth or dentures?	505 56.2	185 20.6	153 17.1	44 4.9	11 1.2
Q7	Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?	330 36.7	168 18.7	230 25.7	122 13.6	48 5.3
Q8	Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?	624 69.4	157 17.5	79 8.8	31 3.5	7 0.8
Q9	Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?	648 72.2	167 18.6	58 6.4	17 1.9	8 0.9
Q10	Have you been totally unable to function because of problems with your teeth, mouth or dentures?	770 85.7	95 10.6	25 2.8	5 0.6	3 0.3
Q11	Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?	518 57.7	197 21.8	129 14.5	39 4.3	15 1.7
Q12	Has your diet been unsatisfactory because of problems with your teeth, disability mouth or dentures?	648 72.2	150 16.7	71 7.9	21 2.3	8 0.9
Q13	Have you had painful aching in your mouth?	212 23.6	302 33.6	267 29.7	86 9.6	31 3.5
Q14	Have you been self-conscious because of your teeth, mouth or dentures?	436 48.6	283 31.5	119 13.2	36 4.0	24 2.7

The registered frequencies of the OHIP-G14's answers for the age group samples are listed in Table 2 and shown in Figure 2. In the 6-17-years-old sample group almost the same items appeared "often" or "very often" as for the total group: "discomfort during eating" (question 7; N = 91, 14.5 %), "feeling tense" (question 5; N = 36, 5.8 %), and "painful aching in the mouth" (question 13; N = 79, 12.6 %). Another finding worth mentioning originating from the OHIP-G14 in this patient group was "difficulties in pronouncing words" (question 1; N = 37, 5.9 %). On the other hand, less frequent problems like "being totally unable to function" (question 10), "worsening the sense of taste" (question 2), "having difficulties doing usual jobs" (question 9) and "an unsatisfactory diet" (question 12) were the same as registered for the total sample (Table 2). Question 7 on "discomfort during eating" was also found to appear "often" or "very often" for the adults examined patients (N = 79, 29.1 %). Other perceptible findings coming from the OHIP-G14 for this sample were "feeling tense" (question 5; N = 35, 12.9 %), "having to interrupt meals" (question 6; N = 28, 10.3 %), "painful aching in the mouth" (question 13; N = 38, 14.1 %) and being "self-conscious" (question 14; N = 31, 11.5 %). In contrast, the less frequent problems were almost the same as the total sample and young adolescent group: questions 2, 9, 10 and 12 (Table 2).

Table 2. Descriptive results from the OHIP-14 of 6- to 17-year-old orthodontic patients (N= 627) and ≥18 years-old (N= 271).

Questions from OHIP-14 (Number/%)		Age group									
		6-17					≥18				
		Never	Rarely	Once in a while	Often	Very often	Never	Rarely	Once in a while	Often	Very often
Q1	Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?	349 55.5	164 26.2	78 12.4	31 4.9	6 1.0	131 48.3	74 27.3	45 16.7	19 7.0	2 0.7
Q2	Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?	484 77.2	98 15.6	33 5.3	9 1.4	3 0.5	205 75.6	47 17.3	13 4.9	4 1.5	2 0.7
Q3	Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?	388 61.9	153 24.4	64 10.1	16 2.6	6 1.0	122 45.0	75 27.7	47 17.4	18 6.6	9 3.3
Q4	Have you found it difficult to relax because of problems with your teeth, disability mouth or dentures?	312 49.8	181 28.9	112 17.8	19 3.0	3 0.5	118 43.5	71 26.2	59 21.8	14 5.2	9 3.3
Q5	Have you felt tense because of problems with your teeth, mouth or dentures?	318 50.7	178 28.4	95 15.1	28 4.5	8 1.3	93 34.3	81 29.9	62 22.9	25 9.2	10 3.7
Q6	Have you had to interrupt meals because of problems with your teeth, mouth or dentures?	377 60.1	124 19.8	99 15.8	18 2.9	9 1.4	128 47.2	61 22.5	54 20.0	26 9.6	2 0.7
Q7	Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?	257 41.0	125 19.9	154 24.6	64 10.2	27 4.3	73 26.9	43 15.9	76 28.1	58 21.4	21 7.7
Q8	Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?	455 72.6	111 17.7	45 7.2	12 1.9	4 0.6	169 62.4	46 17.0	34 12.5	19 7.0	3 1.1
Q9	Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?	476 75.9	106 16.9	34 5.5	7 1.1	4 0.6	172 63.5	61 22.5	24 8.8	10 3.7	4 1.5
Q10	Have you been totally unable to function because of problems with your teeth, mouth or dentures?	549 87.6	62 9.9	12 1.9	2 0.3	2 0.3	221 81.5	33 12.2	13 4.8	3 1.1	1 0.4
Q11	Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?	395 63.0	133 21.2	76 12.1	18 2.9	5 0.8	123 45.4	64 23.6	53 19.6	21 7.7	10 3.7
Q12	Has your diet been unsatisfactory because of problems with your teeth, disability mouth or dentures?	486 77.5	86 13.7	39 6.2	10 1.6	6 1.0	162 59.8	64 23.6	32 11.8	11 4.1	2 0.7
Q13	Have you had painful aching in your mouth?	160 25.5	205 32.7	183 29.2	59 9.4	20 3.2	52 19.2	97 35.7	84 31.0	27 10.0	11 4.1
Q14	Have you been self-conscious because of your teeth, mouth or dentures?	328 52.3	202 32.2	68 10.8	16 2.6	13 2.1	108 39.9	81 29.8	51 18.8	20 7.4	11 4.1

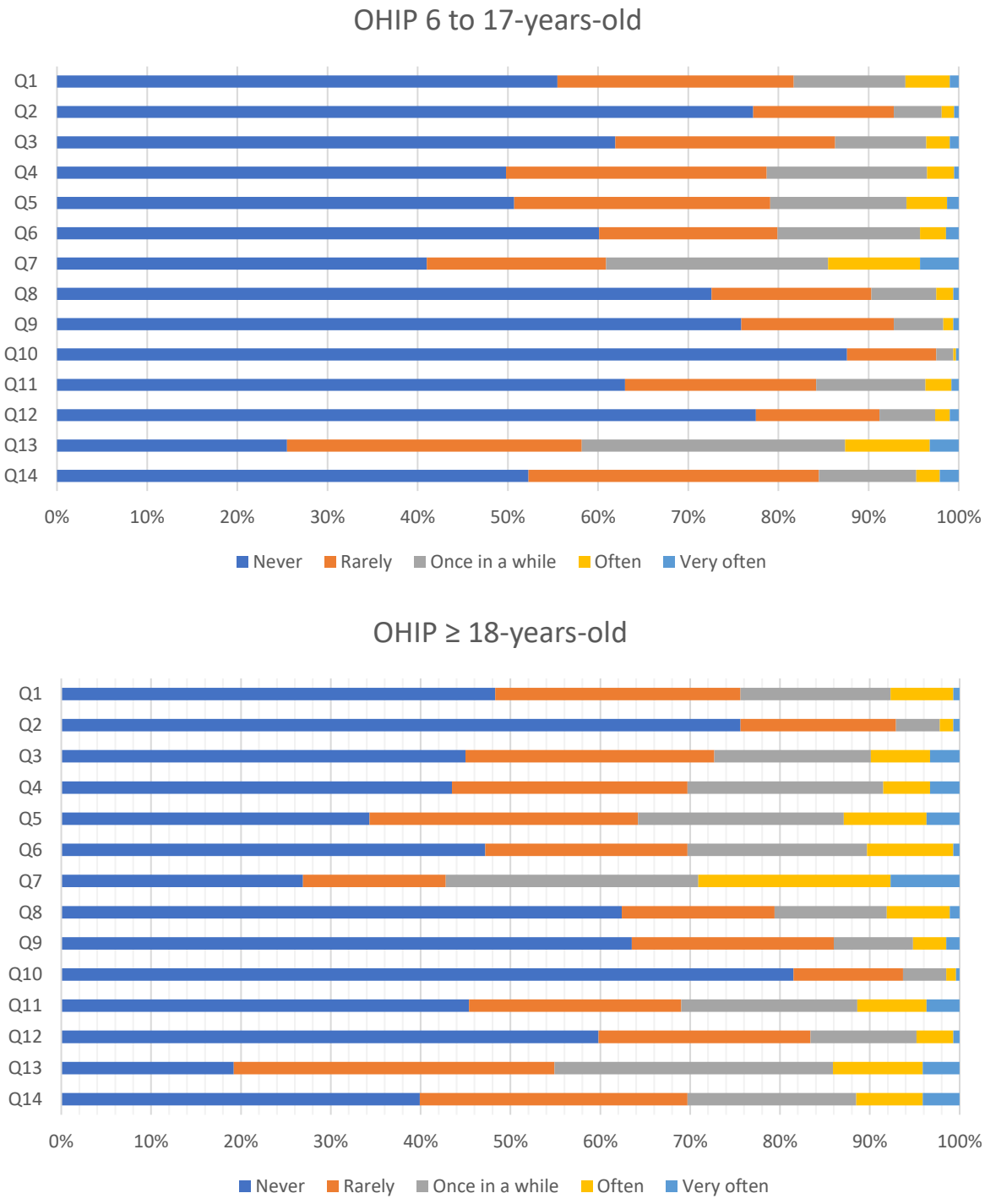

Figure 2. Descriptive OHIP-G14 questions' rate according to the answer of (top) 6- to 17-year-old orthodontic patients (N = 627) and (bottom) ≥18 years-old orthodontic patients (N = 271).

In Table 3 descriptive statistics for the overall OHIP-G14 score and its subscales for the complete patient cohort and both age groups is summarized. Age-group dependency of the OHIP-G14 score and its subscales was tested using Student's T-test. The OHIP-G14 mean scores were 9.92 ± 8.22 for the whole patient cohort, 8.78 ± 7.27 for the younger patient's group and 12.56 ± 9.59 for the ≥18 years-old orthodontic patients (Table 3). With the exception of OHIP-G14 subscale 1 ("functional limitation"; $p = 0.100$), all other subscales and the overall OHIP-G14 score showed significant differences between both age groups ($p < 0.001$; Table 3).

Table 3. Descriptive statistics for the subscales and the overall OHIP-G14 score of the total sample and both age groups of 6-17-years-old and ≥18-years-old orthodontic patients. Age group dependency of the overall OHIP score and its subscales was tested with Student's T-test. The P values reported are based on the assumption of non-equal variances.

OHIP-14 Subscale	Total (N = 898)			Age Group						P value
				6-17 (N = 627)			≥18 (N = 271)			
	Mean	SD	Min - Max	Mean	SD	Min-Max	Mean	SD	Min-Max	
1: Functional limitation	1.07	1.35	0-7	1.02	1.31	0-7	1.19	1.43	0-7	0.100
2: Physical pain	2.68	1.92	0-8	2.49	1.85	0-8	3.11	2.02	0-8	**< 0.001**
3: Psychological discomfort	1.70	1.75	0-8	1.47	1.59	0-8	2.24	1.96	0-8	**< 0.001**
4: Physical disability	1.17	1.54	0-8	1.00	1.42	0-8	1.56	1.73	0-7	**< 0.001**
5: Psychological disability	1.53	1.58	0-8	1.33	1.39	0-8	1.99	1.88	0-8	**< 0.001**
6: Social disability	0.89	1.41	0-8	0.74	1.21	0-8	1.25	1.75	0-8	**< 0.001**
7: Handicap	0.87	1.24	0-8	0.72	1.11	0-8	1.22	1.43	0-7	**< 0.001**
Overall OHIP-G14 score	**9.92**	**8.22**	**0-50**	**8.78**	**7.27**	**0-50**	**12.56**	**9.59**	**0-49**	**< 0.001**

5.1.3 Demography

The age distribution of the whole patient group is given in Figure 3. The main portion of study participants was between 16-18 years old (mean age: 16.89 ± 6.67 years). In both genders age showed comparable distributions (Figure 4).

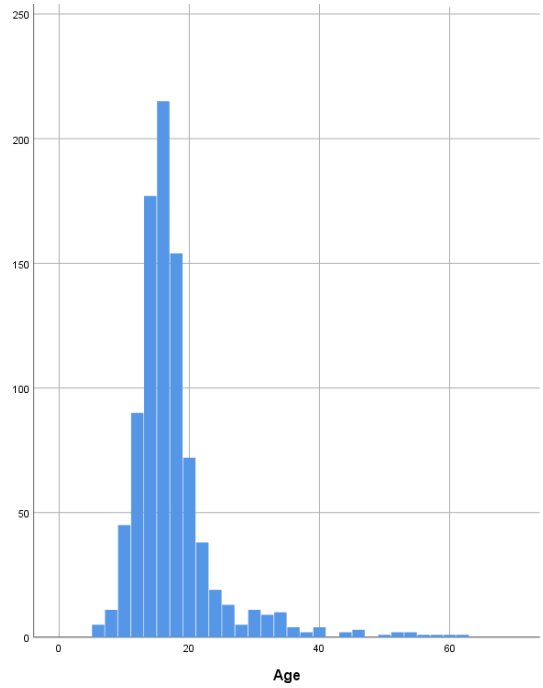

Figure 3. Age distribution. Mean age 16.89 ± 6.68 (N = 898).

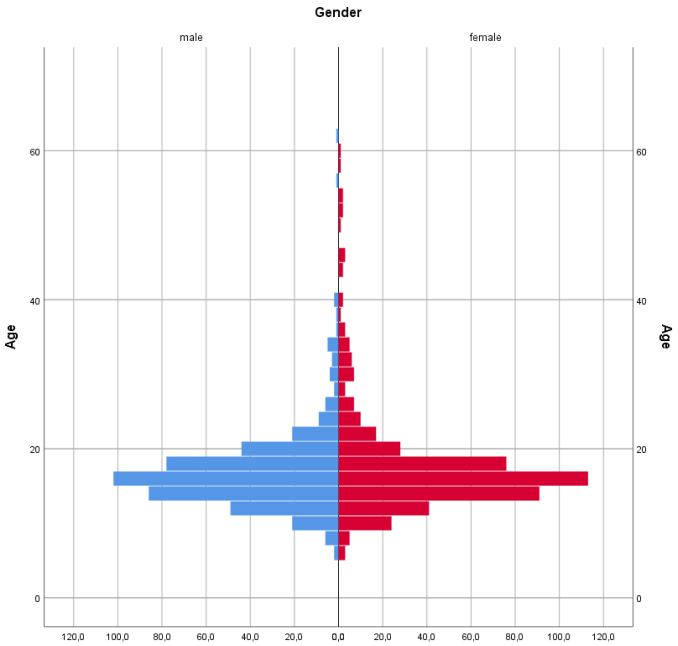

Figure 4. Frequencies of the total sample according to age and gender (N = 898).

According to the age group, in both age groups patients with governmental insurance are more frequent than those with private insurance (Figure 5). This pattern was also found in both genders (Figure 6).

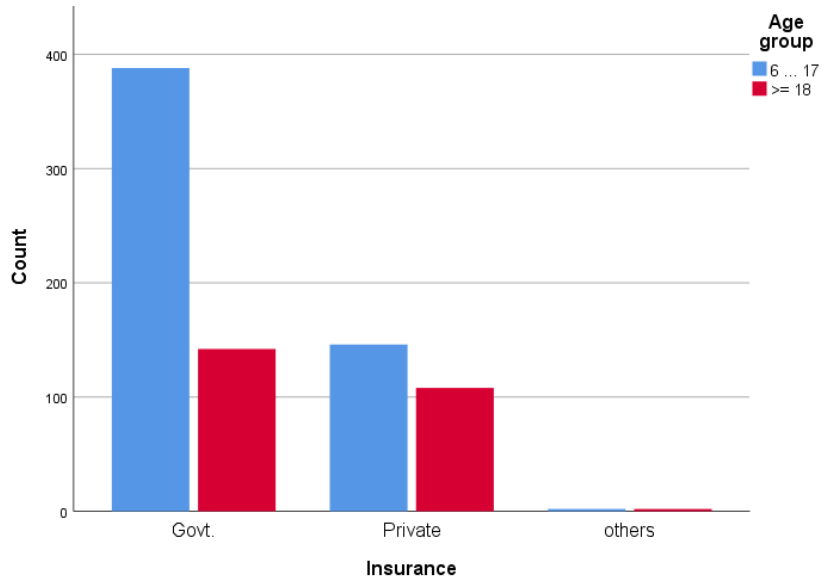

Figure 5. Type of insurance for total sample (N = 898) according to age group.

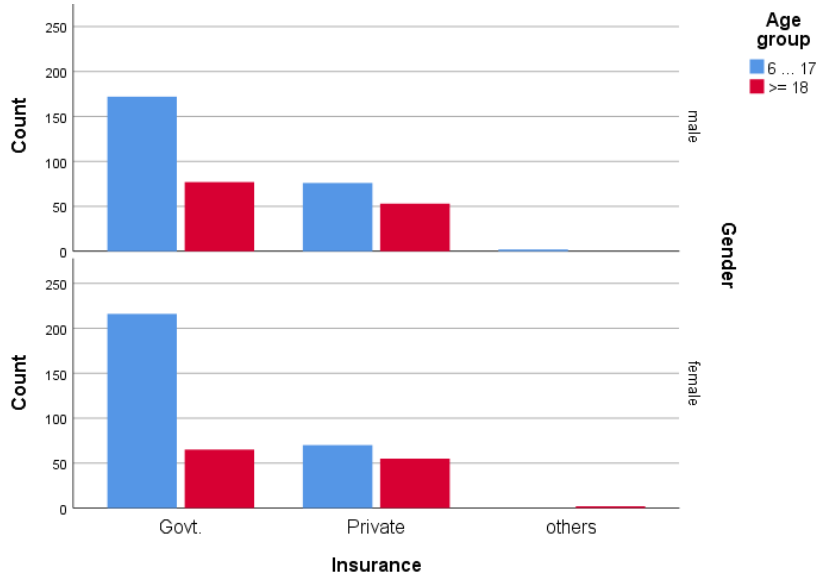

Figure 6. Type of insurance according to age group for males (N = 444) and females (N = 454).

Though some patients report to travel more than 600 km taking up more than 2 hours to obtain orthodontic treatment, most of them arrive within 30-60 minutes and travel no more than 100 km (Figure 7).

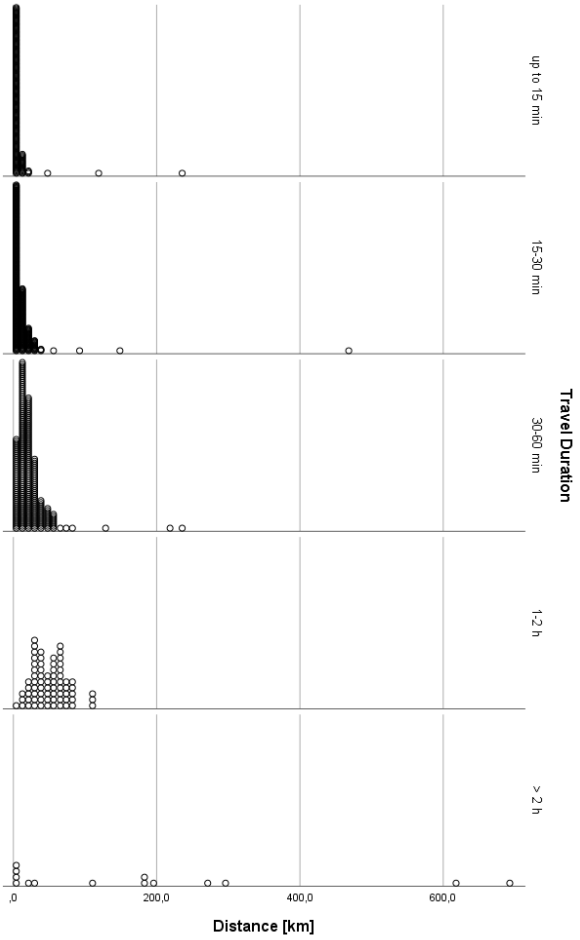

Figure 7. Travel duration according to distance (N = 898).

5.1.4 Treatment Background

Independent of their insurance status, the majority of patients reported the necessity of treatment (Figure 8) and this was not related to gender (Figure 9). Function played an important role in the decision of patients to acquire orthodontic treatment (Figure 10).

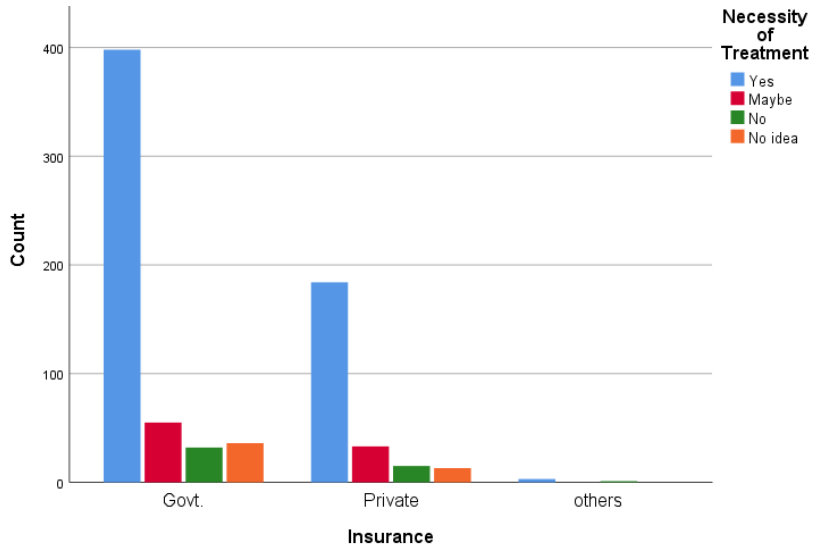

Figure 8. Type of insurance according to the necessity of treatment for the whole the sample (N = 898).

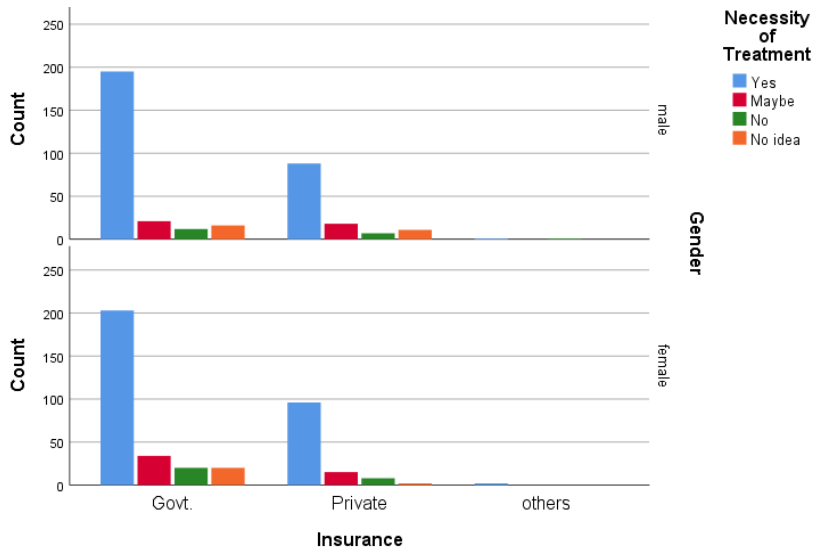

Figure 9. Type of insurance according to the necessity of treatment for males (N = 444) and females (N = 454).

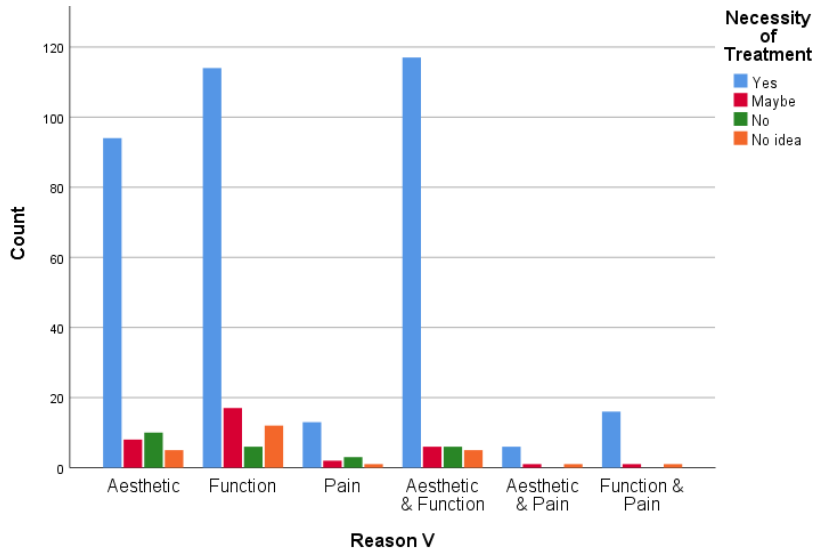

Figure 10 Reason for treatment according to the necessity of treatment for the whole sample (N = 898).

5.1.5 Current Treatment

As shown in the Figure 11, most of the patients (male and female) were between 1-3 years in orthodontic treatment. It is clearly noticeable in the Figure 12 that most of the patients in the group of ≥18 years-old were more than three years in orthodontic treatment. Figure 13 shows that patients wear more fixed appliance and it concentrates between 16-20-years-old while removable appliance was better distributed in the same ages.

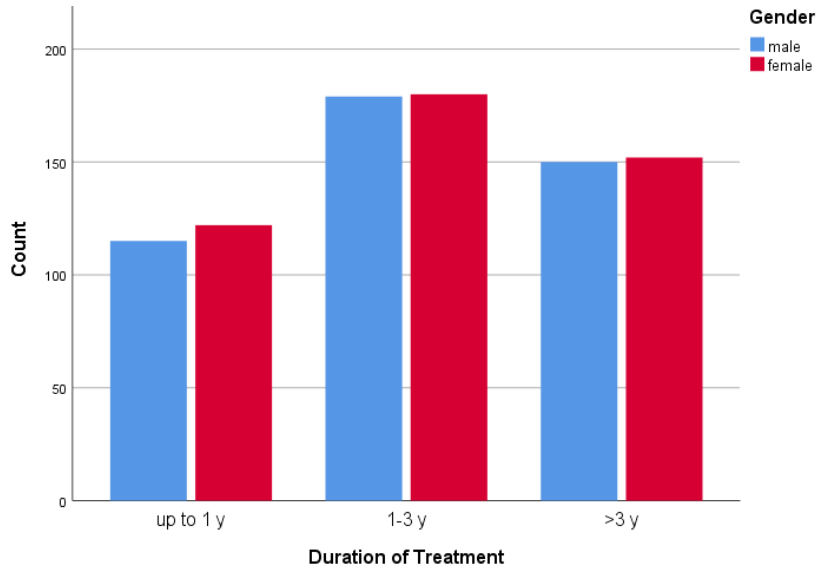

Figure 11. Duration of treatment according to gender (N = 898).

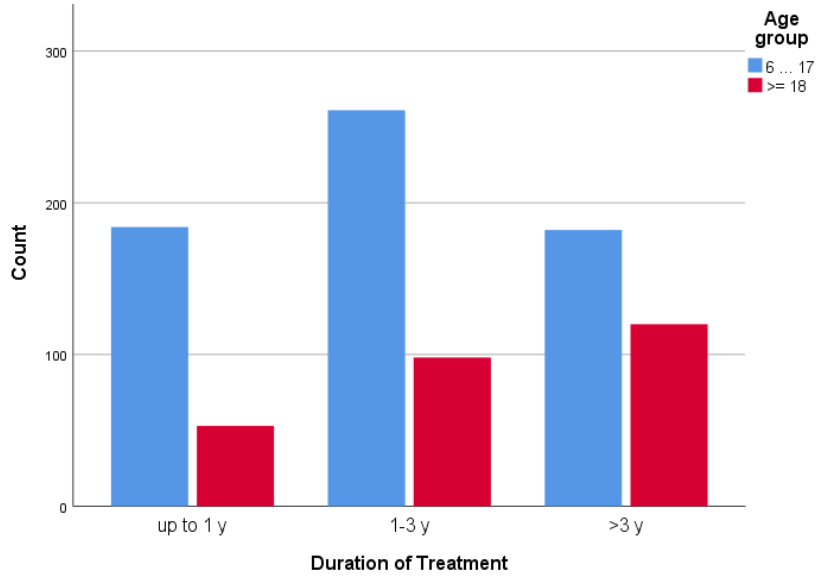

Figure 12. Duration of treatment according to age group (N = 898).

