Influence of orthodontic caregiver behaviour on the perceived satisfaction of patients during orthodontic treatment.
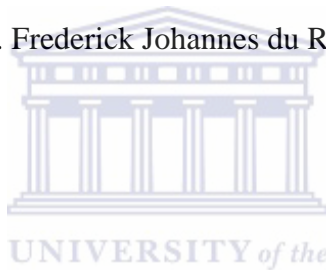
Dr. Frederick Johannes du Raan

UNIVERSITY *of the*

A thesis submitted in fulfillment of the requirements for the degree of M.Sc. (Orthodontics) in the Department of Orthodontics, University of the Western Cape.

Supervisor: Prof AMP Harris
Co-Supervisor: Dr. A. Hudson

May 2014

i

Influence of orthodontic caregiver behaviour on the perceived satisfaction of patients during orthodontic treatment.

Dr. Frederick J du Raan

Keywords

UNIVERSITY *of the*
WESTERN CAPE

ABSTRACT

Influence of orthodontic caregiver behaviour on the perceived satisfaction of patients during orthodontic treatment.

Dr. F.J. du Raan

M.Sc. (Orthodontics) thesis, Department of Orthodontics, University of the Western Cape.

In this thesis I interviewed patients that are busy with orthodontic treatment, as well as those that have undergone orthodontic treatment at the Department of Orthodontics at the University of the Western Cape, with the aid of four questionnaires.

Patients completed questionnaires to provide general and demographic information, quantify their satisfaction with the orthodontic treatment process, their perception of the orthodontic clinician's behavioural traits and lastly they completed the NEO-FFI personality questionnaire to determine their own personality profile.
All these questionnaires were used in previous studies, or they were slightly modified to be applicable to orthodontics.

The information gained was used to determine if there are correlations between the patient's perceived satisfaction of the treatment process with patient specific treatment variables (as acquired from the General Information and Demographics Questionnaire), demographic factors, clinician's behavioural traits and patient specific personality traits and any combination of the above mentioned.

We wanted to determine which behavioural traits of the orthodontic caregiver influences the perceived satisfaction with the treatment to the greatest extent. Furthermore, we wanted to determine if certain personality traits of the patients would influence their perceived satisfaction with the treatment process or their perception of the clinician's behavioural traits.

The only aspect from the General Information and Demographics Questionnaire that had any correlation to satisfaction with the treatment process or the perception of the clinician's behavioural traits, was whether the patient was treated by a single registrar or multiple registrars. Patients treated by multiple clinicians had a lower average score for satisfaction and orthodontist behaviour.

Results from the study shows that all the clinician's behavioural traits do have statistically significant influence on the perceived satisfaction with the treatment process, but certain behavioural traits have a greater influence.
Result showed Empathy and Care to have the strongest influence on perceived satisfaction, whereas Motivation has the lowest influence.

The NEO-FFI personality questionnaire was used to register each patient's personality

profile. Scoring for the following personality traits created the personality profile: Neuroticism, Extraversion, Openness to Experience, Conscientiousness and Agreeableness.

Patient personality profiles were shown to have no significant influence on the patient's perceived satisfaction with the treatment process.

Neuroticism was shown to have a weak negative correlation with the Professionalism sub-category of the Orthodontic Clinician Behaviour Questionnaire.

Conscientiousness has been shown to have a weak positive correlation with all categories of the Orthodontic Clinician Behaviour Questionnaire

It is put forth by the researcher that more time and effort has to be put into improving all aspects of the clinician's behaviour, as it will positively influence the perceived satisfaction of the orthodontic treatment process.

Even though there are no significant correlations, patients needs to be screened to determine their personality profiles, as this may lead to slight improved scoring on certain behavioural aspects which may in turn lead to greater patient satisfaction. It may be especially worthwhile to recognise the neurotic patient and treat them on a more personal level, as this may improve their overall satisfaction.

DECLARATION

I declare that *Influence of orthodontic caregiver behaviour on the perceived satisfaction of patients during orthodontic treatment* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Dr. Frederick Johannes du Raan   May 2014

UNIVERSITY *of the*
WESTERN CAPE

Signed...

CONTENTS

UNIVERSITY *of the*

WESTERN CAPE

vii

LIST OF TABLES

LIST OF FIGURES

1. Introduction

Over the past few years, the satisfaction of patients with healthcare has been used for four distinct purposes within the healthcare system in general (Locker and Dunt, 1978:289). It can be used to compare different healthcare systems/programs, as a measure of the level of quality of healthcare in the public as well as private health sector, to identify the aspects of service that needs to be changed or improved to bring about improved satisfaction and lastly, to identify patients/consumers who have a higher likelihood of disenrolling.

From the above it is clear that determining the different aspects of healthcare that influences the perceived satisfaction by patients with the care provided is of utmost importance. Once these aspects are known and better understood, the healthcare provider can focus his attention on improving these areas, thereby ensuring a more positive patient experience.

Despite the increasing importance of gauging and improving patient satisfaction, it has been difficult to pin down the exact factors contributing to patient satisfaction. Because satisfaction with treatment is subject to an individual's perception, it gives rise to a variety of factors that has an influence and a great variance in the weight that each of these factors bear in an individual's perceived satisfaction.
Results of previous studies done will be discussed to highlight a few of the most important factors influencing patient satisfaction with healthcare in general.

The researcher has chosen two of the multitude of factors that may influence the perceived satisfaction with orthodontic treatment. Firstly, the influence that behavioural traits of the orthodontic caregiver has on perceived satisfaction with treatment and secondly, whether the personality profile of the patient has an effect on satisfaction will be researched. Certain demographic variables will be measured and compared to the perceived satisfaction levels.

When the study was started, very few studies have been done to determine the effect of the behavioural traits of the orthodontic caregiver on patient satisfaction with treatment. There are numerous studies on the satisfaction with the outcome of orthodontic treatment, but only the study by Keles and Bos (2013; 507-511) and Sinha, Nanda and McNeil (1996:370-377) correlated the satisfaction of the treatment process with the caregiver's behavioural traits.
Due to the lack of studies in this area and the fact that it is an area where every caregiver can improve, the researcher has decided to retest the effect that caregiver behavioural traits has on perceived satisfaction.

In the literature there are no studies that tried to correlate the effect of the patient's personality profile to the perceived satisfaction with the orthodontic treatment process, or to the perception of the caregiver's behavioural traits.
The only studies done in the past that used patient personality profiles in orthodontics and other fields of dentistry focussed more on the way personality traits influences the satisfaction with the outcome of treatment, tolerance to appliances (e.g. dentures) and pain perception. These findings will be discussed more broadly in the literature review.
In this study the researcher will try to determine if there is any correlation between personality profiles and the satisfaction with the treatment process or perception of the

caregiver's behavioural traits, and then hypothesise on reasons for this correlation and how the orthodontic caregiver can use this information to deliver a more satisfying treatment.

The **Null hypothesis** for this study is that there is no correlation between the orthodontic caregiver behavioural traits or patient personality profiles and the perceived satisfaction with the orthodontic treatment process.

To evaluate this hypothesis, the study candidates completed four questionnaires to gain data (General information and demographics questionnaire, Satisfaction with treatment and process questionnaire (STQ), Orthodontic clinician behaviour questionnaire and do a NEO-FFI Personality profile). The data obtained was statistically analysed by a statistician of the Medical Research Council of South Africa and all correlations compared to the null hypothesis.

The researcher will go more in-depth into the subject of what treatment satisfaction is, factors that have been described that may influence satisfaction with treatment in general medicine and dentistry and the current data available on satisfaction with dental and orthodontic treatment.
Furthermore the effects of caregiver behaviour will be discussed as studied in orthodontics and other fields of dentistry.
Lastly the creating of a patient's personality profile and the influence those specific personality traits have in dentistry and orthodontics will be discussed in more detail.

The research aims and objectives will be clarified in a subsequent section. It will outline what this study would like to achieve, and how the researcher went about to achieve these aims.

The researcher will discuss the reason behind the methods used to gather the data needed to prove or disprove the Null hypothesis. Attention will be given to the selection of the sample, the logic behind the different questionnaires used and how they will be used to generate the data needed for statistical analysis. Lastly attention will be given to the legal and ethical considerations involved in this study.

In the relevant sub-section, results arising from the statistical analyses will be presented. A description of the result obtained from the individual questionnaires will be given, as well as the correlations between data obtained from these sections.

During the discussion of the results, the researcher will indicate how the results may be used to improve patient satisfaction and hypothesise on why specific variables does or does not have any correlation. Shortcomings and further improvement of this study will be discussed as well as recommendations made for future studies into this field of study.

After the results have been discussed, the researcher will draw his conclusions and present certain recommendations. Results will be given to either prove or disprove the Null hypothesis stated earlier.

Recommendations as to how the information obtained from the study could be used will be presented. Critique on shortcomings of the present study and possible improvements will be highlighted.

2. Literature Review

Various studies have been done in the past to gauge patient satisfaction during general dental treatment and also with their satisfaction of the outcome after treatment. Until recently there has however been a lack of these types of studies in the field of orthodontics, especially gauging the perceived satisfaction with the orthodontic treatment process.

In the Literature review the researcher will clarify what is meant by Satisfaction with treatment, how to try and gauge satisfaction with treatment, factors shown to affect satisfaction with orthodontic treatment and the importance of satisfaction with treatment pertaining to dentistry and more specifically orthodontic treatment.
Furthermore literature will be reviewed on the role that patient profiles has in dentistry and satisfaction with specific areas of dentistry. Attention will also be given to the assessment of personality profiles with the use of the NEO FFI personality assessment.

To gauge patient satisfaction it is important to firstly have a good definition of what exactly Satisfaction is and have the study set up to reliably and accurately record the true level of satisfaction experienced by the patient.

Defining patient satisfaction

There have been various definitions as to what exactly the concept of satisfaction really entails, with no real standardized definition of the concept itself. This has given rise to problems in the development of standardized tools to consistently and accurately measure patient satisfaction (Williams, Coyle and Healy 1998: 1351).
A widely used definition of satisfaction are as follows.
"Satisfaction is either implicitly or explicitly defined as an evaluation based on the fulfilment of expectations" (Williams, 1994: 511).
There are however problems with the concept that the fulfilment of the expectations alone are a sure way to guarantee satisfaction with treatment (Bramadat, 1993:22-29). In a study by Like (1987: 355), it was found that unmet expectations only accounted for about 19% in the variance of the reported satisfaction experienced by patients.
It is therefore clear that meeting treatment expectations alone does not account for the total perceived satisfaction during treatment. It has however been put forward by Driedger (1991) as cited by Williams, Coyle and Healy (1998: 1352), that a greater level of satisfaction will be obtained if the experience during fulfilment of the treatment expectation is better than expected before treatment. From this it is concluded that properly interviewing the patient to determine their expectations of the treatment process and outcome is of vital importance to treat the patient satisfactorily.

Another variation on the definition of patient satisfaction is that the patient thinks or feels that the doctor-patient interaction should be comfortable and warm, and that the treatment will be supplied by a technically competent doctor who will give adequate information with regards to the treatment needed, as well as possible complications/problems. If these expectations are not met, the patients may feel disappointed, they tend to be less compliant and be less satisfied (Gerbert, 1994 and Fischer, 1971 as cited by Sinha 1996: 373).
This puts more of a focus on the interaction between the patient and the caregiver, and less on the fulfilment of the clinical outcome.

Studies support this idea that satisfaction with the clinical outcome and with the treatment process may differ (Bennett, 1999:53-61), where patients are satisfied with the treatment outcome, but have some dissatisfaction with the treatment process.

