

Diplomarbeit

**SELBSTEINSCHÄTZUNG IN DER
KIEFERORTHOPÄDIE
Und mögliche bestimmende Faktoren**

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Zusammenfassung

Hintergrund: Die beabsichtigte Studie widmet sich der subjektiven Wahrnehmung dentaler Ästhetik. Diese gewinnt im gesellschaftlichen Wandel neben medizinischen Parametern für eine kieferorthopädische Behandlung zunehmend an Bedeutung.

Ziel: Die vorliegende Arbeit geht der Frage nach, in wieweit jugendliche PatientInnen und ihre Eltern einerseits und zahnmedizinisches Fachpersonal andererseits in der Einschätzung der dentalen Ästhetik übereinstimmen.

Material und Methoden: Die *Ästhetic Component* des *Index of Orthodontic Treatment Need* (IOTN) wurde als Marker für die subjektive Einschätzung der dentalen Ästhetik eingesetzt. Diese wird anamnestisch routinemäßig im Rahmen der kieferorthopädischen Erstberatungen von PatientInnen und Begleitpersonen erhoben. 145 Anamnesebögen aus den Jahren 2008 bis 2010 und deren zugehörigen Intraoralfotos liefern die entsprechenden Daten zur Selbsteinschätzung. In der Folge wird die Übereinstimmungen zwischen PatientInnen und deren Begleitpersonen einerseits und PatientInnen und zahnmedizinischem Fachpersonal andererseits geprüft. Zu letzterem zählen 8 zahnärztlichen FachassistentInnen, 1 Kieferorthopädin und die Diplomandin selbst, welche die entsprechenden intraoralen Patientenfotos einem Wert auf der 10teiligen Fotoskala der *Aesthetic Component* des IOTN zuordnen.

Ergebnisse: Von 131 auswertbaren Anamnesebögen von PatientInnen im Alter von 5,4 und 43,6 waren 91 (63%) weiblich und 54 (38%) männlich. 38 (26%) der untersuchten PatientInnen hatten eine vorangegangene kieferorthopädische Behandlung vornehmlich mit abnehmbaren Apparaturen. 75 (52%) der Begleitpersonen waren Mütter und 13 (8%) waren Väter. Die subjektive Einschätzung der dentalen Ästhetik durch die PatientInnen ergab einen mittleren Wert von 3 auf einer 10 teiligen Skala. Den gleichen mittleren Wert, jedoch mit grösserer Streuung, zeigte die Beurteilung durch die Begleitperson und Kieferorthopädin. Die Studentin und das zahnärztliche Hilfspersonal gesamt benotete mit einem Punkt höher (schlechtere dentale Ästhetik) und mit grösserer Spannweite. Assistentinnen beurteilten die Fotos von PatientInnen sehr unterschiedlich mit Ausnahme von zwei Beurteilerinnen aus dieser Gruppe, deren mittlere Beurteilung mit der von PatientInnen und Kieferorthopädin übereinstimmte. Um die Unterschiede und Übereinstimmungen zu beurteilen wurden die Einschätzungen mittels „intraclass correlation coefficient“ (ICC) paarweise verglichen. Die beste Übereinstimmung wurde zwischen PatientInnen und Begleitperson (0,58) sowie innerhalb der zahnärztlichen

Helferinnen (0,59) gefunden. Die geringere Übereinstimmung in der Beurteilung zwischen Kieferorthopädin und PatientInnen (0,24) war signifikant. In der Unterschiedstestung ergab dieser Vergleich jedoch keine signifikanten Ergebnisse. Um die Signifikanz zu erreichen ist eine Fallzahlplanung mit 328 in jeder Gruppe errechnet worden.

Diskussion: Die Teilnahme von mehr weiblichen als männlichen Personen an dieser Untersuchung lässt wage auf eine größere Betroffenheit betreffend die dentale Ästhetik für Frauen schließen, was nur in einer prospektiven Studie mit randomisierter Fallauswahl bestätigt werden könnte. Die Perspektive von PatientInnen deckt sich am ehestens mit der von Angehörigen, was in erster Linie auf pädagogische Beeinflussung und gleiche Standesherkunft zurückzuführen ist. Die unterschiedliche Bewertung von Betroffenen und kieferorthopädischem Personal spiegelt deren unterschiedlichen Standpunkt wider: auf der einen Seite der hilfeschuchende Patient mit Begleitung, auf der anderen Seite diagnostisch und therapeutische geschultes Personal. Es ist anzunehmen dass dieses Wissen in die Beurteilung mit einfließt.

Konklusion: Die vorgestellte Hypothese konnte mäßig bestärkt werden: die Selbst-Einschätzung und Fremd-Einschätzung der dentalen Ästhetik stimmt in vielen Fällen a) mit der Wahrnehmung durch Familienangehörige und b) etwas weniger häufig mit der Einschätzung durch die Kieferorthopädin überein. Zahnärztliche Assistentinnen haben offensichtlich einen ganz anderen Blickwinkel, stimmen jedoch untereinander überein. Die Beurteilung von PatientInnen und Begleitpersonen hatten die größte Übereinstimmung. Das leitet zur Schlussfolgerung, dass die PatientInnen durch Familienmitglieder, gleichaltrige Freunde und Mitschuler, Medien und andere Faktoren der Sozialisierung beeinflusst sind und dieser Blickwinkel sich vom therapeutischen unterscheidet. Die Ergebnisse sollten in prospektiven Studien mit genügend hohen Fallzahlen geprüft werden.

Abstract

Background: The thesis deals with the subjective perception of dental aesthetics, which, together with the medical parameters for orthodontic treatment, is gaining in importance in the modern society.

Aim: The main aim of the thesis is to find the agreement between the young patient's self-perception on one hand, and the accompanying person's and orthodontic team's assessment of the patient's state on the other hand.

Materials and Methods: The *Aesthetic Component of Index of Orthodontic Treatment Need (IOTN)* was used as a marker for the subjective perception of dental aesthetics. On the first orthodontic examination and consultation as a part of the anamnesis, the anamnesis questionnaire with the Aesthetic Component was filled out routinely by patients and accompanying person. The needed data for the self-perception were gathered with the help of 145 anamnesis questionnaires, filled out in years 2008-2010, and patients' intraoral-photos. Then the agreement between patients and accompanying persons on one hand, and orthodontic team on the other hand, was tested. Orthodontic team represented by 8 dental assistants, a orthodontist and a student of dental medicine evaluated the patients' intraoral-photos with a grade on the 1-10 photo scale of *Aesthetic component* of IOTN.

Results: Among 131 evaluable anamnesis questionnaires of the patients in the ages between 5.4 and 43.6, 91 (63%) were females and 54 (38%) were males. 38 (26%) examined patients have undergone orthodontic treatment, most of them with removable orthodontic appliance. 75 (52%) accompanying persons were mothers and 13 (8%) were fathers. The patients' subjective self-perception of dental aesthetics averaged with 3 out of 10 grades as to the Aesthetic Component of IOTN. The orthodontist's and accompanying person's evaluation was of the same grade, but in greater range. The student's and dental assistants' evaluation was in average for one grade higher (worse dental aesthetic) and with wider range. Dental assistants' evaluations of the photos varied a lot, with exception of 2 dental assistants, whose evaluation, in average, was the same as the evaluation of patients and an orthodontist. In evaluating the agreements and differences of dental aesthetic perceptions, the "intra-class correlation coefficient" (ICC) was used in order to compare the perceptions in pairs. The best agreement was found between patients and accompanying persons (0.58) and in the group of dental assistants (0.59). The agreement between patients and orthodontist (0.24) was significantly lower. By testing differences, no significant results were found. To reach the significance, the sample size should be 328 in each group.

Discussion: Among all participants, there were more women, what makes it difficult to generalise the results. However, this fact leads to a possible indication that women are more concerned about aesthetics and dental aesthetics. This presumption could be proved through prospective research including greater sample size. The greatest agreement with patients' perception was found in the group of accompanying persons, due to the educational influence and the same origin. The difference between patients' perception and the assessment of the orthodontic team reflects different point of view: patient with accompanying persons on the one hand, and diagnostics and therapy specialized and educated staff on the other hand. We could presume that the knowledge influences the evaluation and perspective.

Conclusion: The presented hypothesis can be moderately supported: the self-perception and foreign assessment often agree a) with the family members' assessment and b) less often with orthodontist's assessment. Dental assistants have obviously completely different point of view from the other participants of the research, however, there is a high agreement among them. The highest agreement was observed between patients and accompanying persons. This leads to a conclusion that patients have been affected by family members, peers, media and other social factors influencing the children and that there is a difference between their point of view and state of mind and the orthodontic staff's sight. The results have to be proved in prospective research with greater sample size.

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Glossar und Abkürzungen

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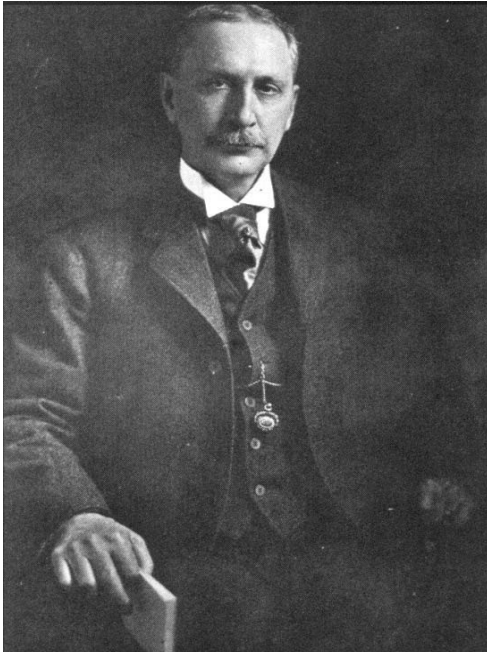
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1. INTRODUCTION

1.1 DENTAL AESTHETICS IN A HISTORIC VIEW



“Beauty is a greater recommendation than any letter of introduction.” Aristotle said. A statement that is true nowadays where attractive and beautiful people are more successful and getting better chances and-, what they say is a halfway to achievement. Dentists and Orthodontist can greatly influence patients’ smiles, appearance and subsequently -patients’ self- confidence.