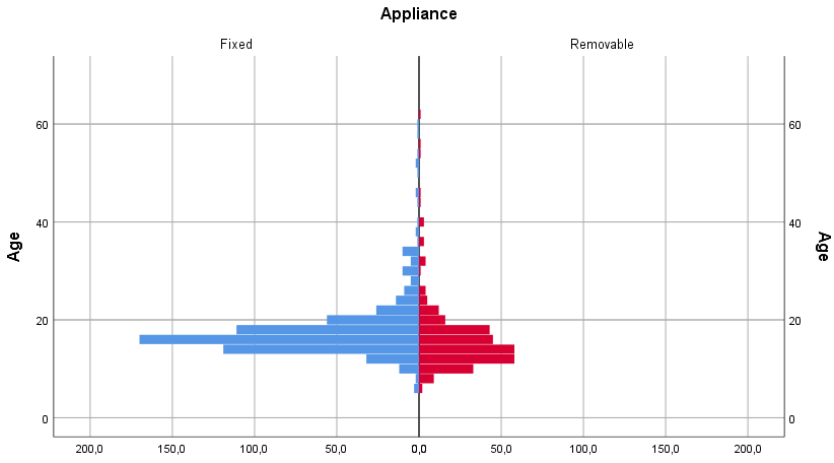

Figure 13. Type of appliance according to age for the total group (N = 898).

Independent of the type of appliance (fixed or removable) most of the patients were in orthodontic treatment for 1-3 years at the time of the survey (Figure 14) regardless of their gender (Figure 15).

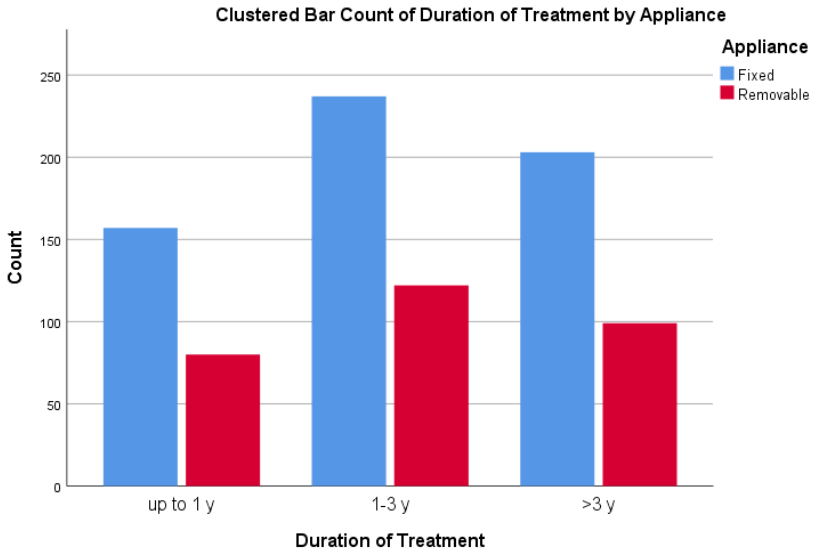

Figure 14. Type of appliance according to duration of treatment of the total group (N = 898).

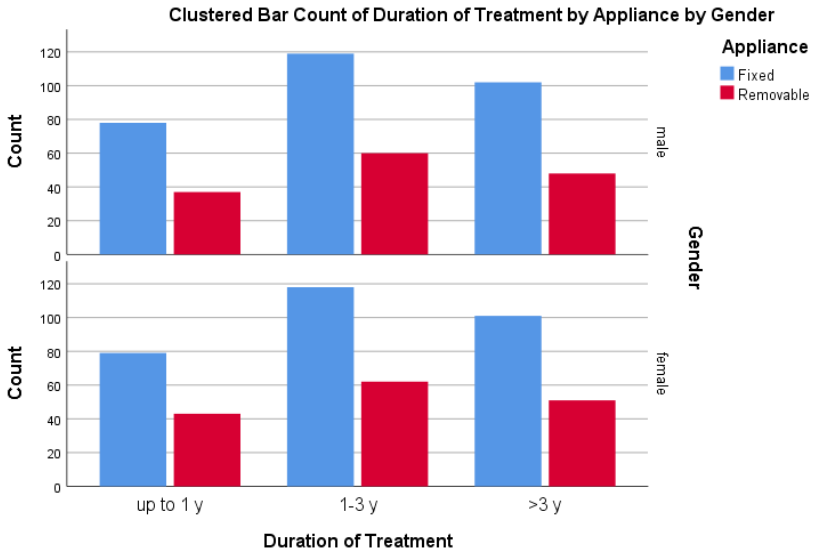

Figure 15. Type of appliance according to duration of treatment of male group (N = 444) and female group (N = 454).

Assuming the null model (independence) between age group and appliance, there were more study participants in the younger age group with removable appliances than expected (Figure 16). In the age group of ≥18-years-old orthodontic patients the proportion of participants with removable appliances was lower and with fixed appliances was higher than expected (Figure 16).

Appliance		Age group		Total
		6 ... 17	>= 18	
Fixed	Count	396	201	597
	Exp. Count	416,8	180,2	597,0
	Std. Resid.	-1,0	1,6	
Removable	Count	231	70	301
	Exp. Count	210,2	90,8	301,0
	Std. Resid.	1,4	-2,2	
Total	**Count**	**627**	**271**	**898**
	Exp. Count	**627,0**	**271,0**	**898,0**

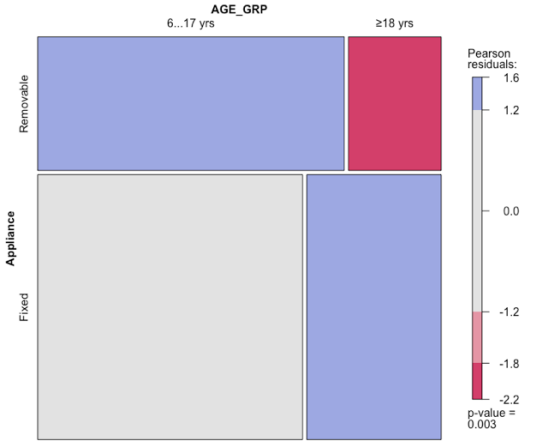

Figure 16. Cross-tabulation of appliance vs. age group stating observed and expected (exp.) frequencies and the corresponding Pearson standardized residuals (std. resid.) (N = 898). The chi-squared statistics (X^2 = 10.297, *df* = 1, p = 0.001) show a highly significant relationship between both variables. This is also shown in the mosaic plot (right).

There's a significant relationship between the type of the patient's appliance and the appointment frequency (X^2 = 71.600, *df* = 3, p < 0.001; Figure 17). More patients with fixed appliances than with removable appliances reported an appointment frequency of at least once per month. An appointment once per six months was reported by patients with removable appliance than with a fixed one (Figure 17).

Appointment frequency		Appliance		Total
		Fixed	Removable	
At least once per month	Count	334	88	422
	Exp. Count	280.6	141.4	422.0
	Std. Resid.	3.2	-4.5	
Once in two months	Count	209	138	347
	Exp. Count	230.7	116.3	347.0
	Std. Resid.	-1.4	2.0	
Once in three months	Count	38	54	92
	Exp. Count	61.2	30.8	92.0
	Std. Resid.	-3.0	4.2	
Once in six months	Count	16	21	37
	Exp. Count	24.6	12.4	37.0
	Std. Resid.	-1.7	2.4	
Total	Count	597	301	898
	Exp. Count	597.0	301.0	898.0

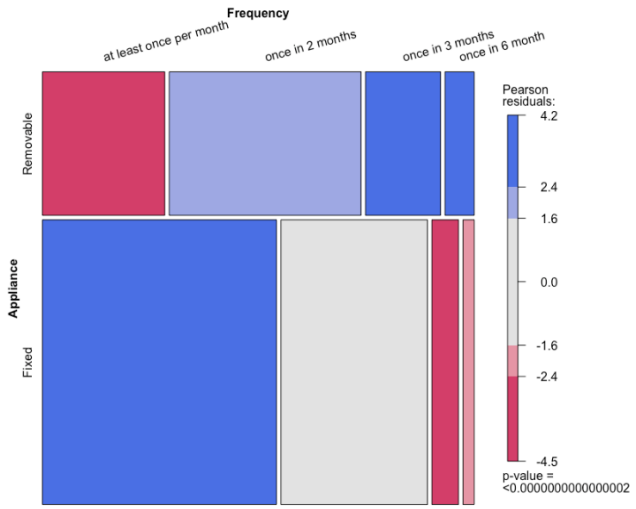

Figure 17. Cross-tabulation of appliance vs. frequency of appointment stating observed and expected (exp.) frequencies and the corresponding Pearson standardized residuals (std. resid.) (N = 898). The shading in the corresponding mosaic plot (right) is based on the Pearson residuals.

5.1.6 Treatment Satisfaction

Male orthodontic patients tended to be more dissatisfied than female, although the number of patients satisfied or very satisfied with their treatment were very high (Figure 18), though this difference was statistically not significant (X^2 = 2.205, *df* = 2, p = 0.332; Figure 19).

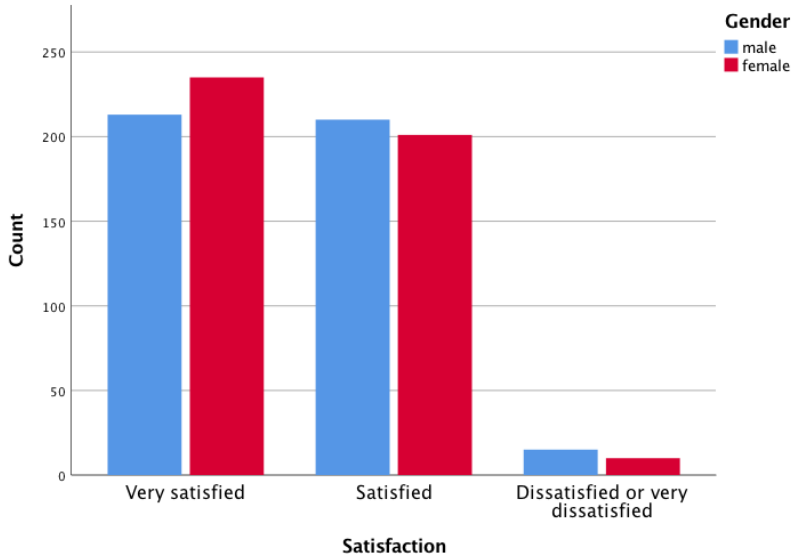

Figure 18. Satisfaction of treatment according to gender (N = 898).

Satisfaction		Gender		Total
		male	female	
Very satisfied	Count	213	235	448
	Exp. Count	222.0	226.0	448.0
	Std. Resid.	-0.6	0.6	
Satisfied	Count	210	201	411
	Exp. Count	203.6	207.4	411.0
	Std. Resid.	0.4	-0.4	
Dissatisfied or very dissatisfied	Count	15	10	25
	Exp. Count	12.4	12.6	25.0
	Std. Resid.	0.7	-0.7	
Total	Count	438	446	884
	Exp. Count	438.0	446.0	884.0

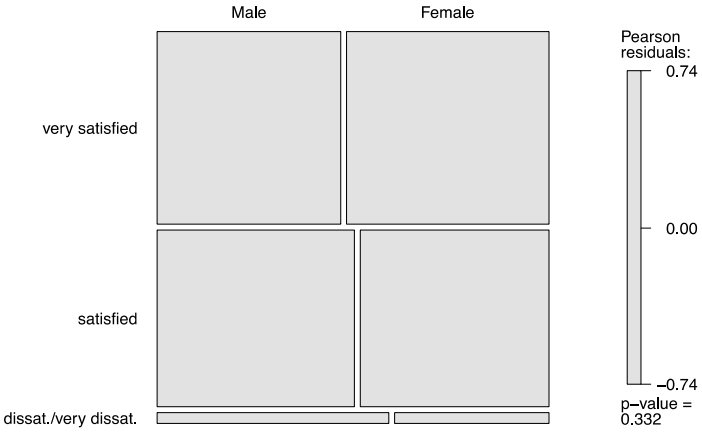

Figure 19. Cross-tabulation of satisfaction vs. gender stating observed and expected (exp.) frequencies and the corresponding Pearson standardized residuals (std. resid.) (N = 898). The shading in the corresponding mosaic plot (right) is based on the Pearson residuals.

The number of very satisfied and satisfied patients in both groups is very high (Figure 20). There was a highly significant correlation between self-esteem and patient satisfaction

(X^2 = 159.853, *df* = 6, p < 0.001; Figures 21 and 22). Patients reporting being very satisfied with treatment also reported a very high improvement in self-esteem. In the opposite direction, patients reporting dissatisfaction with treatment also reported a worsened self-esteem. Though, this has to be considered with care, since the expected frequency for this feature combination is below 5 (i. e. 0.9).

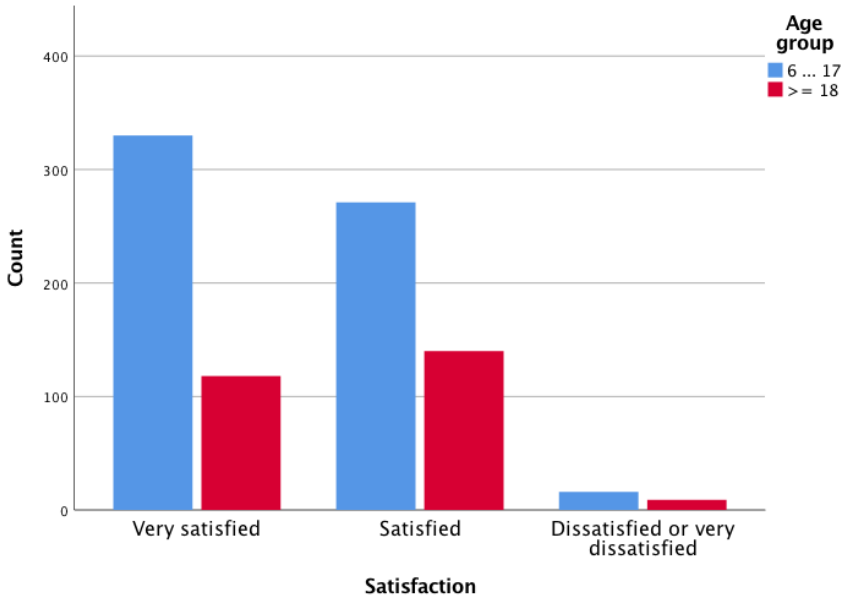

Figure 20. Graphic showing the satisfaction of treatment according to age group (N = 898).

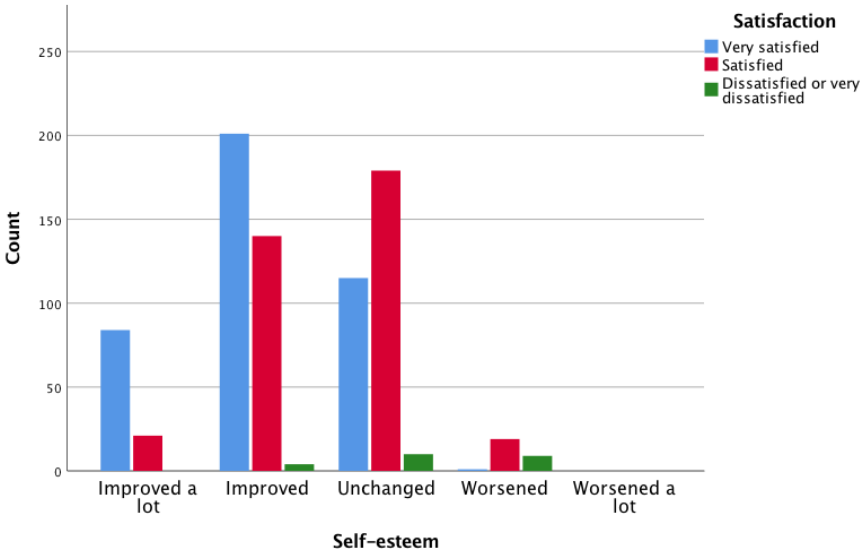

Figure 21. Satisfaction of treatment according self-esteem due to treatment (N = 898).

Self-esteem		Satisfaction			Total
		Very satisfied	Satisfied	Dissat./very dissat.	
Improved a lot	Count	84	21	0	105
	Exp. Count	53.8	48.1	3.1	105.0
	Std. Resid.	4.1	-3.9	-1.8	
Improved	Count	201	140	4	345
	Exp. Count	176.7	158.2	10.1	345.0
	Std. Resid.	1.8	-1.4	-1.9	
Unchanged	Count	115	179	10	304
	Exp. Count	155.7	139.4	8.9	304.0
	Std. Resid.l	-3.3	3.4	0.4	
Worsened	Count	1	19	9	29
	Exp. Count	14.9	13.3	0.9	29.0
	Std. Resid.l	-3.6	1.6	8.8	
Total	Count	401	359	23	783
	Exp. Count	401.0	359.0	23.0	783.0

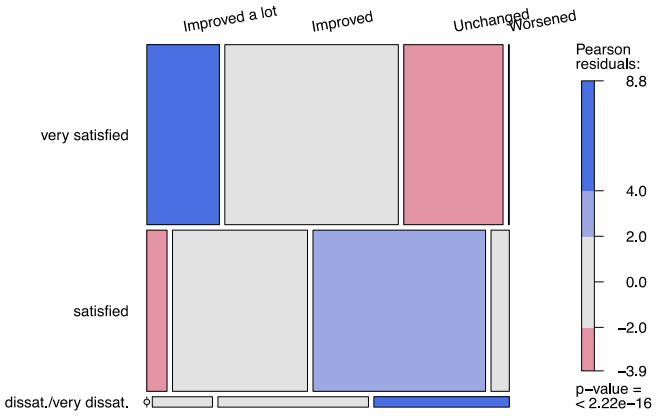

Figure 22. Cross-tabulation of satisfaction vs. self-esteem stating observed and expected (exp.) frequencies and the corresponding Pearson standardized residuals (std. resid.). The shading in the corresponding mosaic plot (right) is based on the Pearson residuals. N = 898

Orthodontic patients reporting "function" as reason for treatment also reported an unchanged self-esteem due to orthodontic treatment (Figure 23). However, aesthetic and aesthetic in combination with function were reported to improve the patient's self-esteem.

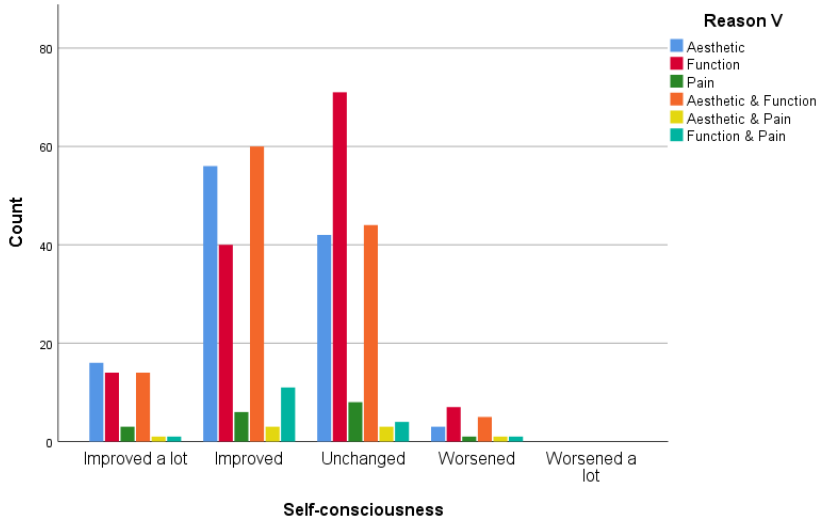

Figure 23. Graphic showing the self-esteem due to treatment according to reason for treatment (N = 898).

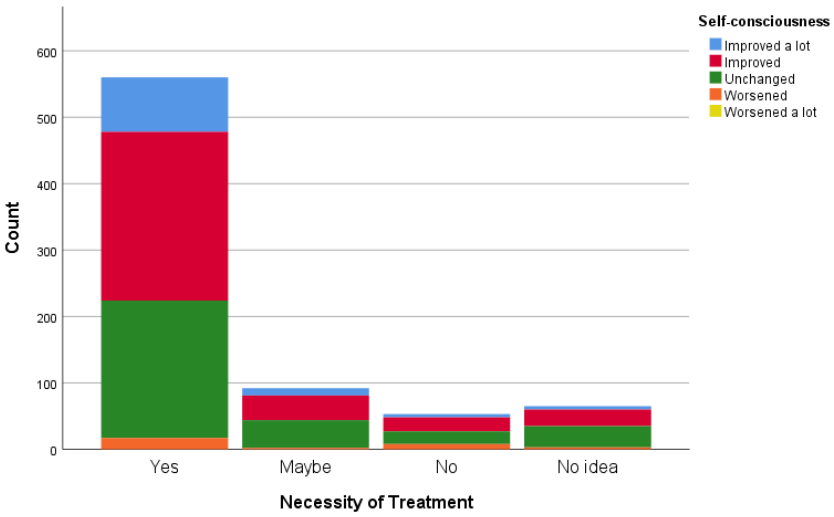

Figure 24. Graphic showing the self-esteem due to necessity of treatment (N = 898).

Figure 24 shows that more than 70 % of the patients of the total sample considered the orthodontic treatment a need. From those, most of them improved or unchanged self-esteem.

5.2 Multiple linear regression models

The impact of some variables on OHRQoL were analyzed using multiple linear regression (Tables 4-6). This modeling technique was applied to cases without any missing values in the variables used. For this reason, the multiple linear regression model for the total group contained 747, for the first age group (6-17 years of age) 512, and for the second age group (≥18-years-old) 235 complete cases.

The model for the total group (Table 4) revealed statistically significant augmented mean scores of OHIP-G14 for the ≥18-years-old group and females ($p < 0.001$). Moreover, not only reason for treatment #5 (“aesthetic, pain and others”; $p < 0.001$) was observed as statistically significant, but also reason for treatment #6 (“function, pain and others”; $p < 0.001$) and reason for treatment #7 (“aesthetic, function, pain and others”; $p = 0.014$). This can be interpreted, that these patients showed a much increased OHIP-G14 total score and thus had significantly reduced OHRQoL. Fixed appliances increased the OHIP-G14 total score and thus reduced OHRQoL ($p < 0.001$). Additional variables, i. e. duration of treatment, insurance and

immigration status, contributed to an increased OHIP-G14 total score, but their contribution was statistically not significant (Table 4).

Table 4. Estimates, 95 % CI and p-values from multiple linear regressions performed for overall OHIP score, adjusted for age, gender, insurance status, reason for orthodontic treatment, type of orthodontic appliance, duration of treatment, and immigration background of the total (6-17- and ≥18-years-old) orthodontic patients. Reason of treatment: A, aesthetics; F, function; P, pain; O, others.

Variable	Level	Reason for treatment				N	OHIP		Estimate	CI (95%)	P value
		A	F	P	O		Mean	SD			
Intercept						747	9.94	8.22	5.471	(3.412; 7.530)	**<0.001**
Age group	6…17 years					512	8.89	7.47	Reference		
	≥18 years					235	12.24	9.26	2.715	(1.430; 3.999)	**<0.001**
Gender	Male					363	9.03	7.12	Reference		
	Female					384	10.80	9.06	1.695	(0.568; 2.821)	**0.003**
Reason for treatment	Reason #1	X				104	8.96	6.76	Reference		
	Reason #2		X			137	9.05	7.55	0.494	(-1.500; 2.488)	0.627
	Reason #3			X		16	9.25	7.78	-0.216	(-4.370; 3.939)	0.919
	Reason #4	X	X		X	178	9.97	7.81	0.873	(-1.035; 2.781)	0.37
	Reason #5	X		X	X	12	19.25	13.35	9.637	(4.954; 14.319)	**<0.001**
	Reason #6		X	X	X	24	15.83	12.71	6.348	(2.876; 9.820)	**<0.001**
	Reason #7	X	X	X	X	30	13.77	10.31	3.989	(0.804; 7.173)	**0.014**
	Reason #8	X			X	42	9.17	7.67	-0.115	(-2.948; 2.718)	0.936
	Reason #9		X		X	30	7.97	6.20	-1.217	(-4.400; 1.967)	0.453
	Reason #10			X	X	6	11.00	5.06	1.568	(-4.857; 7.994)	0.632
	Reason #11				X	168	9.63	8.16	0.992	(-0.933; 2.917)	0.312
Appliance	Removable					255	7.60	6.97	Reference		
	Fixed					492	11.15	8.56	3.248	(2.044; 4.451)	**<0.001**
Duration of treatment	Up to 1 year					188	9.91	7.74	Reference		
	1-3 years					284	9.71	7.97	-0.501	-1.961; 0.959	0.501
	more than 3 years					275	10.20	8.79	-0.596	-2.087; 0.895	0.433
Insurance	Governmental					495	9.96	8.07	Reference		
	Private					248	9.91	8.54	-0.120	-1.348; 1.108	0.848
	Others					4	10.00	8.68	0.205	-7.611; 8.022	0.959
Migration	German					652	9.89	8.14	Reference		
	Non-German					95	10.28	8.75	-0.120	-1.348; 1.108	0.848

Based on the findings for the complete sample, identical models were calculated for each of both age groups separately. The variable "age group" was excluded here.

Similar findings as reported for the complete sample (Table 4) were also found for the first age group (6-17 years old) summarized in Table 5. Female patients ($p = 0.031$), reason for treatment #5 ($p < 0.001$) and reason for treatment #7 ($p = 0.001$) significantly increased OHIP-G14 total sore and thus lowered these patients' OHRQoL. Furthermore, fixed appliances were statistically significantly ($p < 0.001$) increasing the OHIP-G14 total score (Table 5). Though

all other variables (duration, insurance, migration status) contributed to the OHIP-G14 total score, their contribution was statistically not significant.

Table 5. Estimates, 95 % CI and p-values from multiple linear regressions performed for overall OHIP score, adjusted for age, gender, insurance status, reason for orthodontic treatment, type of orthodontic appliance, duration of treatment, and immigration background of the 6-17-years-old orthodontic patients. Reason of treatment: A, aesthetics; F, function; P, pain; O, others.