Investigations of patient satisfaction after orthodontic treatment have also shown a wide range of satisfaction levels, ranging from 34% (Al-Omiri and Abu Alhaija, 2006:427) to 74% (Larsson and Bergstrom, 2005: 100). This wide range of satisfaction levels makes comparisons between studies almost impossible

Gauging patient satisfaction

Gauging satisfaction with treatment has a big priority in modern medicine. As it is an indicator as to the perceived quality of healthcare, it is used to compare different healthcare programs, can be used to determine where healthcare could change or improve and to determine which patients are more likely to be less compliant or finish treatment (Jackson, Chamberlin and Kroenke, 2001:609). To properly gauge satisfaction the tools used should provide pertinent, reliable and consistent results.

Assessments of the quality of health care and the satisfaction of treatment received can be based on patient, parental, and professional perspectives, or a combination of the three.

In the past a lot of studies and questionnaires to measure patient satisfaction were based on the clinicians' perceptions, but this lowers the reliability and validity of the study (McNair et al, 2009: 760).

Most studies have examined issues that concern parents, rather than patients, and have used measures developed by professionals without patient input. It is now recognized that to be of value, patient satisfaction measures should be based on the issues that are important to patients (Burke and Croucher, 1996 as cited by McNair et al, 2009: 760). Questionnaires used to gauge satisfaction with the treatment process should therefore be based on aspects that are deemed important by the patients themselves, and not on what is deemed important by the healthcare providers.

As there is evidence that adult and adolescent patients can provide reliable judgments on their health care experience (Jenkinson et al, 2000:337; Vogels et al, 1998:464), they should therefore be personally gauged to gain the information needed on patient satisfaction.

There are some concerns that parental report, although valid, should not substitute for child reports (This is because such reports may be affected by parental anxiety, their own previous experience, and levels of education (Theunissen et al, 1998: 396) Questionnaires completed by the patients undergoing treatment themselves, even if they are adolescents, will therefore give more reliable information as to their perceived satisfaction with treatment.

The orthodontic visit satisfaction scale used in this study is an adaptation of a questionnaire used to gauge satisfaction with general dental treatment developed by Corah (1984:367-373) and adapted by Bos et al (2005). It has been used with reliability and consistency in the past and results of this study can therefore be compared to other studies using the same questionnaire.

Factors influencing patient satisfaction

There are a variety of factors that seem to influence the satisfaction with dental and orthodontic treatment. According to Muray and Kaplin (1981: abstr. 892) as cited by Bennett et al (2001: 155), there are six aspects of dental patient satisfaction, which are also relevant to orthodontic patient satisfaction: General treatment, Staff performance, Organization/efficiency, Convenience, Pain and Patient-personnel interaction.
The period for satisfaction during dental or orthodontic treatment could be subdivided into three distinct timeframes: pre-treatment, during treatment and posts-treatment.

A. Pre-treatment influences on patient satisfaction

In the pre-treatment phase Dento-facial problems are a well-documented cause of dissatisfaction in patients (Slade and Spencer, 1994: as cited by Al-Omiri and Abu Alhaija, 2006: 422). The reasons for dissatisfaction may be due to unfavourable aesthetics, performance and function. Satisfaction with aesthetics is correlated with age and sex. Satisfaction seems to decrease with age, so adults are more likely to be dissatisfied than adolescents (Shaw, 1981:158). From this one should expect that adults seek treatment to improve aesthetics more regularly than adolescents, but that does not seem to be the case in orthodontic treatment. This may be due to the fact that adults with braces are not as easily socially accepted. Females are more dissatisfied with their aesthetics than males, thus perceiving a greater need for orthodontic treatment (Sheats et al,1998: 113). Females have been shown to be more concerned with teeth that are malaligned than males.
The reasons for seeking orthodontic treatment also differs between the sexes and has to be kept in mind when trying to treat a patient with a high level of satisfaction. Females seek treatment to improve their self-confidence and appearance, while males seek treatment to improve their social well being (Feu et al, 2010:157).
Even though a lot of patients seek orthodontic treatment to improve self-confidence and social well being, they have low satisfaction scores on their psychosocial improvement, but high total satisfaction (Keles and Bos, 2013:508). This clearly indicates that the fulfilment of their treatment expectation alone (improved aesthetics) cannot attribute to their total perceived satisfaction with the orthodontic treatment.
Dissatisfaction with dento-facial appearance is also linked to the degree of malocclusion before the start of treatment (Maia et al ii, 2010: 1158), where patients with slight malocclusions are more satisfied with their aesthetics than those with major malocclusions.

B. In-treatment factors influencing patient satisfaction

During the phase of active orthodontic treatment, several factors have been researched to gauge its effect on satisfaction with treatment.
The association between sex and satisfaction with treatment has given ambiguous results, with some results showing that females are more dissatisfied with orthodontic treatment than males (Sheats et al, 1998:113) and other studies showing no difference between the sexes (Al-Omiri and Abu Alhaija, 2006:427). Sex based satisfaction with the experience of pain during orthodontic treatment also shows conflicting results. Certain studies indicates that females have a lower pain threshold and thus experience more pain during treatment (Schreurer, Firestone and Burgin, 1996:355) and those that shows there are no

difference in pain threshold and thus no difference in satisfaction with the pain aspect of orthodontic treatment (Erdinc and Dincer, 2004:83)

Mixed results with the experience of pain at different ages were also recorded. It has been shown by some that there are no difference in pain experience between age groups (Ngan, Kess and Wilson, 1989:47) and other studies have shown that pain tolerance and dissatisfaction with the pain aspect increases with age (Al-Omiri and Abu Alhaija, 2006:427).

The infliction of pain during treatment is a well-documented cause of anxiety and decreased satisfaction with treatment (Corah, 1988:779-790).

The notion of a patient's "possible self" can also influence a patient's satisfaction with the treatment process and outcome (Markus and Nurius, 1986:961). The "possible self" can be defined as a person's thoughts concerning what they might become in the future/ after treatment. The more patients are energized or motivated on reaching a more positive "possible self" as an outcome of the treatment, the more satisfied they are with the treatment process and outcome (Anderson, Arruda and Inglehart, 2009: 822). It then naturally flows from this information that a good orthodontist will be able to motivate a patient to have a better-perceived "self" as end product of the treatment.

According to a study done by Chang and Chang (2013:243) there are certain service provision elements during dental treatment that has an effect on the perceived satisfaction during active treatment. Good hygienic facilities and up-to-date equipment were indicated to be essential; ease of making appointments, convenience of location, clear statement of fees charged and being on time for appointments were found to play an important role in increasing satisfaction with the treatment process. The orthodontic caregiver, without a big cost-to-benefit ratio, can easily improve all of the service provision elements indicated in the above-mentioned study. By streamlining the appointment making procedure, the patient can make/change appointments easier and more conveniently and treatment time scheduling can be done more effectively. This minimizes the chances of caregivers running late for appointments.

Good practice hygiene should be a standard practice in any orthodontic clinic. Maintaining high levels of hygiene should not only be in place to improve patient satisfaction but be part of normal practice protocols.

Maybe the most important aspect that may influence satisfaction during the orthodontic treatment process is the caregiver-patient interaction. In a study done by Sinha, Nanda and McNeil (1996:375) it was found that all the tested orthodontic behavioural traits had a statistically significant effect on the perceived satisfaction with treatment by patients. The most important behavioural trait of the caregiver was how polite they were towards the patient. Other verbal communication behaviours expressed by the caregiver that had a strong correlation with satisfaction were (1) giving of information and (2) reassuring the patient and expressing concern towards the patient. Some non-verbal behaviour by the caregiver that influenced the perceived satisfaction most, were having a calm and confident manner, a confident attitude and having an unhurried approach to the treatment. Other studies have shown that dentist behavioural traits that have a positive effect on the perceived satisfaction with treatment are gentleness, friendliness and professional competence (Van Groenestijn et al, 1980:538). It is interesting to note that there was a correlation between the sex of the patient and the satisfaction with the doctor-patient relationship (Bos et al, 2005: 531), where the doctor-patient interaction had a greater influence on the perceived satisfaction of females.

Communication between the caregiver and patients can result in improved satisfaction due to various mechanisms. With better communication the caregiver can give more

information to the patient, thus creating a better informed patient, which has been shown to lessen fear, stress and anxiety, which indirectly leads to greater satisfaction with the treatment received (Laskin, 1979:786). Scouring the literature no studies were found that correlated patient personality traits specifically with increased satisfaction with the orthodontic treatment process (active treatment phase).

C. Post-treatment influences on patient satisfaction

Some factors have been reported to play a role in predicting the level of post-treatment satisfaction. It has previously been shown that orthodontically treated patients are more satisfied with their teeth in general, when compared to non-treated patients (Maia et al, 2010:1157). The reason for this improved satisfaction may be due to better dento-facial aesthetics, improved chewing function and the ability to practice better oral hygiene. Being treated with extractions or non-extraction gives conflicting results in different studies, where some studies indicates that patients treated non-extraction seems to be less satisfied with the orthodontic treatment than those treated with extractions (Al-Omiri and Abu Alhaija, 2006:427). Other studies show that there are no correlation between levels of satisfaction and being treated with or without extractions (Maia et al, 2010: 1158). Research has shown that several personality traits of patients can have an influence on their levels of satisfaction with treatment in general dentistry. Female patients with higher Neuroticism scores and males with high Introversion scores, in general, scores lower on post-treatment satisfaction (Al-Omiri and Abu Alhaija, 2006:428). It is necessary to note however that studies has shown that the initial dissatisfaction expressed by these more neurotic or introverted patients were tempered with time, leading to more satisfaction with the treatment outcome as time passes (Kiyak et al, 1986: 391).
In other studies done to determine if there are changes in the levels of reported satisfaction with orthodontic treatment as perceived over time and in studies reporting on general medicine (Jackson, Chamberlin and Kroenke, 2001:615), it seems that satisfaction increases as time goes by and the result of the treatment persists. Therefore patients that were dissatisfied immediately after treatment shows improved levels of satisfaction as time goes by and the treatment result still conforms to their levels of expectations. Keeping this in mind it is important when comparing studies that report on satisfaction with treatment, to make sure those patients that are compared with each other has been interviewed at the same interval after initial treatment.
In patients where a lingual fixed retainer was placed, higher level of satisfaction was measured due to less relapse of the obtained result (Maia et al, 2010 i: 65). This correlates with the findings that patients are more satisfied after orthodontic treatment if the treatment results have been retained for an extended time.
According to studies done in the past there are no correlation between post-treatment satisfaction and age, gender, duration of treatment and pre-treatment need for orthodontic treatment (Al-Omiri and Abu Alhaija, 2006:422-431; Larsson and Bergstrom, 2005:95-101).

The importance of treating patients with a high level of satisfaction cannot be stressed enough. In orthodontics as in all fields of dentistry, patient satisfaction with the treatment rendered is of utmost importance. Since the 1970's the rise of consumer rights have provided strong impetus to assess the level of patient experience and satisfaction with their dental treatment (Pascoe, 1983:185-210). By assessing how satisfied patients are with treatment, which factors influences it the most and by adapting treatment strategies various beneficial care interactions are established.

1.Financial implications

From a financial point of view it makes a lot of sense to treat patients with a high level of satisfaction. In the ever more competitive climate of health care and in particular dental health care, the dental service provider has to change his traditional role to more than being almost solely a clinician. It is ever more important to advertise provided services and expertise to the community, to make a practice stand out when compared to your colleagues. As advertising laws are quite strict, a lot of advertisement done for a practice happens by word of mouth from the patients themselves and their parents.
In orthodontics, unlike many other fields of dentistry, the patient comes to the dentist, not out of necessity driven by pain, but with the wish to improve their aesthetics and/or function. The patient or more commonly the parents of the patient are much more critical with regards to the way in which they perceive the treatment process. For this reason it is of utmost importance to determine factors which may influence patient satisfaction, and try to improve or adjust treatment, attitudes, protocols etcetera that may have a positive effect on the satisfaction levels of treated patients. It goes without saying that a satisfied patient will give a better review and will be more likely to encourage others to receive treatment from a specific health care provider. Focus on patient satisfaction may be a good marketing strategy as part of practice building, i.e. a means to increase patient retention and attraction (Ball, 1996: 470).
Poor communication, a major factor in dissatisfaction with treatment, has also been shown to be directly linked to increased malpractice suits, even if they are satisfied with the treatment outcome (Barbat, 1992:97-98). This may be due to the fact that the patient feels that the caregiver has a lack of interest and concern for his well-being.