Figure 1: Dr.Edward H.Angle

The concept of what exactly constitutes the „orthodontic treatment“ originates over a100 years ago and was well described by Angle. ¹

He believed and taught that an ideal or anatomically correct occlusion was essential for the optimum functioning, stability and aesthetics of the dentition. In his beliefs every single tooth had an essential role for maintaining occlusal harmony (that is why he excluded any kind of extraction, as they might destroy the occlusal balance). Considering that observational deduction was the main source of information about orthodontics in time of Angle- it can be said that his observations and assumptions were thus incorrect. ²

¹ (Angle E.H. 1907)

² (McGrath, Bedi R. 2003)

1.1.1 Importance of dentition (Function versus aesthetics)

The initial question of different studies will deal with the necessity of determining whether there are any prominent arguments-, why comfortable functioning of the dentition when eating, speaking and socialising would be important for our quality of life. Research shows that nowadays people eat mostly food-, which needs little or no mastication for efficient digestion in fact-mastication may be now more a pleasure than a necessity for digestion, even for people with severe malocclusions and cleft palates.³

1.1.2 The importance of the aesthetics

“Achieving a good aesthetic result from orthodontic treatment has always been a high priority.” Angle acknowledged this in 1907 and in 1930 Casto said, ‘Aesthetics is the primary objective of treatment’. 1993, Goldstein considered aesthetic dentistry as a health service. Cerny (2005) found that when patients, parents and dentists were asked why they wanted or recommended orthodontic treatment, 95 per cent of the public and 60 per cent of dentists did so for the aesthetic benefit. “The majority of people acknowledge that orthodontic treatment is primarily about aesthetic enhancement of the face and smile. In most cases, people want the orthodontic treatment because of the three main reasons; aesthetics, aesthetics and aesthetics.”⁴

Aesthetics has become a very important issue in modern society. The perception of beauty is an individual preference that may be influenced by training, cultural and ethnic factors. Although perception of misalignment of the teeth is influenced by aesthetic norms in the society, it is also related to individual psychological factors and norms for dental attractiveness. For example: while dental spacing, or so called Diastema is significantly disapproved in Caucasian cultures it is believed to be a desirable sign of beauty in many African cultures, although there is no published report to support this belief. There were and some still are -women following the Ohaguro –fashion (or trend) - of dyeing one’s teeth black in Japan, south-eastern China and south-east Asia till Meiji Era. Pitch black such as glaze like a lacquer was seen as beautiful.⁵

³ (Byrne B.M. 1984)

⁴ (Cerny 2005)

⁵ (Klages, Bruckner & Zentner 2004)



Figure 2:Ohaguro



Figure 3:Diastema

Individual perception seems to define one's character. It influences patient's self-esteem, self- image, personal aesthetic satisfaction, behavior and the acceptance in the society. It is one of the numerous things that modern society requests in order to be as close to ideal as possible. The more of those requests you fulfill, the more chances for success you will have.⁶ It has been shown that individuals with facial deviations were often subject to teasing, nicknaming, and social discrimination. That is why aesthetics have become very important for patient's physical, social and psychological well- being.⁷

In Tanzania however, it is common to see people of different age and varying levels of socioeconomic background smiling, untroubled by severe occlusal irregularities from professional point of view.⁸

⁶ (de Paula Junior et al. 2009)

⁷ (Neumann, Christensen & Cavanaugh 1989)

⁸ (Mugonzibwa et al. 2004)

It was also shown, that the relationship between dental aesthetics and oral- health related quality of life is not negligible. Dental aesthetics has direct and moderating influence on private and public self consciousness and direct influence also on all oral- health related quality of life scale values.⁹

Dento-facial aesthetics is one important motivational factor to seek orthodontic treatment and, therefore, an improvement in appearance should be an essential treatment goal. Personal aesthetic perceptions of the dento-facial complex and the associated psychosocial need are relevant to the consumers of orthodontic care.¹⁰ Treatment is therefore often influenced more by demand than by need. Social appearance concerns were related to private self-consciousness, while both social appearance concerns and appearance disapproval were associated with public self- consciousness.

However, the concern with dental aesthetics is not just one adult's expression. There is a broad range of factors that have an impact on self-confidence of an adolescent. This impact is created by how an individual perceives dental aesthetics i.e.-the severity of malocclusion- tooth color- poor tooth alignment- crowding- oral health-related quality of life and figure.¹¹

1.1.3 Facial and dental aesthetics

Having stated the entire thesis, I have to ask myself which features of the dentition are the most important when it comes to socializing. Psychosocial studies have discovered that the aesthetics of a face is enhanced by a beautiful smile and by straight upper anterior teeth, the so- called “social six”. According to R. Keim, the teeth and the smile are essential to facial attractiveness.¹² According to Samoroditzky-Naveh, the “dominant facial features” are the smile with its components: teeth, gingiva and lips, also the eyes and the facial frame.¹³

It has been noted that people with attractive dentition are considered to be more popular, find it easier to gain positive attention and even have greater chances of employment. Some studies describe these people having a higher self-esteem in comparison with the

⁹ (Bernabe et al. 2008)

¹⁰ (Birkeland, Boe & Wisth 2000)

¹¹ (Bernabe et al. 2008)

¹² (Keim R.G. 2005)

¹³ (Samorodnitzky-Naveh, Geiger & Levin 2007)

people with unattractive dentitions. The arrangement of the “social six” is the most important aesthetic aspect of the dentition.¹⁴

A research conducted in the Netherlands concluded that the perception of facial aesthetics strongly determines social behavior.¹⁵

1.1.3.1 Importance of dental and facial aesthetics

“Facial appearance not only appears to be an influential feature in being asked as a dating partner, but handsome people are also thought to have nicer personality”. Furthermore, these are expected to be more intelligent, which implies a higher educational potential, and to have more socially desirable characteristics. Studies which specifically focused on the presumption of personal characteristics show a relation to dento - facial appearance. Some have shown that attractive people are supposed to be more extrovert, more interesting, and of a higher social class. Those results confirm that facial attractiveness is of great influence to our daily social interactions.¹⁶

1.1.3.2 Facial features

One interesting question sets itself up constantly in the scientific literature on orthodontics; which facial features determine such interpersonal judgements? Is it the eyes, the dental position, the symmetry of face or a combination of several facial features?

Male and female evaluators agree on the importance of features, such as inter-eye distance, face length, face width, mouth size and cheek position.¹⁷ Features, such as prominent cheek-bones, square jaws, or a large chin, so called “mature” features, and are positively linked with attractiveness of males. On the contrary “juvenile” features, such as large and wide eyes, greater inter-eye distance, a small chin and wide smile contribute to the attractiveness of females. Research over the last decades revealed different perceptions. For example, studies of Cunningham (1986) and Meredick et al (1990) agree with the importance of nose size and cheek width in the perception of facial attractiveness. However, they disagree in that **eye size, face length and eyebrow-shape** can influence a person’s perception of facial attractiveness. The colour of one’s hair, the eyebrow height,

¹⁴ (Cerny 2005)

¹⁵ (Bos, Hoogstraten & Zentner 2010)

¹⁶ (Julie C. Faure, Carolien Rieffe & Jaap C. Maltha 2002)

¹⁷ (Julie C. Faure, Carolien Rieffe & Jaap C. Maltha 2002)

the eye placement and the width of the smile are other examples of features of contradictory opinions.

3. Facial symmetry and average features have also been studied, but the results have led to some contradictory results. Some features from several individual faces have been put together to make up one face. Such a face possesses the average features of the selected group. Some argue that a degree of averageness and symmetry in faces are essential in perception of attractiveness. Some researchers have found that symmetry and averageness of face features are indeed perceived as more attractive. However their conclusions have not been confirmed by others, which found average faces as less attractive or concluded that facial attractiveness was independent of facial symmetry. ¹⁸

4. In orthodontics, studies on the relationship between different growth directions of mandible and the attractiveness of the profile have shown that a straight profile with normal vertical dimensions and a horizontal mandibular direction is considered as facial attractive. The least appreciated profile is a long face with a more vertical mandibular plane and a large lower face height.

5. Other studies have dealt with the importance of the oral area in an attempt to categorize dental preferences. It appears that missaligned anterior teeth, with severe crowding or a median diastema have a negative influence on the attractiveness and seem to be more important than inter-arch disharmonies, such as an overjet or maxillary protrusion. ¹⁹

6. According to Croatian researchers (Čala Luka, Špalj Stjepan et al., 2007) is the eugnathic facial profile is the most preferred profile, whereas the retrognathic profile with a combination of a prognathic maxilla and a retrognathic mandible is the least preferred profile among both male and female profile proportions. ²⁰ More research was conducted to see which part of the face is the most important to patients: teeth and eyes were rated as the most important features for an attractive face. Women rated teeth and hair higher than men. ²¹

7. Furthermore, a bimaxillary protrusive profile with thicker lips was considered more attractive among women profiles, whereas a bimaxillary retrusive profile with flat lips and prominent chin was considered more attractive among men profiles. Orthodontic history and the type of facial profiles had little effect on facial profile preferences. In the past, function had priority than dental aesthetics was. The harmony between the dominant

¹⁸ (Julie C. Faure, Carolien Rieffe & Jaap C. Maltha 2002)

¹⁹ (Shaw et al. 2007)

²⁰ (Spalj et al. 2009)

²¹ (Julie C. Faure, Carolien Rieffe & Jaap C. Maltha 2002)

features of a face contributes to a beautiful face. The “Facial dominant features” are the smile with its components: teeth, gingiva and lips, as are also the eyes and the facial frame.²²

Nowadays more and more patients are seeking help in dental aesthetics and orthognathic surgery, because the face and the mouth with the teeth are two of the first things we notice in the person’s outside.²³

1.1.4 Measuring dental aesthetics

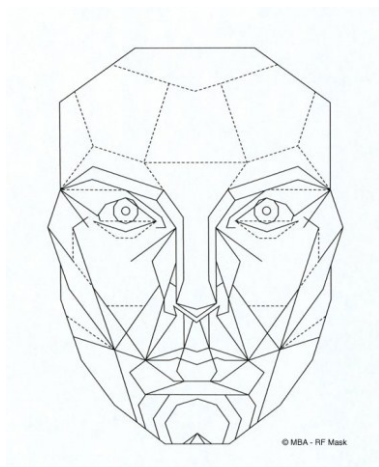


Figure 4: The beauty mask

It is difficult to measure what exactly “dental aesthetics” means. There exist some good determinants for measuring what good dental function and stability are, but how can we measure aesthetics? Aesthetics is a judgmental commodity and underlies variability of individual judgments. (Beauty is in the eye of beholder.) This makes aesthetics difficult to generalize²⁴. “It has been stated that beauty defies measurements.” Orthodontists and

craniofacial biologists indulge in scientific investigations to define and redefine dento-facial aesthetics. There has always been a big dilemma whether the rating method is capable of measuring perceptions of aesthetics in a valid way or could it be that the beauty of one’s face and one’s smile really is immeasurable.²⁵