Variable	Level	Reason for treatment				N	OHIP		Estimate	CI (95%)	P value
		A	F	P	O		Mean	SD			
Intercept						512	8.89	7.47	8.532	(6.403; 10.662)	**<0.001**
Gender	Male					243	8.20	6.52	Reference		
	Female					269	9.51	8.19	1.388	(0.127; 2.650)	**0.031**
Reason	Reason #1	X				72	7.71	5.92	Reference		
	Reason #2		X			104	7.96	6.13	0.511	(-1.668; 2.690)	0.645
	Reason #3			X		8	6.25	6.94	-0.571	(-6.018; 4.875)	0.837
	Reason #4	X	X		X	102	9.09	7.00	1.277	(-0.925; 3.479)	0.255
	Reason #5	X		X	X	7	19.00	13.56	10.506	(4.891; 16.122)	**<0.001**
	Reason #6		X	X	X	11	8.36	8.45	1.089	(-3.505; 5.683)	0.642
	Reason #7	X	X	X	X	14	14.86	13.16	6.902	(2.759; 11.046)	**0.001**
	Reason #8	X			X	28	8.36	7.43	0.675	(-2.517; 3.866)	0.678
	Reason #9		X		X	23	8.65	6.33	0.311	(-3.093; 3.715)	0.858
	Reason #10			X	X	5	9.20	2.77	0.486	(-6.070; 7.042)	0.884
	Reason #11				X	138	9.27	8.06	1.725	(-0.337; 3.786)	0.101
Appliance	Removable					195	6.92	6.25	Reference		
	Fixed					317	10.10	7.90	3.279	(1.956;4.603)	**<0.001**
Duration	Up to 1 year					148	9.22	7.17	Reference		
	1-3 years					205	8.53	6.99	-0.800	(-2.359; 0.758)	0.313
	more than 3 years					159	9.05	8.32	-0.741	(-2.393; 0.910)	0.378
Insurance	Governmental					366	8.73	7.01	Reference		
	Private					144	9.26	8.49	1.041	(-0.400; 2.482)	0.156
	Others					2	10.50	14.85	2.316	(-8.157; 12.789)	0.664
Migration status	German					444	9.04	7.51	Reference		
	Non-Ger./Immig.					68	7.93	7.15	-0.759	(-2.646; 1.129)	0.43

A similar tendency was observed in the second age group (≥18-years-old orthodontic patients) as shown in Table 6. Female gender ($p = 0.029$) and reason for treatment #6 ("function, pain, and others"; $p = 0.002$) were significantly increasing mean score of the OHIP-G14 (Table 6). Therefore, it was found a significant reduced OHRQoL values. Though reason for treatment #5 ("aesthetic, pain, others"; $p = 0.093$) trailed a similar tendency, it was a non-significant outcome. Another significant result was that patients with fixed appliances ($p = 0.045$) exhibited increase in OHRQoL similar to the findings in the total sample and the first age group. In contrast to the findings reported above, in this age group patients with a

private insurance showed a significant decrease in the OHIP-G14 score than those with a governmental insurance (E = -2.713; p = 0.025) and thus improving OHRQoL. But patients with a non-German or immigration status showed a statistically significant increase in OHIP-G14 total score than those with German nationality (E = 3.950; p = 0.034).

Table 6. Estimates, 95 % CI and p-values from multiple linear regressions performed for overall OHIP score, adjusted for age, gender, insurance status, reason for orthodontic treatment, type of orthodontic appliance, duration of treatment, and immigration background of the ≥18-years-old orthodontic patients. Reason of treatment: A, aesthetics; F, function; P, pain; O, others.

Variable	Level	Reason for treatment				N	OHIP		Estimate	CI (95%)	P value
		A	F	P	O		Mean	SD			
Intercept						235	12.24	9.26	13.144	(8.780; 17.509)	**<0.001**
Gender	Male					120	10.72	7.97	Reference		
	Female					115	13.83	10.23	2.609	(0.271; 4.947)	**0.029**
Reason for treatment	Reason #1	X				32	11.78	7.72	Reference		
	Reason #2		X			33	12.48	10.26	-0.124	(-4.443; 4.195)	0.955
	Reason #3			X		8	12.25	7.81	-1.831	(-8.754; 5.091)	0.603
	Reason #4	X	X		X	76	11.16	8.69	-0.693	(-4.345; 2.958)	0.709
	Reason #5	X		X	X	5	19.60	14.62	7.157	(-1.208; 15.521)	0.093
	Reason #6		X	X	X	13	22.15	12.48	9.182	(3.465; 14.898)	**0.002**
	Reason #7	X	X	X	X	16	12.81	7.31	-0.495	(-5.809; 4.818)	0.854
	Reason #8	X			X	14	10.79	8.16	-1.769	(-7.410; 3.871)	0.537
	Reason #9		X		X	7	5.71	5.56	-6.211	(-13.414; 0.991)	0.091
	Reason #10			X	X	1	20.00	NA	4.719	(-12.881; 22.320)	0.598
	Reason #11				X	30	11.30	8.55	-2.254	(-6.738; 2.230)	0.323
Appliance	Removable					60	9.82	8.61	Reference		
	Fixed					175	13.07	9.36	2.737	(0.059;5.415;)	**0.045**
Duration	Up to 1 year					40	12.50	9.19	Reference		
	1-3 years					79	12.80	9.45	-0.473	(-3.930; 2.985)	0.788
	more than 3 years					116	11.77	9.21	-0.642	(-3.943; 2.659)	0.702
Insurance	Governmental					129	13.44	9.72	Reference		
	Private					104	10.80	8.57	-2.713	(-5.087; -0.339)	**0.025**
	Others					2	9.50	2.12	-3.011	(-15.617; 9.594)	0.638
Migration status	German					208	11.72	9.10	Reference		
	Non-Ger./Immig.					27	16.22	9.68	3.950	(0.298; 7.603)	**0.034**

Part II – Cleft-Lip and Ortho-Surgical Patients

6 Patients & Methods

The completely anonymous and self-administered surveys on CLP and ortho-surgical patients, were approved by the Ethics Committee of the Ludwig-Maximillian-University Medical Center (LMU) in Munich (project number 114-14). The reporting of these studies was improved using the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) statement (Eysenbach 2004). The surveys were realized at the Department of Orthodontics at the LMU Munich between August to October 2017.

6.1 Study Population

In each survey, 50 subjects undergoing orthodontic treatment and their guardians were included. The survey on CLP patients included 46 % females and 54 % males with a mean age 13.4 ± 5.1 years. The survey on ortho-surgical patients included 54.0 % females and 46.0 % males with a mean age 28.0 ± 8.7 years. In contrast to the first study with traditional orthodontic patients reported in Part I of this thesis, in this both studies patients with any medical problems, syndromes, craniofacial abnormalities, orofacial clefts or orthognathic surgery were obviously considered. The guardians and/or the patients (children, adolescents or adults) gave informed consent for study participation.

6.2 Questionnaire

SoSci-Survey (URL: https://www.soscisurvey.de) was used to host the electronic version of the questionnaires used in this study, separately for each patient group.

The questionnaire for the CLP group (Appendix 11.2.1) contained 28 items arranged in three subsections related to the following topics: A) German version of the Children Perception questionnaire (CPQ11-14) (cf. below); B) demographic information of the subject and his/her family, such as age, gender, insurance and immigration status (Fritz and Gehricke 2012); and

C) general questions about the orthodontic treatment, such as treatment phase, treatment duration and the satisfaction with orthodontic treatment.

The ortho-surgical group questionnaire (Appendix 11.3.1) consisted of 34 questions also subdivided in three main subtopics: A) Orthognathic Quality of Life Questionnaire (OQLQ) (cf. below); B) demographic information of the subject and his/her family, such as age, gender, insurance and immigration status (Fritz and Gehricke 2012); and C) general questions about the orthodontic treatment, such as treatment phase, treatment duration, the satisfaction with orthodontic treatment and reason.

6.3 Children Perception Questionnaire (CPQ-G11-14)

The German version of the Children Perception Questionnaire for ages between 11- and 14-years-old (CPQ11-14) was used to assess the OHRQoL in the CLP group (Appendix 11.2.1). This validated tool was primarily developed in Canada (Jokovic et al. 2002) and is available as the German version (CPQ-G11-14) with 35 items (Bekes et al. 2011a; Bekes et al. 2011b). In particular, the CPQ-G11-14 consisted of four subscales (Foster Page et al. 2005; Jokovic et al. 2002): 1) oral symptoms (5 items); 2) functional limitations (10 items); 3) emotional well-being (8 items); and 4) social well-being (12 items). For each of the CPQ items, patients were asked to select how often this items occurred during the last three month using a five-point Likert scale (Jokovic et al. 2002): “Never” (0), “Once/twice” (1), “Sometimes” (2), “often” (3), “Every day/almost every day” (4). Due to technical reasons associated with SoSci-Survey the order of the Likert scale was inverted in the online questionnaire. For analysis, this was considered. The responses were summed into a score ranging from 0 to 140 measuring the severity of OHRQoL representing a “problem index”. A summary score of “0” indicated the absence of any problem, and higher scores represented more impairment with a maximum impairment score of 140.

6.4 Orthognathic Quality of Life Questionnaire (OQLQ-G)

The German version of the Orthognathic Quality of Life Questionnaire (OQLQ) was used to assess the OHRQoL in our ortho-surgical group of patients (Appendix 11.3.1). This tool was primarily developed and validated by Cunningham et al. (2000, 2002). Its German version is available as the OQLQ-G containing 24 items (Bock et al. 2009; John et al. 2006). As originally proposed by Cunningham et al. (2000), the OQLQ's individual items were allocated to four categories or subscales (Bock et al. 2009; Cunningham et al. 2000, 2002): 1) function (questions 3-6); 2) aesthetics (questions 1, 2, 7, 10, 11, 14); 3) social aspects (questions 15-22); and 4) awareness of the dentofacial deformity (questions 8, 9, 12, 13). For each of the 24 OQLQ-G items, patients were asked if they were bothered by some aspects of the OHRQoL using a 4-point Likert scale (Bock et al. 2009; Cunningham et al. 2000): "not applicable" (0), "bothers you a little +" (1), "++" (2), "+++" (3), and "bothers you a lot ++++" (4). Due to technical reasons associated with SoSci-Survey the order of the Likert scale was slightly changed in the online questionnaire. The responses were summed into a score ranging from 0 to 96. A summary score of "0" indicated the absence of any problem, and higher scores represented more impairment with a maximum impairment of 96.

6.5 Patient Recruitment

CLP and ortho-surgical patients undergoing orthodontic treatment at the Department of Orthodontics at the LMU were invited to take part in the corresponding study. The invitation was done personally by the dental staff or by written informational materials. Based on previous experience, patients and their parents received an explaining by the research project's staff in detail and included the possibility to interrupt it at any time. The majority of patients accepted to join the projects and gave written consent; the rejection rate was low in both groups: 6 % in the CLP group (N = 3) and 2 % in the ortho-surgical group (N = 1). The individuals under orthodontic treatment from both studies were invited personally by P.d.S. in the clinic or

in the waiting room. At the end of the appointment or during waiting for the appointment patients answered the online questionnaire. The self-administered questionnaires were answered anonymously in available computers or tablets. P.d.S. was continuously available to answer possible concerns or questions raised by patients participating to either study.

6.6 Statistics

The data from the online based questionnaires were transferred from the database of the Sosci-Survey website to Microsoft Excel 2010® (Microsoft Corporation, Redmond, Washington, USA). All descriptive analysis was done using SPSS for Windows, Version 25.0 (IBM Corp., Armonk, NY). Explorative statistics was evaluated and analyzed using R, version 3.5.1 (R Core Team 2018).

The descriptive statistics were evaluated for diverse subscales and categories of CPQ-G11-14 and QOLQ-G. CPQ-G11-14 or QOLQ-G total scores were calculated for each participant. In both questionnaires several items allowed multiple answers. For these variables, the total number reported was exceeding the number of participants in each questionnaire. The corresponding tables in the appendices (CLP in Appendix 11.2.2; ortho-surgical in Appendix 11.3.2) are not including these multiple answers as separate levels. For the items "Orthodontic treatment costs" and "Reason for orthodontic treatment" in the CLP survey and "Migration background" in both surveys these multiple answers were taken into account.

Explorative statistics was done using the OHRQoL questionnaires scores for the respective subscales and variables for the CLP sample and ortho-surgical sample. For the CLP group the continuous variable age and the categorical variables gender, CLP classification, syndrome, treatment phase, health insurance, self-esteem and migration background were considered. For the ortho-surgical patients the variables included were the continuous variable age and the categorical variables gender, family status, indication of treatment, reason for treatment, health insurance, malocclusion classification, syndrome, treatment phase, self-

esteem and migration background. Depending on the number of levels of the categorical variables the non-parametric Mann-Whitney U-test (two levels) or the Kruskal-Wallis test (three and more levels) were calculated. Statistically significant Kruskal-Wallis tests were completed with pairwise comparisons and Bonferroni correction for multiple testing. A two-tailed α significance level of 0.05 was applied for all analyses.

7 Results

7.1 Cleft-Lip Patients

7.1.1 Descriptive Statistics – Variables Overview

The frequencies and percentages registered for the variables specifically developed for the cleft lip palate patients are presented in Appendix 11.2.2. The mean age was 13.4 ± 5.1 years and the gender of the CLP patients in orthodontic treatment were equally distributed (female 46.0 % and male 54.0 %). Regarding the exact cleft classification, 42.0 % of the participants reported unilateral CLP and 26.0 % bilateral CLP while the other patients have only cleft lip or cleft palate. Almost half of the patients were in combined orthodontic-surgery treatment (48.0 %) and one-third were in main treatment phase in (36 .0%), though multiple answers were allowed. Nevertheless, when analyzing the answers that were exclusive, the number of patients that were only in the combined orthodontic-surgery treatment phase are 32 % and in the main orthodontic treatment are 26 %. More than half of the patients (54.0 %) had their first surgery with less than 3 months of age. Only 4.0 % of the patients lived outside Munich and a travel duration to get to the practice of more than 1 hour was reported by 22.0 % of the CLP group.

The great majority of the CLP group (94.0 %) was supported by a governmental health insurance for the treatment. More than half of the sample considered their oral health status so far as “normal”, “good” or “very good” (92.0 %) and reported an improvement of their self-esteem (52.0 %). Furthermore, almost all patients were “very satisfied” (54.0 %) or “satisfied” (40.0 %) with orthodontic treatment. Only 6 % were immigrant and had no German citizenship.

7.1.2 Descriptive Statistics – CPQ

The registered frequencies of the CPQ-G11-14's answers for the CLP sample are listed in Table 7 and in Figure 25. The most frequently reported problems ("often" or "every day/almost every day") were question 23 on "breathing through the mouth" (N = 13, 26.0 %), question 24 on "unclear speech" (N = 12, 24.0 %), and question 25 on "a slow eat" (N = 12, 22.0 %). Less frequent problems were reported to occur "never" or "once/twice" (Table 7): "trouble doing homework" (question 35), "hard time paying attention in the school" (question 4), being "not wanted or unable to spend time with other children" (question 5) and "left out by other kids" (question 15).

According to the CPQ-G11-14, the quality of life mean rate for the total sample was 26.3 ± 15.5, for boys 28.4 ± 16.6 and for girls 23.8 ± 14.0 (Table 8). The subscales analysis of the descriptive statistics for the total sample reported a mean score 6.0 ± 3.1 for "oral symptoms", 8.9 ± 6.9 for "functional restrictions", 5.5 ± 5.2 "emotional well-being" and 5.8 ± 4.9 "social well-being.

Table 7. Descriptive results of the CPQ-G11-14 of the cleft lip palate sample (N= 50).

Questions from CPQ-G11-14 (Number/%)		Never	Once/ twice	Sometimes	Often	Every day/ almost every day
Q1	Food stuck to the roof of your mouth?	17 (34.0)	11 (22.0)	16 (32.0)	4 (8.0)	2 (4.0)
Q2	Asked questions by other children about your condition?	21 (42.0)	8 (16.0)	10 (20.0)	7 (14.0)	4 (8.0)
Q3	Not wanted or been unable to take part in school and non-school activities (e.g. sports, drama, clubs)?	38 (76.0)	5 (10.0)	6 (12.0)	0 (0-0)	1 (2.0)
Q4	Had a hard time paying attention in school?	35 (70.0)	14 (28.0)	0 (0-0)	0 (0-0)	1 (2.0)
Q5	Not wanted or been unable to spend time with other children?	45 (90.0)	3 (6.0)	1 (2.0)	1 (2.0)	0 (0-0)
Q6	Crabby or frustrated?	17 (34.0)	10 (20.0)	19 (38.0)	4 (8.0)	0 (0-0)
Q7	In a bad mood?	24 (48.0)	13 (26.0)	9 (18.0)	4 (8.0)	0 (0.0)
Q8	Worried about what other people think?	31 (62.0)	8 (16.0)	10 (20.0)	1 (2.0)	0 (0.0)
Q9	Worried that you aren't very healthy?	32 (64.0)	10 (20.0)	7 (14.0)	1 (2.0)	0 (0.0)
Q10	Nervous or afraid?	32 (64.0)	11 (22.0)	4 (8.0)	2 (4.0)	1 (2.0)
Q11	Shy or embarrassed?	33 (66.0)	9 (18.0)	7 (14.0)	0 (0.0)	1 (2.0)
Q12	Worried that you are less good-looking than other kids?	29 (58.0)	13 (26.0)	5 (10.0)	2 (4.0)	1 (2.0)
Q13	Worried that you are different from other people?	32 (64.0)	11 (22.0)	6 (12.0)	1 (2.0)	0 (0.0)
Q14	Teased or called names?	32 (64.0)	12 (24.0)	3 (6.0)	2 (4.0)	1 (2.0)
Q15	Left out by other kids?	41 (82.0)	6 (12.0)	2 (4.0)	0 (0.0)	1 (2.0)
Q16	Bad breath?	22 (44.0)	13 (26.0)	11 (22.0)	3 (6.0)	1 (2.0)
Q17	A toothache or sore mouth?	8 (16.0)	21 (42.0)	15 (30.0)	6 (12.0)	0 (0.0)
Q18	Mouth sores?	13 (26.0)	15 (30.0)	14 (28.0)	6 (12.0)	2 (4.0)
Q19	Bleeding gums?	17 (34.0)	17 (34.0)	12 (24.0)	4 (8.0)	0 (0.0)
Q20	Trouble drinking or eating cold or hot foods?	26 (52.0)	11 (22.0)	9 (18.0)	3 (6.0)	1 (2.0)
Q21	Trouble chewing tough food?	16 (32.0)	11 (22.0)	14 (28.0)	5 (10.0)	4 (8.0)
Q22	Trouble opening your mouth wide?	36 (72.0)	6 (12.0)	6 (12.0)	2 (4.0)	0 (0.0)

Questions from CPQ-G11-14 (Number/%)	Never	Once/ twice	Sometimes	Often	Every day/ almost every day
Q23 Breathing through your mouth?	21 (42.0)	8 (16.0)	8 (16.0)	6 (12.0)	7 (14.0)
Q24 Unclear speech?	13 (26.0)	16 (32.0)	9 (18.0)	11 (22.0)	1 (2.0)
Q25 A slow eat?	22 (44.0)	8 (16.0)	9 (18.0)	6 (12.0)	5 (10.0)
Q26 Trouble eating food that you like?	25 (50.0)	11 (22.0)	6 (12.0)	3 (6.0)	5 (10.0)
Q27 Trouble playing a musical instrument?	45 (90.0)	3 (6.0)	0 (0.0)	1 (2.0)	1 (2.0)
Q28 Trouble drinking with a straw?	42 (84.0)	4 (8.0)	2 (4.0)	1 (2.0)	1 (2.0)
Q29 Avoided smiling when around other children?	35 (70.0)	11 (22.0)	0 (0.0)	0 (0.0)	4 (8.0)
Q30 Trouble sleeping?	35 (70.0)	9 (18.0)	4 (8.0)	0 (0.0)	2 (4.0)
Q31 Missed school?	28 (56.0)	14 (28.0)	5 (10.0)	3 (6.0)	0 (0.0)
Q32 Argued with your family?	36 (72.0)	4 (8.0)	8 (16.0)	2 (4.0)	0 (0.0)
Q33 Not wanted to speak or read out loud in class?	36 (72.0)	4 (8.0)	4 (8.0)	1 (2.0)	5 (10.0)
Q34 Not wanted to talk with other children?	43 (86.0)	3 (6.0)	3 (6.0)	1 (2.0)	0 (0.0)
Q35 Trouble doing your homework?	46 (92.0)	3 (6.0)	1 (2.0)	0 (0.0)	0 (0.0)

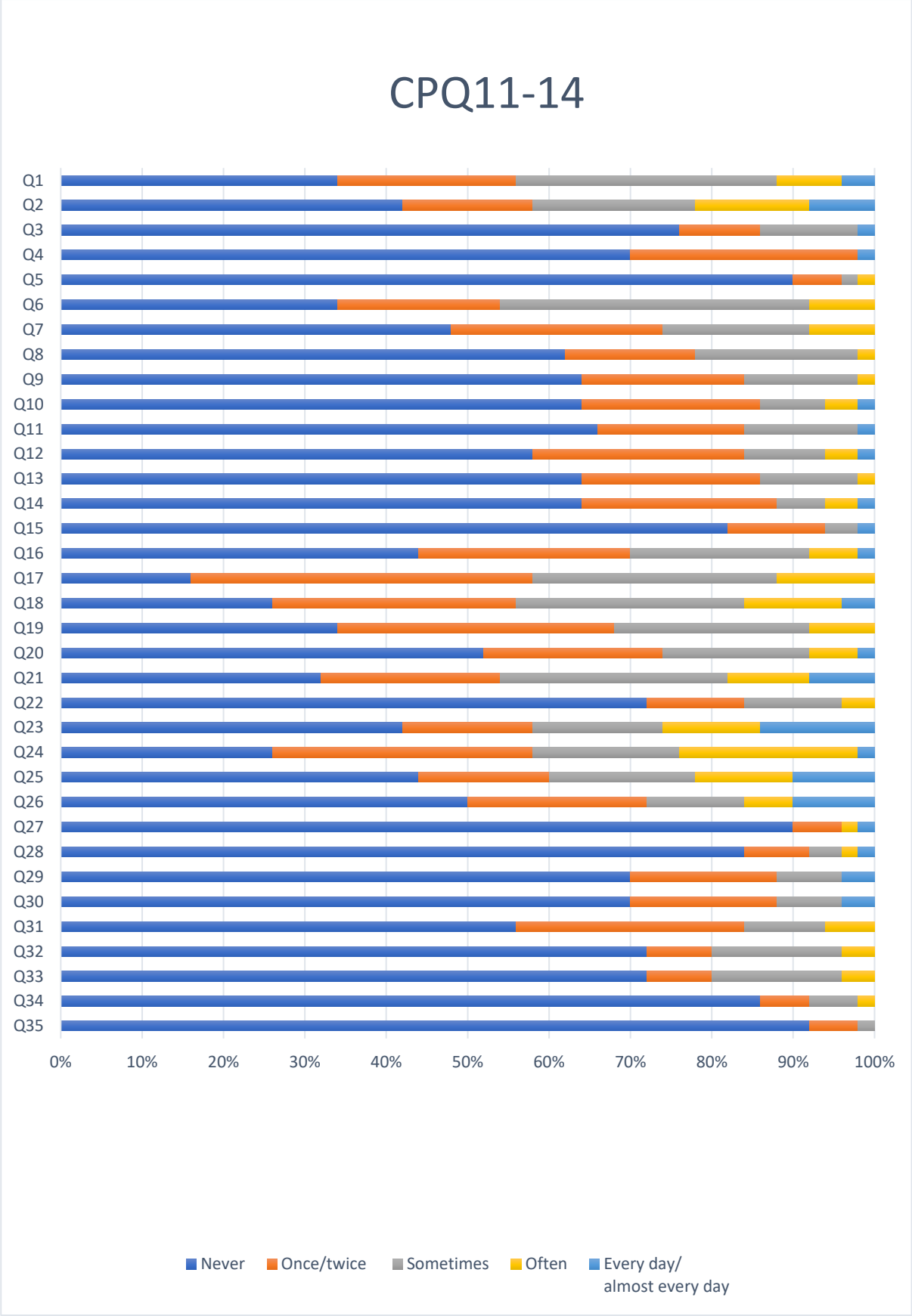

Figure 25. Descriptive CPQ-11-14 questions' rate according to the answer from the CLP sample (N= 50).

Table 8. Descriptive statistics for the subscales and overall CPQ-G11-14 score of the total sample of clef lip palate sample (N = 50) and according to gender.

Subscale from CPQ-G11-14	All (n = 50)		Boys (n = 27)		Girls (n = 23)	
	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max
1. Oral symptoms (0-20)	6.0 (3.1)	0-13	5.9 (2.9)	0-13	6.2 (3.4)	0-12
2: Functional restrictions (0-40)	8.9 (6.9)	0-30	10.4 (7.3)	0-30	7.0 (5.2)	0-24
3: Emotional well-being (0-32)	5.5 (5.2)	0-21	5.6 (5.2)	0-21	5.4 (5.3)	0-20
4: Social well-being (0-48)	5.8 (4.9)	0-22	6.4 (5.8)	0-22	5.2 (3.7)	0-12
Overall CPQ-G11-14 Score	26.3 (15.5)	0-69	28.4 (16.6)	0-69	23.8 (14.0)	0-50

7.1.3 Descriptive Statistics – Demography

The highest proportion in the CLP sample was between 10 to 15 years of age (mean age for the complete sample: 13.4 ±5.1; Figure 26). The age distribution was similar in both genders (Figure 27).

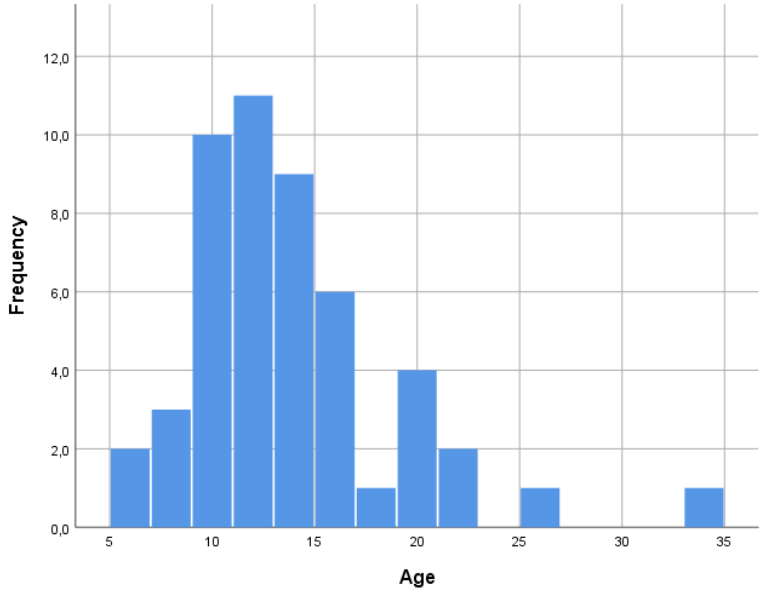

Figure 26. Age distribution of the CLP sample (N = 50); mean age: 13.4 ± 5.1 years.

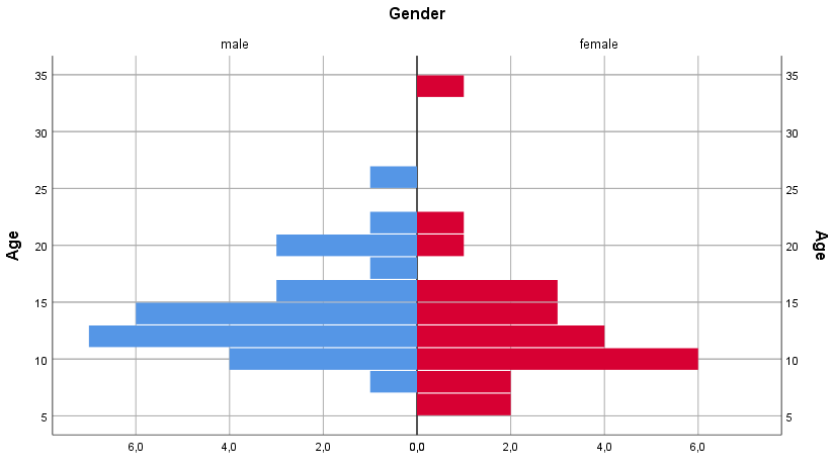

Figure 27. Frequencies of CLP sample according to age and gender (N = 50).

Patients with unilateral CLP were younger than those with bilateral CLP (Figure 28) and males were more frequent than females (Figure 29).