2. Patient Management

From a patient management point of view it is also of utmost importance to treat patients with a high level of satisfaction. Patient management and satisfaction are positively influenced by the doctor-patient relationship. Because doctor-patient relationships have significant impact on successful treatment in dentistry and orthodontics (Gerbert, Bleecker and Saub, 1994:264-272), it is important to improve this relationship for superior treatment outcomes, doctor satisfaction and patient satisfaction. An important part of this relationship is communication. Better communication can expedite treatment and improve perceived quality of care because information exchange is better. Better communication can also enhance patient management by letting the patient understand the nature of their condition or treatment (Dougherty, 1985: 345). With good communication and a good orthodontist-patient relationship, the patients are found to be more compliant and adherent during treatment (Nanda and Kierl, 1992: 20). Working with compliant patients is beneficial, as they usually are more cooperative and have better

oral hygiene. With better oral hygiene it is more likely that the treatment will not be a compromise treatment done to prevent the further deleterious effects of poor oral hygiene e.g. caries, decalcification and periodontal disease (Zachrisson, 1976:293).

With periodontal disease due to poor compliance, a negative feedback can occur, where patients experiences more discomfort during treatment, leading to less satisfaction with the treatment process, which may once again lead to even worse compliance.

Evidence shows that satisfied patients are more likely to be adherent to and cooperative with treatment regimes, which should increase the rate of reaching your treatment goals in a shorter time (Pascoe, 1983:199; Nanda and Kierl, 1992:19). This happens because patients are well informed of what is expected of them, why they are expected to do certain actions and what the consequences are if they do not adhere or comply with the instructions given.

From the above it follows logic that time should be spent to create and maintain a healthy patient-doctor bond. Orthodontist behaviour e.g. listening, empathy and care, as well as communication, are important in reaching this objective (Dougherty 1985:345-346). In the long run, the time taken to build a practice which is oriented to improve patient satisfaction may be more time saving and satisfying to the service provider than that required to correct potential difficulties resulting from poor compliance due to dissatisfied patients.

Assessing patient personality profiles

There are various tools used to assess the personality profile of people. When using these tools during dental research, it is important that the tool should be easy to use, results should be easy to analyse, the test and re-test reliability should be high and it must be universally accepted by researchers.

The Big Five Personality types as measured by the NEO-FFI

A popular conception of personality today rests on the assumption of a specific number of underlying personality dimensions. The five personality dimensions recognized by most researchers in psychology are Neuroticism, Extraversion, Openness to experience, Agreeableness and Conscientiousness (Panayiotou and Kokkinos, 2004:1841). The NEO-personality inventory revised (NEO-PI-R) developed by Costa and McCrae's is the most popular instrument for assessing these five dimensions. The NEO-PI-R consists of 240 items that result in the five factors and a number of factor facets. To be more user friendly during research, a briefer version of the NEO-PI-R, the NEO-five factor inventory (NEO-FFI), was created (Costa and McCrae, 1992) with 60 items. The validity, internal consistencies and test-retest reliability has been shown to be very good (Sherry et al, 2007:484)

The following literature on the NEO FFI comes from the professional manual on NEO, developed by Costa and McCrae in 1992.

There are 60 items, 12 for each scale. Every fifth item is from the same scale. Items 1, 6, 11, and so on assess Emotionality or Neuroticism (N). Items 2, 7, 12, and so on assess Extraversion (E). Items 3, 8, 13, and so on assess Openness to Experience (O). Items 4, 9, 14, and so on assess Agreeableness (A). Items 5, 10, 15, and so on assess Conscientiousness (C).

A number of the items are reverse scored. For example, item 1 ("I am not a worrier") is reverse scored. The more you disagree, the higher your score on N. Item 27 ("I usually

prefer to do things alone") is also reverse scored. The more you agree, the lower your score on E.

To compute the score per personality trait the following are used.
For the non-reversed-scored items, SD=0, D=1, N=2, A=3, SA=4.
For the reversed-scored items, SD=4, D=3, N=2, A=1, SA=0.
The sum of all 12 items is your score for the specific personality trait.

The following are the items for each scale, with the reverse-scored items in bold-faced type.
N: **1**, 6, 11, **16**, 21, 26, **31**, 36, 41, **46**, 51, 56
E: 2, 7, **12**, 17, 22, **27**, 32, 37, **42**, 47, 52, **57**.
O: **3**, **8**, 13, **18**, **23**, 28, **33**, **38**, 43, **48**, 53, 58.
A: 4, **9**, **14**, 19, **24**, **29**, 34, **39**, **44**, 49, **54**, 59.
C: 5, 10, **15**, 20, 25, **30**, 35, 40, **45**, 50, **55**, 60.

The following will clarify what the different personality domain scores translates to in each individual,

1. Neuroticism
For Neuroticism the following applies to the different scores. People who score in the average range tend to be generally calm and are able to deal with stress, but sometimes experience feelings of guilt, anger, and sadness.
Subjects who score above average tend to be sensitive, emotional, and are prone to experience feelings more intensely.
Subjects who score below average tend to be secure, hardy, and generally relaxed even under stressful conditions.
The normative range for males are: Below 13 is low (below 6 is very low). Above 21 is high (above 29 is very high).
For females the range is: Below 16 is low (below 8 is very low). Above 25 is high (above 32 is very high).

2.Extraversion
The characteristics most often related to the different scores in Extraversion are as follows.
Subjects who score in the average range tend to be moderate in activity and enthusiasm and they enjoy the company of others but also value their privacy.
People who score above average tend to be extraverted, outgoing, active, and high-spirited; they prefer to be around people most of the time.
Subjects who score below average tend to be introverted, reserved, serious and prefer to be alone or with a few close friends.
The normative range for males are: Below 24 is low (below 18 is very low). Above 30 is high (Above 36 is very high).
For females the range is: Below 25 is low (below 19 is very low). Above 31 is high (above 37 is very high).

3. Openness to experience
Openness to Experience has the following characteristics per score distribution.
People who score in the average range tend to be practical but willing to consider new ways of doing things and seek a balance between the old and the new.
Subjects who score above average tend to be open to new experiences, they have broad interests and are very imaginative.

People who score below average tend to be down-to-earth, practical, traditional, and pretty much set in their ways.

The normative range for males are: Below 23 is low (below 18 is very low). Above 30 is high (above 36 is very high).

For females the range is: Below 23 is low (below 18 is very low). Above 30 is high (above 36 is very high).

4. Agreeableness

Characteristics of individual that fall in different score categories of Agreeableness are as follows. Subjects who score in the average range tend to be generally warm, trusting, and agreeable, but they can sometimes be stubborn and competitive.

People who score above average tend to be compassionate, good-natured, and eager to cooperate and avoid conflict.

People who score below average tend to be hard-headed, sceptical, proud, and competitive. They may tend to express anger directly.

The normative range for males are: Below 29 is low (below 24 is very low). Above 35 is high (Above 40 is very high).

For females the range is: Below 31 is low (below 26 is very low). Above 36 is high (above 41 is very high).

5. Conscientiousness

Conscientiousness can manifest itself as follows in the different scoring categories.

People who score in the average range tend to be dependable, moderately well-organized; they generally have clear goals but are able to set their work aside.

People who score above average tend to be conscientious and well-organized; they have high standards and always strive to achieve your goals.

People who score below average tend to be easy-going, not very well-organized, sometimes careless and they usually prefer not to make plans.

The normative range for males are: Below 30 is low (below 25 is very low). Above 37 is high (Above 43 is very high).

For females the range is: Below 32 is low (below 26 is very low). Above 38 is high (above 44 is very high).

The role of different personality types on satisfaction with dental treatment

Perusal of the literature pertaining to the role that personality profiles plays in affecting satisfaction within different dental sub specialities and orthodontics in particular brought the following to attention.

There are no studies that the researcher could find while scouring the literature that directly links the effect of a patient's personality to his satisfaction with the orthodontic treatment process itself and the way that it affects the patient's perception of the orthodontic caregiver's behaviour.

There are studies that gives insight into the way a person's personality traits can influence satisfaction with the way a patient perceives himself, which influences their decision to seek dental treatment and their satisfaction with the treatment outcome.

Self-esteem, self-confidence, obedience, extroversion, anxiety, warmth, conscientiousness and neuroticism are but a few of the patient personality traits, which can influence level of satisfaction (Mehra,Nanda and Sinha, 1998:118). It was shown that patients with low self-esteem and self-confidence or those with high levels of anxiety or neuroticism were

more prone to indicate that they are less satisfied with their dento-facial appearance before treatment. Females have also been shown to be more neurotic, and less open than males, making them less satisfied with their dento-facial appearance, which leads them to seek help more often to correct their perceived problem (Abu Hantash, Al-Omiri and Al-Wahadni, 2006: 120). In a study done on the relationship between satisfaction with removable prosthodontic treatment and personality profiles, it was shown that during treatment, those patients with higher conscientiousness scores had a higher tolerance to pain (translating to better satisfaction scores) and those with higher extraversion scores had higher satisfaction with eating after delivery of the dentures (Al-Omiri et al, 2014: 370).

Post-treatment satisfaction has also been shown to be less in patients that score higher than average on neuroticism (Kiyak, 1986: 391), but that the level of dissatisfaction does go down in this group as time goes by and they still experience the positive effect of the treatment that they have undergone.

A recent study by Agou et al (2011, 374-375) has shown that children with a better psychological well-being level experience higher levels of oral health related quality of life, regardless if they have received orthodontic treatment or not. On the other hand children with lower levels of psychological well-being showed lower levels of oral health related quality of life, than those that did receive orthodontic treatment. From this study it is clear that a child's psychological well-being may be positively influenced by orthodontic treatment, which should then translate into a more satisfied treatment experience for the patient. When determining the priority for treatment need, these psychological/personality tools could thus be used to prioritise treatment for candidates that show higher neuroticism scores (they tend to be less satisfied with their dento-facial appearance) and those with low psychological well-being levels (they benefit most from improvement of oral health related quality of life).

3. Aims and Objectives

The aim of this study was to determine if there were specific personality and behavioural traits of an orthodontic caregiver that positively or negatively influences satisfaction of patients during the treatment process and determine if specific patient demographic or personality characteristics influences this perception.

The objective of the study was to identify and quantify specific behavioural traits of orthodontic caregivers, to determine the patients' satisfaction with the treatment process, to determine patient personality types and gather demographic data of the patients.

Statistical analysis was then done on the results of satisfaction with the different orthodontist behaviour traits, and the results of the satisfaction levels within different personality types and within demographic groups.

UNIVERSITY *of the*

WESTERN CAPE

4. Research Methodology

Study design

This was an Analytical Cross-sectional Survey Study, with a descriptive component. Information was gathered at a specific point in time to describe and analyse specific information and their correlation to each other.

Sample size determination

Comparative studies have used between 50 and 200 candidates.
The researcher tried to contact 157 candidates, which is the total number of patients treated by the last three orthodontic registrars that completed their specialization at the University of the Western Cape, Faculty of orthodontics. To have reliable representation of this group, between 40-80% of the possible candidates had to respond to the questionnaires, as this has been shown to be acceptable (Gelbach, 1993 as cited in McNair et al, 2009: 763).
To minimize the time since having had treatment and completing the questionnaires for this study, the researcher avoided using patients of registrars that completed their studies before the registrars on which were being focussed.
Having a very extended period between completion of treatment and reporting on the satisfaction with the treatment process may make the report given unreliable.
The current rotation of registrars has not been at the faculty long enough to have a sufficient patient base to conduct a study with enough candidates to get statistically significant data. It is however, a good idea to repeat this study at the end of their tenure and compare it to the results of this study.
Ideally a larger sample size would have been more ideal, but due to the limited number of patients that can satisfactorily be treated by each rotation of registrars, it was not possible to increase the sample base.
By comparing the same study after each rotation of registrars that has completed their tenure in the future, a cumulatively larger sample base can be created.