1. For over 2000 years, many artists and scientists have tried to understand or quantify the form of a perfect, an ideal, or the most beautiful face both in art and in society. A mathematical factor has consistently and repeatedly been reported to have been present in beautiful things. This particular factor is the golden ratio. It is a **mathematical ratio of 1,618:1** that seems to appear recurrently in beautiful things in nature as well as in other things that are seen as beautiful. Dr. Marquardt brought the so called „facial golden mask« that contains and includes all of the one-dimensional and two-dimensional geometric golden ratio elements of the human face.(Schabel et al. 2009)

²² (Samorodnitzky-Naveh, Geiger & Levin 2007)

²³ (Sherlock, Cobourne & McDonald 2008)

²⁴ (Graber, Lucker 1980)

²⁵ (Schabel et al. 2009)

2. Both, "**Golden Proportion**" and "**Beautiful Proportion**" manage to find a rational, physically measurable definition of beauty. *»Beauty is that pleasant experience seen with subjective senses, interpreted by our associations, filtered by a philosophy of life, capturing our imagination through variety and distortion, and felt by intuition. The essence of beauty has been sought since the beginning of time«.*

»Lombardi defined 'dental aesthetics' by the way things were perceived visually. Visual

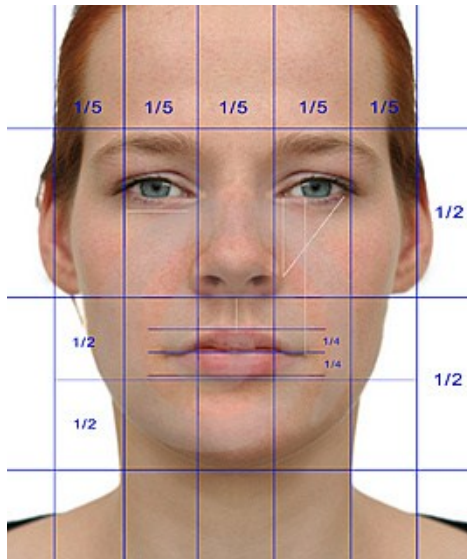


Figure 5: Golden Proportion

perception could be divided into two categories: composition and proportion. Composition was the way color; contour and texture are related to one another. Proportion was defined as balance, symmetry, parallel lines, curves and how they work together. The aesthetics of the face were said to encompass three views: the facial, the dento-facial and the dental views. The most important element is the facial composition. This composition influences most patients' concept of an aesthetic smile. From the normal distance at

which one focuses on a person's face, the dentition appears white and straight. However, upon closer examination, the teeth are not straight they exhibit distinct proportions, characterizations and embrasures. The second component in anterior dental aesthetics is the dento-facial composition (i.e., orofacial view). The constituents of the element are the oral orifice, the highly vascularised red lips, and the teeth, which act as a gate or entrance to the oral cavity. The dento-facial view involves the teeth and the surrounding structures of the gingivae and the lips. Rufenacht described this view as a coincidence of curves created by the contact points, incisal edges and the lower lip. It is important to evaluate the amount of teeth that are exposed when smiling and at rest²⁶

²⁶ (Schabel et al. 2009)

1.1.4.1 Measurements- Index

Nowadays the results for measuring dental aesthetics are mainly gained with the help of IOTN (index of orthodontic treatment need), AC (aesthetic component), VAS (visual analogue scale) and Q-sort assessment, OHR-QL (oral health related quality of life) and with questionnaires for subjective orthodontic treatment need and demand.

1.1.4.1.1. The index of orthodontic treatment need (IOTN)

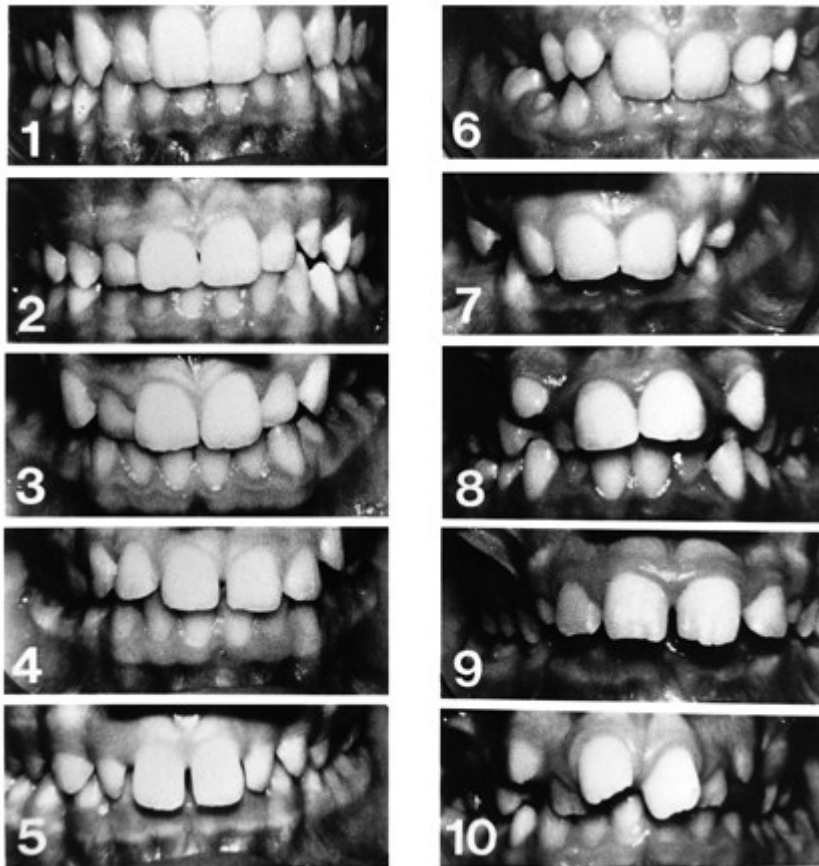
This is an index to measure orthodontic treatment need, developed by Brook and Shaw (1989)

The index consists of two components:

- a) **Dental Health Component (DHC):** is divided in 5 grades and is used to record the functional and dental health indications for orthodontic treatment. Grade 5 represents a very great treatment need, while grade 1 represents no treatment need.

- b) **Aesthetic component (AC):** is used to record the aesthetic impairment of malocclusion to the individual. The construction of the scale was made of 10 photographs, which represent the range of dental aesthetics. Photo 1 represents the most attractive dentition, while photo 10 represents the least attractive. The selection of a photo from the scale means that is that photo that best represents the overall degree of attractiveness of the actual dentition. It evaluates 10 occlusal characteristics: overjet, negative overjet, tooth loss, diastema, anterior open bite, anterior crowding, anterior diastema, width of the anterior irregularities (mandible and maxilla) and antero-posterior spring relationship. More details to the grades of aesthetic index of IOTN.

Figure 6:Aesthetic Index



(Sanjeev Soni, Pancham Aggarwal, Vinay S Dua 2011)

1.1.4.1.2. Visual analogue scale (VAS):

Visual analogue scale is a psychometric response scale allowing the discrimination of the self-perceived dental appearance between orthodontic treated and untreated subjects. It can be used in questionnaires. It is a measurement instrument for

defining subjective characteristics or attitudes that cannot be directly measured. When responding to a VAS item, respondents specify their level of agreement to a statement by indicating a position along a continuous line between two end-points. VAS is usually a horizontal line, 100mm in length, anchored by word descriptors at each end. The patients mark the point that they feel represents their perception of their current state on the line. The VAS score is determined by measuring in millimetres from the left hand end of the line to the point that patient marks. Even though such assessment is clearly highly subjective, these scales are of high value when looking at change within individuals, and are of low value when we compare different individuals within a group at one point in time.

1.1.4.1.3. Q-Sort Assessment:

9- Point ordinal ranking technique allows the ranking of many objects on basis of various subjective criteria.²⁷

1.1.5. Perception of aesthetics

Firstly, researchers found that the satisfaction with dental appearance is most strongly influenced by age, gender, the presence of discoloured teeth and restorations. (Christopherson, Briskie & Inglehart 2009)

Secondly, Croatian researchers found that the orthodontic treatment need and the child self- perceptions varied according to the children's age, gender, ethnicity/ race, pre-treatment and socio-economical status. Gender was a weak factor in the perception of the overall self-image, but it was gender that was significant in predicting a child's satisfaction with his/her oral appearance. Gender is considered as a factor that has slightly bigger influence on the facial profile scores than orthodontic treatment or personal profile type have.²⁸

Studies have shown that over-jet and its influence on facial features appears to be of key importance to females, while dental crowding is important to males. This difference between genders probably arose due to the fact that standards for acceptable facial form are

²⁷ (Schabel et al. 2009)

²⁸ (Spalj et al. 2009)

more clearly delineated for females. Consequently deviations in dental form that adversely influence the facial outline are more important to girls than boys.

Age was also a significant predictor of satisfaction with dental aesthetics, along with gender and discoloration.²⁹

Socio- economically disadvantaged people from minority backgrounds have limited or no access to orthodontic treatment. That is sometimes why the disadvantaged people want the unreachable treatment more. A research conducted by The American Association of Public Health Dentistry shows, that children with lower social-economical status wanted braces more than the children with higher socio-economical.³⁰

Another research conducted, this time, by the University of North Carolina that the only statistically significant predictor when looking into the self-concept as a whole or at single features of it competence emotional comprehension and the academic and physical domains of it, is the self-perception of dento-facial region. The further argue that age, parental marital status, and the adolescent's self perception of the dento-facial region are statistically significant predictors of one's social self-concept. The non-significant factors associated with levels of treatment need were defined by the Peruvian university as influenced by sex, age and socio-economical status.³¹

Studies supervised by K. Birkeland (University of Bergen, Norway), revealed that gender difference play a role in the degree of improvement of the self-esteem correlated with orthodontic treatment. The research also concluded that there were more females who perceived themselves as having less attractive dentition and greater treatment need despite having no objective evidence to support this feeling.³²

The same thing was evidenced in A. Holmes' research, where women were less satisfied with their dental appearance than males, despite the lack of evidence of a greater treatment need. In fact, the subjective treatment need, the demand and the dissatisfaction with facial appearance were higher with females.³³

1.2. PSYCHOLOGY

²⁹ (Graber, Lucker 1980)

³⁰ (Christopherson, Briskie & Inglehart 2009)

³¹ (Holmes 1992)

³² (Birkeland, Boe & Wisth 2000)

³³ (Holmes 1992)

1.2.1. Self-esteem

In the long history of psychology three major types of self-esteem have been determined, each of which has generated its own tradition of research, findings and practical applications.