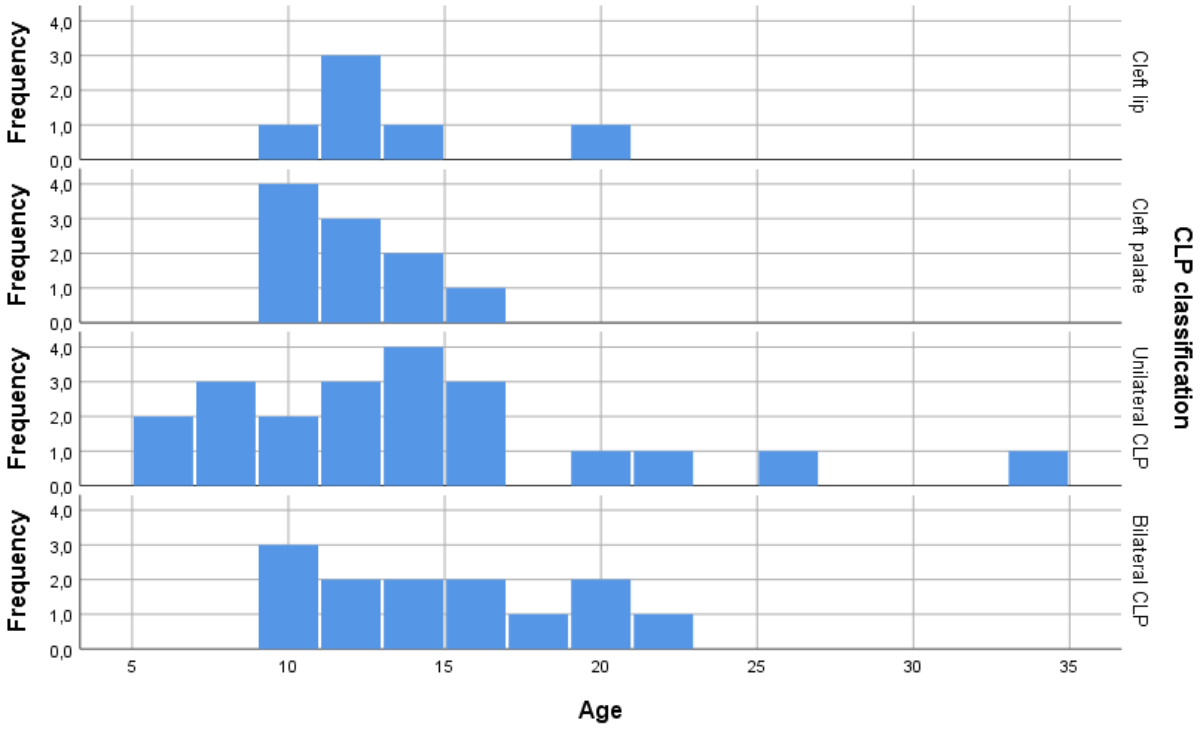

Figure 28. Age distribution according to CLP classification (N = 50).

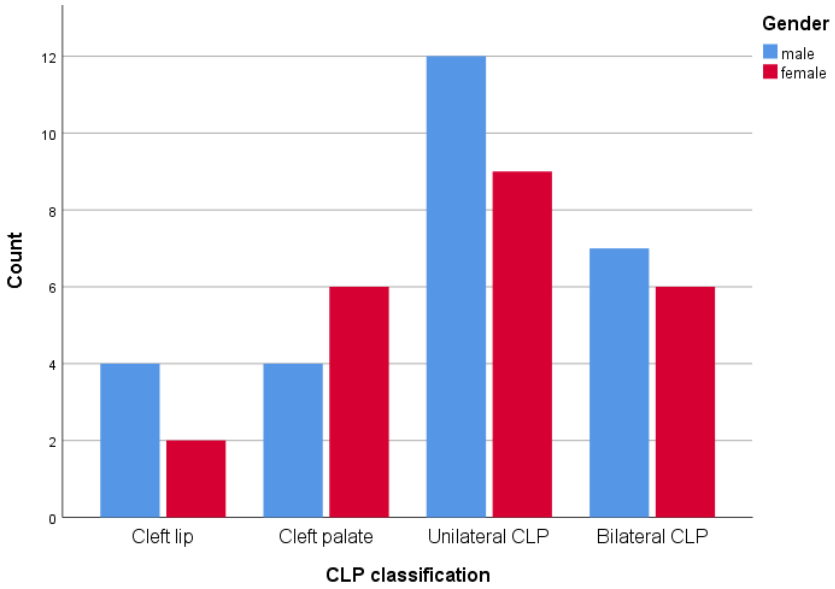

Figure 29. CLP classification according to gender (N = 50).

Patients of the CLP sample without syndrome are more frequent. Syndromes are associated with cleft palate or bilateral CLP (Figure 30).

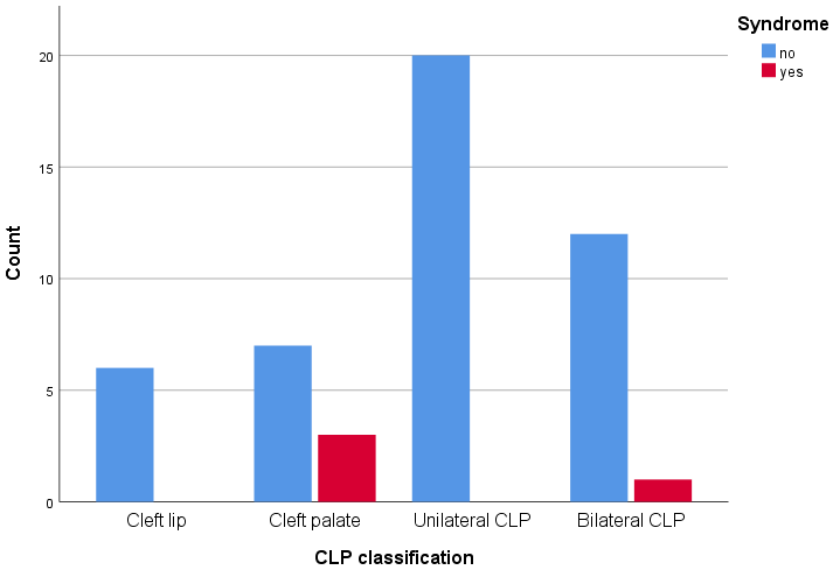

Figure 30. CLP classification according to syndrome (N = 50).

7.1.4 Descriptive Statistics – Treatment

Most CLP patients have governmental insurance (94.0 %), mainly males (Figure 31). Most of CLP patients are very satisfied or satisfied with treatment (Figure 32). The majority of CLP patients are governmental insured and are very satisfied or satisfied with orthodontic treatment (Figure 33). A great number of patients that are very satisfied or satisfied with orthodontic treatment have their self-esteem unchanged during it (Figure 34).

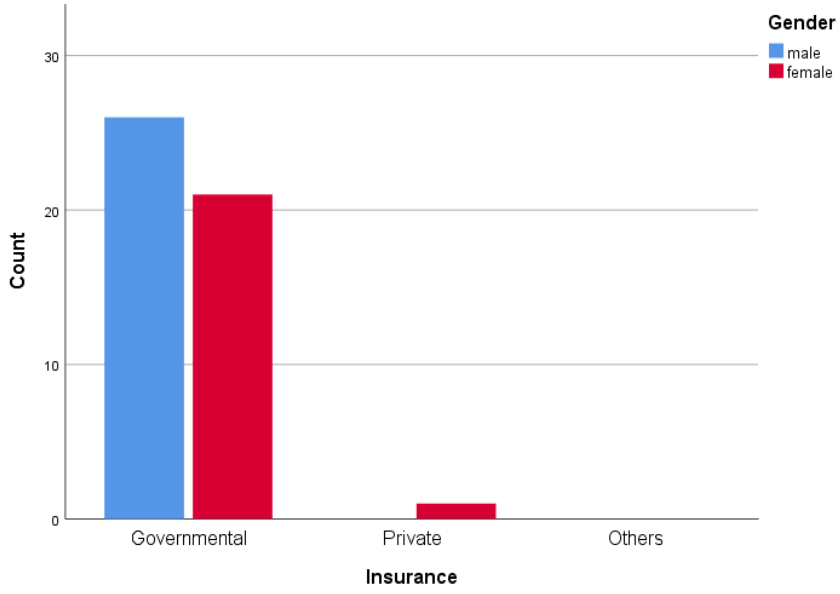

Figure 31. CLP sample according to gender and insurance (N = 50).

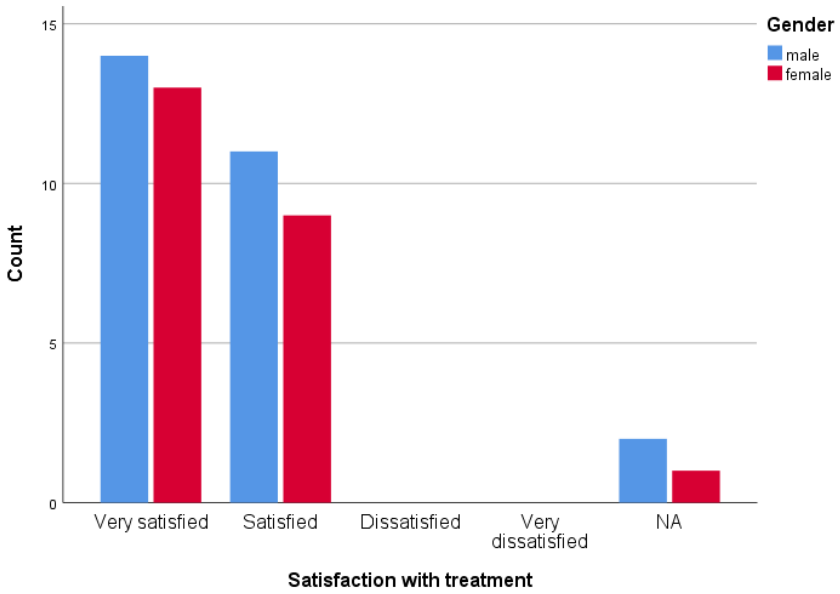

Figure 32. CLP sample according to gender and satisfaction with treatment (N = 50).

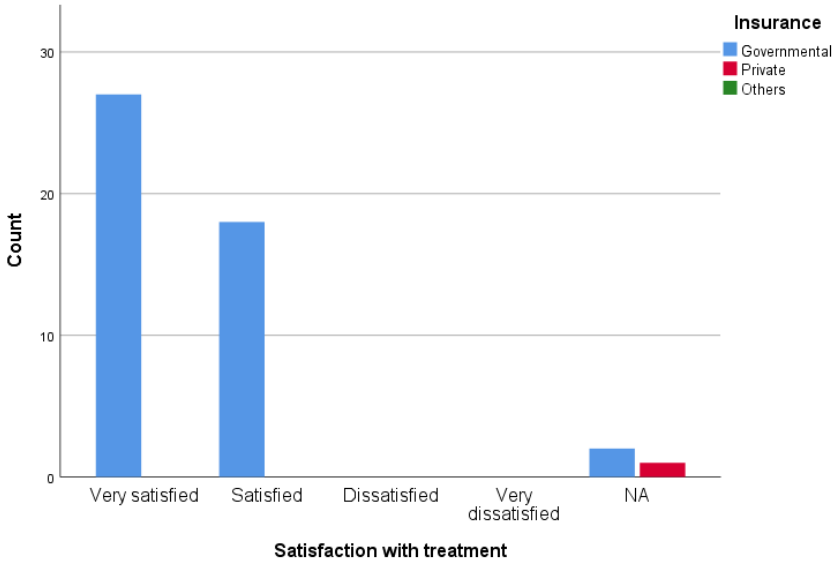

Figure 33. CLP sample according to insurance and satisfaction with treatment (N = 50).

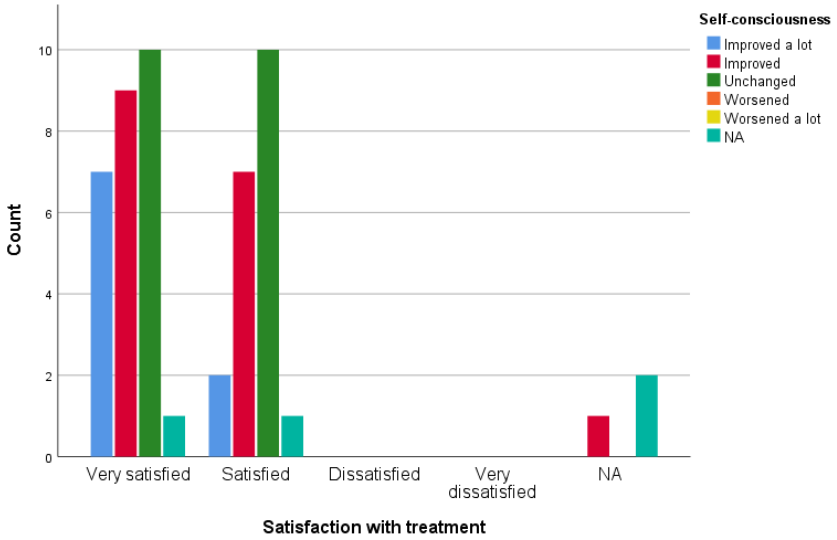

Figure 34. CLP sample according to self-esteem and satisfaction with treatment (N = 50).

7.1.5 Explorative Statistics

CLP patients with syndromes showed a significant higher ($p = 0.014$) mean score (16.0 ± 5.5) for subscale 2 ("functional restrictions") than those without syndrome (8.0 ± 6.6). The descriptive statistics of all subscales and overall total scores can be seen in Table 9. Figure 35 shows a boxplot of the subscale 2 (functional restrictions) according to the syndrome variable.

Table 9. Statistics for the CPQ-G11-14 subscales and its overall score distribution according to syndrome impairment of the CLP group (N = 50). P values for Mann-Whitney's U test are given. "*" denotes significant differences between patients with and without syndrome.

	With syndrome						Without syndrome						P value
	N	Mean	SD	Min	Max	Median	N	Mean	SD	Mini	Max	Median	
Subscale 1	4	8.3	1.7	6.0	10.0	8.5	45	5.8	3.2	0.0	13.0	5.0	0.090
Subscale 2	4	16.0	5.5	12.0	24.0	14.0	45	8.0	6.6	0.0	30.0	8.0	0.014*
Subscale 3	4	4.5	3.7	2.0	10.0	3.0	45	5.7	5.3	0.0	21.0	4.0	0.792
Subscale 4	4	5.0	3.2	2.0	9.0	4.5	45	6.0	5.1	0.0	22.0	6.0	0.930
Overall score	**4**	**33.8**	**9.8**	**23.0**	**43.0**	**34.5**	**45**	**25.5**	**16.0**	**0.0**	**69.0**	**24.0**	**0.231**

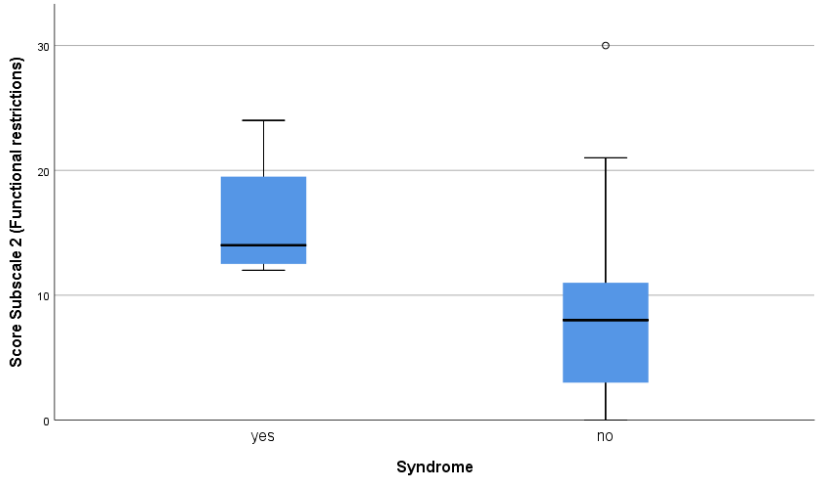

Figure 35. CLP sample according to subscale 2 score and syndrome (N = 50).

The distribution of the CPQG-11-14 subscales scores and overall scores were also evaluated according to the CLP classification (Table 10). Though being quite different for individual subscales and CLP types neither difference was statistically significant (Table 10, Figure 36).

Table 10. Distribution of the CPQ-G11-14 subscales and its overall score according to the CLP classification (N = 50). The p value according to the Kruskal-Wallis (K-W) test is given.

CPQ scale	CLP type	N	Mean	SD	Min	Max	Median	P value (K-W)
Subscale 1	Cleft lip	6	3.3	3.4	0.0	9.0	3.0	0.139
	Cleft palate	10	7.0	1.9	4.0	10.0	6.5	
	Unilateral CLP	21	6.3	2.9	2.0	12.0	5.0	
	Bilateral CLP	13	6.1	3.7	1.0	13.0	6.0	
Subscale 2	Cleft lip	6	3.0	4.3	0.0	11.0	1.5	0.086
	Cleft palate	10	10.3	6.2	0.0	21.0	11.5	
	Unilateral CLP	21	9.4	5.7	1.0	20.0	10.0	
	Bilateral CLP	13	9.5	9.2	0.0	30.0	6.0	
Subscale 3	Cleft lip	6	3.5	3.9	0.0	10.0	3.0	0.507
	Cleft palate	10	5.3	3.4	1.0	12.0	4.5	
	Unilateral CLP	21	6.6	6.1	0.0	21.0	4.0	
	Bilateral CLP	13	4.9	5.2	0.0	15.0	3.0	
Subscale 4	Cleft lip	6	3.8	4.4	0.0	11.0	2.5	0.594
	Cleft palate	10	4.9	3.0	1.0	11.0	4.5	
	Unilateral CLP	21	6.3	5.6	0.0	22.0	5.0	
	Bilateral CLP	13	6.8	5.3	0.0	17.0	8.0	
Overall score	Cleft lip	6	13.7	12.5	0.0	32.0	15.0	0.193
	Cleft palate	10	27.5	10.0	10.0	41.0	28.5	
	Unilateral CLP	21	28.6	15.6	6.0	64.0	24.0	
	Bilateral CLP	13	27.3	18.5	2.0	69.0	27.0	

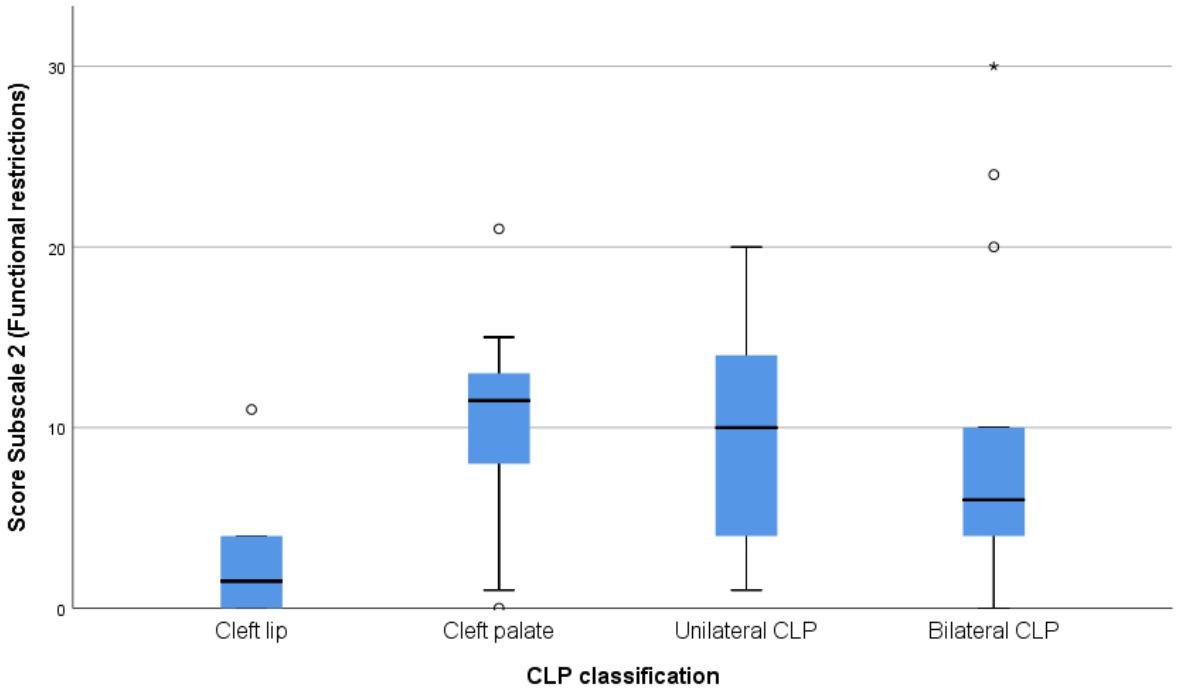

Figure 36. CLP sample according to subscale 2 score and syndrome (N = 50).

7.2 Ortho-Surgical Patients

7.2.1 Descriptive Statistics –Variables Overview

The frequencies and percentages registered for the variables specifically developed for the ortho-surgical patients are presented in Appendix 11.3.2. The mean age was 27.9 ± 8.7 years. The gender of the ortho-surgical patients in orthodontic treatment were nearly equally distributed (female 54.0 % and male 46.0 %) and more than a half of the patients were singles (58.0 %) and students (54.0 %). Only 18.0 % of the sample took more than 1 hour to get the practice.

Interesting to notice that 78.0 % from the sample had problems in both jaws and identified both appearance and health (58.0 %) as reasons for treatment and/or surgery. Specifically, 70.0 % consider the improvement of chewing performance as a reason while aesthetics is the reason in 54.0 % of cases. Referral by an orthodontist was stated by 36.0 % of the patients while in 32.0 % of the cases they noticed it by themselves. It was verified in this study that 86.0 % of the sample were financially supported by the governmental health insurance.

Regarding the classification or type of malocclusion described by patients themselves. 32.0 % were class III (6.0 % associated to crossbite) while 30.0 % were class II (8.0 % associated to crossbite). Almost a quarter of the sample were in orthodontic treatment after surgery (28 %) and a quarter were in main treatment with multibrackets before surgery (24.0 %). It was interesting to notice that more than half of the patients had not their surgery yet (50.0 %) or it was done between 20- to 30-years-old (24.0 %).

Despite almost the haft of the sample rated their health status so far as “normal” (48.0 %). more than the haft rated their self-esteem as “improved a lot” (12.0 %) or “improved” (48.0 %) by the orthodontic treatment. Furthermore. almost all patients were “very satisfied”

(44.0 %) or “satisfied” (48.0 %) with the orthodontic treatment in the clinic. Immigration background and no German citizenship was reported by 42.0 % of the sample.

7.2.2 Descriptive Statistics – OQLQ

The registered frequencies of the OQLQ-G’s answers for the ortho-surgical sample are listed in Table 11 and Figure 37. The most frequently occurring problems reported in this samples with “bothered a lot ++++” or “+++” were on “having trouble biting” (question 3; N = 29, 58.0 %), “often pay attention to other people’s teeth” (question 13; N = 28, 56.0 %), “dislike being seen on video or having picture taken” (question 12; N = 27, 54.0%) and “often pay attention to other people’s faces” (question 14; N = 27, 54.0%). Less concerns (“not applicable” or “bothered a little +”) were reported for question 24 on “taking pain medication on repeated occasions because of symptoms”, question 21 on “getting depressed about the appearance”, question 23 on “being upset about comments that have to do with appearance” and question 17 on “worrying about meeting people for the first time” (Table 11).

According to the OQLQ-G, the quality of life mean rate for this sample was 41.4 ± 17.7, for males 31.1 ± 16.0 and for females 50.2 ± 14.3 (Table 12). Details for the subscales of the OQLQ-G are reported in Table 12.

Table 11. Descriptive results of the OQLQ-G of the ortho-surgical sample (N= 50).

Questions from OQLQ-G (Number/%)		Bothered a little +	++	+++	Bothered a lot ++++	Not applicable
Q1	I am ashamed of the way my teeth look.	11 (22.0)	11 (22.0)	11 (22.0)	8 (16.0)	9 (18.0)
Q2	I am ashamed of the way my upper and/or lower jaw look/s.	9 (18.0)	12 (24.0)	8 (16.0)	12 (24.0)	9 (18.0)
Q3	I have trouble biting.	6 (12.0)	9 (18.0)	11 (22.0)	18 (36.0)	6 (12.0)
Q4	I have trouble chewing.	7 (14.0)	18 (36.0)	7 (14.0)	13 (26.0)	5 (10.0)
Q5	There are some foods I avoid eating because the way my teeth meet makes it difficult.	14 (28.0)	11 (22.0)	10 (20.0)	10 (20.0)	5 (10.0)
Q6	I don't like eating in public.	17 (34.0)	8 (16.0)	9 (18.0)	5 (10.0)	11 (22.0)
Q7	I often get pains in my face or in my upper and/or lower jaw.	19 (38.0)	7 (14.0)	12 (24.0)	5 (10.0)	7 (14.0)
Q8	I don't like seeing a side view of my face (profile).	13 (26.0)	7 (14.0)	5 (10.0)	16 (32.0)	9 (18.0)
Q9	I spend a lot of time studying my face in the mirror.	18 (36.0)	13 (26.0)	6 (12.0)	5 (10.0)	8 (16.0)
Q10	I spend a lot of time studying my teeth in the mirror.	14 (28.0)	13 (26.0)	10 (20.0)	8 (16.0)	5 (10.0)
Q11	I spend a lot of time studying my upper and/or lower jaw in the mirror.	19 (38.0)	10 (20.0)	9 (18.0)	5 (10.0)	7 (14.0)
Q12	I dislike being seen on video or having my picture taken.	8 (16.0)	11 (22.0)	13 (26.0)	14 (28.0)	4 (8.0)
Q13	I often pay attention to other people's teeth.	5 (10.0)	9 (18.0)	13 (26.0)	15 (30.0)	8 (16.0)
Q14	I often pay attention to other people's faces.	7 (14.0)	9 (18.0)	14 (28.0)	13 (26.0)	7 (14.0)
Q15	I am often completely insecure about the way my face looks.	9 (18.0)	12 (24.0)	13 (26.0)	5 (10.0)	11 (22.0)
Q16	I try to cover my mouth when I meet people for the first time.	16 (32.0)	11 (22.0)	4 (8.0)	5 (10.0)	14 (28.0)
Q17	I worry about meeting people for the first time.	18 (36.0)	10 (20.0)	5 (10.0)	4 (8.0)	13 (26.0)
Q18	I worry about whether other people might make hurtful comments about my appearance.	15 (30.0)	9 (18.0)	5 (10.0)	6 (12.0)	15 (30.0)
Q19	I am not self -confident when I am around other people.	16 (32.0)	7 (14.0)	12 (24.0)	4 (8.0)	11 (22.0)
Q20	I do not like smiling when I encounter other people.	11 (22.0)	9 (18.0)	9 (18.0)	7 (14.0)	14 (28.0)
Q21	I sometimes get depressed about my appearance.	17 (34.0)	7 (14.0)	7 (14.0)	4 (8.0)	15 (30.0)
Q22	I think sometimes that people are staring at me.	15 (30.0)	9 (18.0)	6 (12.0)	5 (10.0)	15 (30.0)
Q23	I get upset about comments that have to do with my appearance, even if I know they aren't meant seriously.	19 (38.0)	7 (14.0)	6 (12.0)	4 (8.0)	14 (28.0)
Q24	I have to take pain medication on repeated occasions because of my symptoms.	21 (42.0)	5 (10.0)	2 (4.0)	4 (8.0)	18 (36.0)

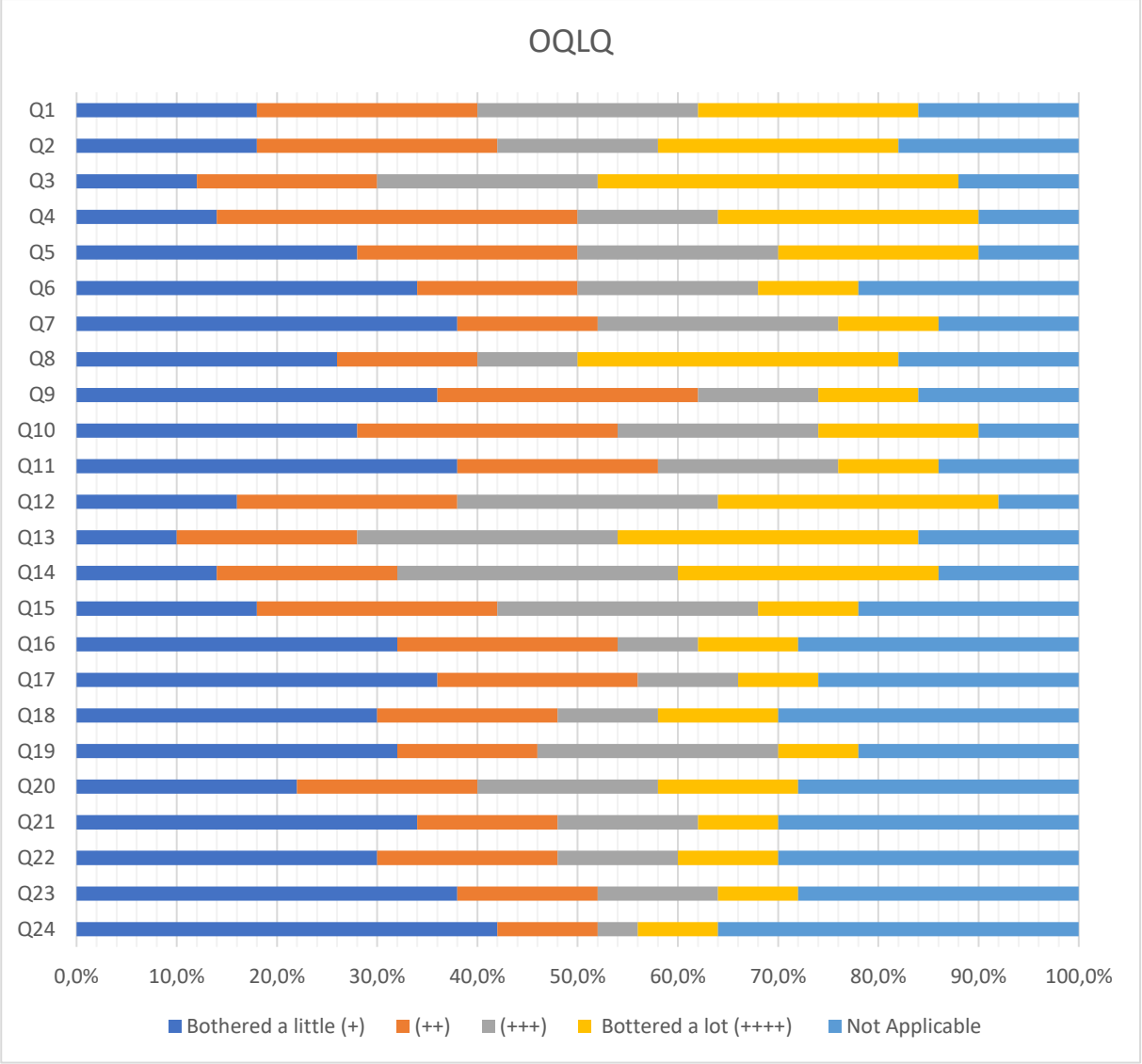

Figure 37. Descriptive OQLQ questions' rate according to the answer from the ortho-surgical sample (N= 50).