Subject selection

Participation in the study was totally voluntary.

Subjects in whom treatment were done by the last three orthodontic registrars that completed their studies at UWC Department of Orthodontics, were eligible for the study. This group included those that were treated to completion, as well as those that are still under treatment by the current group of Orthodontic registrars. No new patients that were started on by the current group of registrars were eligible.

All subjects in the target population that had up to date contact details were contacted and asked to participate in the study. The idea was to end up with a group that represented all the study criteria.
Due to the limited amount of candidates available, this was not always possible to achieve. The criteria according to which the subjects were picked included all ages, language and sex groups and candidates from different orthodontic care providers at the University of the Western Cape Orthodontic Department. Candidates that received

14

removable appliances, fixed appliances or a combination of the two were eligible for the study.

The care providers included the last three orthodontic registrars that finished in the Department of Orthodontics, as well as current orthodontic registrars.

Subjects that started with a cleft lip or palate were excluded.

Materials

Materials sent to the candidates that participated in the study consisted of a Letter of Information, Letter of Consent, General information questionnaire, Satisfaction with treatment questionnaire, Orthodontist Behaviour questionnaire and a NEO-FFI personality assessment.

The questionnaires used gathered data on the following subjects:
1. General information and demographics.
2. Satisfaction with the treatment process.
3. Perception/satisfaction with the orthodontic caregiver traits.
4. Personality profile assessment.

The *Letter of Information* was developed by the researcher to provide information to the potential study candidates with regards to the study that is being conducted.
In the letter, the study title, the purpose of the study, the procedures required by the candidates, potential risks and benefits, confidentiality measures, participation and withdrawal rights, feedback methods, subsequent use of the data obtained and the rights of the research subjects are explained. The Information Letter was done in accordance with guidelines stipulated by the Ethical Board of the University of the Western Cape.
An example of the Information Letter is presented as Appendix A (page 42)

The Letter of Consent was sent to the candidates together with the Information letter, and had to be signed and returned along with the various questionnaires. The Letter of Consent functioned as a check to make sure that the candidates or their parents (in the case of candidates younger than 18) has read the information relayed by the Information Letter and consents to participate within the boundaries stipulated therein.
All returned questionnaires without a signed letter of consent were not used in the study until a signed letter was received.
The letter of Consent was done in accordance with guidelines stipulated by the Ethical Board of the University of the Western Cape
An example of the Letter of Consent is presented as Appendix B (page 44)

The General Information Questionnaire was developed by the researcher to gather specific demographic data that may show certain correlations with the perception of satisfaction with treatment or orthodontist behaviour.
The questionnaire consists of 10 separate questions with multiple answers from which the candidate should choose.
An example of the General Information questionnaire is presented as Appendix C (page 45)

The Orthodontist behaviour Questionnaire (OBQ) (Sinha, Nanda and McNeil, 1996:373) was used to evaluate verbal and non-verbal communication of the orthodontic care provider during treatment. The verbal communication was related to information given to

the patient about procedures, the amount of motivation given before and during the treatment and reassurance of the patient when needed. The non-verbal aspects that were measured included the empathy/ care shown, professionalism and competency. This questionnaire was originally used to access general dentist behaviour (Corah et al, 1985:443-446) but was modified by Sinha, Nanda and McNeil (1996:373) so that all items were presented as gender neutral and all items were written with reference to the orthodontist and orthodontic treatment. One question from the original questionnaire developed by Corah was dropped ("made me numb").

In this study the researcher extended the questionnaire to not only evaluate the clinician, but the whole orthodontic care team (clinician and supporting staff) as the actions of the whole care team influences the perception of the treatment process.

The OBQ consists of 28 questions and these are subdivided into four main categories: Communication, Motivation, Empathy and care, and Professionalism.

Patients scored each question on a 5-point Likert-scale, where a higher score indicates that the patient agrees more strongly with the statement made. Scoring a 1 would indicate that the patient Strongly Disagrees, while scoring a 5, would indicate that the patient Strongly Agrees. Patients were asked to minimize the use of Neutral answers, which should increase the probability that the candidate will make a conscious effort to relay what their real opinions are.

An example of the OBQ is presented as Appendix D (page 46)

The *Satisfaction with treatment and process questionnaire (STQ)* used to assess patient satisfaction is an adaptation of a questionnaire designed to measure satisfaction of patients undergoing dental treatment (Bos, 2005:528). The questions pertaining to satisfaction were kept, while questions on Psychosocial improvement, doctor-patient relationship and dental function were omitted. This was done to get a clearer indication of the satisfaction with the treatment process, more than evaluating the orthodontist or the orthodontic treatment outcome.

The questionnaire consists of 21 questions.

Patients scored each question on a 5-point Likert-scale, Where a higher score indicates that the patient agrees more strongly with the statement made. Scoring a 1 would indicate that the patient Strongly Disagrees, while scoring a 5, would indicate that the patient Strongly Agrees. Patients were asked to minimize the use of Neutral answers, which should increase the probability that the candidate will make a conscious effort to relay what their real opinions are.

A total satisfaction score was obtained by summing the individual item scores, with reverse scoring for one negative item (18. My orthodontic treatment was inconvenient to me).

An example of the STQ is presented as Appendix E (page 49)

The *NEO Five Factor Inventory (NEO-FFI) for assessment of personality profiles* was used to determine the personality profile of the subject.

This test assesses the personality of an individual comprehensively. There are five personality domains that are identified: Neuroticism, Extraversion, Openness to experience, Agreeableness and Conscientiousness.

The NEO-FFI is a shortened version of a more comprehensive personality test, the NEO PI-R. Even though the NEO FFI is a shortened version it is still seen as very reliable and comprehensive.

In a dental survey setting the NEO FFI is more practical than the NEO PI-R, as it takes about 10-15 minutes to complete instead of 45-60 minute.

The NEO FFI is also very useful in dental research as it is highly valid, reliable, well documented in literature, easy to answer and easily interpreted by the researcher.
An example of the NEO FFI questionnaire is presented as Appendix F (page 51).

All the documents and questionnaires were sent to the patients in English, but if necessary, the questionnaires could have been provided in the subject's home language if he/she wasn't fluent in English. This was not found to be necessary, as none of the subjects indicated that they would rather have the questionnaires in a different language.

Data collection

Once permission was gained from the Department of Orthodontics to access records of patients who completed orthodontic treatment, or those still under treatment, all eligible patients were picked. The contact details of 157 patients were gathered from patient files, and questionnaires were sent to the addresses available.

Each patient was allocated a random number, which corresponded with his/her questionnaire. This number system was not used to link specific data received to a specific person; rather it was used to follow up those on candidates that did not respond, and try to motivate them to complete the questionnaires.

To start off with, the Information Letter, Letter of consent and questionnaires were posted with normal mail service to addresses on the patient files. The questionnaires and accompanying information letter were sent together with a return-to-researcher envelope that had the necessary postage paid. This was done so that the study participant did not have to incur any extra costs when returning the questionnaire.
30 Questionnaires were returned to sender due to incorrect postal addresses.

After an initial poor response rate of only 30 completed and returned questionnaires, patients were called to motivate them to complete and return the questionnaires. Only 67 patients that did not respond to the mailed questionnaires had an up-to-date telephone number.
Calling the non-responders did not have the desired effect and only 4 extra questionnaires were returned. This brought the total number of respondents after postal contact up to 33 out of 157 (21%).

Another round of calls was made to all of the possible candidates whose telephone numbers were up to date, during which time the e-mail addresses of the candidates were obtained (e-mail addresses were not available from the patient charts).
E-mail addresses for 65 candidates were obtained, with 2 candidates indicating to have no access to e-mail.
E-mails with the questionnaires were sent to 65 the candidates that had e-mail addresses. The questionnaires were in a Word document form, where the applicable boxes could be ticked while in the Word program, thus eliminating the need for printing, scanning or faxing. It is important to note that there was only a check box that needed to be checked by candidates if they gave their consent, so the need to sign the consent form was eliminated for ease of replying.

The patients that were contacted via e-mail was given a financial incentive to complete and return the questionnaires, which was not the case with the first round when the

questionnaires were sent via the normal postal service. Each patient that completed and returned their questionnaire was entitled to one ZAR 50,00 voucher (+- US$ 4,70).

Patients were also given a contact telephone number and e-mail address to contact the researcher if there were any problems with completing the questionnaires. Only one patient contacted the researcher via e-mail to have a question clarified.

Only the researcher and his co-authors handled all the questionnaires received. The data capturing was done by the researcher himself and presented to the statistician for further statistical analysis.
The responses to the NEO FFI questionnaire was tabulated and scored by the researcher to get a specific score for each of the five personality domains per patient. These personality scores were presented to the statistician and not the responses to the questionnaire themselves.

Data analysis

The information from the sub sets of the questionnaire were captured by the researcher and presented to the statistician to be used as follows for further statistical analysis:
S*atisfaction score* = this is an aggregate score of the items in the STQ. This aggregate score will be indicated as STQ_tot
Orthodontist behaviour = the individual items from the OBQ are used as independent variables and, hence, scored individually for a portion of the analyses. The mean score for the orthodontist behaviour questionnaire is also obtained by adding the scores for each of the 28 items for each patient and averaging this score for the entire group (OBQ_tot).
For the mean orthodontist behaviour questionnaire score, item 12 *(criticized my teeth or how I have been taking care of them)* is reverse scored.
The individual scores within each subgroup of the OBQ will be summed to give a sub-group specific score (OBQ_com, OBQ_mot, OBQ_ec and OBQ_prof), which will be correlated to the STQ_total
Personality specific analysis = each individual's personality group will be determined using the NEO-FFI questionnaire. Each personality group can now be compared to see if their satisfaction scores and perception of orthodontist behaviour vary.
Demographic and general information analysis =Further descriptive analysis was also be made with regards to satisfaction when compared to the different categories in the general information and demographic questionnaire.

Statistical analysis such as linear regression and ordinal regression were performed to evaluate to significance and extent of associations and taking into account patient characteristics such as gender and age.
The response rate of the random sample was considered and because a response rate of less than 80% was achieved, sample weights were employed to ensure unbiased estimates of effects in this study population.
Where the missing values were more than 5% for a particular questionnaire no imputation analysis was done.
All the participants were treated in the same facility by a limited number of providers. This setup introduces clustering of patients within providers.

The statistician, Mr Carl Lombard, works at the Medical Research Council of South Africa and did all the statistical analysis.

Legal and ethical considerations

This research protocol was presented to the Research Committee of the Faculty of Dentistry, UWC, for consideration and registration as an approved research project. The approval was given and a study number has been allocated (**13/4/37).**

All candidates were informed about aims and objectives of the research project and asked for (parental) consent before they could partake in the study. They had to submit a signed or check-boxed checked (in the case of e-mailed questionnaires) Letter of Consent included in the questionnaire.
By completing the Letter of Consent the candidates agreed to the fact that the information they gave may be used in this research study alone.

They were made aware of the fact that the research done may be published in a scientific journal.
All patients in this study were patients who have completed, or who are still busy with treatment at the University of Western Cape's Orthodontics Department. For this reason ethical clearance had to be attained from the University of the Western Cape alone, and not from Western Cape Provincial Government.

Even though each patient was allocated a random number that correlated to the questionnaire completed, their replies would not be traced back them personally. To ensure their anonymity, the names of the orthodontic registrars that treated the patients will not be made known in any publications or reports of the study.