1. The basic definition presents self-esteem as a ratio between one's success in important areas of life and the failure in them or one's desire to succeed. Problems with this approach come from making self-esteem contingent upon success: that implies inherent instability because failure can occur at any moment.
2. In the mid 1960's Morris Rosenberg and social-learning theoreticians defined self-esteem in terms of a stable sense of personal worth or worthiness (see: Rosenberg Self-esteem scale). This became the most frequently used definition of self-esteem, but still some problems of boundary definition remain. By making self-esteem indistinguishable from such behavior as narcissism or simply bragging, the boundaries become unclear.

Nathaniel Branden in 1969 briefly defined self esteem as "... the experience of being competent to cope with basic challenges of life and being worthy of happiness". This two-factor approach, as some also called it, provides a balanced definition that seems to be capable of dealing with limits of defining self-esteem primarily in terms of competence or worth alone.³⁴

Branden's (1969) description of self-esteem includes the following primary properties:

1. "Self-esteem as a basic human need, i.e."...it makes an essential contribution to the life process"...is indispensable to normal and healthy self-development, and has value for survival."
2. Self-esteem as an automatic and inevitable consequence of the sum of individual choices in using their consciousness.
3. Self-esteem is something that is experienced as a part of, or background to, all of the individuals' thoughts, feelings and actions.
4. Self esteem is a concept a part of one's personality and for it to grow we need to have self worth – the feeling of self worth will result in successfully embracing challenges.

³⁴ (Mark R. Leary, June Prince Tangeny 2003, Mark R. Leary, June Prince Tangeny 2003)

Many early theories suggested that self-esteem is a basic human need or motivation. Abraham Maslow, an American psychologist, for example, included self-esteem in his famous hierarchy of needs. He described two different forms of esteem: the need for respect from others and the need for self-respect, or inner self-esteem. Respect from others entails recognition, acceptance, status, and appreciation, and was believed to be more fragile and easily lost than inner self-esteem. According to Maslow, if the self-esteem need is not fulfilled, individuals will be driven to seek it and thus unable to grow and obtain self-actualization.³⁵

Modern theories of self-esteem explore the reasons why humans are motivated to maintain a high regard for them. The sociometer theory argues that self-esteem evolved in order to check one's level of status and acceptance in ones' social group. According to the terror management theory, self-esteem serves as a protective function and reduces the anxiety about life and death.³⁶

³⁵ (Maslow A.H. 1987)

³⁶ (Greenberg J. 2008)

FIGURE 6.1 The Rosenberg Self-Esteem Scale

Circle one response for each of the following ten items.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. I feel that I am a person of worth, at least on an equal basis with others.	1	2	3	4
2. I feel that I have a number of good qualities.	1	2	3	4
*3. All in all, I am inclined to feel that I am a failure.	1	2	3	4
4. I am able to do things as well as most other people.	1	2	3	4
*5. I feel I do not have much to be proud of.	1	2	3	4
6. I take a positive attitude toward myself.	1	2	3	4
7. On the whole, I am satisfied with myself.	1	2	3	4
*8. I wish I could have more respect for myself.	1	2	3	4
*9. I certainly feel useless at times.	1	2	3	4
*10. At times I think I am no good at all.	1	2	3	4

*Items marked with an asterisk have reversed wording. The numbers on items with reversed wording should be reversed before summing the responses for the ten items. For example, on item 3, "strongly agree" becomes 4, "agree" becomes 3, "disagree" becomes 2, and "strongly disagree" becomes 1.

Source: Morris Rosenberg's "Self-Esteem Scale" from pp. 325–327 of *Society and Adolescent Self-Image*. © 1989 by Morris Rosenberg, Wesleyan University Press.

Figure 7: Morris Rosenberg's Self-Esteem Scale

1.2.2. Self concept

Self concept is a mental representation we have of ourselves. What is the difference between me and the others? How do I look like? What am I doing? ³⁷

Self-concept is a construct of more dimensions that refers to an individual's perception of "self" in relation to any of these characteristics: academics (and non-academics), gender roles and sexuality, racial identity, etc. ³⁸

In comparison to self-esteem, self-construct is more general, because it is a purely evaluative element of the self-concept. Self-assessment is the relatively permanent composition of self-concept represented by many features, such as personal and physical attributes, awareness and knowledge of someone's skills, abilities and occupations, and hobbies. ³⁹

1.2.3. Self-awareness

The Self-Awareness Theory

The self-awareness theory states that when we are focused on ourselves, we evaluate ourselves and we compare our current behavior to our internal standards and values. During the process of growing-up we become self-conscious as objective evaluators of ourselves.

1.2.4. Self-reflection

Self-reflection is a kind of a general opinion one has of one's social environment. However, some deviations occurred while assessing this general opinion of the social environment.

Shrauger and Schoeneman (1979) constructed a theory on the basis of the results of their research. The theory argues that subjects "see" themselves more in the way they think they

³⁷ (Dieter Frey, Martin Irle 2002)

³⁸ (Mark R. Leary, June Prince Tangeny 2003)

³⁹ (Fleming J.S., Courtney B.E. 1984)

are, and not so much as they think others see them, and even less than others actually perceive them.

Kenny and DePaulo (1993) and also Felson (1993) pointed out that one's self-perceptions do not come from their beliefs about how others view them (i.e., their meta-perception); rather do their meta-perceptions originate directly from their self-perception. In other words, people directly observe their own behavior and infer conclusions of what others probably think of them.⁴⁰

2. HYPOTHESES AND STUDY AIMS

2.1. MAIN AIM OF THE STUDY

The main aim of the thesis is to find the difference regarding dental aesthetics between self (patient's) – and perception of an accompanying person and orthodontic. The thesis includes men and women.

- H 0: There are no differences between patients' self-perception of dental aesthetics (teeth and their alignment) and perception from the sight of their accompanying person (mostly family), dental medicine student and orthodontic team.
- H 1: There are differences between patients' self-perception of dental aesthetics (teeth and their alignment) and perception from the sight of their accompanying person (mostly family), dental medicine student and orthodontic team.

The side aims of the thesis are to find the differences in aesthetic assessment between different educated persons (student/orthodontist, dental assistants/orthodontist, student/dental assistants).

⁴⁰ (de Paula Junior et al. 2009)

3. MATERIALS AND METHODS

3.1. Aesthetic Component of Index Orthodontic Treatment Need

The *Aesthetic Component of Index of Orthodontic Treatment Need* (IOTN) was used as a marker for the subjective perception of dental aesthetics. The anamnesis questionnaire with the Aesthetic Component was filled out by patients and accompanying person routinely at the first orthodontic examination and consultation as a part of the anamnesis. As shown in figure 6 there are grades from 1 to 10, described on the next page.

Grade 1 (No need treatment)

1 Extremely minor malocclusions including contact point displacements less than 1 mm

Grade 2 (Mild/Little need treatment)

2a Increased overjet greater than 3.5 mm, but less than or equal to 6 mm with competent lips

2b Reverse overjet greater than 0 mm but less than or equal to 1 mm

2c Anterior or posterior crossbite with less than or equal to 1 mm discrepancy between retruded contact position and intercuspal position

2d Contact point displacements greater than 1 mm but less than or equal to 2 mm

2e Anterior or posterior open bite greater than 1 mm but less than or equal to 2 mm

2f Increased overbite greater than or equal to 3.5 mm without gingival contact

2g Pre- or post-normal occlusions with no other anomalies

Grade 3 (Moderate treatment need)

3a Increased overjet greater than 3.5 mm, but less than or equal to 6 mm with incompetent lips

3b Reverse overjet greater than 1 mm, but less than or equal to 3.5 mm

3c Anterior or posterior crossbites with greater than 1 mm, but less than or equal to 2 mm discrepancy between retruded contact position and intercuspal position

3d Contact point displacements greater than 2 mm, but less than or equal to 4 mm

3e Lateral or anterior open bite greater than 2 mm, but less than or equal to 4 mm

3f Deep overbite complete on gingival or palatal tissues, but no trauma.

Grade 4 (Great need treatment)

4h Less extensive hypodontia requiring pre-restorative orthodontics or orthodontic spaceclosure (one tooth per quadrant)

4a Increased overjet greater than 6 mm, but less than or equal to 9 mm

4b	Reverse overjet greater than 3.5 mm with no masticatory or speech difficulties
4m	Reverse overjet greater than 1 mm but less than 3.5 mm with recorded masticatory and speech difficulties
4c	Anterior or posterior crossbites with greater than 2 mm discrepancy between retruded contact position and intercuspal position
4l	Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments
4d	Severe contact point displacements greater than 4 mm
4e	Extreme lateral or anterior open bites greater than 4 mm
4f	Increased and complete overbite with gingival or palatal trauma
4t	Partially erupted teeth, tipped and impacted against adjacent teeth
4x	Presence of supernumerary teeth.
Grade 5 (Very great need treatment)	
5i	Impeded eruption of teeth (except for third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause
5h	Extensive hypodontia with restorative implications (more than one tooth per quadrant) requiring pre-restorative orthodontics
5a	Increased overjet greater than 9 mm
5m	Reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties
5p	Defects of cleft lip and palate and other craniofacial anomalies
5s	Submerged deciduous teeth

3.2. Subjects and data collection

This study was performed with 145 photos of the frontal view of human teeth chosen from the database of 260 patients' frontal view photos taken between April 2008 and May 2010. The chosen photos have been numbered according to the patients. Patients were listed in a raw data base, where they've got their serial (ID-) number. These photos, along with the IOTN Aesthetic Index, were used to form different versions of evaluation questionnaires, which were to be filled out by 3 different parties: the doctor- orthodontic specialist, dental medicine student and 8 dental assistants.

Different versions of the questionnaire were set up to obtain the information (evaluations) from the photographed patients' and accompanying person at the orthodontic consultation (mostly family members). These questionnaires included:

- The patients' name (not revealed to research staff),
- The information about their orthodontic therapy (if any), the time of the therapy, and the type of the therapy (fixed or removable).
- Gender
- The relationship between the patient and the person accompanying him/her
- The patients' serial number
- The colours' code : a child escort -yellow, an adult escort -orange, an adult patient-blue, a child patient- green

(Figure 8)

1739

Hier sehen Sie eine Reihe von Fotografien, die eine Skala der Zahnästhetik darstellen.

Nummer 1 ist die schönste und 10 die am wenigsten schöne Anordnung.
Wo würden Sie die Zähne des Patienten, den Sie begleiten, auf dieser Skala einordnen?

Hatte der Patient jemals eine Zahnregulierung? JA NEIN

wenn JA, in welchem Alter? _____

Art der Zahnregulierung:

herausnehmbar ca wie viele Jahre? _____

feststehend (Brackets) ca wie viele Jahre? _____

aus der Sicht von: Mutter Vater Begleitperson

Begleitperson Erwachsene Ästhetik

1739

Hier siehst Du eine Reihe von Fotografien, die eine Skala der Zahnästhetik darstellen.