Table 12. Descriptive statistics for the subscales and overall OQLQ-G score of the total ortho-surgical sample and according to gender.

Subscale from OQLQ-G	All (N = 50)		Males (N = 23)		Females (N = 27)	
	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max
1. Function (0-16)	8.6 (4.0)	0-16	7.5 (4.0)	0-14	9.5 (3.8)	2-16
2: Aesthetics (0-24)	12.0 (5.4)	0-22	9.1 (5.3)	0-19	14.4 (4.3)	6-22
3: Social aspects (0-32)	12.1 (8.3)	0-31	8.1 (6.7)	0-20	15.6 (8.0)	1-31
4: Awareness of dentofacial deformity (0-16)	8.7 (4.0)	2-16	6.4 (3.3)	2-15	10.6 (3.6)	4-16
Overall OQLQ-G Score	**41.4 (17.7)**	**4-78**	**31.1 (16.0)**	**4-61**	**50.2 (14.3)**	**23-78**

7.2.3 Descriptive Statistics – Demographic

Most of the patients of the ortho-surgical group were between 20-35 years of age with a general mean age of 27.96 ± 8.71 (Figure 38). Similar age distributions were found in both genders; nevertheless, males tend to be younger than females (Figure 39).

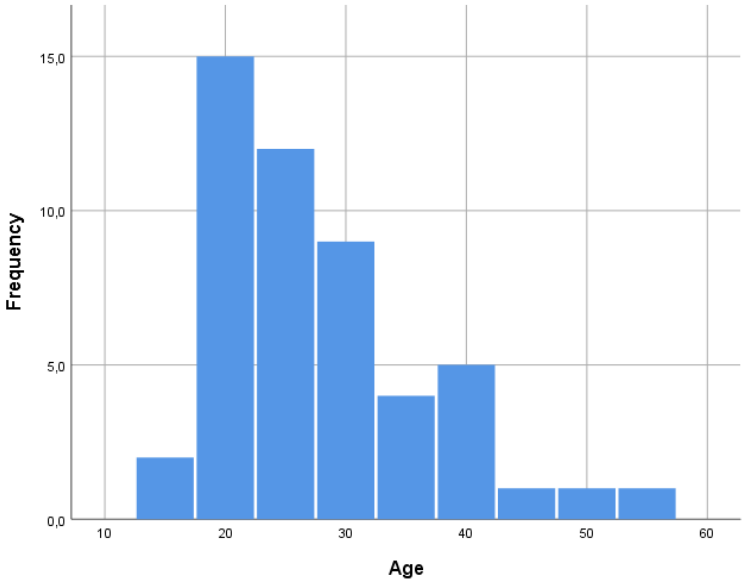

Figure 38. Age distribution in the ortho-surgical patient group (N = 50); mean age: 27.96 ± 8.71 years.

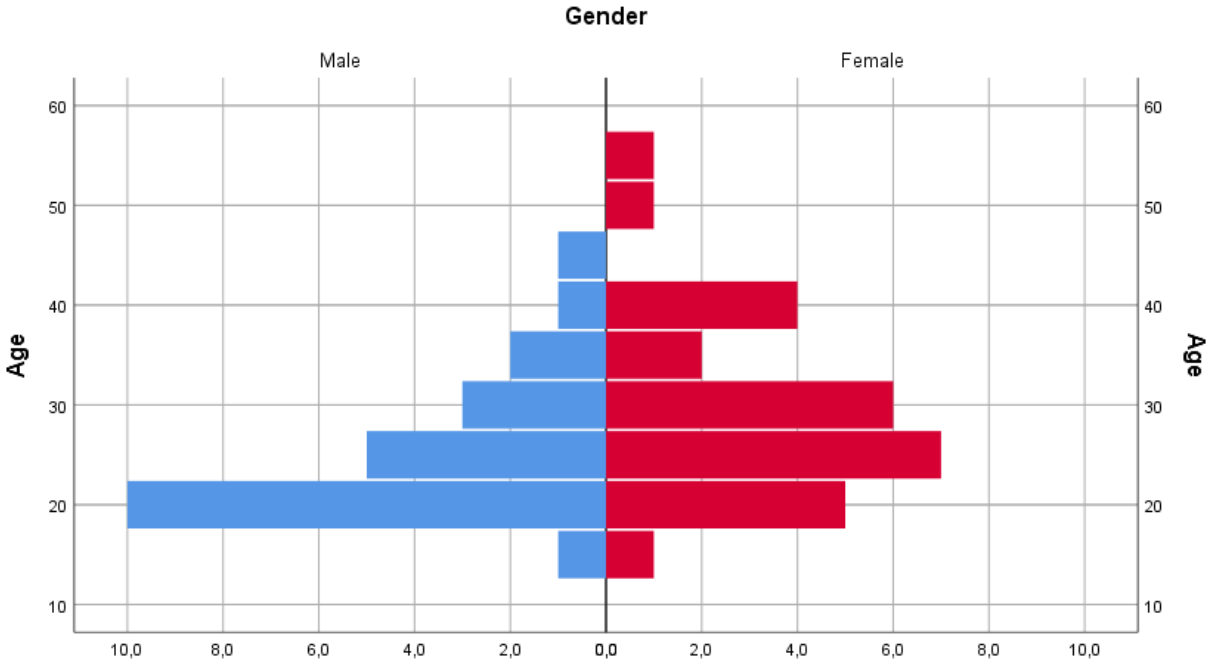

Figure 39. Gender specific age distribution in the ortho-surgical patient group (N = 50).

The majority of patients didn't know which malocclusion's classification they have (Figure 40). Nevertheless, class II and III are more frequently reported by patients being 20-25 years of age. Class II was more frequently reported by females, while class III was more frequently reported by males (Figure 41). In Figure 42 it can be noticed that there are few syndrome patients in ortho-surgical sample. Moreover, syndrome patients are not class II or III in this sample.

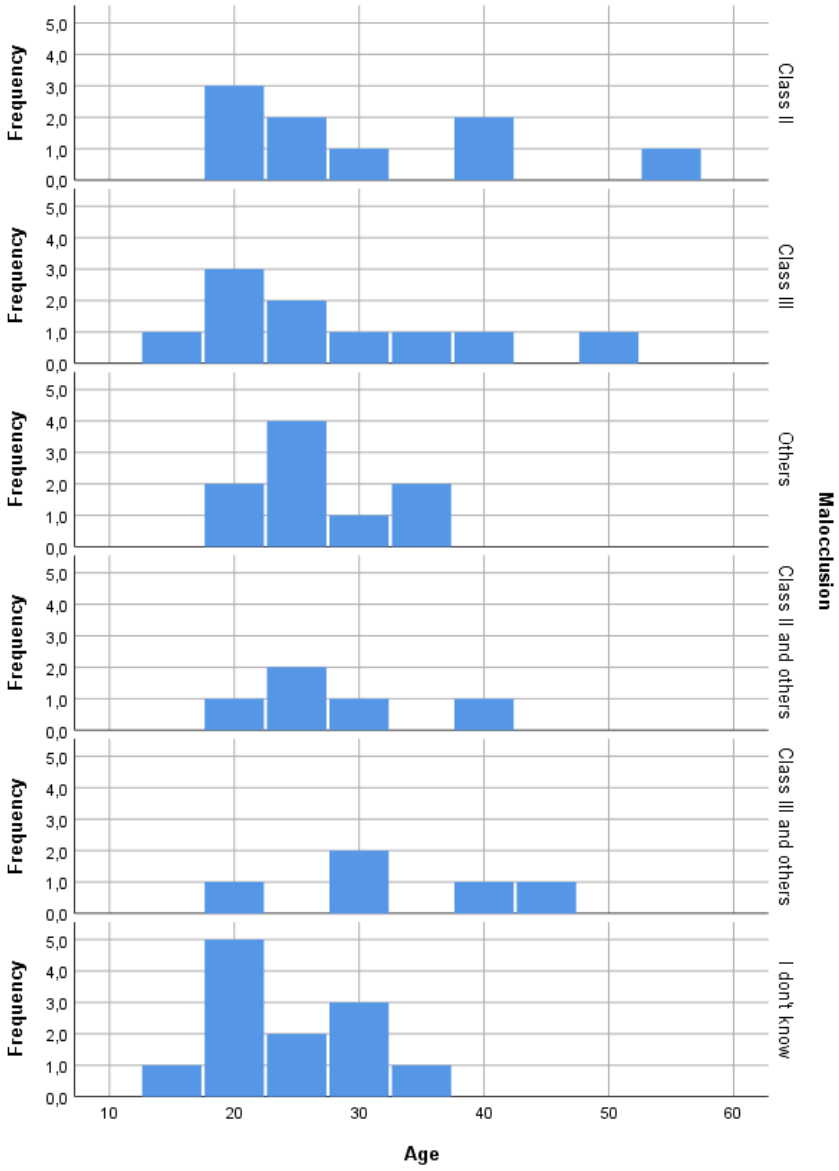

Figure 40. Frequencies of ortho-surgical sample according to age and malocclusion classify–cation (N = 50).

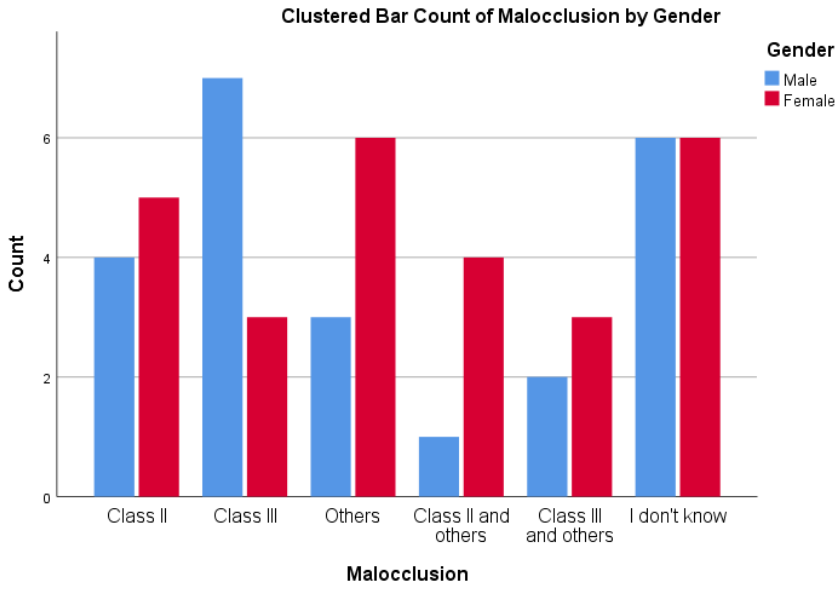

Figure 41. Frequencies of ortho-surgical sample according to gender and malocclusion classification (N = 50).

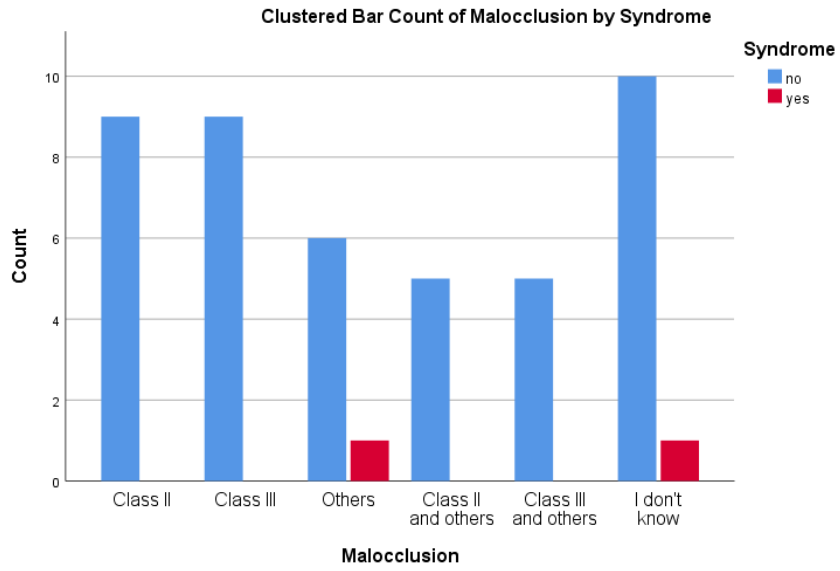

Figure 42. Frequencies of ortho-surgical sample according to syndrome and malocclusion classi–fication (N = 50).

7.2.4 Descriptive Statistics – Treatment

Patients that were very satisfied with treatment decided by themselves to go under ortho-surgical treatment. Then orthodontist and dental clinic dentists are also a common way to reach ortho-surgical treatment (Figure 43).

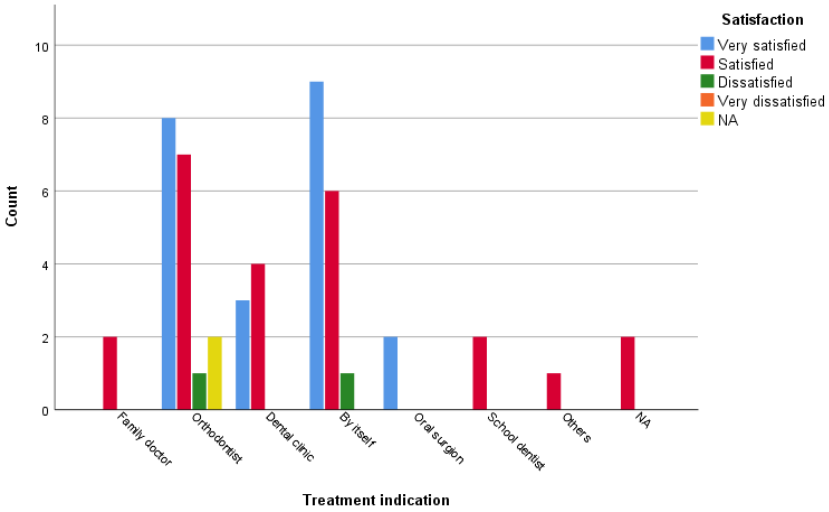

Figure 43. Frequencies of ortho-surgical sample according to satisfaction and indications of treatment (N = 50).

7.2.5 Explorative Statistics

Explorative statistics were done using the OQLQ-G subscales and total score as the outcome variables. Statistically significant differences in OQLQ-G total score and its subscales 2 ("aesthetic"), 3 ("social aspects") and 4 ("awareness of dentofacial deformity") were found between male and female participants (Table 13), also shown in Figures 44-47.

Table 13 Statistics for the OQLQ-G subscales and its overall score distribution according to gender of the ortho-surgical group (N = 50). P values for Mann-Whitney's U test are given. "*" denotes significant differences between patients with and without syndrome.

	Male						Female						P value
	N	Mean	SD	Min	Max	Median	N	Mean	SD	Mini	Max	Median	
Subscale 1	23	7.5	4.1	0.0	14.0	8.0	27	9.6	3.8	2.0	16.0	10.0	0.125
Subscale 2	23	9.1	5.3	0.0	19.0	8.0	27	14.4	4.4	6.0	22.0	15.0	0.001*
Subscale 3	23	8.1	6.8	0.0	20.0	7.0	27	15.6	8.0	1.0	31.0	14.0	0.002*
Subscale 4	23	6.4	3.3	2.0	15.0	6.0	27	10.7	3.6	4.0	16.0	12.0	0.001*
Overall score	**23**	**31.2**	**16.0**	**4.0**	**61.0**	**24.0**	**27**	**50.2**	**14.4**	**23.0**	**78.0**	**49.0**	**0.001***

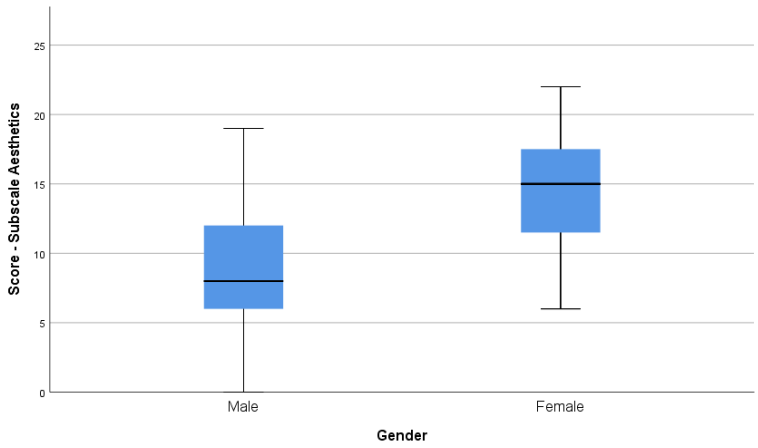

Figure 44. Ortho-surgical sample according to subscale 2 score and gender (N = 50).

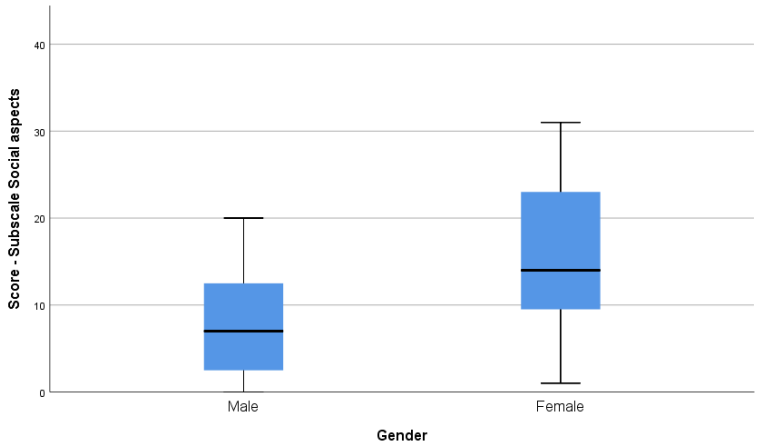

Figure 45. Ortho-surgical sample according to subscale 3 score and gender (N = 50).

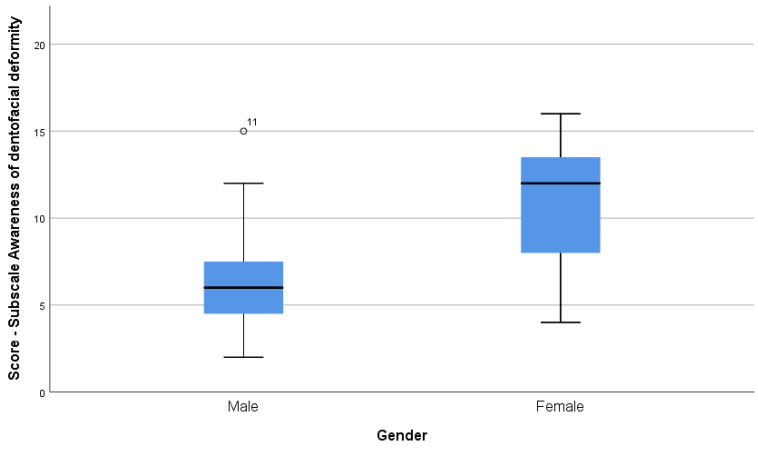

Figure 46. Ortho-surgical sample according to subscale 4 score and gender (N = 50).

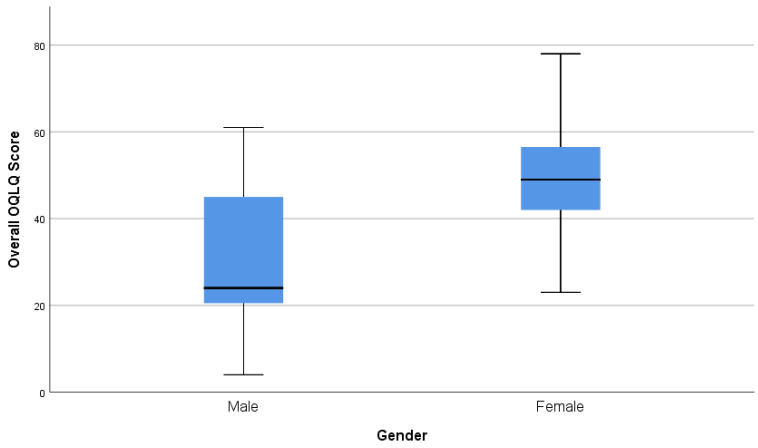

Figure 47. Ortho-surgical sample according to OQLQ overall score and gender (N = 50).

Only subscale 1 ("function") was significant higher ($p = 0.039$) in patients with syndrome (8.6 ± 3.8) than in those without syndrome (2.5 ± 3.5). All other subscales and the overall score showed no significant differences between both groups (Table 14). Nevertheless, it is important to mention that there are only two patients related themselves as a syndrome case. The descriptive statistics are referred in the Table 14.

Table 14. Statistics for the OQLQ-G subscales and its overall score distribution according to syndrome impairment of the ortho-surgical group (N = 50). P values for Mann-Whitney's U test are given. "*" denotes significant differences between patients with and without syndrome.

	Without syndrome					With syndrome					P value
	N	Mean	SD	Min - Max	Median	N	Mean	SD	Min - Max	Median	
Subscale 1	44	8.6	3.8	0 - 16	8.5	2	2.5	3.5	0 - 5	2.5	0.039*
Subscale 2	44	11.5	5.6	0 - 22	11.0	2	11.5	3.5	9 - 14	11.5	1.000
Subscale 3	44	11.3	8.1	0 - 31	10.0	2	12.0	7.1	7 - 17	12.0	0.852
Subscale 4	44	8.5	4.1	2 - 16	8.0	2	5.5	0.7	5 - 6	5.5	0.379
Overall score	**44**	**39.9**	**17.2**	**4 - 78**	**42.5**	**2**	**31.5**	**14.8**	**21 - 42**	**31.5**	**0.406**

Subscales 2 (aesthetics) and 3 (social aspects) and the overall OLQ-G score were significantly different depending on family status (Table 15). Pairwise comparison of the individual levels of family status showed, that only "single" and "engaged/married" participants showed significant differences in subscale 2 ($p = 0.025$; Figure 48), subscale 3 ($p = 0.009$; Figure 49) and overall OLQ-G score ($p = 0.007$; Figure 50). After Bonferroni correction for multiple testing only the last two were still significant.

Table 15. Distribution of the CPQ-G11-14 subscales and its overall score according to the family status (N = 50). The p value according to the Kruskal-Wallis test is given. "*" denotes significant differences between patients according to subscales and family status.

OQLQ scale	Family status	N	Mean	SD	Min	Max	Median	P-value
Subscale 1	Single	29	7.8	4.1	0.0	15.0	8.0	0.349
	Long-term partnership	10	9.2	3.2	4.0	14.0	8.5	
	Engaged/married	11	10.2	4.1	5.0	16.0	10.0	
Subscale 2	Single	29	10.3	5.7	0.0	22.0	9.0	0.045*
	Long-term partnership	10	13.6	3.5	8.0	19.0	13.5	
	Engaged/married	11	14.9	4.9	6.0	22.0	15.0	
Subscale 3	Single	29	9.2	7.2	0.0	24.0	8.0	0.016*
	Long-term partnership	10	15.2	8.5	6.0	30.0	13.0	
	Engaged/married	11	17.2	8.0	6.0	31.0	16.0	
Subscale 4	Single	29	7.7	4.2	2.0	15.0	6.0	0.119
	Long-term partnership	10	9.5	3.3	4.0	15.0	8.5	
	Engaged/married	11	10.5	3.7	4.0	16.0	12.0	
Overall score	Single	29	35.1	17.5	4.0	70.0	32.0	0.013*
	Long-term partnership	10	47.5	14.1	24.0	74.0	47.5	
	Engaged/married	11	52.8	14.7	27.0	78.0	49.0	

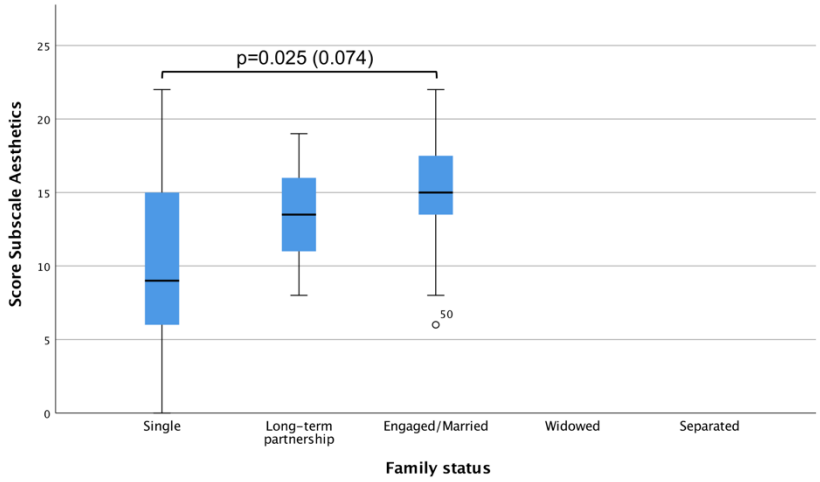

Figure 48. Ortho-surgical sample according to subscale 2 score and family status (N = 50). The p-value of significant comparisons and the adjusted p-value after Bonferroni correction are given.