The questionnaires will be kept in a safe environment for five years, as per international guidelines, and then be destroyed in a secure manner.

5. Results

The results will be discussed under the following headings:
  1. Response to the questionnaire.
  2. Description of demographic characteristics.
  3. Description of OBQ results.
  4. Description of STQ results.
  5. Description of NEO-FFI personality traits results.
  6. Statistical correlation between demographics and OBQ and STQ.
  7. Statistical correlation between patient personality traits and OBQ and STQ.
  8. Statistical correlation between satisfaction and Orthodontic Care team behaviour.

1. Response to the questionnaire

The contact details of the 157 patients that were treated by the last three orthodontic registrars were gathered from the administration department of the Faculty of Dentistry at the University of the Western Cape. This constituted all of the patients that were treated by these registrars, and whose contact details were found to be available. Unfortunately not all the contact details were up to date, which made it impossible to reach 57 of the 157 possible patients.
The 57 patients that could not be reached, were those patients of whom the telephone number and postal address was found to be incorrect.
This brought the maximum amount of respondents that could be reached down to 100 (Pop_pos), even though the total population was 157 (Pop_tot).

Of the 157 questionnaires sent, only 30 were completed and returned. The response rate after sending the questionnaires was thus 30% of Pop_pos and 19% of Pop_tot.
A response rate of 30% was deemed insufficient for proper statistical analysis and it was decided to contact the patients again.

After an initial waiting period, the non-responders were contacted by phone to motivate them to return the questionnaires. The telephone numbers from the patient records were very much out-dated, and of the remaining 127 candidates that did not answer the questionnaires in the first round, only 67 could be reached telephonically.
After the telephonic contact session only four more candidates responded.
This brought the response up to 34, which translates to 34% of Pop_pos and 21,6 % of Pop_tot. One of the questionnaires could not be used, due to incompleteness. In total 33 questionnaires were completed satisfactorily and could be used for further analysis.

In the first week after having had e-mail contact with the 65 candidates that had an e-mail address, 25 completed questionnaires were returned. The remaining candidates were contacted again (some up to two times) and eventually a total of 40 completed questionnaires were returned via e-mail (40 out of 65 = 61 %).
In total, 74 completed questionnaires were returned and could be used for further statistical analysis. In one questionnaire only the General Information and Demographics questionnaire was completed and therefor it could not be used in the OBQ, STQ and NEO-FFI sections. This response rate correlates to 73% of the Pop_pos and 46,5 % of the Pop_tot.

2. Description of the General information and demographic characteristics

Due to the fact that some patients did not complete all questions in the General information and demographics questionnaire, the sample size of the individual questions may be less than 74.

Age: The mean ages of the respondents were 18,92 years, with a standard deviation of 4,53 years. The minimum was 14 and the maximum was 46 years. This puts most of the respondents in the late adolescent and early adult age group. 7 Respondents did not answer the age question, leaving 67 that gave an answer. (Table 1, page 56)

Treatment duration: The mean duration of treatment was 3,45 years, with a standard deviation of 1,81 years. The minimum was 2 and the maximum 13 years!
25% of patients were treated for two years, 13,9 % treated for 2,5 years, 27,8% treated for 3 years, 13,9 % treated for 4 years and 18% treated more than 4 years.
The duration of treatment reported by the candidates in this study is significantly higher than the average of 2 years as reported in previous studies (Richmond, Andrews and Roberts, 1993:345-350). This may be due to the fact that these patients were treated in a training facility and not in private practice like the patients that were assessed in the study of Richmond, Andrews and Roberts (1993:345-350). 2 Respondents did not answer the age question, leaving 72 that gave an answer (Table 2, page 56)

Sex: Of the 74 responses, 55 were female (74,32%) and 19 were male (25,68%).
This gives about a 3:1 ratio of females: males that answered the questionnaires. This correlates to the ratio found in the Pop_pos of candidates that were contacted.
Previous studies has also reported a higher incidence of females seeking treatment, most probably due to the fact that females tend to be more dissatisfied with their dento-facial appearance (Al-Omiri and Abu Alhaija, 2006:427) and thus seek treatment more regularly than males. (Table 3, page 56)

Language: The home language of 54 candidates was English (72,97%), 15 were Afrikaans (20,27%), 2 were Xhosa (2,7%) and 3 indicated to have another home language (4,05%). Even though there were a variety of different home languages. During telephonic contact with the patients, none of the candidates indicated that they would rather have the questionnaire in another language than English. All candidates thus completed the questionnaires in English. (Table 4, page 56)

Type of braces: 58 candidates had fixed braces (82,86%), 5 had removable (7,14 %) and 7 a combination (10%). 4 candidates did not respond to this question (Table 5, page 57). This clearly shows that the majority of patients treated by registrars are treated with fixed appliances. The undergraduate students treat most patients that only need removable appliance therapy.

Indicator for treatment: The breakdown of whom indicated that the candidate needed to be treated, showed that 24 indicated it themselves (32,43 %), the parents indicated treatment in 27 cases (36,49%) and the dentist indicated treatment in 23 cases (31,08%). (Table 6, page 57)

Satisfaction with results: 8 candidates were happy with their dento-facial appearance before treatment (10,9%). Of those candidates that were happy with their appearance before treatment, 7 were happy after treatment (87,5%) and 1 was unhappy with his appearance after treatment (12,5%).

Of the 65 candidates that indicated that they were not happy with their dentition before treatment, 59 were happy after treatment (90,77%) and 6 were still unhappy after treatment (9,23%). In total, 66 candidates were happy with the treatment results (90,41%) and 7 were not satisfied with the results (9,59%). One candidate did not answer this question. (Table 7, page 57)

Amount of treating registrars: 44 candidates were treated by a single registrar (60,27 %) and 29 were treated by multiple registrars (39,73%). Of the 29 candidates that were treated by multiple registrars, 19 indicated that they had differing levels of satisfaction between the care givers (65,51 %), and 10 indicated to have no difference in satisfaction with treatment received (43,49%). (Table 8, page 57)

3. Description of OBQ results

The OBQ questionnaire scores were used individually as independent variables and the scores of the main categories were summed to get a total score per category.
The results obtained were as follows (Table 9, page 58):

Communication: The minimum score was 17 and maximum score 40, with the mean being 31,28.
The p25 was a score of 29 , the p50 a score of 32 and the p75 a score of 36.
There were 8 questions, which bring the average score per question to 3,91.
This correlates to an average "Agree", or relative positive experience of the caregivers' communication skills.

Motivation: The minimum score was 12 and the maximum score 26, with the mean being 19,62.
The p25 was a score of 18, the p50 a score of 20 and the p75 a score of 22.
There were 5 questions, which bring the average score per question to 3,92.
This correlates to an average "Agree", or relative positive experience of the caregivers' motivational skills.

Empathy and Care: The minimum score was 18 and the maximum score 40, with the mean being 31,72.
The p25 was a score of 29, the p50 a score of 32 and the p75 a score of 35.
There were 8 questions, which bring the average score per question to 3,96.
This correlates to an average "Agree", or relative positive experience of the caregivers' Empathy and Care.

Professionalism: The minimum score was 14 and the maximum score 35, with the mean being 29,68.
The p25 was a score of 28, the p50 a score of 30 and the p75 a score of 34.
There were 7 questions, which bring the average score per question to 4,24.

This correlates to an average "Agree", or relative positive experience of the caregivers' professionalism.

Total score: The minimum score was 68 and the maximum score 138, with the mean being 112,32.
The p25 was a score of 106, the p50 a score of 113 and the p75 a score of 124.
There were 28 questions, which bring the average score per question to 4,01.
This correlates to an average "Agree", or relative positive experience of the caregivers' behavioural traits in general.

4.Description of STQ results

The Satisfaction with Treatment Questionnaire's results was gathered and grouped together to get a single score, the STQ_total. This gave rise to a total satisfaction with the treatment process score per patient.
Each candidate's STQ_total was then used to analyse how it correlated with the data retrieved from the other questionnaires.
The results were as follows (Table 9, page 58):
Of the whole group, the minimum STQ_total was 53 and the maximum score was 104, with the mean being 80,86.
There was a minimum STQ_total score of 6, but that was obtained due to an incomplete answer sheet. Due to the fact that more than 5% of that questionnaire was not completed, it was not used.
The p25 score was 76, the p50 score 84 and the p75 was 90.
There were 21 questions, which brings the average to 3,85. This correlates to an "Agree" that they are satisfied with the treatment.

5. Description of NEO-FFI personality traits results.

Each patient's answer sheet was tabulated and analysed to determine his or her score for each individual personality trait. Each patient was thus provided with a score for each of the five personality domains.
To compute the score per personality trait the following are used.
For the non-reversed-scored items, SD=0, D=1, N=2, A=3, SA=4.
For the reversed-scored items, SD=4, D=3, N=2, A=1, SA=0.
The sum of all 12 items is your score for the specific personality trait.

The group as a whole scored as follows on the different personality traits (Table 9, page 58).

Neuroticism: The minimum score was 8 and the maximum 40, with 21,12 being average.
The p25 score was 16, the p50 score was 20 and the p75 score was 26.
In the normative sample for the NEO FFI the scores for Neuroticism are: <13 Low score (below 6 is very low) and >21 High score (above 29 is very high).

From the data available on the neuroticism scores for this group of subjects, the group as a whole seems to score high on neuroticism, where the average is 21,12 and a high neuroticism score is anything above 21.

Extraversion: The minimum score was 14 and the maximum 41, with 30,04 being average.
The p25 score was 26,5, the p50 score was 31 and the p75 score was 34,5
In the normative sample for the NEO FFI the scores for Extraversion are: <24 Low score (below 18 is very low) and >30 High score (above 36 is very high).
For the study sample as a whole, it seems from the data that they average borderline high on Extraversion, with the average candidate score at 30,04 and a high Extraversion score being anything above 30.

Openness to experience: The minimum score was 9 and the maximum 37, with 23,33 being average.
The p25 score was 20, the p 50 score was 24 and the p75 score was 27,5.
In the normative sample for the NEO FFI the scores for Openness are: <23 Low score (below 18 is very low) and >30 High score (above 36 is very high).
The average Openness score for the study population is borderline low, with the average being 23,33 and a low Openness score being anything less than 23.

Agreeableness: The minimum score was 18 and the maximum 39, with 28,27 being average.
The p25 score was 25, the p50 score was 28 and the p75 score was 31.
In the normative sample for the NEO FFI the scores for Agreeableness are: <29 Low score (below 24 is very low) and >35 High score (above 40 is very high).
The group as a whole averages low on Agreeableness, with the average being 28,27 and a low Agreeableness score being anything below 29.

Conscientiousness: The minimum score was 14 and the maximum 48, with 34,48 being average.
The p25 score was 29, the p50 score was 35,5 and the p75 score was 40.
In the normative sample for the NEO FFI the scores for Conscientiousness are: <29 Low score (below 25 is very low) and >37 High score (above 43 is very high).
The group average of 34,48 for Conscientiousness falls within the normal value range for this personality trait (29-37)

6. Statistical correlation between General information and demographics and OBQ and STQ

The association of only four demographic factors were compared to the STQ and OBQ. Due to the composition of the study population, the only demographic factors where there was a big enough variation available to have statistical significance between the sub-groups, were *sex, treatment indicator, age and single or multiple service providers.*

When correlations by sex, with the data obtained from the various questionnaires are analysed, there are no statistically significant differences between males and females (Table 10, page 58)

Although not statistically significant, it is interesting to note that females had a slightly higher average satisfaction score (STQ_tot 81,01) when compared to males (STQ_tot 80,42). The same pattern was seen in OBQ_tot, where females had an average score of 113,27 and males a score of 109,57. Within the subcategories of OBQ, females had slightly higher scores on all of the categories. Within the personality groups, females scored, on average, slightly higher in the domains of neuroticism (21,7 vs 19,16), agreeableness (28,29 vs 28,22) and conscientiousness (35,53 vs 31,33), while males scored higher on extraversion (30,77 vs 29,7) and openness to experience (23,88 vs 23,14). It is important to once again note that these differences are not statistically significant.