Nummer 1 ist die schönste und 10 die am wenigsten schöne Anordnung. Wo würdest Du Deine eigenen Zähne auf dieser Skala einordnen?

Hattest Du jemals eine Zahnregulierung? JA NEIN

wenn JA, in welchem Alter? _____

Art der Zahnregulierung:

herausnehmbar ca wie viele Jahre? _____

feststehend (Brackets) ca wie viele Jahre? _____

m f

Patient Kind Ästhetik

Figure 8: Questionnaires

3.3. *Assessment by the orthodontic team*

The questionnaires for the doctor-specialist, student of dental medicine and 8 assistants included:

- The frontal view photo of patients' dentition
- The patients' serial number
- The aesthetic index

(Figure 9)

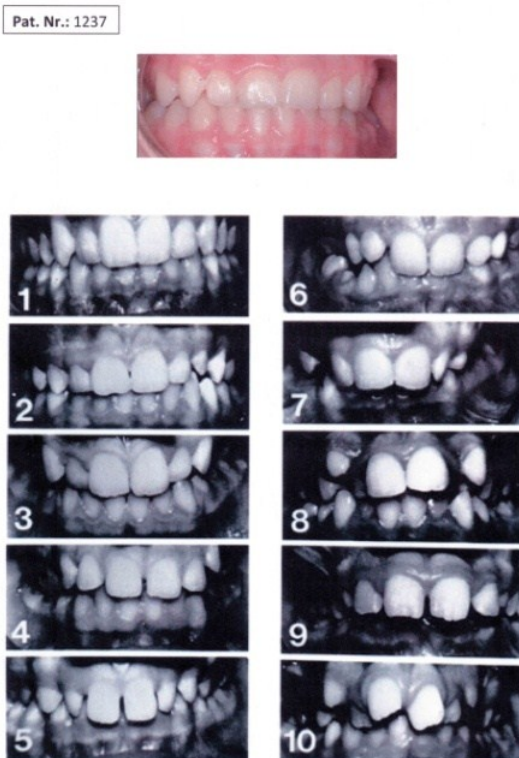


Figure 9: Evaluation-Form

The evaluation had to be conducted in 10 days, and each day 10 patients' photos were to be evaluated, mainly to prevent any kind of misjudgement on account of different factors (for example: exhaustion, tired eyes, and lack of time). The evaluations have been inserted separate in the special tables. Each day of evaluation is presented in its own table, in which the serial numbers of the 10 patients are listed.

For example -picture below:

Nummer	Patientenkennnummer	Beurteilung 1-10 (Ästhetic Index)
1	1030	
2	1036	
3	1037	
4	1038	
5	1039	
6	1046	
7	1054	
8	1058	
9	1061	
10	1065	

2.Tag

Figure 100: Questionnaire 2

The incomplete questionnaires were also included in the research, but only those with an existing frontal view photo. The incomplete data were specified in the Excel-based database with:

Number -998: for no answer

Number -997: for the nonsensical answers

Number -996: for the patients with no escort

Number -995: for any kind of orthodontic regulation

Number -994: for inexact answers

3.4. Data management

Collected data was put into database table, using Microsoft Office for Windows Excel in order to do a statistical analysis, using SPSS for Windows.

On the first page of database is a list of patients' basic data: patients' names with their serial numbers and the exact dates of when the frontal photo was taken.

On the second page there is the answers database, where all items of data needed are listed:

- The serial number (short form: ID),
- The date of birth (DAT),
- The date of the first examination (ERST),
- Gender (SEX),
- The orthodontic regulation (REG)
- The type of the orthodontic regulation (ART),
- The age at first removable orthodontic therapy (AGEF)
- The age at first fixed orthodontic therapy (AGEA),
- The duration of the removable orthodontic therapy (DAUA),
- The duration of the fixed orthodontic therapy (DAUF)
- The escorts (BEG),
- The relationship of the escort to the patient (REL),
- The second escort (BEG2)
- The relationship to the second escort (REL2)
- Self- Evaluation (OWN)
- The doctors-specialists (DOC),
- The evaluation of the patients' frontal photo done by the students of dental medicine (according to the aesthetic index) (DIPL)
- The 8 assistants (AS1-AS8)

On the last page the data with the short forms and type of answers used on the second page are listed. It is in a way an index for the second page.

Figure 11: Excel data-matrix

ID	PAT	DAT	SEX	REG	ERST	ART	AGEA	AGEF	DAUA	DAUF	BEG	REL	BEG2	REL2	OWN	DOC	DIPL	AS1	AS2	AS3
1	989	12.4.1999	1	-996	10.12.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	3	4	2	3	2
2	993	13.1.2003	2	-996	8.9.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	8	10	10	10	7
3	994	19.4.1992	2	-996	30.9.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	3	3	1	4	3
4	994	12.6.1992	2	-996	27.10.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	3	4	2	3	5
5	999	20.7.1997	2	-996	15.9.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	8	10	8	8	10
6	1001	3.9.1999	2	-996	4.11.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	6	2	5	1	2
7	1003	4.7.1981	1	-996	21.10.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	1	1	3	1	1
8	1004	3.11.1991	1	-996	11.10.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	6	6	4	3	4
9	1006	2.5.1998	1	-996	11.10.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	3	5	4	3	2
10	1009	16.12.1999	2	-996	4.2.2010	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	6	8	5	4	9
11	1030	11.11.1998	1	-996	29.10.2009	-996	-996	-996	-996	-996	-996	-996	-996	-996	-996	2	2	3	5	2
12	1036	12.5.1998	1	1	14.11.2009	1	9	-995	2	-995	4	1	-996	-996	-996	3	5	6	10	10
13	1037	9.10.2001	1	0	15.5.2010	-995	-995	-995	-995	-995	5	1	-996	-996	-996	5	9	7	8	5
14	1038	28.5.1996	2	0	12.11.2009	-995	-995	-995	-995	-995	-995	-995	-996	-996	2	3	7	6	7	8
15	1039	18.12.1996	1	0	12.12.2009	-995	-995	-995	-995	-995	3	2	1	1	1	1	1	-998	1	-99
16	1046	3.11.1994	1	1	25.11.2009	1	-998	-995	1	-995	3	-998	-996	-996	6	5	9	9	10	10
17	1054	20.10.1999	1	0	18.12.2009	-995	-995	-995	-995	-995	5	1	-996	-996	5	9	8	8	10	9
18	1058	9.4.1993	1	1	4.1.2010	3	10	8	5	2	1	1	-996	-996	1	2	1	5	3	4
19	1061	11.3.1994	2	1	4.12.2009	1	12	-995	2	-995	3	1	-996	-996	3	4	2	7	6	6
20	1065	28.9.1997	1	0	4.1.2010	-995	-995	-995	-995	-995	3	1	-996	-996	1	6	5	4	5	2
21	1066	29.8.1998	1	0	1.12.2009	-995	-995	-995	-995	-995	6	1	-996	-996	5	2	4	3	5	4
22	1068	-996	2	0	2.12.2009	-995	-995	-995	-995	-995	4	1	-996	-996	3	3	5	3	4	3
23	1069	-996	2	0	2.12.2009	-995	-995	-995	-995	-995	2	1	-996	-996	4	4	2	2	3	10

Figure 12: Index

Fragebogen	REG	ERST	ART	AGEA	AGEF	DAUA	DAUF	DAU	BEG	REL	BEG2	REL2	OWN	DOC	DIPL	AS1-8
5	Zahnregulierung	ja / nein	1/0													
6	Datum der Untersuchung	dd/mm/yyyy	Eingabewert													
7	Art der Zahnregulierung	keine/ herausnehmbar/ festsitzende/beide/andere	0/1/2/3/4													
8	herausnehmbare Zahnregulierung-Alter	Zahl in Jahren	Eingabewert													
9	festsitzende Zahnregulierung-Alter	Zahl in Jahren	Eingabewert													
10	herausnehmbare Zahnregulierung- Dauer	Zahl in Jahren	Eingabewert													
11	festsitzende Zahnregulierung- Dauer	Zahl in Jahren	Eingabewert													
12	Dauer der Zahnregulierung	Zahl in Jahren	Eingabewert													
13	Begleitperson-Einschätzung	Zahl 1-10	Eingabewert													
14	Verhältnis- Begleitperson zum Patienten	Mutter / Vater / Ehemann/ Schwester/andere/keine	1/2/3/4/0													
15	2. Begleitperson	Zahl 1-10	Eingabewert													
16	Verhältnis- Begleitperson zum Patienten	Mutter / Vater / Ehemann/ Schwester/andere/keine	1/2/3/4/5/0													
Aesthetic Index																
17	OWN	Selbsteinschätzung	Zahl 1-10	Eingabewert												
18	DOC	Doktorin- Einschätzung	Zahl 1-10	Eingabewert												
19	DIPL	Diplomandin-Einschätzung	Zahl 1-10	Eingabewert												
20-26	AS1- 8	Assistentinnen-Einschätzung 1-8	Zahl 1-10	Eingabewert												
missing data																
1198,1118, 11	non respondent	keine Antwort, keine Eingabe	-998													
1103	ungültig	kein Sinn	-997													
989-1030	nicht vorhanden	fehlende Daten bzw keine Begleitperson	-996													
1036,1037	nicht relevant	keine Eingabe zur Art der Zahnregulierung bei keiner Zahl	-995													
1170, 1100, 11	nicht exakt	nicht genau beschrieben	-994													

3.5. Ethical considerations

Pseudonymization:

Collected data from questionnaires and intraoral photos, were copied, the names substituted by ID-numbers, which were transferred into Excel data-matrix in the ID-column. Later on, no personal names were used in the study. Only the authorized personell is allowed to identify the patients by their ID-Number

Statement of Ethic committee of the Medical University Graz is attached on the 42thpage of the thesis (Votum-Number: 25-074 ex 12/13), to exhibit the ethical comitement of the thesis procedure.