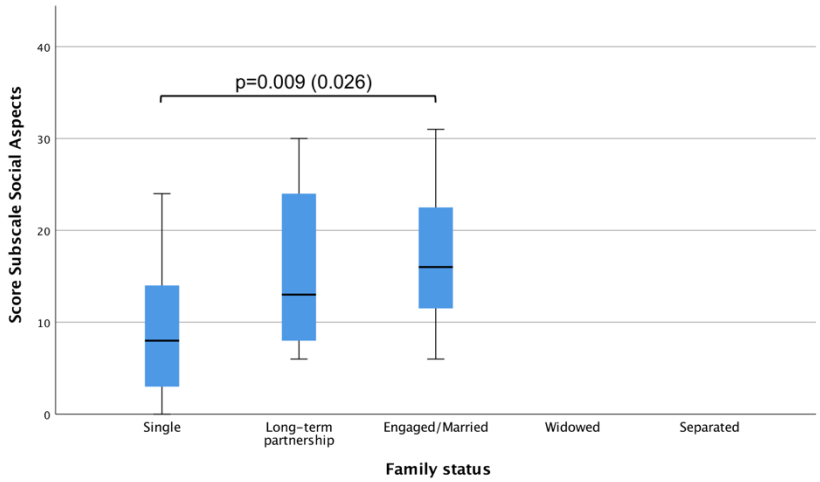

Figure 49. Ortho-surgical sample according to subscale 3 score and family status (N = 50). The p-value of significant comparisons and the adjusted p-value after Bonferroni correction are given.

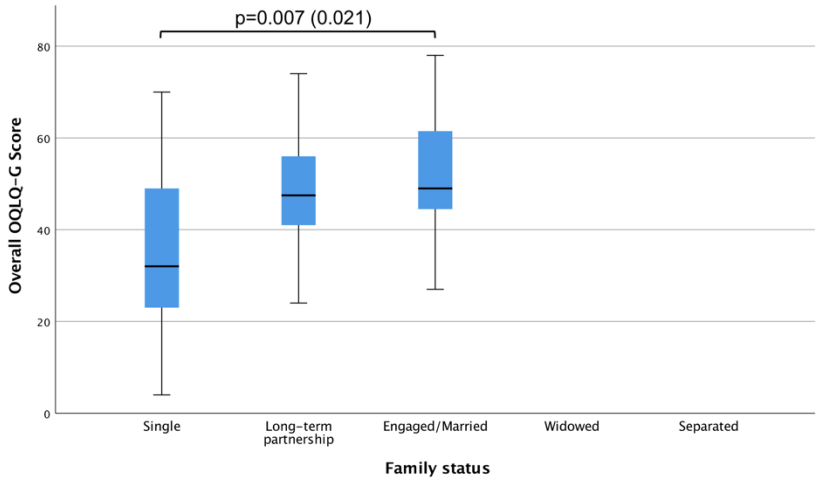

Figure 50. Ortho-surgical sample according to OQLQ overall score and family status (N = 50). The p-value of significant comparisons and the adjusted p-value after Bonferroni correction are given.

Subscales 2 (aesthetics), 3 (social aspects) and overall OQLQ-G scores were significantly different depending on self-esteem (Table 16). Pairwise comparisons of the different levels of self-esteem showed, that only “improved” and “unchanged” reported self-esteem showed significant differences in subscale 2 ($p = 0.001$; Figure 51), subscale 3 ($p < 0.001$; Figure 52) and overall OQLQ-G score ($p = 0.001$; Figure 54). These differences were still significant after Bonferroni correction for multiple testing. The difference in overall OQLQ-G score between “improved a lot” and “unchanged” was barely missing the significance level ($p = 0.051$; Figure 54). The different levels of self-esteem barely missed the significance level (Table 16; Figure 53) and are shown here for completeness.

Table 16. Distribution of the OQLQ-G subscales and its overall score according to the self-esteem improvement during the treatment (N = 50). The p-value according to the Kruskal-Wallis test is given. "*" denotes significant differences between patients according to subscales and self-esteem improvement. n.d. – not determined.

OQLQ scale	Self-esteem	N	Mean	SD	Min	Max	Median	P-value
Subscale 1	Improved a lot	6	10.0	4.3	4.0	14.0	12.0	0.683
	Improved	24	9.0	4.2	0.0	16.0	8.0	
	Unchanged	19	7.7	3.8	0.0	14.0	8.0	
	Worsened	1	9.0	n.d.	9.0	9.0	9.0	
Subscale 2	Improved a lot	6	12.5	6.6	4.0	19.0	13.0	0.010*
	Improved	24	14.4	4.7	6.0	22.0	15.0	
	Unchanged	19	8.7	4.7	0.0	18.0	9.0	
	Worsened	1	14.0	n.d.	14.0	14.0	14.0	
Subscale 3	Improved a lot	6	14.3	8.7	5.0	30.0	12.5	0.005*
	Improved	24	15.8	8.3	1.0	31.0	17.0	
	Unchanged	19	7.0	5.5	0.0	18.0	7.0	
	Worsened	1	10.0	n.d.	10.0	10.0	10.0	
Subscale 4	Improved a lot	6	9.2	5.0	2.0	15.0	9.5	0.071
	Improved	24	10.1	3.7	4.0	16.0	11.0	
	Unchanged	19	6.8	3.8	2.0	15.0	5.0	
	Worsened	1	8.0	n.d.	8.0	8.0	8.0	
Overall score	Improved a lot	6	46.0	19.1	24.0	74.0	42.5	0.006*
	Improved	24	49.2	15.7	19.0	78.0	50.0	
	Unchanged	19	30.3	15.0	4.0	57.0	24.0	
	Worsened	1	41.0	n.d.	41.0	41.0	41.0	

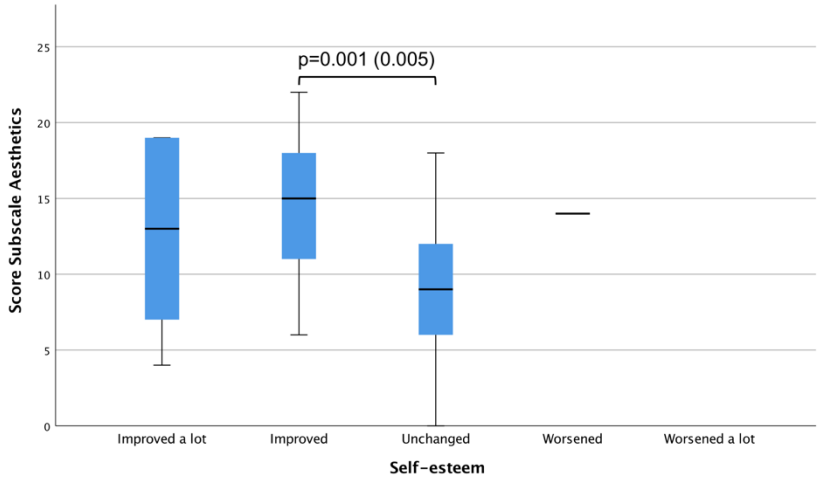

Figure 51. Ortho-surgical sample according to subscale 2 score and self-esteem (N = 50). The p-value of significant comparisons and the adjusted p-value after Bonferroni correction are given.

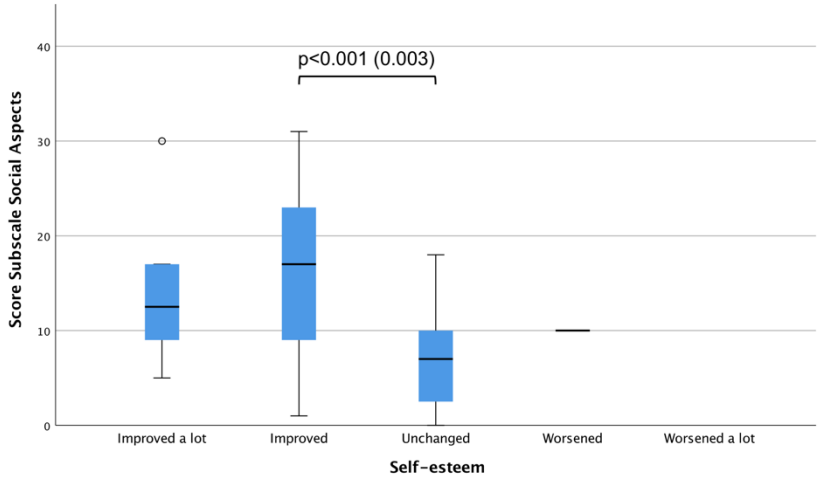

Figure 52. Ortho-surgical sample according to subscale 3 score and self-esteem (N = 50). The p-value of significant comparisons and the adjusted p-value after Bonferroni correction are given.

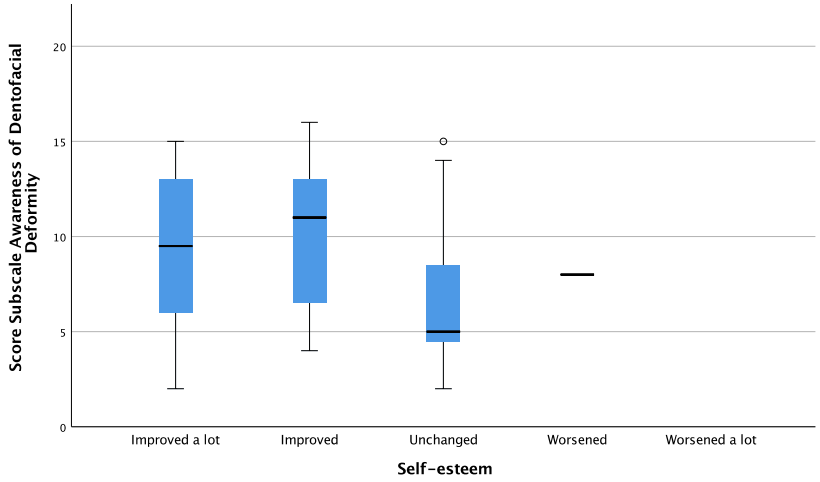

Figure 53. Ortho-surgical sample according to subscale 4 score and self-esteem (N = 50). For this subscale the Kruskal-Wallis test barely missed the significance threshold.

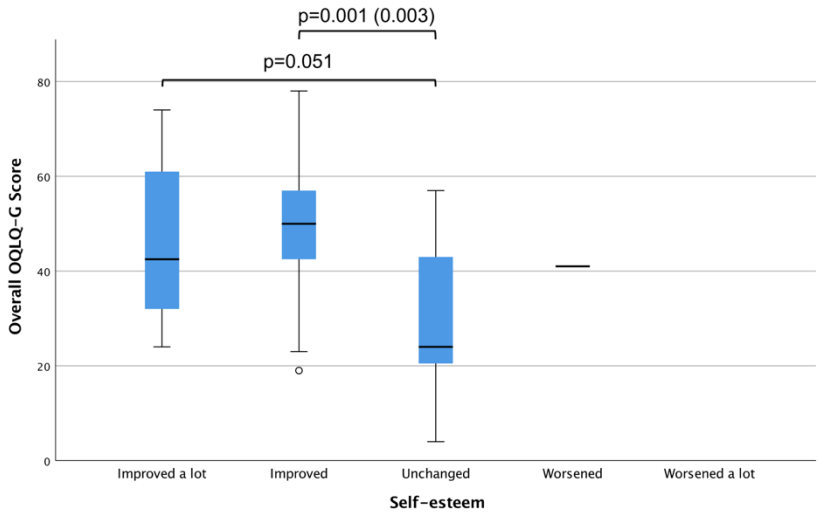

Figure 54. Ortho-surgical sample according to OQLQ overall score and self-esteem (N = 50). The p-value of significant comparisons and the adjusted p-value after Bonferroni correction are given.

8 Discussion of Both Parts

8.1 Orthodontics Patients

Our project of orthodontics patients examined the OHRQoL in 898 young adolescents and adults undergoing orthodontic treatment, with the inclusion of multiple variables. The recorded mean OHIP score quantified to 8.78 for the young adolescents group (Table 4), the extent of which is in accordance with that of scores renowned in another samples (Feu et al. 2013; Jamilian et al. 2016) and 12.56 for the adults group. Jamilian et al. (2016) performed a study with 100 subjects aged 17- to 21-years-old with moderate and severe malocclusion (50 subjects in the retention phase and 50 in a non-treated control group) according to the Index of Orthodontic Treatment Need (IOTN) (Brook and Shaw 1989). It was found in this study that the control group with moderate malocclusion showed an OHIP-14 mean score similar to that found in our study (8.25 ± 3.88), giving to the IOTN (Jamilian et al. 2016).

The null hypothesis that wholly variables have the same impact on OHRQoL in our study was rejected by the authors as some variables had a significant impact on OHRQoL in the total (Table 4), adolescents (Table 5) and adult groups (Table 6) undergoing orthodontic treatment. In our multiple linear regression model applied to both age groups, the ≥ 18-years-old showed a significantly increased OHIP score in comparison to the younger patients' group. An increased OHIP score is correlated with a reduction in this patient's quality of life during orthodontic treatment. It might also be assumed, that being in this phase of orthodontic treatment patient tent to be more critical or more empathic concerning their quality of life. In all three models, independent of age group, females had a significantly higher OHIP score than males, thus presenting a lower quality of life level or being more critical. Second, problems with aesthetics, function and pain were recognized as significant factors that negatively impacted OHRQoL in this convenience total sample (Table 4). The sample of 6 to 17-year-old

adolescents (Table 5) showed only problems with aesthetics and pain as reasons for treatment, while function problems and pain were recognized as significant factors for the sample the ≥18-years-old (Table 6). In this case, these problems may be realistic warnings for an orthodontic treatment, and the patients lastly recognized that these are problems requiring intervention by an orthodontist. Therefore, augmented rates in these groupings of the OHIP are not astonishing, as they are problematics are strictly connected to the need of any orthodontic treatment. Furthermore, this patient-related outcome emphasizes the necessity for orthodontic intervention in the selected study sample (Tsichlaki and O'Brien 2014). According to these authors, orthodontic treatment has the goal to improve patient's dentofacial appearance (Tsichlaki and O'Brien 2014). However, one of the foremost treatment aims is to improve not only oral-facial aesthetics, but also functionality and pain problems and psychological well-being. Our study disclosed that aesthetics is an issue that, only when associated to function and pain, is applicable for subjects with malocclusion's problems or disharmonic faces.

Additionally, to the earlier conferred outcomes from explorative statistical analysis, physical pain, psychological discomfort and disability were recognized as important subscales of the OHIP-G14 for both adolescents and adults' patients, which negatively influenced the OHRQoL (Table 3). This outcome is in agreement with those of some other authors (Feu et al. 2013; Johal et al. 2014; Kang and Kang 2014). Moreover, Silvola et al. (2014) found out that the orthodontic intervention of severe malocclusions enhanced aesthetics and OHRQoL, especially diminished psychological discomfort and disability. Recently, Patel et al. (2016) acknowledged three variables that derived from patient-related OHRQoL: 1) concerns about the appearance of their teeth, 2) influence on social interactions and 3) oral health and function. This finding is in accordance by our appraisal of the subscales (Table 3).

Fixed appliances are identified to result discomfort and pain and throughout the orthodontic intervention, which negatively impacts the patients' OHRQoL (Chen et al. 2010;

Krukemeyer et al. 2009; Mansor et al. 2012; Rakhshan and Rakhshan 2015; Sergl et al. 1998). This outcome was also supported by our study (Tables 4-6). Arrow et al. (2011) reported on a 17-year observational cohort study and found that using fixed appliance has apparently no relation to OHRQoL. According to Sergl et al. (1998), the level of discomfort and pain described by patients using fixed or functional appliances was significantly stronger than that described by patients using removable appliances. Nevertheless, tiny is acknowledged about the outcome of fixed vs. removable appliances with respect to OHRQoL. Mandall et al. (2008) found out that the type of appliance had insignificant effect on the patient's well-being. However, it is apparently clear that fixed appliances might be more painful due to possible mucosa injuries that can result withdrawal of the orthodontic intervention (Rakhshan and Rakhshan 2015). Finally, private adult patients disclosed to have improved quality of life during orthodontic intervention, possibly due to better understanding of the treatment necessity and the choice to carry on an orthodontic intervention. In spite of the little amount of non-German adult aged patients in contrast to Germans, they possibly have poorest quality of life during the intervention due to communication difficulties.

Although our study disclosed that the duration of the treatment was insignificant (Table 4-6), Johal et al. (2014) found out that the during the first orthodontic three months therapy there is a bad influence on the OHIP scores. Liu et al. (2011) stated that the utmost worsening in OHRQoL scores happens at the beginning of the treatment. Nonetheless, de Oliveira and Sheiham (2003) found out that orthodontists should be conscious of this influence, and the findings of a study by Sergl et al. (1998) disclosed an adaptation to discomfort and pain in the firsts few days subsequently the inset of the appliance.

Our study has strengths and limitations. As a whole, we conducted our investigation in a trial of orthodontic patients (6- to 17-year-olds), which is chief given that mostly of orthodontic interventions are hypothetical to be easier during this growing phase, tooth eruption

and a strong opportunity of treatment. In Germany, the insurance status "governmental" is defined by age and additional prerequisites (e.g. severity of malocclusion): patients below 18 years of age are eligible to governmental insurance, adults only under special circumstances (e.g. combined orthognathic-surgery/orthodontics treatment). Nonetheless, nowadays there is a claim for orthodontic intervention in adults, which led to the investigation not only in young adolescent subjects. Additionally, we performed a logistic regression model to find out significant impacts on the OHIP scores. On the other hand, a restriction of this investigation is that throughout the pilot phase, we perceived that some few had difficulty to comprehend the questionnaire. Consequently, caregivers or parents or were permitted to support the adolescents during the questionnaire, if needed. Another relevant weakness of this investigation is that it was difficult to access the clinical diagnoses of the subjects. Therefore, it can be theorized that patients with more severe orthodontic outcomes will have a worst OHRQoL score than patients with minor or moderate orthodontic findings (Dalaie et al. 2018; Jamilian et al. 2016). Moreover, the intervention treatment duration in patients of strong orthodontic problems might be longer. Regrettably, we could not investigate this likely association in this study.

8.2 Cleft-Lip Patients

Similar to the orthodontic patient's multi-centre study, this project also investigated the OHRQoL under inclusion of multiple variables. Nevertheless, the 50 subjects were patients under treatment only at the Clef-lip and Palate Center of Orthodontic Department of LMU. The study presented descriptive statistics obtained from the CPQ-G11-14 (Bekes et al. 2011a; Bekes et al. 2011b). The registered mean CPQ rate amounted to 26.3 for the total sample, 28.4 for boys and 23.8 for girls (Table 8), the magnitude of which is higher than that of rates registered from Bekes et al. (2011a). Considering it was a German general population-based norm values and not CLP patients, the findings are consistent to our investigation. Nonetheless, Jokovic et

al. (2002) conducted a primarily study including 83 children (32 children with dental disease, 52 undergoing orthodontic treatment and 39 with oral facial conditions, primarily CLP children) to the CPQ11-14. Emphasizing that the original version of CPQ11-14 has 37 questions and the CPQ-G11-14 German version has 35 questions, it was observed by Jokovic et al. (2002) in their study that the CLP group presented a higher mean of 31.4 than that found in our study (26.3±15.5). Comparing the overall CPQ between boys and girls, it can be noticed that boys have a higher score (28.4±16.6) than girls (23.8±10.0). The same pattern is encountered in almost every subscale, except the oral symptoms (boys 5.9 ± 2.9; girls 6.2 ± 3.4; Table 8).

The null hypothesis that wholly variables have the same impact on OHRQoL in our study was rejected by the authors as some variables had a significant impact on OHRQoL in CLP patients. First, the cases that were identified as a syndrome presented statistically significant augmented mean values of CPQ in the subscale of functional restriction (Table 9), which means apparently the quality of life is negatively impacted in these patients. Succeeding a similar interpretation, the classification of the CLP sample shows a similar tendency also in the functional restriction (Table 10), but not statistically significant. In this cases, functional restrictions may be realistic warnings for an orthodontic treatment when treating CLP patients. Therefore, augmented rates in these cases of the CPQ are not surprisingly, as they are problematics strictly connected to the need of the CLP orthodontic treatment.

This project also has strengths and limitations. In general, we performed our study in a sample of CLP orthodontic patients without age as an inclusion criterion, which is important given that clefting is the utmost common facial impairment that occurs throughout birth. Nevertheless, according to Sischo et al. (2017), the outcomes during the CLP long-term interventions and OHRQoL regarding patients' satisfaction in young adolescents continue mostly unknown. Therefore, the lack of age inclusion criteria can be considered as strength. In contrast, a limitation of this study is that during the questionnaire responses, there was the

possibility of some children having difficulty understanding the questions. Consequently, caregivers or parents were permitted to support the CLP children to proceed the questionnaire's responses if necessary. Like in the first project of traditional orthodontic patients, there was another relevant drawback, which is that it was impossible to have access to the clinical data of the patients. Thus, it can also be hypothesized that subjects with stronger clinical findings will have a less positive OHRQoL rate than patients with mild or moderate clinical problems (Dalaie et al. 2018; Jamilian et al. 2016). Despite we could unfortunately analyze this potential association in this study, it is already known by some authors that the CLP negatively impacted the OHRQoL (Khoun et al. 2018; Kortelainen et al. 2016; Rando et al. 2018).

8.3 Ortho-Surgical Patients

Following an analogous investigation of OHRQoL to the traditional orthodontic patients' multi-centre study and CLP monocentric study, this project was also designed under inclusion of multiple variables. Alike to the CLP project, the 50 participants were patients under ortho-surgical treatment only at the Orthodontic Department of LMU. The study presented descriptive statistics obtained from the OQLQ-G (Bock et al. 2009). Concerning the registered gender frequency, it was found almost a half male and female proportion, which apparently showed both genders almost equal willing to undergo maxillofacial surgery. In contrast, a recently investigation in Germany noted that gender distribution was one-third males and two-third females (Tamme et al. 2017). Despite some authors (Nurminen et al. 1999; Tamme et al. 2017) cited several reasons for seeking ortho-surgical intervention, our investigation showed chewing performance improvement as a very important reasons followed by aesthetics, which was also cited by Cunningham et al. (1995).The average age finding showed a mean of 18-years-old, common to this kind of intervention. Some other studies contain similar records (Azuma et al. 2008; Bock et al. 2009; Choi et al. 2010; Tamme et al. 2017; Zingler et al. 2017).

OQLQ-G score amounted to 41.4 for the total sample, 31.1 for males and 50.2 for females (Table 12). It can be clearly noticed that the females' score is hugely higher than the males' one. Based in this finding we can hypothesize that females are more negatively critical to their OHRQoL outcomes than males are. Nevertheless, due to the reason of including only patients after treatment, Tamme et al. (2017) found lower values not only for the OQLQ-G questionnaire, but also for the four subscales: oral function, facial aesthetics, social aspects and awareness for dentofacial deformity. Considering that in the study of Bock et al. (2009) included only patients before treatment, he found higher values for oral function and social aspects than our investigation. Similarly, the findings of Cunningham et al. (2002) before the treatment began, showed higher social aspects values, but differently lower values for the awareness for dentofacial deformity.

The null hypothesis that all variables have the same impact on OHRQoL in our study was rejected by the authors as some variables had a significant impact on OHRQoL in the ortho-surgical patient undergoing orthodontic treatment (Tables 15, 17, 19 and 21). First, the gender showed that females presented statistically significant augmented mean values of OQLQ-G (Table 13), excepted in the subscale 1 (function, Table 13). It means apparently the quality of life is negatively impacted in these patients while they are in ortho-surgical treatment or there's a tendency of being more critical to their quality of life level through this treatment. Performing a similar interpretation, in the variable family status showed that the married ortho-surgical patients showed the highest mean scores (Table 15). Therefore, displayed a statistically significant values, while in ortho-surgical treatment, in subscales 2 (aesthetic), 3 (social aspects) and overall OQLQ-G scores (Table 15), presenting lower quality of life level or being more critical to it. Second, the influence of orthodontic treatment in the self-esteem were recognized as significant values that negatively impacted OHRQoL in this ortho-surgical sample. Specifically, in subscales 2 (aesthetic), 3 (social aspects) and overall OQLQ-G scores (Table

16) had negative influence in the OHRQoL. Nevertheless, the highest subscales OQLQ-G scores were noticed in ortho-surgical patients had their self-esteem improved or improved a lot by the orthodontic treatment. These tendencies may be realistic warnings for the orthodontists critically evaluate the reason for this tendency. Therefore, augmented rates of the OQLQ-G and its subscales in these cases demand further investigations.

Alike previous projects of this study, this one has also strengths and limitations. Generally, we performed our study in a sample of ortho-surgical patients without age as an inclusion criterion, which is important given that the patients can be in this kind of treatment since youth adulthood when is supposed having no more growth until no reasonably limits of age. In Germany, the insurance status "governmental" is defined by age and additional prerequisites (e.g. severity of malocclusion): patients below 18 years of age are eligible to governmental insurance, adults only under special circumstances (e.g. combined orthognathic-surgery/orthodontics treatment). According to Miguel et al. (2014), considering patients' psychological factor is an imperative outcome during orthodontic interventions associated with orthognathic surgery and not only aesthetics and function. which is.an aim of this investigation about OHRQoL. Therefore, the lack of age inclusion criteria can be considered as strength. Like previous projects of our study of traditional orthodontic patients, there was another relevant drawback, which is that it was, which was not part of the design of our investigation to have access to the clinical data of the patients. Thus, it can also be hypothesized that subjects with stronger clinical findings will have a less positive OHRQoL rate than patients with mild or moderate clinical problems. Notwithstanding we could unfortunately evaluate this likely suggestion in this investigation, it is already cited by many authors patients following ortho-surgical treatment have positively impacts of the OHRQoL (Abdullah 2015; Al-Asfour et al. 2018; Catt et al. 2018; Corso et al. 2016; Emadian Razvadi et al. 2017; Eslamipour et al. 2017;

Murphy et al. 2011; Palomares et al. 2016; Sun et al. 2018). Nevertheless, it can vary depending on ortho-surgical intervention phase (Tachiki et al. 2018).

9 Conclusions

9.1 Orthodontic Patients

In summary, this investigation came to conclusion that the OHIP-G14 permitted an assessment of the OHRQoL not only in children and adolescents, but also in adults in the orthodontic field. Consequently, some features should be wisely measured when planning orthodontic treatment in all types of orthodontics patients. Primarily, adults and females have poorest QoL throughout the treatment. Then, problems like aesthetic, function and pain are significant influences that harmfully exaggerated OHRQoL in the sample of 6- to 17-year-olds or ≥18-years-old. Subsequently, the mean rate for QoL giving the OHIP-G14 for the children and adolescents sample was 8.78 ± 7.27. Additionally, the descriptive statistic of the subscales revealed that "physical pain" (mean 2.49 ± 1.85), "psychological discomfort" (mean 1.47 ± 1.59) and "psychological disability" (mean 1.33 ± 1.39) disclosed the uppermost rates for the adolescents' sample. In contrast, in the adult sample the mean rate for the QoL according to the OHIP-G14 was 12.56 ± 9.59 (Table 3). Furthermore, the descriptive statistic of the subscales showed that "physical pain" (mean 3.11 ± 2.02), "psychological discomfort" (mean 2.24 ± 1.96) and "psychological disability" (mean 1.99 ± 1.88) revealed the highest values for the adults' sample. As a consequence, efforts should be made to improve these related influences. Then, in quotidian orthodontic interventions, fixed appliances diminished OHRQoL in comparison to removable appliances. Finally, adults' subjects who had private insurance have an improved OHRQoL when compared to non-German/Immigrant ones. Hence, they have the opposite pattern when they have a non-German background.

9.2 Cleft-Lip Patients

In conclusion, this project verified that the CPQ-G11-14 allowed an assessment of the OHRQoL in CLP patients in the orthodontic field. As a consequence, this outcome should be prudently assessed when forecasting orthodontic treatment for CLP orthodontics subjects. The functional restrictions were referred as a factor that is negatively influenced by syndrome patients. Boys have poorest QoL throughout the treatment. Then, problems like functional restrictions, emotional and social well-being are influences that harmfully interfere in the QoL. As a consequence, efforts should be made to improve these related influences.