The association of STQ_tot and OBQ_tot shows the same joint distribution between the two sexes; therefore one does not need to worry about sex as a variable during comparisons between STQ and OBQ of patients of different sexes (Fig. 1)

Fig. 1: Association between STQ_tot and OBQ_tot by Sex -Scatterbox
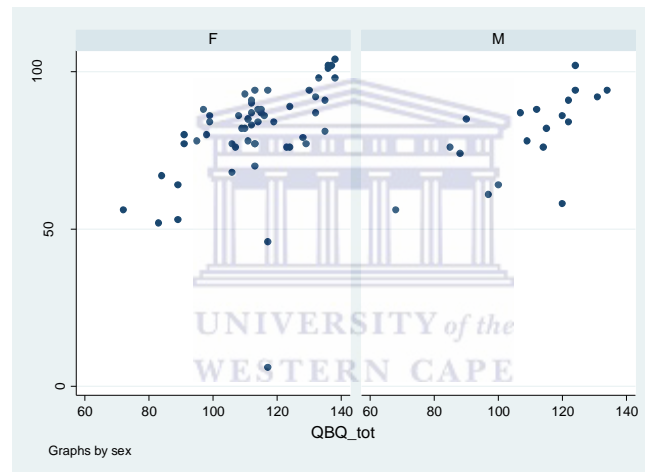
Formal inference was done using a Kruskal-Wallis equality-of-population rank test to determine if sex had an influence on OBQ or STQ. The box-plots of OBQ_tot by sex and STQ_tot by sex shows the median of both sexes on the same horizontal line, and the boxes overlap significantly, so there are no statistically differences between the two sexes for OBQ_tot or STQ_tot (Fig. 2 and Fig. 3).

Fig. 2: Box-plot of OBQ_tot by sex
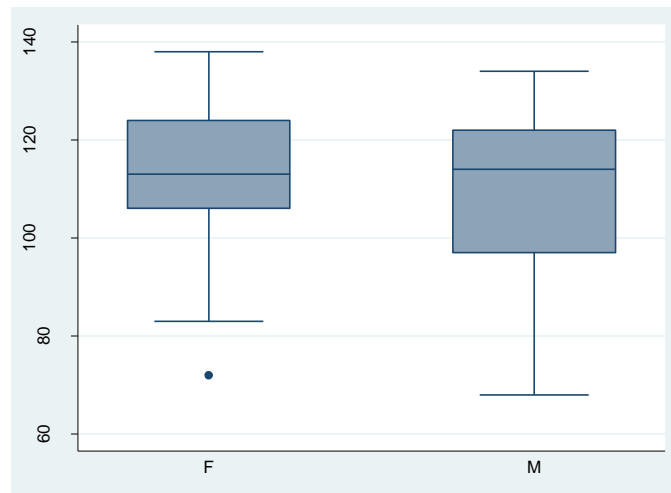
Fig. 3: Box-plot of STQ_tot by sex
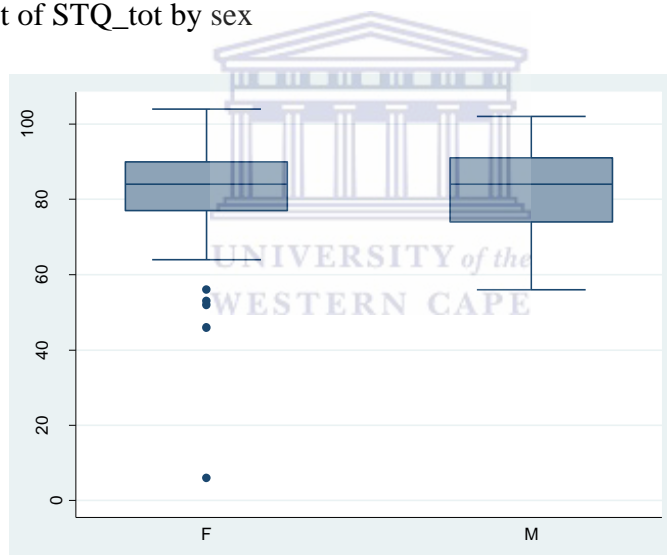
When correlations by age, with the data obtained from the various questionnaires are analysed, there are no statistically significant differences between different age groups. Age and OBQ_tot (Fig. 4) and Age and STQ_tot (Fig. 5) shows on a Lowess smoother scale that there are no statistically significant differences between various ages.

Fig. 4: Lowess smoother for OBQ_tot and Age
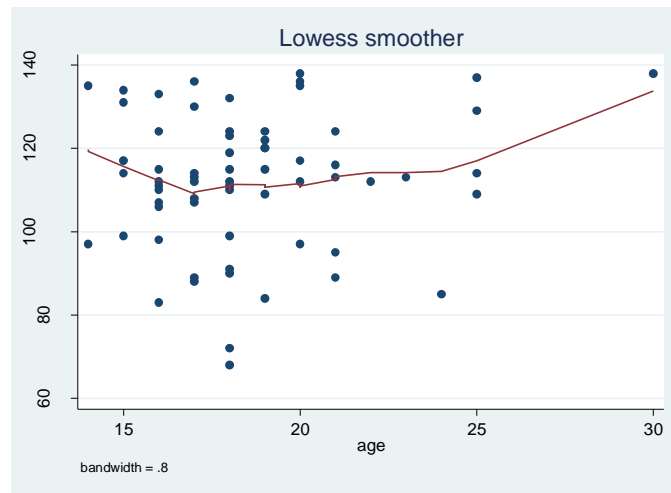
Fig. 5: Lowess smoother for STQ_tot and Age
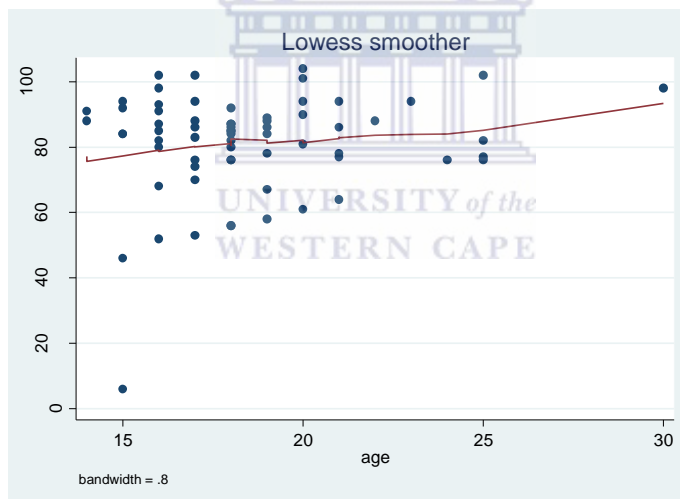
When correlation by treatment indicator and the research variables were compared, there were no statistically significant correlations found (Table 11, page 59). Although not statistically significant, it is interesting to note that the highest STQ_tot score was seen in cases where the treatment was indicated by the parents (81,88) and the lowest was when the dentist indicated treatment (79,3). The highest OBQ_tot score was seen in cases where treatment was indicated by the subjects themselves (114,7) and the lowest when the dentist indicated treatment (109,26).

The association of STQ_tot and OBQ_tot shows a same joint distribution between the three groups of treatment indicators, therefore one does not need to worry about who indicated treatment when comparisons are done between STQ and OBQ (Fig. 6).

Fig. 6 Association between STQ_tot and OBQ_tot by treatment indicator scatter box
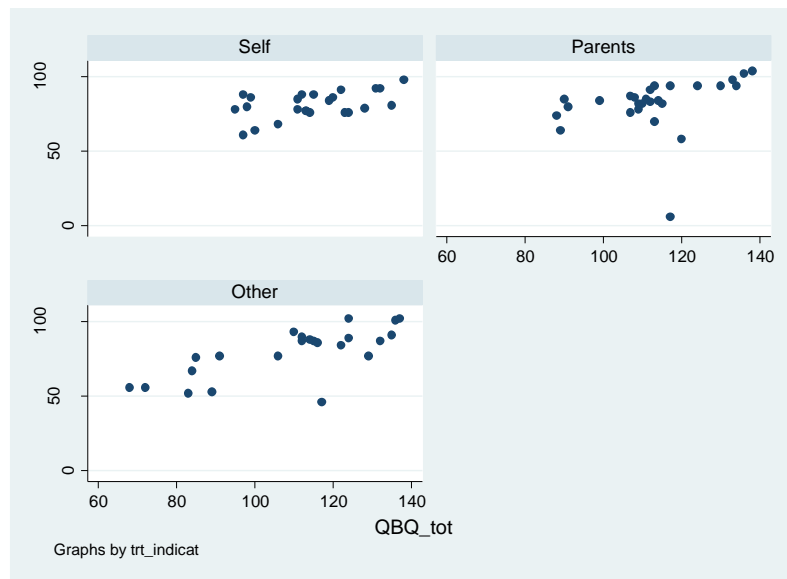
Graphs by trt_indicat

Formal inference was done using a Kruskal-Wallis equality-of-population rank test to determine if treatment indicator had an influence on OBQ or STQ. The box-plots of OBQ_tot by treatment indicator (Fig. 7) and STQ_tot by treatment indicator (Fig.8), shows the median of all three indicators on the same horizontal line, and the boxes overlap significantly, so there are no statistically differences between the treatment indicators for OBQ_tot or STQ_tot.
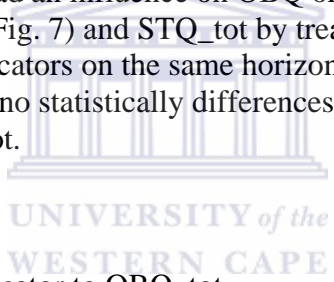
Fig. 7: Box-plot for treatment indicator to OBQ_tot

28
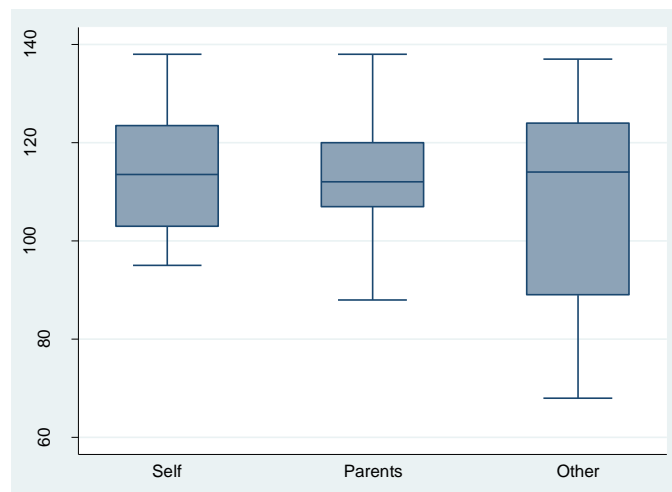
Fig. 8: Box-plot for treatment indicator to STQ_tot
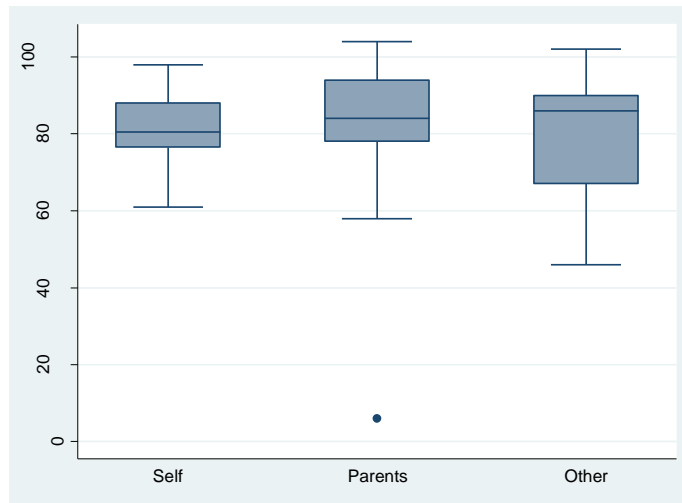
When correlation of the number of clinicians that performed treatment was compared to the research variables, there was a statistically significant correlation (p= 0,0341) between the two sub-groups in this demographic variable (Table 12, page 59). Patients that were treated by a single caregiver displayed statistically significantly higher scores on STQ_tot than those who had multiple caregivers (83,31 versus 76,68) and had significantly higher scores on OBQ_tot than those treated by multiple caregivers (116,06 versus 106,62). From this it can be inferred that being treated by a single caregiver should result in higher levels of satisfaction with the treatment process. (Fig. 9)