3.6. Statistical relevant variables

3.6.1. INDEPENDENT VARIABLES

- a) Aesthetic-Index of IOTN of patients
- b) Assessment from the sight of accompanying person
- c) Assessment from the sight of dental assistants
- d) Assessment from the sight of dental medicine student
- a) Assessment from the sight of the orthodontist

3.6.2. DEPENDENT VARIABLES

- Demographic variables:
 - Age of participants
 - Gender
- History of orthodontical treatment:
 - Pre-treatment
 - Kind of orthodontic treatment (fixed/removable)
 - Duration of orthodontical treatment
 - Age at the begin of orthodontical treatment

- Date at the first examination (where also the questionnaire was filled out)- is used for calculate the age of the participant

4. RESULTS

4.1. Demographic characteristics of participating patients and accompanying adult

There were 145 patients included in the research. Out of those 145 patients 86 (63%) were females and 45 (38%) males. Based on 131 respondents that answered the questionnaire, the minimum age was 5.4 and the maximum was 43.6. That makes an average of 15.76 years. Most of the patients were accompanied by an adult. 75 (51.7%) of accompanying adults were mothers. 13 (9%) of accompanying adults were fathers. The rest came with

Table 1: Demographic characteristics of participating patients and accompanying person sister, husband (2) or no

	<i>female</i>	<i>male</i>	<i>Total</i>
participants n(%)	86 (63)	45 (38)	131 (90.3)
mean age in years (range; SD)	15.9 (5.6-43.6; 8.4)	15.5 (5.4-42.9;8.4)	15.7 (5.4-43.6;8.4)
accompanying person			
mother	75 (52%)		
father		13 (9%)	
sister	4 (3%)		
husband		2 (1%)	
none			51 (35%)

accompanying person (51). (Table 1)

4.2. *Missing data*

In this retrospective research with 145 contributing participants, there were quite a lot of missing data. 14 (9.7%) did not answer the question about the date at the beginning of orthodontic treatment. 22 (15%) patients had not have previous orthodontic treatment. From those patients, who had pre-treatment, 105 patients did not answer the question about the kind of orthodontic treatment. 35% of patients were without 1 accompanying person, 95% of patients without second accompanying person.

One fifth (20%) of patients, did not fill out the questionnaire about the self-perception. Orthodontic assistants partially contributed in the assessments. They haven't evaluated between 1 and 19 patients. (Table2).

Table 2: Missing data

	<i>n</i>	<i>%</i>
self - assessment and dental assistants		
patient's self perception	24	(20)
dental assistant 1	19	(13)
dental assistant 2	1	(1)
dental assistant 3	2	(1)
dental assistant 4	11	(8)
dental assistant 5	15	(11)
dental assistant 6	11	(8)
dental assistant 7	1	(1)
dental assistant 8	2	(1)
history of orthodontic treatment		
age at the beginning of orthodontic treatment	14	(10)
previous orthodontic treatment	22	(15)
relationship patient to accompanying person 1	51	(35)
relationship patient to accompanying person 2	138	(95)

4.3. Orthodontic history of participating patients

Out of 145 contributing patients there were almost two third (59%) without any previous orthodontic treatment. One third (28%) came in with previous orthodontic treatment. Most of pre-treated patients (22%), have undergone removable orthodontic therapy, at the age between three and thirteen years. 5 patients have undergone combination of fixed and removable orthodontic therapy. (Table 3)

Table 3: Orthodontic history of participating patients

	<i>n</i>	<i>%</i>	<i>tx duration mean mean (range; SD)</i>	<i>age at treatment mean (range;SD)</i>
NO previous orthodontic treatment	86	(59)		
previous orthodontic treatment	38	(26)		
fixed	2	(1)	2.7 (1-6; 1.6)	12.9 (7-35; 9.1)
removable	32	(22)	3.2 (1-8; 1.9)	9.2 (3-13; 2.2)
combination	5	(3)		

4.4. Dental aesthetic perception

4.4.1. DESCRIPTIVE STATISTICS

Descriptive statistic reveals that the patients evaluated themselves in most cases with 3, in a range from 1 to 10. Dental assistants just partially filled out the questionnaires. They rated the patients differently, mostly with 4, and used the full range of Aesthetic component of IOTN (1-10). (Table 4)

Table 2: : Dental aesthetic perception of patients, accompanying person and orthodontic staff measured by AC of IOTN

	n	median	range
patient	119	3	1-9
accompanying person 1	98	3	1-9
accompanying person 2	7	3	1-5
orthodontist	143	3	1-9
dental student	143	4	1-10
dental assistant 1	124	5	1-10
dental assistant 2	142	6	1-10
dental assistant 3	141	3	1-10
dental assistant 4	132	2	1-10
dental assistant 5	128	4	1-10
dental assistant 6	132	4	1-9
dental assistant 7	142	3	1-9
dental assistant 8	141	2	1-9
dental assistant 1-8	142	4	1-10

4.4.2. EXPLORATIVE STATISTICS

As shown in figure 13 participating patients, person accompanying them (mostly family members) and the orthodontist had the same average evaluation 3(AC). However orthodontists, in comparison to patients and accompanying adult, provided a wider range of grades. The student of dental medicine evaluated with the same range of evaluations, but averaged one grade higher than orthodontists. The orthodontic team evaluated patients in a very different way, except for dental assistants 4 and 8, who were similar in the median evaluation and its range. (Figure 13)

The summary of the results from the sight of dental assistants were put in one box-plot in figure 14, where it is shown how in average assistants evaluated the photos, with a median of 4 and range between 1 and 9. (Figure 14)

Figure 13: Aesthetic perception of patient, accompanying person, orthodontist, student and dental assistants measured by AC of IOTN

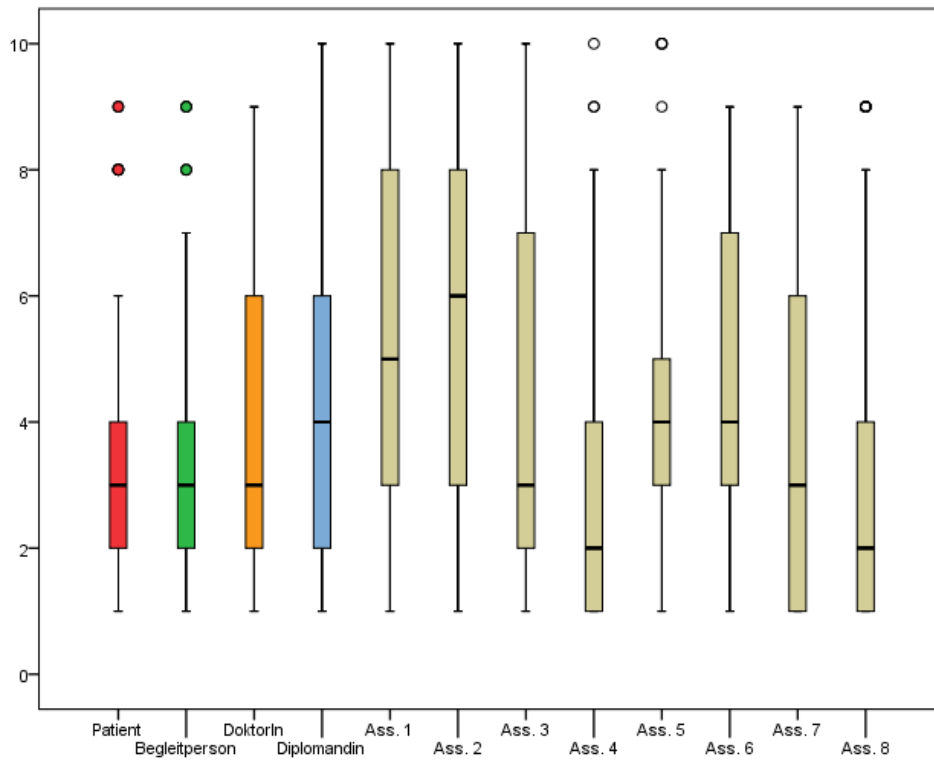
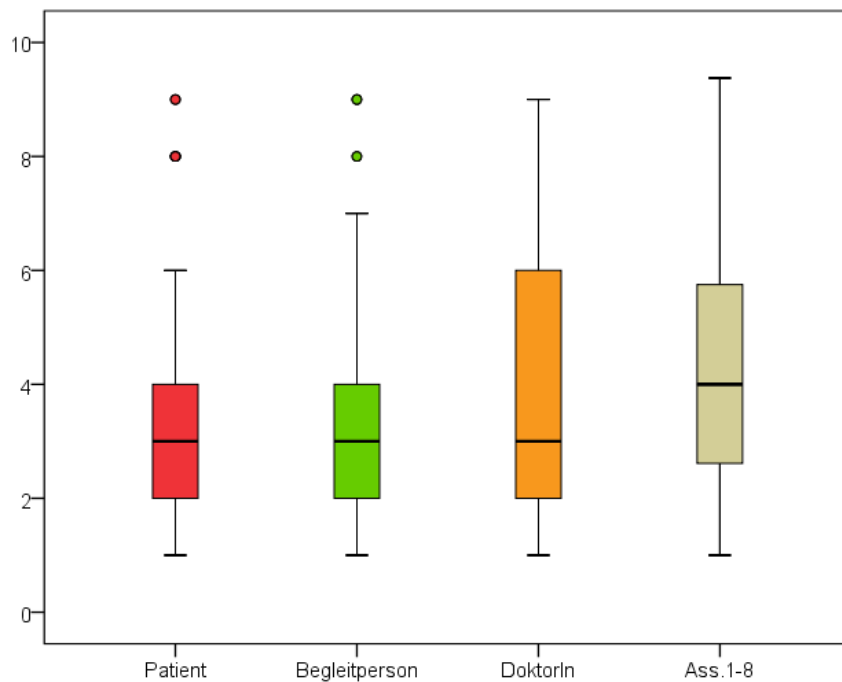


Figure 14: Aesthetic perception of participating patient, accompanying person, orthodontist, and orthodontic staff measured by AC of IOTN



4.5. *Agreement and differences between patient, accompanying person and orthodontic staff in perception of dental aesthetic*

To test the agreement and differences between patient, accompanying person and orthodontic staff in perception of dental aesthetic, the data were compared in pairs. Through interclass correlation coefficient (ICC) it was found that there is a high agreement between patient and accompanying person. Also between patient and orthodontist there was no significant difference to be found. Significant difference in assessment was between patient and dental assistants. But the results are not yet to be proved. Sample size estimation to reach significance would be 328 in each group.

(see: Table 5).