9.3 Ortho-Surgical Patients

Concluding, this project settled that the OQLQ-G permitted an assessment of the OHRQoL for ortho-surgical patients in the orthodontics. Thus, like in both previous examined projects, the outcome QoL should be wisely investigated when developing orthodontic intervention in this kind of patients. Primarily, females have poorest QoL throughout the treatment. Then, excepting function, problems like aesthetic, social aspects and awareness of dentofacial deformity are influences that harmfully interfere in the QoL. Subsequently, a similar pattern was noticed for the married patients, in which aesthetic and social aspects were influencing aspects which lower the QoL. Additionally, the influence of orthodontic treatment on self-esteem, negatively impacted OHRQoL. Especially in this patient group, aesthetical and social aspects seem to play an important role in patient's reported self-esteem. Further studies on the influence of social and aesthetical aspects on patient's self-esteem should be done to clarify this relationship.

10 Summary

Orthodontic treatment is closely linked to oral health-related quality of life (OHRQoL), and some of the main reasons for seeking orthodontic treatment are related to the benefits of aesthetics, oral-facial functionality and psycho-social well-being. These benefits are relevant in patients with malocclusion problems or facial disharmony. Therefore, studying these aspects is also essential for understanding patients' perceptions of the treatment in evidence-based orthodontics and could be related to identified treatment needs. Therefore, this thesis aimed to evaluate OHRQoL of patients undergoing orthodontic treatment in three different patient cohorts, independently from each other:

1. general orthodontic patients;
2. patients with cleft-lip/palate;
3. patients in combined orthodontic-orthognathic therapy.

The first patient cohort – patients currently undergoing orthodontic treatment with fixed or removable appliances – was evaluated in a multicenter study at four different universities' orthodontic departments at the Ludwig-Maximilians-University Medical Center (LMU) in Munich, the Johannes-Gutenberg-University in Mainz (JGU), the Medicine University of Hannover (MHH) and the Heinrich Heine University in Dusseldorf (HHU). 898 orthodontic patients (40.9% males and 50.6% females) participated anonymously. They anonymously answered the validated German version of the Oral Health Impact Profile questionnaire (OHIP-G14) online and additional questions related to demography (i.e. age, gender, insurance and immigration status), and general questions about the orthodontic treatment such as the reason for treatment, the type of appliance used and the duration of orthodontic treatment. Descriptive and explorative statistics (Mann-Whitney U-test, Pearson chi-squared test, multiple linear

regression modeling) were applied to the complete patient cohort. To conform with the German insurance system (governmental vs. private), the patient cohort was additionally analyzed according to age (6…17 years vs. ≥18 years). The main findings can be summarized as follows:

1. The mean OHIP-G14 score for the total sample was 9.92 ± 8.22. There was a statistically highly significant difference in this score between the 6 to 17-years old patients and the ≥18-years-old adults ($p < 0.001$).
2. The OHIP-G14 subscales "physical pain" (2.68 ± 1.92), "psychological discomfort" (1.70 ± 1.75), and "psychological disability" (1.53 ± 1.58) showed the highest scores.
3. Adult patients showed significant higher mean scores for the OHIP subscales "physical pain" (young: 2.49 ± 1.85; adult: 3.11 ± 2.02; $p < 0.001$), "psychological discomfort" (young: 1.47 ± 1.59; adult: 2.24 ± 1.96; $p < 0.001$), "psychological disability" (young: 1.33 ± 1.39; adult: 1.99 ± 1.88; $p < 0.001$) and the overall OHIP-G14 score (young: 8.78 ± 7.27; adult: 12.56 ± 9.59; $p <0.001$) than the patients 6-17 years old.
4. Using the OHIP score as a continuous outcome variable, multiple linear regression analysis was performed, adjusting for age group, gender, reason for orthodontic treatment, type of appliance, duration of treatment, insurance and the nationality/immigration status of the patient.
    a. Remarkable findings from multiple linear regression were: adults and females have worst quality of life during the treatment.
    b. The co-variate "reason for treatment" was the most influential one: aesthetic in combination with pain and others, aesthetic in combination with function, pain and others and the combination of function, pain and others without aesthetics were highly significant factors increasing the OHIP-G14 score in both age groups.
    c. In the younger patient group aesthetics in combination with function, pain, and others significantly increased the OHIP score.

d. In adults, function and pain were negatively affecting OHRQoL.
e. In comparison to removable appliances, fixed appliances also increased the patient's OHIP score.
f. German, adult patients with a private insurance showed a lower OHIP score and therefore had a better OHRQoL.

To evaluate the second patient cohort 50 CLP patients (54.0 % males and 46.0 % females) were anonymously invited to participate in an online survey applying the validated German version of Children Perception Questionnaire (CPQ-G11-14). Like in the first project, demographic items and information on their orthodontic treatment were acquired. Descriptive and explorative statistics (Mann-Whitney U test, Kruskal-Wallis test) were applied. The main findings can be summarized as follows:

1. The CLP patients' mean age was 13.4 ± 5.1.
2. Regarding the CLP classification, 42.0 % of the participants had unilateral CLP and 26.0 % had bilateral CLP. The remaining patients had cleft lip or palate imperfection only.
3. Patient satisfaction with orthodontic treatment was very high ("very satisfied", 54.0 %; "satisfied", 40.0 %).
4. The registered frequencies of the CPQ-G11-14's answers revealed "breathing through the mouth", "unclear speech" and "reduced eating speed" as the most frequent problems.
5. The mean rate of the CPQ-G11-14 was higher in boys (28.4 ± 16.26) than in girls (23.8 ± 14.0). A similar pattern was found in almost every subscale, except for the subscale "oral symptoms" (boys 5.9 ± 2.9; girls 6.2 ± 3.4).
6. Explorative statistics showed, that syndrome-associated CLP patients showed the highest CPQ-G11-14 scores due to functional restrictions (subscale 2; $p = 0.014$).

The third patient cohort consisted of 50 ortho-surgical patients (46.0 % males and 54.0 % females). They answered anonymously the German version of the Orthognathic Quality of Life Questionnaire (OQLQ-G). Additionally, demographic items and information on their orthodontic treatment were acquired. Descriptive and explorative statistics (Mann-Whitney U test, Kruskal-Wallis test) were applied. The main findings can be summarized as follows:

1. The ortho-surgical patients' mean age was 28.0 ± 8.7.
2. Seventy-eight percent of the study subjects reported problems in both jaws. Appearance and health were the main (58.0 %) reasons for treatment and/or surgery.
3. Their malocclusion classification/type was described as being class III by 32.0 % of the patients, with 6.0 % being associated with crossbite, whereas 30.0 % were class II (8.0 % associated with crossbite).
4. Most of the patients were "satisfied" (48.0 %) or "very satisfied" (44.0 %) with the orthodontic treatment.
5. The mean OQLQ-G score was statistically significant ($p < 0.001$) higher for females (50.2 ± 14.3) than for males (31.1 ± 16.0). These gender differences were also found in all four subscales, but only statistically significant in subscales 2-4.
6. Significant higher scores for the OQLQ-G overall score ($p = 0.013$) and its subscale scores "aesthetic" ($p = 0.045$) and "social aspects" ($p = 0.016$) were found in patients "being engaged/married" than those "being single".
7. Patients reporting an improvement in self-esteem showed significantly increased OQLQ-G scores in the subscales "aesthetics" ($p = 0.010$), "social aspects" ($p = 0.005$) and the overall OQLQ-G score ($p = 0.006$).

11 Appendix

11.1 Orthodontic Patients

11.1.1 Questionnaire

Deutschlandweite Umfrage zur Lebensqualität durch kieferorthopädischen Behandlung

Liebe Patientin, lieber Patient!

Mein Name ist Susie Paes da Silva. Ich bin Zahnärztin aus Brasilien und zurzeit Doktorandin bei Frau Prof. Dr. Andrea Wichelhaus an der Poliklinik für Kieferorthopädie der Ludwig-Maximilians-Universität München.

Sie befinden sich zurzeit in kieferorthopädischer Behandlung und damit die Behandlung der Zahnfehlstellung. Dies wird auch Einfluss auf Ihre Lebensqualität haben. Zu letzterem Aspekt möchten wir Sie bitten, uns bei einer wissenschaftlichen Umfrage zu unterstützen.

Was können *Sie* tun, *wenn Sie an dieser Studie teilnehmen wollen*?

Wir haben einen Online-Fragebogen entwickelt, den Sie anonym ausfüllen. Wir empfehlen Patienten unter 15 Jahren, den Fragebogen gemeinsam mit den Eltern zu beantworten. Für die Beantwortung des Online-Fragebogens benötigen Sie ca. 10 Minuten.

Um statistisch aussagekräftige Ergebnisse zu erhalten, möchten wir insgesamt ca. 1.000 verschiedene Patienten in ganz Deutschland befragen. Wären Sie bereit, an dieser Online-Umfrage teilzunehmen?

Die Teilnahme ist freiwillig! Wenn Sie nicht teilnehmen möchten, bitten wir Sie, diesen Fragebogen nicht zu beantworten und das Browser-Fenster zu schließen.

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OHIP

1. Hatten Sie im vergangenen Monat aufgrund von Problemen mit Ihren Zähnen, im Mundbereich oder mit Ihrem Zahnersatz....

	sehr oft	oft	ab und zu	kaum	nie
Schwierigkeiten bestimmte Worte auszusprechen?	○	○	○	○	○
das Gefühl, Ihr Geschmackssinn war beeinträchtigt?	○	○	○	○	○
den Eindruck, dass Ihr Leben ganz allgemein weniger zufriedenstellend war?	○	○	○	○	○
Schwierigkeiten zu entspannen?	○	○	○	○	○

2. Ist es im vergangenen Monat aufgrund von Problemen mit Ihren Zähnen, im Mundbereich oder mit Ihrem Zahnersatz vorgekommen,...

	sehr oft	oft	ab und zu	kaum	nie
dass Sie sich angespannt gefühlt haben?	○	○	○	○	○
dass Sie Ihre Mahlzeiten unterbrechen mussten?	○	○	○	○	○
dass es Ihnen unangenehm war, bestimmte Nahrungsmittel zu essen?	○	○	○	○	○
dass Sie anderen Menschen gegenüber eher reizbar gewesen sind?	○	○	○	○	○
dass es Ihnen schwergefallen ist, Ihren alltäglichen Beschäftigungen nachzugehen?	○	○	○	○	○
dass Sie vollkommen unfähig waren, etwas zu tun?	○	○	○	○	○
dass Sie sich ein wenig verlegen gefühlt haben?	○	○	○	○	○
dass Ihre Ernährung im vergangenen Monat unbefriedigend gewesen ist?	○	○	○	○	○

3. Hatten Sie im vergangenen Monat...

	sehr oft	oft	ab und zu	kaum	nie
Schmerzen im Mundbereich?	○	○	○	○	○
ein Gefühl der Unsicherheit in Zusammenhang mit Ihren Zähnen, Ihrem Mund oder Ihrem Zahnersatz?	○	○	○	○	○

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01

4. Geschlecht:

- ○ Männlich
- ○ Weiblich

5. Geburtsjahr:
Bitte geben Sie Ihr Geburtsjahr als ganze Zahl ein.

Geburtsjahr: ____

6. Bitte geben Sie den Code, die Sie auf dem Flyer finden ein.

Code: ____

7. In welcher Stadt wohnen Sie?
Geben Sie die Postleitzahl Ihres Wohnorts an.

Wohnort: ____

8. Denken Sie, dass Sie eine KFO-Behandlung benötigen?

- ○ Ja
- ○ Vielleicht
- ○ Nein
- ○ Keine Ahnung
- ○ Keine Angabe

9. Wie bewerten Sie Ihren Mundgesundheitszustand vor der KFO-Behandlung?

- ○ Sehr gut
- ○ Gut
- ○ Normal
- ○ Schlecht
- ○ Sehr schlecht
- ○ Keine Angabe

10. Waren Sie vor Ihrer KFO-Behandlung mit Ihrer Mundästhetik zufrieden?

- ○ Sehr zufrieden
- ○ Zufrieden
- ○ Unzufrieden
- ○ Sehr unzufrieden
- ○ Keine Angabe

11. Warum haben Sie sich für eine KFO-Behandlung entschieden?
(Sie dürfen mehr als eine Option wählen)

- ☐ Ästhetik
- ☐ Funktion
- ☐ Schule
- ☐ Arbeit
- ☐ Mode
- ☐ Schmerzen
- ☐ Sonstige

12. Wer trägt die KFO-Behandlungskosten?
(Sie dürfen mehr als eine Option wählen)

- [ ] Gesetzliche Krankenversicherung
- [ ] Private Krankenversicherung
- [ ] Zuzahlung
- [ ] Selbstzahlung
- [ ] Öffentlicher Träger
- [ ] Keine Angabe

13. Wie lang sind Sie schon in KFO-Behandlung?

- ○ Bis zu 1 Jahr
- ○ Länger als 1 – 2 Jahre
- ○ Länger als 2 – 3 Jahre
- ○ Länger als 3 Jahre

14. Welches Gerät tragen Sie jetzt?

- ○ Festsitzende Apparatur
- ○ Herausnehmbare Apparatur

15. Wie lang ist die durchschnitliche Behandlungsdauer pro Sitzung?

- ○ Bis zu 15 Minuten
- ○ Mehr als 15 – 30 Minuten
- ○ Mehr als 30 – 60 Minuten
- ○ Mehr als 1 – 1,5 Stunden
- ○ Mehr als 1,5 – 2 Stunden
- ○ Mehr als 2 Stunden

16. Dauer der Anreise zur Praxis:

- ○ Bis zu 15 Minuten
- ○ Mehr als 15 – 30 Minuten
- ○ Mehr als 30 – 60 Minuten
- ○ Mehr als 1 – 2 Stunden
- ○ Mehr als 2 Stunden

17. Wie oft müssen Sie zur Behandlung beim Kieferorthopäden vorstellig werden?

- ○ Zweimal pro Monat
- ○ Einmal pro Monat
- ○ Einmal in zwei Monaten
- ○ Einmal in drei Monaten
- ○ Einmal in sechs Monaten

18. Wie zufrieden sind Sie mit der KFO-Behandlung?

- ○ Sehr zufrieden
- ○ Zufrieden
- ○ Unzufrieden
- ○ Sehr unzufrieden
- ○ Keine Angabe

19. In wieweit hat die KFO-Behandlung bisher Ihr Selbstbewusstsein verbessert?

- ○ Sehr verbessert
- ○ Verbessert
- ○ Unverändert
- ○ Verschlechtert
- ○ Sehr verschlechtert
- ○ Keine Angabe

20. Haben sie Angst vor dem ZAHNARZT?

- ○ Ja
- ○ Nein
- ○ Keine Angabe

21. Haben Sie Angst vor dem KIEFERORTHOPÄDEN?

- ○ Ja
- ○ Nein
- ○ Keine Angabe

22. Ich besitze die deutsche Staatsangehörigkeit.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

23. Ich bin in Deutschland geboren (heutiges Gebiet der Bundesrepublik Deutschland).

- ○ Ja
- ○ Nein
- ○ Keine Angabe

24. Ich bin nach 1949 nach Deutschland zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

25. Mein Vater ist ausserhalb Deutschlands (heutiges Gebiet der Bundesrepublik Deutschland) geboren und nach 1949 zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

26. Meine Mutter ist ausserhalb Deutschlands (heutiges Gebiet der Bundesrepublik Deutschland) geboren und nach 1949 zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

Last Page

Vielen Dank für Ihre Teilnahme!

Wir möchten uns ganz herzlich für Ihre Mithilfe bedanken.

Ihre Antworten wurden gespeichert, Sie können das Browser-Fenster nun schließen.

Zahnärztin Susie Paes da Silva, Poliklinik für Kieferorthopädie, Klinikum der Ludwig-Maximillians-Universität München – 2015-2017

11.1.2 Descriptive Summary Statistics

Variable	Level N(%)	Total N(%)	Age groups N(%)	
			6...17 yrs	≥18 yrs
N		898	627	271
Gender	Male	444 (49.4)	302 (48.2)	142 (52.4)
	Female	454 (50.6)	325 (51.8)	129 (47.6)
Age (mean (sd))		16.89 (6.68)	13.96 (2.37)	23.67 (8.31)
Distance (mean (sd))		19.61 (43.78)	15.95 (26.91)	28.04 (67.65)
Do you think that you need an orthodontic treatment?	Yes	633 (70.5)	425 (67.8)	208 (76.8)
	Maybe	101 (11.2)	75 (12.0)	26 (9.6)
	No	59 (6.6)	41 (6.5)	18 (6.6)
	No idea	74 (8.2)	65 (10.4)	9 (3.3)
	No information	31 (3.5)	21 (3.3)	10 (3.7)
How do you rate your oral health status prior to the orthodontic treatment?	Very good	154 (17.1)	116 (18.5)	38 (14.0)
	Good	229 (25.5)	157 (25.0)	72 (26.6)
	Normal	284 (31.6)	209 (33.3)	75 (27.7)
	Bad	156 (17.4)	96 (15.3)	60 (22.1)
	Very bad	34 (3.8)	17 (2.7)	17 (6.3)
	No information	41 (4.6)	32 (5.1)	9 (3.3)
Were you satisfied with your oral aesthetic before your orthodontic treatment?	Very satisfied	95 (10.6)	70 (11.2)	25 (9.2)
	Satisfied	321 (35.7)	248 (39.6)	73 (26.9)
	Dissatisfied	299 (33.3)	197 (31.4)	102 (37.6)
	Very dissatisfied	117 (13.0)	60 (9.6)	57 (21.0)
	No information	66 (7.3)	52 (8.3)	14 (5.2)
Why did you choose an orthodontic treatment?	Aesthetics	123 (13.7)	85 (13.6)	38 (14.0)
	Function	152 (16.9)	115 (18.3)	37 (13.7)
	Pain	20 (2.2)	10 (1.6)	10 (3.7)
	Aesthetic/Function /Others	200 (22.3)	115 (18.3)	85 (31.4)
	Aesthetic/Pain	13 (1.4)	8 (1.3)	5 (1.8)
	Function/Pain/Others	27 (3.0)	13 (2.1)	14 (5.2)
	Aesthetic/Function/Pain/ Others	33 (3.7)	15 (2.4)	18 (6.6)
	Aesthetic/Others	46 (5.1)	31 (4.9)	15 (5.5)
	Function/Others	37 (4.1)	28 (4.5)	9 (3.3)
	Pain/Others	9 (1.0)	8 (1.3)	1 (0.4)
	Others	236 (26.3)	197 (31.4)	39 (14.4)
	Missing	2 (0.2)	2 (0.3)	0 (0.0)
Who bears the orthodontic treatment costs?	Govt	530 (59.0)	388 (61.9)	142 (52.4)
	Private	254 (28.3)	146 (23.3)	108 (39.9)
	Others	4 (0.4)	2 (0.3)	2 (0.7)
	NA	110 (12.2)	91 (14.5)	19 (7.0)
How long have you been in orthodontic treatment?	≤1 year	237 (26.4)	184 (29.3)	53 (19.6)
	>1...3 years	359 (40.0)	261 (41.6)	98 (36.2)
	>3 years	302 (33.6)	182 (29.0)	120 (44.3)
Which appliance do you wear now?	Fixed	597 (66.5)	396 (63.2)	201 (74.2)
	Removable	301 (33.5)	231 (36.8)	70 (25.8)
How long does it take to the practice?	Up to 15 minutes	175 (19.5)	134 (21.4)	41 (15.1)
	More than 15 - 30 minutes	354 (39.4)	255 (40.7)	99 (36.5)
	More than 30 - 60 minutes	280 (31.2)	189 (30.1)	91 (33.6)
	More than 1 - 2 hours	72 (8.0)	43 (6.9)	29 (10.7)
	More than 2 hours	17 (1.9)	6 (1.0)	11 (4.1)
How often do you have to present to the orthodontist for treatment?	At least once per month	422 (47.0)	291 (46.4)	131 (48.3)
	Once in 2 months	347 (38.6)	251 (40.0)	96 (35.4)
	Once in 3 months	92 (10.2)	64 (10.2)	28 (10.3)
	Once in 6 months	37 (4.1)	21 (3.3)	16 (5.9)
How satisfied are you with the orthodontic treatment?	Very satisfied	448 (49.9)	330 (52.6)	118 (43.5)
	Satisfied	411 (45.8)	271 (43.2)	140 (51.7)
	Dissatisfied	19 (2.1)	13 (2.1)	6 (2.2)
	Very dissatisfied	6 (0.7)	3 (0.5)	3 (1.1)
	No information	14 (1.6)	10 (1.6)	4 (1.5)
How satisfied are you with the orthodontic treatment?	Very satisfied	448 (49.9)	330 (53.5)	118 (44.2)
	Satisfied	411 (45.8)	271 (43.9)	140 (52.4)
	Dissatisfied/very dissatisfied	25 (2.8)	16 (2.6)	9 (3.4)
	No information	14 (1.6)	10 (1.6)	4 (1.5)

Variable	Level N(%)	Total N(%)	Age groups N(%)	
			6...17 yrs	≥18 yrs
How orthodontic treatment improved your self-esteem?	Improved a lot	106 (11.8)	73 (11.6)	33 (12.2)
	Improved	347 (38.6)	223 (35.6)	124 (45.8)
	Unchanged	308 (34.3)	220 (35.1)	88 (32.5)
	Worsened	31 (3.5)	18 (2.9)	13 (4.8)
	NA	106 (11.8)	93 (14.8)	13 (4.8)
Are you afraid of the DENTIST?	Yes	62 (6.9)	37 (5.9)	25 (9.2)
	No	807 (89.9)	567 (90.4)	240 (88.6)
	No information	29 (3.2)	23 (3.7)	6 (2.2)
Are you afraid of the ORTHODONTIST?	Yes	20 (2.2)	14 (2.2)	6 (2.2)
	No	860 (95.8)	597 (95.2)	263 (97.0)
	No information	18 (2.0)	16 (2.6)	2 (0.7)
Migration (%)	German	738 (82.2)	514 (82.0)	224 (82.7)
	Non German/Immigrant	108 (12.0)	78 (12.4)	30 (11.1)
	NA	52 (5.8)	35 (5.6)	17 (6.3)

11.2 Cleft-Lip Patients

11.2.1 Questionnaire

Umfrage zur Lebensqualität

durch interdisziplinärische Behandlung

von Lippen-, Kiefer-, Gaumen-Spalten

Liebe Patientin, lieber Patient!

Mein Name ist Susie Paes da Silva. Ich bin Zahnärztin aus Brasilien und zurzeit PhD-Kandidatin bei Frau Prof. Dr. Andrea Wichelhaus an der Poliklinik für Kieferorthopädie der Ludwig-Maximilians-Universität München.

Sie befinden sich zurzeit in kieferorthopädischer Behandlung. Neben der Behandlung der Zahnfehlstellung wird Ihre Lebensqualität verbessert. Zu letzterem Aspekt möchten wir Sie bitten, uns bei einer wissenschaftlichen Umfrage zu unterstützen.

Was kann ich tun?

Hierzu haben wir einen Online-Fragebogen entwickelt, den Sie anonym ausfüllen. Wir empfehlen Patienten unter 15 Jahren, den Fragebogen gemeinsam mit den Eltern zu beantworten. Für die Beantwortung des Online-Fragebogens benötigen Sie ca. 10 Minuten.

Die Teilnahme ist freiwillig! Wenn Sie nicht teilnehmen möchten, bitten wir Sie, diesen Fragebogen nicht zu beantworten und das Browser-Fenster zu schließen.

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SP01

1. In den vergangenen 3 Monaten, wie oft ...
Fragen zu Deinen Mundproblemen

	sehr oft	oft	ab und zu	kaum	nie
blieben Essensreste am Gaumen kleben?	○	○	○	○	○
haben sich andere Kinder nach Deinen Mundproblemen erkundigt?	○	○	○	○	○

2. In den vergangenen 3 Monaten, wie oft wolltest/konntest Du wegen Mundproblemen...
Fragen zu Deinen Mundproblemen

	sehr oft	oft	ab und zu	kaum	nie
nicht an schulischen oder außerschulischen Aktivitäten (wie Sport, Theater, Verein) teilnehmen?	○	○	○	○	○
dem Schulunterricht nicht aufmerksam folgen?	○	○	○	○	○
nicht mit anderen Kindern zusammen sein?	○	○	○	○	○

3. In den vergangenen 3 Monaten, wie oft warst Du wegen Mundproblemen ...
Fragen zu Deinen Mundproblemen

	sehr oft	oft	ab und zu	kaum	nie
gereizt/frustriert?	○	○	○	○	○
verstimmt?	○	○	○	○	○
betroffen davon, was andere Leute denken?	○	○	○	○	○
besorgt, weniger gesund zu sein?	○	○	○	○	○
nervös/ängstlich?	○	○	○	○	○
schüchtern/verlegen?	○	○	○	○	○
besorgt, weniger attraktiv als andere zu sein?	○	○	○	○	○
besorgt, anders als andere zu sein?	○	○	○	○	○
von anderen gehänselt/verspottet worden?	○	○	○	○	○
von anderen ausgeschlossen worden?	○	○	○	○	○

4. IIn den vergangenen 3 Monaten, wie oft hattest Du ...

Fragen zu Deinen Mundproblemen

	sehr oft	oft	ab und zu	kaum	nie
einen schlechten Atem?	○	○	○	○	○
Zahnschmerzen/Schmerzen im Mund?	○	○	○	○	○
wunde Stellen im Mund?	○	○	○	○	○
Zahnfleischbluten?	○	○	○	○	○
Schwierigkeiten beim Trinken bzw. Essen von kalten/warmen Speisen?	○	○	○	○	○
Schwierigkeiten beim Kauen fester Nahrung?	○	○	○	○	○
Schwierigkeiten den Mund weit zu öffnen?	○	○	○	○	○
durch den Mund geatmet?	○	○	○	○	○
eine undeutliche Aussprache?	○	○	○	○	○
nur langsam essen können?	○	○	○	○	○
Schwierigkeiten beim Essen von Speisen, die Du gern essen möchtest?	○	○	○	○	○
Schwierigkeiten beim Spielen eines Musikinstruments?	○	○	○	○	○
Schwierigkeiten mit einem Trinkröhrchen zu trinken?	○	○	○	○	○
vermieden zu lächeln, wenn andere Kinder dabei waren?	○	○	○	○	○

5. In den vergangenen 3 Monaten, wie oft hattest Du wegen Mundproblemen...

Fragen zu Deinen Mundproblemen

	sehr oft	oft	ab und zu	kaum	nie
Schlafstörungen?	○	○	○	○	○
in der Schule gefehlt?	○	○	○	○	○
mit Familienmitgliedern gestritten?	○	○	○	○	○
nicht gewollt, laut vor der Klasse zu sprechen oder vorzulesen?	○	○	○	○	○
nicht mit anderen Kindern sprechen wollen?	○	○	○	○	○
Schwierigkeiten beim Erledigen von Hausaufgaben?	○	○	○	○	○

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SP02

6. Geschlecht:

- ○ Männlich
- ○ Weiblich

7. Geburtsjahr:
(Bitte geben Sie Ihr Geburtsjahr als ganze Zahl an)

Geburtsjahr: ____

8. Welche Form von LKG-Spalte haben Sie?

- ○ Lippenspalte
- ○ Gaumenspalte
- ○ Einseitige LKG-Spalte
- ○ Doppelseitige LKG-Spalte

9. Ist die Spalte Bestandteil eines syndromalen Krankheitsbildes?
(Wenn JA, welches Syndrom; Wenn NEIN, antworten Sie bitte mit NEIN)

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SP03

10. In welche Behandlungsphase sind Sie?
(Sie dürfen mehr als eine Option wählen)

- [ ] Jährliche Vorstellung in der Spaltsprechestunde
- [ ] 1. Operation
- [ ] Frühbehandlung (Milchgebiss)
- [ ] Hauptbehandlung (Wechselgebiss)
- [ ] Chirurgische Therapie: Versorgung der Spalte mit Knochen
- [ ] Kombinierte KFO-Chirurgie-Behandlung

11. Wie alt waren Sie zur Zeit der erste Operation?
(Wenn Sie nocht nicht in dieser Behandlungsphase sind, antworten Sie bitte mit NEIN)

Alter:

12. Wie alt waren Sie zu Beginn der Frühbehandlung und wie lange hat diese Behandlungsphase gedauert?
(Wenn Sie nocht nicht in dieser Behandlungsphase sind, tragen Sie bitte NEIN bei Alter und Dauer ein)

Alter:

Dauer:

13. Wie alt waren Sie zu Beginn der Hauptbehandlung und wie lange hat diese Behandlungsphase gedauert?
(Wenn Sie nocht nicht in dieser Behandlungsphase sind, tragen Sie bitte NEIN bei Alter und Dauer ein)

Alter:

Dauer:

14. Wie alt waren Sie in der chirurgischen Therapie (Versorgung der Spalte mit Knochen)?
(Wenn Sie noch nicht in dieser Behandlungsphase sind, antworten Sie bitte mit NEIN)

Alter:

15. Wie alt waren Sie zu Beginn der kombinierten KFO-Chirurgie-Behandlung und wie lange hat diese Behandlungsphase gedauert?