Fig. 9: Association between STQ_tot and OBQ_tot by amount of caregivers scatter box
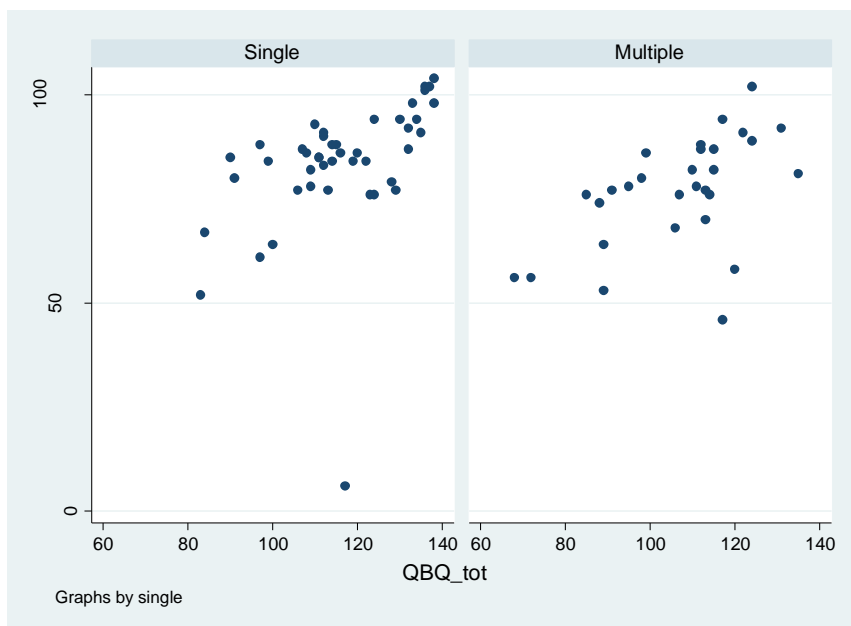
29

Formal inference was done using a Kruskal-Wallis equality-of-population rank test to determine if being treated by one or multiple clinicinans had an influence on OBQ_tot or STQ_tot. The box-plots of OBQ_tot by amount of clinicians (Fig. 10) and STQ_tot by amount of clinicians (Fig. 11), shows that in both cases the boxes of the multiple caregiver group has a lower distribution, indicating lower scores in this group.

Fig. 10: Box-plot for amount of caregivers to OBQ_tot

```
Kruskal-Wallis equality-of-populations rank test

chi-squared =      4.492 with 1 d.f.
probability =      0.0341

chi-squared with ties =      4.496 with 1 d.f.
probability =      0.0340
```


.
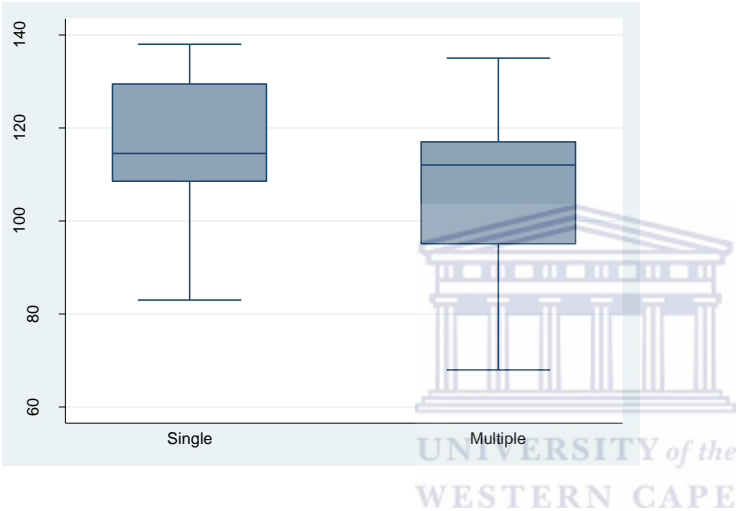
Fig. 11: Box-plot for amount of caregivers to STQ_tot

```
Kruskal-Wallis equality-of-populations rank test

chi-squared =      6.377 with 1 d.f.
probability =      0.0116

chi-squared with ties =      6.388 with 1 d.f.
probability =      0.0115
```
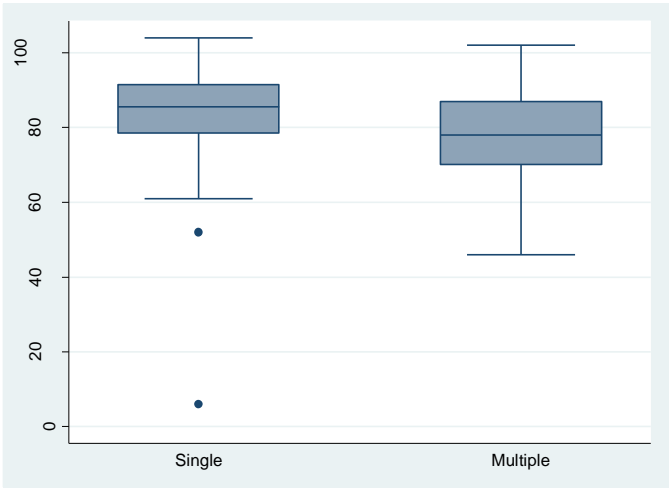
When looking at a Scatter plot Matrix comparing the data obtained from the OBQ, STQ and NEO FFI domain scores, there does not seem to be any association between the NEO domains and OBQ or STQ (Fig. 12).

Fig. 12: Scatter plot Matrix comparing STQ_total with the sub-groups of OBQ and NEO
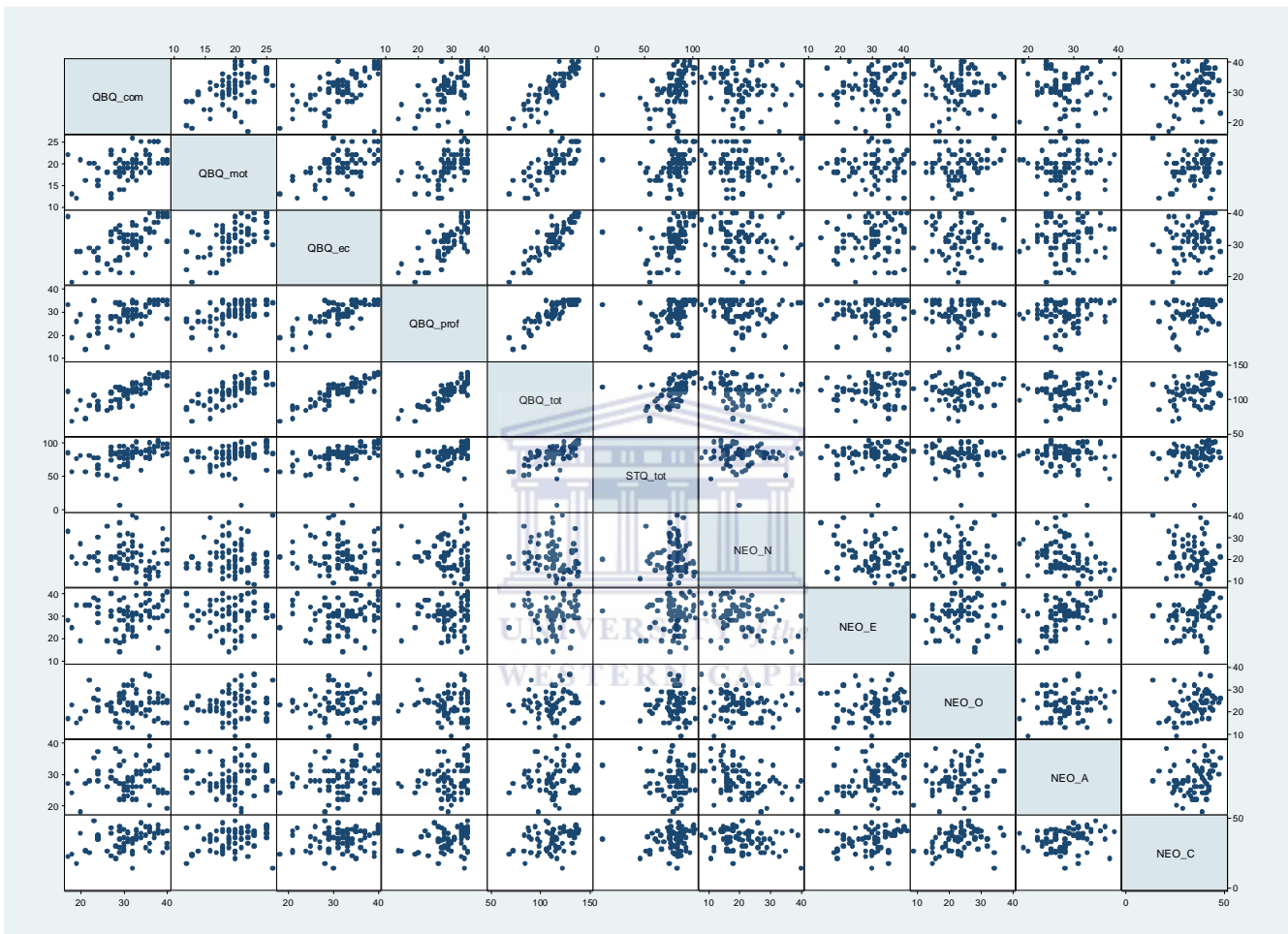
Spearman Correlations between STQ_tot, the subgroups of OBQ and subgroups of NEO did however show certain correlations with certain personality traits (Table 13, page 60). NEO_N showed a weak negative association with OBQ_prof (rho= -0.244) and OBQ_tot (rho= -0.265). NEO_C showed a weak association with all the sub-groups of OBQ. The association with OBQ_comm was 0.326, with OBQ_ mot was 0.2559, with OBQ_ec was 0,2006, with OBQ_prof was 0,324 and with OBQ_tot it was 0,319.
There were no statistically significant correlation seen between STQ_tot and any of the NEO domains. The NEO domains that had negative correlations with STQ_tot, albeit statistically insignificant were NEO_N, NEO_O and NEO_A.

From this we can infer, that in this group of subjects tested, the personality of the patient does not influence the perceived satisfaction with the orthodontic treatment process, but may influence the way in which certain orthodontist behaviours are interpreted.

8. *Statistical correlation between satisfaction and Orthodontic Care provider behaviour.*

To determine the correlation of the orthodontic care provider's behaviour to the perceived satisfaction with treatment, the individual behaviour traits were compared to the perceived satisfaction as expressed by STQ_tot. Comparing the individual questions to the perceived satisfaction should indicate the extent to which a specific behaviour will influence the perceived satisfaction.

Spearman Correlations with a Bonferoni adjustment for multiple testing for significance was done on the gathered data (Table 14, page 61). Only correlations with a p-value $<=$ .0018 could be considered significant.

The statistical analysis showed that all individual items demonstrate a positive correlation coefficient except for OBQ_12 (Criticized my teeth), which was reverse scored. Items with rho> .53 are significantly associated with STQ_tot. Only OBQ_22 (was polite and friendly during the visit) was significantly associated with STQ_tot, having a rho value of 0,586.