Table 5: Agreement and differences between patient, accompanying person and orthodontic staff in perception of dental aesthetics

		ICC *		difference **	
agreement of patients self-assessment with	accompanying person	0,59	($p < 0,001$)	not significant	($p=0,643$)***
	orthodontist	0,24	($p = 0,005$)	not significant	($p=0,080$)
	8 dental assistants	0,00	($p = 0,486$)	Significant	($p=0,001$)
	dental student	0,13	($p < 0,001$)		
agreement of 8 dental assistants		0,59	($p < 0,001$)		
agreement of orthodontist and orthodontic staff		0,08	($p = 0,160$)		

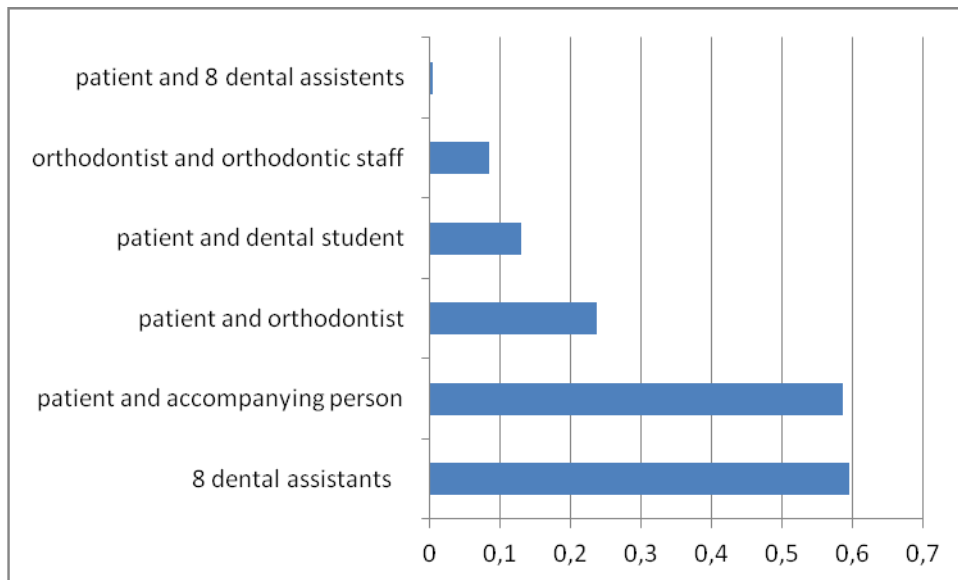
* intraclass correlation coefficient

** paired T-test

*** sample size estimation to reach significance: 328 in each group

As shown in figure 15 there is the highest agreement in between dental assistants. The next highest is between patient and accompanying person, followed by agreement between patient and orthodontist and patient and least with no significance between patient and dental assistants.

Figure 15: Agreement in perception of dental aesthetics by interclass correlation coefficient



5. DISCUSSION

DEMOGRAPHIC CHARACTERISTICS

Out of all participants there were more women, what makes it difficult to generalise the results. However, this fact leads to a possible indication that women are more concerned about aesthetics and are more often taking part in children's therapy.

What makes the demographic results interesting is also the age of participants, which averaged around the age of 15 which could be explained by increased self-awareness and often over-reaction of adolescents' appearance. Both assumptions, however stereotypical they are, do not present the full picture with inclusion of patients as young as 3 and as old as 43 years old.

MISSING DATA

There was a significant proportion of missing data, which could point to respondents' indifference towards this particular topic. One of the possible reasons could also lie in the fact that in particular regarding the information about their treatment, patients were unable to provide detailed or accurate information as they had yet not undergone their therapy prior to filling out the questionnaire. Self-perception was another topic which was problematic particularly for younger patients as they might have gone to therapy unwillingly or involuntarily. Lastly orthodontic assistants' participation was mainly limited to evaluating patients' photos as most of their questionnaires were just partially filled out, presumably due to lack of time, awareness about the importance of the thesis.

ORTHODONTIC HISTORY OF PARTICIPATING PATIENTS

One of the points to be discussed in this study is the orthodontic history. Most of the patients have not undertaken any orthodontic treatment before they filled out the questionnaires, because it usually took place at the first consultation. In the case they have already gone through the treatment, this was that mostly through removable therapy, what for the average age of 9 can be seen as a standard procedure.

SELF-PERCEPTION AND ASSESSMENT

The beauty is in the eye of beholder. Aesthetics is a judgemental commodity and underlies variability of individual judgments. That makes aesthetics so difficult to objectivise and generalize. (Graber, Lucker 1980)

Birkeland stated that the personal aesthetic perception of the dento-facial complex and the associated psychosocial need are relevant to the consumers of orthodontic care. (Birkeland, Boe & Wisth 2000)

While contemplating the results, differences and different opinions, I was also wondering how different respondents had evaluated the given pictures. Due to some knowledge of psychology, I dare to presume that each individual looked at the picture from a different perspective.

Accompanying adults were usually from patients' closer family circle: fathers, sisters, brothers, husbands and in the great majority - mothers. As we can regard one family as one whole - psychological system, we can expect that the patients will grade and evaluate similarly. With these predispositions, this kind of outcome can be expected.

But on the other hand, Bernabe proved that dental aesthetic is not just one's adult's expression. There is broad range of factors that have an impact on self-confidence of an adolescent.(Bernabe et al. 2006)

The displayed agreement in this study, between the perception of dental aesthetics made by parents and their children shows to be very relevant in the context of common family background. It can be stated that the communication between family members eventually leads to consensual opinion. Earlier in history, the children might have been regarded as "ignorant" (unaffected), but since times have changed the psychological perception of children has changed as well. We are now more aware of the parents' projections on the child, the influence of peers, family members, media and other factors involved in the processes of socialization.

So how do we see the "mouth" (intraoral frontal photos)? This study has shown two main models of viewing the photos. The first, mostly found in the non-professional group is "person-oriented". The model describes the phenomenon of looking at the photo and visualizing it as a part of a person, imagining some physical features and the personality traits that go with the frontal photo. One might even imagine a person they know. The frontal photo might remind them of an acquaintance, a friend, a relative, a celebrity... and consequently making them visualize that particular person.

The other model represents the problem-oriented view and includes mostly opinions by professionals or profession-related individuals: students, dental assistants. They mostly look at the frontal picture through the processes of diagnostics, therapy and prognosis. Looking at the frontal photo, they see a problem that needs to be solved, therefore they almost automatically evaluate the presence, the classification, the number and the severity of anomalies. They might even find themselves mentally gathering the analytic tools for diagnostics or imagine the photo as a pair of plaster casts.

This study also revealed a difference between female and male self-evaluations. There were more women (63%) seeking orthodontic treatment than men (38%). On the basis of this particular piece of data we can assume that women are more concerned with the aesthetics of the mouth and dentition than men. These findings could give way to more research opportunities on gender differences, i.e.: criticism as female proverbial characteristic and lack of aestheticism as the male. In other words, the beauty is in the eye of beholder. There have already been made some studies about men' and women' aesthetic perception. Studies supervised by K. Birkeland (University of Bergen, Norway), revealed that gender difference play a role in the degree of improvement of the self-esteem correlated with orthodontic treatment. The research also concluded that there were more females who perceived themselves as having less attractive dentition and greater treatment need despite having no objective evidence to support this feeling. (Birkeland, Boe & Wisth 2000)

Christopherson, Briskie und Ingelhart have found that satisfaction with dental appearance is most strongly influenced by age and gender, followed by the presence of discoloured teeth and restorations. (Christopherson, Briskie & Ingelhart 2009) Croatian researchers added ethnicity, pre-treatment socio-economical status to co-influencing factors of aesthetic perception. (Spalj et al. 2009)

Agreement in perception of dental aesthetics was significant between dental assistants, what makes the researcher presume that they discussed among themselves or it can be ascribed to the same level of education. There is no agreement between patients and dental assistants, probably a result of the fact that that the assistants have least contact to the patient. All the findings about the perception were retrospective gathered, that is one of the reasons there are so many missing data. To prove my thesis about the agreement in perception of dental aesthetics a sample size of 328 in each group is needed to reach significance. What can give a good way to more research opportunities to prove my findings.

6. CONCLUSION

The main aim of the thesis was to find the difference between self (patient's) - and perception of an accompanying person and orthodontic team of dental aesthetics (teeth and their alignment) to research and to find the possible factors and variables influencing it.

The side aims of the thesis were to find the differences in aesthetic assessment between different educated persons (student/orthodontist, dental assistants/orthodontist, student/dental assistants).

I have concluded there are differences between patients' self-perception of dental aesthetics (teeth and their alignment) and perception from the sight of their accompanying person (mostly family), dental medicine student and orthodontic team.

I have concluded that the difference in perception depends on the evaluator.

The original hypothesis suggesting that there are factors influencing self-perception of dentition and that there are differences in the assessment of dental aesthetic, was confirmed by the presented results.

The patients, included in the research visited orthodontists at the minimum age of 5.4 years, when the self-evaluation and self-perception are developed.

There are differences in evaluating according to gender, level of education and profession to be noticed. Notably there were differences between evaluations made by students, orthodontist and dental assistants. The specialists observed the photos using the second model of observing - a more problem-oriented view - and so do their assistants. Looking at the case as a problem, the specialists more or less also see the solution (some treatment and prognosis options) due to their clinical experience. This point of view makes their evaluation milder than the student's. Students are less experienced, therefore they regard the patient, presented by frontal photos as a whole (visualize an image of the person). Students mostly observe the picture and at the same time visualise the personality traits and facial characteristics or imagine themselves suffering the presented anomaly. With almost no clinical experiences, they try to take the same critical approach as the specialist. Most students are equipped with no more than merely theoretical knowledge with very little or no clinical experience; therefore a student can only presume what the evaluation from the sight of the specialist could be. Given that medical professionals are trained not to overlook the details, they tend to develop professional perfectionism, which in most cases

aggravates their evaluation results, but still -students make higher average evaluation (4.4) than the specialist (3.9).

Patients' self-perception and the accompanying person' assessment were in average very similar, about 3, from a scale between 1 and 10. This leads to a conclusion that patients have been affected by family members, peers, media and other social factors influencing the adolescent. I should also mention that communication about orthodontic anomalies (tooth alignment, tooth- colour, etc.) among family members probably makes the similarity inevitable.

On the other hand, agreement in perception of dental aesthetics was significant between dental assistants, what makes me presume that they discussed among themselves or it can lie on the same education. But there is no significant agreement between patient and dental assistants, what can lie on the fact that the assistants have at least contact to the patient. All the findings about the perception were retrospective gathered, that is one of the reasons there are so many missing data and the biggest limitation in this study.

To prove my thesis about the agreement in perception of dental aesthetics I would need sample size of 328 in each group to reach significance. What can give a good way to more research opportunities to prove my findings.