(Wenn Sie nocht nicht in dieser Behandlungsphase sind, tragen Sie bitte NEIN bei Alter und Dauer ein)

Alter:	
Dauer:	

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SP05

16. In welcher Stadt wohnen Sie?

(Bitte geben Sie Ihre Postleitzahl ein)

Postleitzahl:	

17. In welcher Stadt werden Sie kieferorthopädisch behandelt?

Stadt:	

18. Wie lange dauert die Anreise zur Zahnklinik?

- ○ Bis zu 15 Minuten
- ○ Mehr als 15 bis zu 30 Minuten
- ○ Mehr als 30 bis zu 60 Minuten
- ○ Mehr als 1 bis 2 zu Stunden
- ○ Mehr als 2 bis zu 4 Stunden
- ○ Mehr als 4 bis zu 6 Stunden

19. Wer trägt die KFO-Behandlungskosten?

(Sie dürfen mehr als eine Option wählen)

- ☐ Gesetzliche Krankenversicherung
- ☐ Private Krankenversicherung
- ☐ Zuzahlung
- ☐ Selbstzahlung
- ☐ Öffentlicher Träger
- ☐ Sonstige
- ☐ Keine Angabe

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SP06

20. Sind sie in KFO-Behandlung bei uns?

- ◯ Ja
- ◯ Nein

21. Wie zufrieden sind Sie mit der KFO-Behandlung?

- ◯ Sehr zufrieden
- ◯ Zufrieden
- ◯ Unzufrieden
- ◯ Sehr unzufrieden
- ◯ Keine Angabe

22. Hat die KFO-Behandlung Ihr Selbstbewusstsein verbessert?

- ◯ Sehr verbessert
- ◯ Verbessert
- ◯ Unverändert
- ◯ Verschlechtert
- ◯ Sehr verschlechtert
- ◯ Keine Angabe

23. Wie bewerten Sie Ihren Mundgesundheitszustand bis jetzt?

- ◯ Sehr gut
- ◯ Gut
- ◯ Normal
- ◯ Schlecht
- ◯ Sehr schlecht
- ◯ Keine Angabe

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SP07

24. Ich besitze die deutsche Staatsangehörigkeit.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

25. Ich bin in Deutschland geboren (heutiges Gebiet der Bundesrepublik Deutschland).

- ○ Ja
- ○ Nein
- ○ Keine Angabe

26. Ich bin nach 1949 nach Deutschland zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

27. Mein Vater ist ausserhalb Deutschlands (heutiges Gebiet der Bundesrepublik Deutschland) geboren und nach 1949 zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

28. Meine Mutter ist ausserhalb Deutschlands (heutiges Gebiet der Bundesrepublik Deutschland) geboren und nach 1949 zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

Last Page

Vielen Dank für Ihre Teilnahme!

Wir möchten uns ganz herzlich für Ihre Mithilfe bedanken.

Ihre Antworten wurden gespeichert, Sie können das Browser-Fenster nun schließen.

Zahnärztin Susie Paes da Silva, Poliklinik für Kieferorthopädie, Klinikum der Ludwig-Maximillians-Universität München – 2015-2017

11.2.2 Descriptive Summary Statistics

Variable	Level	Total (n = 50)
Gender (n (%))	Male	27 (54)
	Female	23 (46)
Age (mean (SD))		13.4 (5.1)
Cleft classification (n (%))	Cleft lip ("Lippenspalte")	6 (12.0)
	Cleft palate ("Gaumenspalte")	10 (20.0)
	Unilateral CLP ("Einseitige LKG-Spalte")	21 (42.0)
	Bilateral CLP ("Doppelseitige LKG-Spalte")	13 (26.0)
Syndrome (n (%))	No syndrome	45 (90.0)
	Franscesscgetti	1 (2.0)
	Pierre-Robin	2 (4.0)
	unknown	1 (2.0)
	Vacterl-Association	1 (2.0)
Current treatment phase (n (%)) (multiple answers)	Annual presentation in CLP consultation	13 (26.0)
	First surgery	4 (8.0)
	Early treatment (milk dentition)	8 (16.0)
	Main treatment (mixed dentition)	18 (36.0)
	Surgical therapy: provision of the cleft with bone	3 (6.0)
	Combined orthodontic-surgery treatment	24 (48.0)
Age at first (1st) surgery	Up to 3 months	27 (54.0)
	About 3-6 months	11 (22.0)
	Over 6-12 months	6 (12.0)
	Over 12 months	2 (4.0)
	No	4 (8.0)
Age of early treatment (milk dentition)	Up to 3 months	7 (14.0)
	Over 3-6 months	3 (6.0)
	Over 6-12 months	2 (4.0)
	Over 1-5 Year	13 (26.0)
	Over 5 years	11 (22.0)
	No	14 (28.0)
Duration of early treatment	Still in treatment	6 (12.0)
	Up to1 year	8 (16.0)
	Over 1-5 years	13 (26.0)
	Over 5 years	6 (12.0)
	No	17 (34.0)
Age at main treatment	Up to 1 year	2 (4.0)
	Over 1-5 years	5 (10.0)
	Over 5-10 years	12 (24.0)
	Over 10 years	12 (24.0)
	No	19 (38.00)
Duration of main treatment (mixed dentition)	Still in treatment	12 (24.0)
	Up to 1 year	2 (4.0)
	Over 1-5 years	8 (16.0)
	Over 5 years	3 (6.0)
	No	25 (50.0)
Age at surgical therapy: provision of the cleft with bone	Up to 1 year	4 (8.0)
	Over 1-5 years	2 (4.0)
	Over 5-10 years	20 (40.0)
	Over 10 years	6 (12.0)
	No	18 (36.0)
Age at combined orthodontic surgery treatment	Up to 1 year	2 (4.0)
	Over 1-5 years	3 (6.0)
	Over 5-10 years	9 (18.0)
	Over 10 years	7 (14.0
	No	29 (58.0)

Variable	Level	Total (n = 50)
Duration of combined orthodontic surgery treatment	Still in treatment	9 (18.0)
	Up to 1 year	3 (6.0)
	Over 1-5 years	5 (10.0)
	Over 5 years	3 (6.0)
	No	31 (62.0)
Residence	Munich	48 (96.0)
	Not Munich	2 (4.0)
How long does it take to get to practice?	Up to 15 minutes	4 (8.0)
	More than 15-30 minutes	13 (26.0)
	More than 30-60 minutes	22 (44.0)
	More than 1 hours	11 (22.0)
Who bears the orthodontic treatment costs?	Government	47 (94.0)
	Private	1 (2.0)
	Others	0(.0.0)
	NA	2(4.0)
Are you in orthodontic treatment with us?	yes	49 (98.0)
	No	1 (2.0)
How satisfied are you with the orthodontic treatment?	Very satisfied	27(54.0)
	Satisfied	20 (40.0)
	Dissatisfied	0 (0.0)
	Very dissatisfied	0 (0.0)
	NA	3(6.0)
Has orthodontic treatment improved your self-esteem?	Improved a lot	9 (18.0)
	Improved	17 (34.0)
	Unchanged	20 (40.0)
	Worsened	0 (0.0)
	Worsened a lot	0 (0.0)
	NA	4 (8.0)
How do you rate your oral health status so far?	Very good	9 (18.0)
	Good	12 (24.0)
	Normal	25 (50-0)
	Bad	2 (4.0)
	Very bad	0 (0.0)
	NA	2 (4.0)
Migration background	German	46 (92.0)
	Non-German/Immigrant	3 (6.0)
	NA	1 (2.0)

11.3 Ortho-Surgical Patients

11.3.1 Questionnaire

LMU KLINIKUM DER UNIVERSITÄT MÜNCHEN

Umfrage zur Lebensqualität

durch eine kieferchirurgisch-kieferorthopädische

Behandlung

Liebe Patientin, lieber Patient!

Mein Name ist Susie Paes da Silva. Ich bin Zahnärztin aus Brasilien und zurzeit PhD-Kandidatin bei Frau Prof. Dr. Andrea Wichelhaus an der Poliklinik für Kieferorthopädie der Ludwig-Maximilians-Universität München.

Sie befinden sich zurzeit in kieferorthopädischer Behandlung. Neben der Behandlung der Zahnfehlstellung wird Ihre Lebensqualität verbessert. Zu letzterem Aspekt möchten wir Sie bitten, uns bei einer wissenschaftlichen Umfrage zu unterstützen.

Was kann ich tun?

Hierzu haben wir einen Online-Fragebogen entwickelt, den Sie anonym ausfüllen. Wir empfehlen Patienten unter 15 Jahren, den Fragebogen gemeinsam mit den Eltern zu beantworten. Für die Beantwortung des Online-Fragebogens benötigen Sie ca. 10 Minuten.

Die Teilnahme ist freiwillig! Wenn Sie nicht teilnehmen möchten, bitten wir Sie, diesen Fragebogen nicht zu beantworten und das Browser-Fenster zu schließen.

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1. Ist die Ausprägung des Krankheitsbildes so stark, dass eine sprachliche Beeinträchtigung besteht?
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

- ○ Ja
- ○ Nein

2. Haben/Hatten Sie wiederholt Probleme in Ausbildung bzw. im Beruf aufgrund Ihres Krankheitsbildes?
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

- ○ Ja
- ○ Nein

3. Haben/Hatten Sie wiederholt Probleme in Ihrem sozialen Umfeld aufgrund Ihres Krankheitsbildes?
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

- ○ Ja
- ○ Nein

4. Welcher Kiefer ist im Rahmen Ihrer Krankheit betroffen?
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

- ○ Oberkiefer
- ○ Unterkiefer
- ○ beide

5. Gründe für eine Behandlung und/oder Operation:
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

- ○ optischer Grund
- ○ gesundheitlicher Grund
- ○ optische und gesundheitliche Gründe

6. Alter:
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

Alter: ☐

7. Geschlecht:
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

- ○ männlich
- ○ weiblich

8. Familiärer Status:
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

- ○ ledig
- ○ feste Partnerschaft
- ○ verlobt/ verheiratet
- ○ verwitwet
- ○ getrennt lebend

9. Welche berufliche Tätigkeit üben Sie aus?
(Bitte lesen Sie aufmerksam die Frage und kreuzen Sie die jeweils zutreffenden Antworten an)

- ○ Angestellter
- ○ Beamter
- ○ Selbstständiger
- ○ Ausbildung /Student
- ○ sonstige

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OP03

11.10.2018 Print View Projekt_04 (KFO-01) 11.10.2018, 10:57

10. Bitte lesen Sie aufmerksam die folgenden Aussagen, inwiefern jede Aussage Sie betrifft.

	Betrifft Sie wenig +	++	+++	Betrifft Sie erheblich ++++	Aussage nicht zutreffend
1. Ich schäme mich für das Aussehen meiner Zähne.	○	○	○	○	○
2. Ich schäme mich für das Aussehen meiner oder meines Kiefer(s).	○	○	○	○	○
3. Ich habe Probleme beim Zubeißen.	○	○	○	○	○
4. Ich habe Probleme beim Kauen.	○	○	○	○	○
5. Ich vermeide es, einige Speisen zu essen, weil der Zusammenbiss meiner Zähne es schwierig macht.	○	○	○	○	○
6. Ich mag es nicht, in der Öffentlichkeit zu essen.	○	○	○	○	○
7. Ich bekomme oft Schmerzen in meinem Gesicht oder in meinem bzw. meinen Kiefer(n).	○	○	○	○	○
8. Ich mag es nicht, mein Gesicht im Profil zu sehen.	○	○	○	○	○
9. Ich verbringe eine Menge Zeit damit, mein Gesicht im Spiegel zu betrachten.	○	○	○	○	○
10. Ich verbringe eine Menge Zeit damit, meine Zähne im Spiegel zu betrachten.	○	○	○	○	○
11. Ich verbringe eine Menge Zeit damit, meine(n) Kiefer im Spiegel zu betrachten.	○	○	○	○	○
12. Ich mag es nicht, wenn ich auf einem Video zu sehen bin oder wenn Fotos von mir gemacht werden.	○	○	○	○	○
13. Ich achte oft bewusst auf die Zähne anderer Menschen.	○	○	○	○	○
14. Ich achte oft bewusst auf die Gesichter anderer Menschen.	○	○	○	○	○
15. Ich bin völlig verunsichert über das Aussehen meines Gesichtes.	○	○	○	○	○
16. Ich versuche meinen Mund zu verdecken, wenn ich mit anderen Menschen zum ersten Mal zusammentreffe.	○	○	○	○	○
17. Es belastet mich, Menschen zum ersten Mal zu begegnen.	○	○	○	○	○
18. Es belastet mich, dass andere Menschen verletzende Bemerkungen über mein Aussehen machen könnten.	○	○	○	○	○
19. Es fehlt mir an Selbstbewusstsein, wenn ich in Gesellschaft bin.	○	○	○	○	○
20. Ich lächle nicht gern, wenn ich anderen Menschen begegne.	○	○	○	○	○

21. Ich bin manchmal depressiv wegen meines Aussehens.	○	○	○	○	○
22. Ich denke manchmal, dass andere Menschen mich anstarren.	○	○	○	○	○
23. Ich bin bestürzt über Bemerkungen mein Aussehen betreffend, selbst wenn ich weiß, dass sie nicht ernst gemeint sind.	○	○	○	○	○
24. Aufgrund meines Krankheitsbildes ist es wiederholt notwendig, dass ich Schmerzmittel einnehme.	○	○	○	○	○

11. Geburtsjahr (Bitte geben Sie Ihr Geburtsjahr als ganze Zahl an):

Geburtsjahr: ☐

12. In welcher Stadt wohnen Sie?
(Bitte geben Sie Ihre Postleitzahl ein)

Postleitzahl: ☐

13. Wie lange dauert die Anreise zur Praxis?

- ○ Bis zu 15 Minuten
- ○ Mehr als 15 bis zu 30 Minuten
- ○ Mehr als 30 bis zu 60 Minuten
- ○ Mehr als 1 bis zu 2 Stunden
- ○ Mehr als 2 bis zu 4 Stunden
- ○ Mehr als 4 bis zu 6 Stunden

14. Von wem wurden sie überwiesen?

- ○ Hausarzt
- ○ Kieferorthopäde
- ○ Zahnklinik
- ○ “Von selbst” (“Selbstüberweisung”)
- ○ Kieferchirurg
- ○ Schulzahnarzt
- ○ Sonstige
- ○ Keine Angabe

15. Warum sind Sie in einer Behandlung?
(Sie dürfen mehr als eine Option wählen)

- ☐ Ästhetik
- ☐ Verbesserung der Kauleistung
- ☐ Schmerzen
- ☐ Angst vor Zahnverlust
- ☐ Aussprache
- ☐ Keine Angabe

16. Wer trägt die KFO-Behandlungskosten?
(Sie dürfen mehr als eine Option wählen)

- [ ] Gesetzliche Krankenversicherung
- [ ] Private Krankenversicherung
- [ ] Zuzahlung
- [ ] Selbstzahlung
- [ ] Öffentlicher Träger
- [ ] Sonstige
- [ ] Keine Angabe

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OP05

17. Welche Klassifikation kraniomandibulärer Dysfunktion haben Sie?
(Sie dürfen mehr als eine Option wählen)

- [ ] Klasse II (Oberkiefer nach vorne und Unterkiefer nach hinten)
- [ ] Klasse III (Oberkiefer nach hinten und Unterkiefer nach vorne)
- [ ] Offener Biss
- [ ] Tiefbiss
- [ ] Kreuzbiss
- [ ] Ich weiss es nicht

18. Ist die kraniomandibuläre Dysfunktion teil eines syndromalen Krankheitsbildes?
(Wenn JA, welches Syndrom; wenn NEIN, antworten Sie bitte mit NEIN)

19. In welche Behandlungsphase sind Sie?

- ( ) Dysgnathiesprechestunde
- ( ) Planbesprechung
- ( ) Plan ist bei Krankenkasse
- ( ) Kieferorthopädische Vorbehandlung (Schienentherapie vor Operation)
- ( ) Kieferorthopädische Vorbehandlung (Gaumennahterweiterung vor Operation)
- ( ) Kieferorthopädische Hauptbehandlung (Multibrackets vor Operation)
- ( ) Kieferorthopädische Nachbehandlung (nach Operation)
- ( ) Retention
- ( ) Ich weiss es nicht

20. Wie alt waren Sie in der Dysgnathiesprechestunde?

Alter:	

21. Wie alt waren Sie bei der Planbesprechung?

Alter:	

22. Wie alt waren Sie zu Beginn der kieferorthopädischen Vorbehandlung (Schienentherapie, Gaumennahterweiterung oder Multibrackets) und wie lange hat diese Behandlungsphase gedauert?

(Wenn Sie noch nicht in dieser Behandlungsphase sind, antworten Sie bitte mit NEIN zum Alter und Dauer)

Alter:	
Dauer:	

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OP07

23. Wie alt waren Sie bei der Umstellungs-Operation?
(Wenn Sie noch nicht operiert worden sind, antworten Sie bitte mit NEIN zum Alter)

Alter:	

24. Wie alt waren Sie zu Beginn der kieferorthopädischen Nachbehandlung und wie lange hat diese Behandlungsphase gedauert?
(Wenn Sie noch nicht in dieser Behandlungsphase sind, antworten Sie bitte mit NEIN zum Alter und Dauer)

Alter:	
Dauer:	

25. Wie alt waren Sie zu Beginn der Retentionsphase und wie lange hat diese Behandlungsphase gedauert?
(Wenn Sie noch nicht in dieser Behandlungsphase sind, antworten Sie bitte mit NEIN zum Alter und Dauer)

Alter:	
Dauer:	

26. Wie lange hat Ihre Behandlung insgesamt gedauert oder wird dauern?

- ○ Noch nicht in Behandlung
- ○ Bis zu 2 Jahre
- ○ Länger als 2 bis 4 Jahre
- ○ Länger als 4 bis 6 Jahre
- ○ Länger als 6 Jahre

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OP08

27. Wie zufrieden sind Sie mit der KFO-Behandlung?

- ◯ Sehr zufrieden
- ◯ Zufrieden
- ◯ Unzufrieden
- ◯ Sehr unzufrieden
- ◯ Keine Angabe

28. Hat die KFO-Behandlung Ihr Selbstbewusstsein verbessert?

- ◯ Sehr verbessert
- ◯ Verbessert
- ◯ Unverändert
- ◯ Verschlechtert
- ◯ Sehr verschlechtert

29. Wie bewerten Sie Ihren Mundgesundheitszustand jetzt?

- ◯ Sehr gut
- ◯ Gut
- ◯ Normal
- ◯ Schlecht
- ◯ Sehr schlecht
- ◯ Keine Angabe

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OP09

30. Ich besitze die deutsche Staatsangehörigkeit.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

31. Ich bin in Deutschland geboren (heutiges Gebiet der Bundesrepublik Deutschland).

- ○ Ja
- ○ Nein
- ○ Keine Angabe

32. Ich bin nach 1949 nach Deutschland zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

33. Mein Vater ist ausserhalb Deutschlands (heutiges Gebiet der Bundesrepublik Deutschland) geboren und nach 1949 zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

34. Meine Mutter ist ausserhalb Deutschlands (heutiges Gebiet der Bundesrepublik Deutschland) geboren und nach 1949 zugewandert.

- ○ Ja
- ○ Nein
- ○ Keine Angabe

Last Page

Vielen Dank für Ihre Teilnahme!

Wir möchten uns ganz herzlich für Ihre Mithilfe bedanken.

Ihre Antworten wurden gespeichert, Sie können das Browser-Fenster nun schließen.

Zahnärztin Susie Paes da Silva, Poliklinik für Kieferorthopädie, Klinikum der Ludwig-Maximillians-Universität München – 2015-2017

11.3.2 Descriptive Summary Statistics

Variable	Level	Total (n = 50)
Are the symptoms of your disorder so pronounced that your speech is impaired?	Yes	15 (30.0)
	No	35 (70.0)
Do you have/have you repeatedly had problems during your education/training or your job because of your symptoms?	Yes	7 (14.0)
	No	43 (86.0)
Do you have/have you had repeated problems in your social environment due to your symptoms?	Yes	17 (34.0)
	No	33 (66.0)
Which part of your jaw is affected by your symptoms?	Upper jaw	4 (8.0)
	Lower jaw	7 (14.0)
	Both	39 (78.0)
Reasons for treatment and/or surgery:	Appearance	4 (8.0)
	Health	17 (34.0)
	Appearance and health	29 (58.0)
AGE (year) (mean (sd))		28.0 (8.7)
Gender	Male	23 (46.0)
	Female	27 (54.0)
Family status	Single	29 (58.0)
	Long-term partnership	10 (20.0)
	Engaged/married	11 (22.0)
	Widowed	0 (0.0)
	Separated	0 (0.0)
What is your current occupation?	Employee	24 (48.0)
	Civil servant	0 (0.0)
	Self-employed	3 (6.0)
	Education/training/university student	17 (54.0)
	Other	6 (12.0)
How long does it take to get to practice?	Up to 15 minutes	4 (8.0)
	More than 15-30 minutes	18 (36.0)
	More than 30-60 minutes	19 (38.0)
	More than 1-2 hours	7 (14.0)
	More than 2-4 hours	2 (4.0)
	More than 4-6 hours	0 (0.0
From whom were they transferred?	Family doctor	2 (4.0)
	Orthodontist	18 (36.0)
	Dental clinic	7 (14.0)
	"By itself" ("self-transfer")	16 (32.0)
	Oral surgeon	2 (4.0)
	School dentist	2 (4.0)
	Other	1 (2.0)
	NA	2 (4.0)
Why are you in a treatment? (multiple answers)	Aesthetics	27 (54.0)
	Improvement of chewing performance	35 (70.0)
	Pain	15 (30.0)
	Tooth loss	13 (26.0)
	Pronunciation	12 (26.0)
	NA	5 (10.0)
Who bears the orthodontic treatment costs? (multiple answers)	Government	48 (96.0)
	Private	0 (0.0)
	Complement	4 (8.0)
	Self-payment	1 (2.0)
	Public costs	0 (0.0)
	Others	0 (0.0)
	NA	2 (4.0)

Variable	Level	Total (n = 50)
What classification of craniomandibular dysfunction do you have? (multiple answers)	Class II (upper jaw forward and lower jaw backwards)	15 (30.0)
	Class III (upper jaw to the rear and lower jaw to the front)	16 (32.0)
	Open bite	9 (18.0)
	Deep bite	1 (2.0)
	Crossbite	14 (28.0)
	I don‘t know	12 (24.0)
Is the craniomandibular dysfunction part of a syndromic disease?	No syndrome	44 (88.0)
	Syndrome	4 (8.0)
	NA	1 (2.0)
In which treatment phase are you?	Dignathic consultation	0 (0.0)
	Plan discussion	2 (4.0)
	Plan is with health insurance	0 (0.0)
	Orthodontic pretreatment (splint therapy before surgery)	7 (14.0)
	Orthodontic pretreatment (palatal enlargement before surgery)	6 (12.0)
	Main orthodontic treatment (multibrackets before surgery)	12 (24.0)
	Orthodontic treatment (after surgery)	14 (28.0)
	Retention	0 (0.0)
	I don’t know	9 (18.0)
How old were you in the dignathic consultation?	From 10 to 20-years-old	22 (44.0)
	Over 20 to 30- years-old	12 (24.0)
	Over 30-years-old	12 (24.0)
	No	4 (8.0)
How old were you at the plan discussion?	From 10 to 20-years-old	18 (36.0)
	Over 20 to 30-years-old	17 (34.0)
	Over 30-years-old	14 (28.0)
	No	1 (2.0)
AGE: How old were you at the beginning of orthodontic pre-treatment (splint therapy. palatal enlargement or multi-brackets) and how long did this treatment take?	Up 10 years-old	3 (6.0)
	Over 10 to 20-years-old	17 (34.0)
	Over 20 to 30-years-old	13 (26.0)
	Over than 30-years-old	10 (20.0)
	No	7 (14.0)
DURATION: How old were you at the beginning of orthodontic pre-treatment (splint therapy. palatal enlargement or multi-brackets) and how long did this treatment take?	Still in treatment	6 (12.0)
	Up to 1 year	7 (14.0)
	Over 1-5 years	18 (36.0)
	Over 5 years	6 (8.0)
	No	13 (26.0)
AGE: How old were you during the conversion operation?	From 10 to 20-years-old	6 (12.0)
	Over 20 to 30- years-old	12 (24.0)
	Over 30-years-old	7 (14.0)
	No	25 (50.0)
AGE: How old were you at the beginning of post-surgical orthodontic treatment and how long did this treatment take?	From 10 to 20-years-old	5 (10.)0
	Over 20 to 30- years-old	7 (14.0
	Over 30-years-old	9 (18.0)
	No	29 (58.0)
DURATION: How old were you at the beginning of post-surgical orthodontic treatment and how long did this treatment take?	Still in treatment	6 (12.0)
	Up to 1 year	7 (14.0)
	Over 1-5 years	2 (4.0)
	Over 5 years	0 (0.0)
	No	35 (70.0)
AGE: How old were you at the beginning of the retention phase and how long did this treatment take?	From 10 to 20-years-old	0 (0.0)
	Over 20 to 30- years-old	3 (6.0)
	Over 30-years-old	2 (4.0)
	No	45 (90.0)
DURATION: How old were you at the beginning of the retention phase and how long did this treatment take?	Still in Retention	1 (2.0)
	Up to 1 year	1 (2.0)
	Over 1-5 years	0 (0.0)
	Over 5 years	0 (0.0)
	No	48 (96.0)

Variable	Level	Total (n = 50)
How long has your treatment taken or will take?	Not yet in treatment	6 (12.0)
	Up to 2 years	5 (10.0)
	Longer than 2 to 4 years	28 (56.0)
	Longer than 4 to 6 years	6 (12.0)
	Longer than 6 years	5 (10.0)
How satisfied are you with the orthodontic treatment?	Very satisfied	22 (44.0)
	Satisfied	24 (48.0)
	Dissatisfied	0 (0.0)
	Very dissatisfied	2 (4.0)
	No information	2 (4.0)
Has orthodontic treatment improved your self-esteem?	Improved a lot	6 (12.0)
	Improved	24 (48.0)
	Unchanged	19 (38.0)
	Worsened	1 (2.0)
	Worsened a lot	0 (0.0)
	NA	0 (0.0)
How do you rate your oral health status so far?	Very good	3 (6.0)
	Good	18 (36.0)
	Normal	24 (48.0)
	Bad	2 (4.0)
	Very bad	0 (0.0)
	NA	3 (6.0)
Migration background	German	27 (54.0)
	Non-German/Immigrant	21 (42.0)
	NA	2 (4.0)

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