Anhang –Projektplan

Projektplan:

November 2009- Jänner 2010: Literaturrecherche

Seit 2010: Literaturrecherche , Stand der Wissenschaft

Sept 2012: Studienprotokoll

Oktober 2012: Ethikantrag

November 2012: Datenerhebung, Auswertung und Ergebnisse,

Dezember 2012: schriftliche Zusammenfassung

Ethikantrag:

Ethikkommission



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VOTUM gültig bis 24.10.2013

EK-Nummer: 25-074 ex 12/13
Studientitel: Subjektive Einschätzung der dentalen Ästhetik: Unterschiede in der Wahrnehmung und mögliche bestimmende Faktoren - eine retrospektive Studie.
Prüfer: Mag.DDr. Elisabeth Santigli
Univ.Klinik für Zahn- Mund- u. Kieferheilkunde
Sponsor: *) Med. Uni Graz
Ansprechpartner: Spela Novsak, 8020 Graz, Ghegagasse 15/28
CRO: -

*) Antragsteller

Die o.a. Studie wurde von der Ethikkommission erstmals im 'expedited Review' am 24.10.2012 behandelt. Die Ethikkommission ist zu folgendem Schluss gekommen:

Es besteht kein Einwand gegen die Durchführung der Studie in der vorliegenden Form.

Kommissionsmitglieder, die für diesen Tagesordnungspunkt als befangen anzusehen waren und daher gemäß Geschäftsordnung an der Entscheidungsfindung und Abstimmung nicht teilgenommen haben: keine

Zur Beurteilung vorliegende Dokumente:

Dokumente eingegangen am 22.10.2012, begutachtet im 'expedited Review' am 24.10.2012

✓ Antragsformular Unterschriftenseiten	22.10.2012
✓ Antragsformular undatiert	
✓ Originalprotokoll 01	22.10.2012

Die Ethikkommission geht - rechtlich unverbindlich - davon aus, dass es sich um keine klinische Prüfung nach AMG bzw. MPG handelt.

Es handelt sich um eine Studie im Rahmen einer Diplomarbeit.

Das Votum der Ethikkommission berührt in keiner Weise die alleinige Verantwortung der Prüferin / des Prüfers / der Prüfer für die ordnungsgemäße Durchführung der Studie unter Einhaltung aller einschlägiger gesetzlicher Bestimmungen und Richtlinien.

Weiters machen wir darauf aufmerksam, dass der Kommission unverzüglich zu melden sind:

- Abweichungen vom Protokoll aus Sicherheitsgründen oder Protokolländerungen
- Änderungen, die das Risiko der Teilnehmer/-innen erhöhen oder die Durchführung der Studie wesentlich beeinflussen
- Mutmaßliche unerwartete schwerwiegende Nebenwirkungen - SUSARs (AMG-Studien ab 1.5.2004) oder schwerwiegende unerwünschte Ereignisse - SAEs (andere Studien)
- Jegliche Information über sonstige Umstände, die die Sicherheit der Teilnehmer/-innen oder die Durchführung der Studie beeinträchtigen können

EK-Nummer: 25-074 ex 12/13

Votum

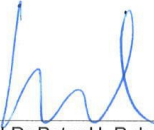
Seite 1 von 2

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Rechtsform: Juristische Person öffentlichen Rechts gem. Universitätsgesetz 2002. Information: Mitteilungsblatt der Universität und www.medunigraz.at. DVR-Nr. 210.9494
UID: ATU 575 111 79. Bankverbindung: Bank Austria Creditanstalt BLZ 12000 Konto-Nr. 500 948 400 04, Raiffeisen Landesbank Steiermark BLZ 38000 Konto-Nr. 49510.

Dieses Votum gilt für ein Jahr ab dem Datum der Ausstellung. Bei längerer Studiendauer ist rechtzeitig vor Ablauf der Gültigkeit des Votums ein Zwischenbericht vorzulegen (Berichtsformular), um eine etwaige Verlängerung zu erlangen.

Graz, 24. Oktober 2012



Univ. Prof. DI Dr. Peter H. Rehak
Vorsitzender



Univ. Prof. DDr. Hans-Peter Kapfhammer
Stv. Vorsitzender

Achtung: Bitte bei allen das Projekt betreffende Schreiben oder telefonischen Anfragen die EK-Nummer angeben!

EK-Nummer: 25-074 ex 12/13

Votum

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UID: ATU 575 111 79. Bankverbindung: Bank Austria Creditanstalt BLZ 12000 Konto-Nr. 500 948 400 04, Raiffeisen Landesbank Steiermark BLZ 38000 Konto-Nr. 49510.

Literature

- Angle E.H. (ed) 1907, *Treatment of malocclusion of the teeth: Angle's system*, 7th edn, White Dental Manufacturing Company, Philadelphia.
- Bernabe, E., Kresevic, V.D., Cabrejos, S.C., Flores-Mir, F. & Flores-Mir, C. 2006, "Dental esthetic self-perception in young adults with and without previous orthodontic treatment", *The Angle Orthodontist*, vol. 76, no. 3, pp. 412-416.
- Bernabe, E., Sheiham, A., Tsakos, G. & Messias de Oliveira, C. 2008, "The impact of orthodontic treatment on the quality of life in adolescents: a case-control study", *European journal of orthodontics*, vol. 30, no. 5, pp. 515-520.
- Birkeland, K., Boe, O.E. & Wisth, P.J. 2000, "Relationship between occlusion and satisfaction with dental appearance in orthodontically treated and untreated groups. A longitudinal study", *European journal of orthodontics*, vol. 22, no. 5, pp. 509-518.
- Bos, A., Hoogstraten, J. & Zentner, A. 2010, "Perceptions of dutch orthodontic patients and their parents on oral health-related quality of life", *The Angle Orthodontist*, vol. 80, no. 2, pp. 367-372.
- Byrne B.M. 1984, "the general/academic self-concept nomological network; a review of construct validation research. review of educational research", *journal of educational psychology*, vol. 54, no. 54, pp. 427-456.
- Cerny, R. 2005, "What are the three most important reasons for orthodontic treatment? Are they aesthetics, aesthetics and aesthetics?", *Australian Orthodontic Journal*, vol. 21, no. 2, pp. 156-160.
- Christopherson, E.A., Briskie, D. & Inglehart, M.R. 2009, "Objective, subjective, and self-assessment of preadolescent orthodontic treatment need--a function of age, gender, and ethnic/racial background?", *Journal of public health dentistry*, vol. 69, no. 1, pp. 9-17.
- de Paula Junior, D.F., Santos, N.C., da Silva, E.T., Nunes, M.F. & Leles, C.R. 2009, "Psychosocial impact of dental esthetics on quality of life in adolescents", *The Angle Orthodontist*, vol. 79, no. 6, pp. 1188-1193.
- Dieter Frey & Martin Irle (eds) 2002, *Theorien der Sozialpsychologie, Motivations-, Selbst- und Informationsverarbeitungstheorien*, 3rd edn, Verlag Haus Huber, Bern.
- Fleming J.S. & Courtney B.E. 1984, "The dimensionality of self-esteem: II Hierarchical facet model for revised measurements scales", *Journal of Personality and social Psychology*, vol. 46, no. 46, pp. 404-421.
- Graber, L.W. & Lucker, G.W. 1980, "Dental esthetic self-evaluation and satisfaction", *American Journal of Orthodontics*, vol. 77, no. 2, pp. 163-173.

- Greenberg J. 2008, "Understanding the vital human quest for self-esteem", *Perspectives on Psychological Science*, vol. 3, no. 3, pp. 48-55.
- Holmes, A. 1992, "The subjective need and demand for orthodontic treatment", *British journal of orthodontics*, vol. 19, no. 4, pp. 287-297.
- Julie C. Faure, Carolien Rieffe & Jaap C. Maltha 2002, "The influence of different facial components on facial aesthetics", *European journal of orthodontics*, vol. 24, no. 24, pp. 1-7.
- Keim R.G. 2005, "The editor's corner: Adult treatment in 21th century", *J Clin Orthod*, vol. 39, no. 39, pp. 193-194.
- Klages, U., Bruckner, A. & Zentner, A. 2004, "Dental aesthetics, self-awareness, and oral health-related quality of life in young adults", *European journal of orthodontics*, vol. 26, no. 5, pp. 507-514.
- Mark R. Leary & June Prince Tangeny (eds) 2003, *Handbook of Self and Identity*, 1st edn, Guilford, New York.
- Maslow A.H. (ed) 1987, *Motivation and Personality*, 3rd edn, Harper & Row, New York.
- McGrath & Bedi R. 2003, "Measuring the impact of oral health on quality of life in Britain using OHQoL- UK (W)", *J. Public Health Dent*, vol. 63, no. 63, pp. 73-77.
- Mugonzibwa, E.A., Kuijpers-Jagtman, A.M., Van 't Hof, M.A. & Kikwilu, E.N. 2004, "Perceptions of dental attractiveness and orthodontic treatment need among Tanzanian children", *American Journal of Orthodontics and Dentofacial Orthopedics : Official Publication of the American Association of Orthodontists, its Constituent Societies, and the American Board of Orthodontics*, vol. 125, no. 4, pp. 426-33; discussion 433-4.
- Neumann, L.M., Christensen, C. & Cavanaugh, C. 1989, "Dental esthetic satisfaction in adults", *Journal of the American Dental Association (1939)*, vol. 118, no. 5, pp. 565-570.
- Samorodnitzky-Naveh, G.R., Geiger, S.B. & Levin, L. 2007, "Patients' satisfaction with dental esthetics", *Journal of the American Dental Association (1939)*, vol. 138, no. 6, pp. 805-808.
- Sanjeev Soni, Pancham Aggarwal, Vinay S Dua 2011, "The Use of Index of Orthodontic Treatment Need (IOTN) in Children with Special Needs", *2011 Int. Journal of Contemporary Dentistry*, vol. 2, no. 3.
- Schabel, B.J., McNamara, J.A., Jr, Franchi, L. & Baccetti, T. 2009, "Q-sort assessment vs visual analog scale in the evaluation of smile esthetics", *American Journal of Orthodontics and Dentofacial Orthopedics : Official Publication of the American Association of Orthodontists, its Constituent Societies, and the American Board of Orthodontics*, vol. 135, no. 4 Suppl, pp. S61-71.

- Shaw, W.C., Richmond, S., Kenealy, P.M., Kingdon, A. & Worthington, H. 2007, "A 20-year cohort study of health gain from orthodontic treatment: psychological outcome", *American Journal of Orthodontics and Dentofacial Orthopedics : Official Publication of the American Association of Orthodontists, its Constituent Societies, and the American Board of Orthodontics*, vol. 132, no. 2, pp. 146-157.
- Sherlock, J.M., Cobourne, M.T. & McDonald, F. 2008, "Assessment of orthodontic treatment need: a comparison of study models and facial photographs", *Community dentistry and oral epidemiology*, vol. 36, no. 1, pp. 21-26.
- Spalj, S., Slaj, M., Varga, S., Strujic, M. & Slaj, M. 2009, "Perception of orthodontic treatment need in children and adolescents", *European journal of orthodontics*, .