Other high scoring traits were OBQ_7 (Paid attention to what I said) (rho= 0.507), OBQ_8 (good communication skills) (rho= 0.521) and OBQ_23 (was patient with me) (0,526)

Additionally the score of the subgroups of behavioural traits were scored together to determine if a specific sub-group has a bigger influence than another.

Spearman Correlation was done on the data (Table 13, page 60).

Statistical analysis demonstrated that there is a significant correlation between STQ_total and all the sub-groups of OBQ, as well as OBQ_tot.

The association of STQ_tot with OBQ_tot had a rho value of 0.593, with OBQ_com a value of 0,563, with OBQ_mot a value of 0,45, with OBQ_ec a value of 0,586 and with OBQ_prof a value of 0,481.

6. Discussion

Data collection

The data gathering for the study was done by means of a set of four questionnaires; General Information Questionnaire, Satisfaction with Treatment Questionnaire (STQ), Orthodontic care team Behaviour Questionnaire (OBQ) and the NEO-FFI personality Questionnaire.
With the data obtained from these questionnaires, further statistical analysis was done to determine the correlations.
After sending the questionnaires by post, telephonic follow-up, e-mail contact and even more telephonic motivation to complete the questionnaire, a total of 73 questionnaires were returned and were be used for further analysis.

Depending on whether the Pop_tot or Pop_pos is used, the response rate was either 46,5% (with regard to the total treated population) or 73% (with regard to the total contactable population).
A response rate of 40% is seen as acceptable, with a response rate above 50% seen as very good (Gehlbach, 1993 and Warwick and Lininger, 1975 as cited by McNair et al, 2009: 763). Both of the different response rates are above 40%, so there is validity to the results that was generated.

Ideally a higher response rate would have been preferable, because this rather low percentage of the total possible population does give acceptable, but not highly acceptable representation of the population as a whole. The power of the study is not as high as the researcher would have liked and various aspects that were questioned could not satisfactorily be explored or analysed due to a low frequency of certain characteristics, e.g. not all the demographic variables could significantly be correlated to the STQ or OBQ.

Various studies has been done in the past to determine which factors may contribute to a hesitancy in responding to questionnaires, which may explain the low response rate. Sociocultural barriers that may have influenced this study, and have been described in the past are; lack of awareness about research studies (Harris et al, 1996; 88:632), economic barriers (Hansen, 1991; 83:770) and communication issues (Harris et al, 1996; 88:632). Most of the target group for this study are young adults (mean age = 18.92), with little or no experience in participation in research studies, thus the importance of responding to study questionnaires has not been fully realized by them.
To overcome economic barriers to responding to the questionnaire, an envelope with postage paid was supplied to return to the researcher, but it does not seem to have made a big difference.
A possible method to lessen the role of economic barriers may be to incentivize the candidates to complete the questionnaires by offering compensation or having them enter into a prize-drawing if the questionnaires has been completed fully. Financial incentives were offered when the questionnaires were sent via e-mail, rather that normal post.
A marked increase in percentage of responders was found when incentives were offered and questionnaires were sent via e-mail. When no incentive was offered and the questionnaires were sent via normal postal service, only 34 % response of the Pop_pos was achieved, while 61% of the remaining Pop_pos replied when an incentive and e-mailed questionnaires were used. After the initial round of posting the questionnaires, the

33

patients were called to inform and motivate them, but only 4 new responses were obtained.

From this, two possible conclusions can be drawn; E-mailed questionnaires are more effective in data gathering than posted questionnaires and candidate response rate increases when incentives are provided to complete questionnaires. Studies have shown that the best response rates have been achieved when using a mixed-mode survey of mailing, phoning and e-mailing questionnaires (Converse, Wolf and Oswald, 2008)

The postage cost and time between sending and receiving responses made this route of trying to re-establish contact with the patients very unattractive to the researcher.

After e-mail addresses were obtained from the patients, a much better response was obtained with no extra costs. It was also much easier to re-establish contact with non-responders and motivate them to complete the questionnaires via e-mail than via normal post.

Of the 67 patients whose telephone numbers were relevant, only 2 did not have e-mail access, proving that presently e-mail contact may be a better medium of dental surveys than via normal post.

Of the 157 possible candidates in the total population, the contact details of only 100 were up to date. Most of the candidates had already finished their orthodontic treatment when the study was done, so there was no direct contact with them in the orthodontic clinic where relevant contact details could be received. Thus, more than a third of the total study population could not be reached due to administrative issues!

It thus clearly shows that communication and administration issues had a big influence on the response rate of the study.

The setting in which the questionnaire gauging treatment satisfaction was to be completed could also have had an influence on the outcome of the study.

If patients completed a questionnaire with regards to their orthodontist while they were in the orthodontic practice, they may have tended to give a more positive feedback. This may be due to the fear that there would be negative repercussions if they give a more negative feedback.

For this reason the questionnaires was sent to patients' homes, so that they could fill it out in a more secure and anonymous setting, thus giving a more accurate account of their satisfaction levels.

The researcher will advise that a similar study be done over the next few years with current patients at the Orthodontic clinic of the Faculty of Orthodontics at UWC.

By doing the study at the Orthodontic clinic the participants can be informed on the importance of scientific studies, it will incur no further costs and proper avenues of communication and information can be established between the researcher and subject.

To ensure that patients do not feel intimidated to complete the questionnaire, the questionnaire should still be completed at their homes, with anonymity.

To determine if there was any bias created by giving an incentive to complete the questionnaires, the researcher compared the results of the STQ_tot and the OBQ_tot between the initial 33 completed questionnaires and the final study sample. The bias expected, if any, would have been a lower STQ_tot and OBQ_tot score in the initial group, when compared to the final sample. The reason for this line of thinking by the researcher is that candidates that are incentivised and in whom a bias is created will respond more positively due to gratitude for the incentive.

The following data was found in the two separate samples:
STQ_tot initial group: 83,54   OBQ_tot initial group: 113,09
STQ_tot final sample: 80,86   OBQ_tot final sample: 112,32

From the above we can see that the STQ_tot and OBQ_tot was actually higher in the initial sample than the final sample, which is contrary to what would be expected if the incentive was to influence the participants to answer more positively

Influence of demographics on STQ and OBQ

In this study, the gender of the patients did not have any influence on their perceived satisfaction with orthodontic treatment, or their perception on the orthodontic caregiver's behaviour. In the past, certain studies has shown that gender was a significant predictor in the doctor-patient relationship, as measured in the OBQ, (Bos et al, 2005:531) and thus satisfaction with treatment, while other studies has shown that it has no significant correlation (Al-Omiri and Abu Alhaija, 2006:427). Even though it has been shown that females tend to be less satisfied with the appearance of their teeth (Shaw, 1981: abstract), that they are more concerned by malaligned teeth and that they have a higher perceived need for orthodontic treatment (Sheats et al, 1998:113), this and other studies (Keles and Bos, 2013) shows that they are not necessarily more satisfied with the orthodontic treatment process and outcome than males. This was corroborated by the present study.

In this study the age of the patients did not have any influence on satisfaction with treatment or the perceived behaviour traits of the caregiver. This finding corresponds with those of earlier studies (Al-Omiri and Abu Alhaija, 2006:427), but contrary to other studies (Larsson and Bergstrom, 2005: 99). The difference in study outcomes may be due to a difference in population age distribution. It has been postulated that a patient's pain threshold lowers with age (Schreurer, Firestone and Burgin 1996: 356). The perception of pain during treatment will negatively influence the perception of satisfaction with treatment. Even though the respondents of the study were young adults, they were mostly adolescent when they were treated. Their pain threshold would therefor have been quite high, making the perceived pain less.
Even though satisfaction with dento-facial appearance decreases with age (Cunningham, 2000: 200), this does not seem to have an effect on the perceived satisfaction of the orthodontic treatment.

The person that indicated that orthodontic treatment is necessary has been shown in this study to have no effect on the satisfaction with the treatment process or perception of the caregiver's behaviour. Scouring the literature, no studies were found where this parameter was used to determine the correlation with treatment satisfaction.

When the results of the comparison done between STQ / OBQ and having received orthodontic treatment by a single, or multiple registrars are analysed, it showed that there are statistically significant correlations. Patients that were treated by multiple caregivers had lower average scores for total satisfaction and all sub-categories of OBQ. Of the 29 candidates that were treated by multiple caregivers, 10 indicated that they experienced different levels of satisfaction with treatment between the different caregivers.

A possible explanation for this result may be that the patient builds up a relationship with his caregiver over time and as this relationship grows, the routes of verbal as well as non-verbal communication gets more open and relaxed. This may positively influence the experience of the caregiver's behaviour by the candidate. When there is a change of caregiver, this relationship is broken and a new relationship has to be built, thus creating a situation where the positive influence of a long-term relationship on the perception of the caregiver's behaviour is missing.

The study was conducted on patients being treated at the orthodontic faculty of the University of the Western Cape, thus in a hospital/university setting. The chances of patients thus being treated by multiple clinicians are quite high, compared to patients treated in private practice, where there is usually only one clinician. The comparison between satisfaction levels of patients treated in private practice versus a university setting may therefor be affected by the amount of treating clinicians.

The importance of continuity in care was shown in a study (Hjortdahl and Laerum, 1992: 1287–1290), where they showed that the duration of the patient-doctor relationship had a significant influence on the satisfaction of the patient.

In a future study, candidates that has had multiple caregivers could be questioned to reveal which differences in caregiver characteristics has had the greatest influence on their perceived satisfaction with treatment.

Influence of Personality type on STQ and OBQ

The method used to determine personality characteristics of the subject is the NEO-Five Factor Inventory. It consists of five categories: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. Each category has twelve questions. The internal consistency and test-retest reliability of the NEO FFI has been proven to be high (McCrae and Costa, 1983: 251), and can thus be used with a high degree of reliability in the determination of personality types. It has also been shown to be stable in scoring when the test was done a few months apart, as well as a few years apart (Costa and McCrae, 1992).

In dentistry, studies has shown that personality has an influence on satisfaction with dento-facial conditions and treatment, and that there is a correlation between traits like self-esteem, self-confidence extroversion, anxiety, warmth, conscientiousness and neuroticism and satisfaction with general dental treatment (Mehra, Nanda and Sinha 1998: 118). As an example, females with a high neuroticism score and males with high introversion scores are less satisfied with orthognathic surgery results (Kiyak et al, 1986; 391).

In this study, there was no significant correlation between the satisfaction with treatment scores and personality type. At first this may seem to be in contrast with previous studies done to assess the patient satisfaction with orthodontic treatment (Al Omiri and Abu Alhaija, 2006; 76:428) and prosthetic treatment (Moltzer, van de Meulen and Verheij, 1996; 24:54), where levels of satisfaction with treatment was lower in patients that had high neuroticism scores. It is however important to keep in mind that these studies correlated the effect of personality types on the **outcome** of treatment, and not the treatment process itself, as was the main focus in this study.

An aspect of the above mentioned studies that may have had an effect on the current study is related to the fact that patients with high neuroticism scores are less satisfied with results of treatment immediately post-treatment. As time progresses however, they tend to

show higher satisfaction scores later on if the beneficial effect of treatment still remains (Kiyak et al, 1986; 89:391).

Many of the participants in the present study have been finished with treatment for an extended time. It may then be that their perception of the treatment process has also been tempered with time, giving a more positive report if they are still happy with the treatment outcome (as almost 90 % has indicated in the questionnaires).

The researcher will therefore advise that a similar study be done over the next few years with current patients at the Orthodontic clinic of the Faculty of Orthodontics at UWC. The patients will need to complete the NEO-FFI at the start and the end of treatment, as it has been shown that there are certain maturation change as one gets older (Costa and McCrae, 2006: 26). They could then at regular intervals complete the STQ and OBQ. This will give a much bigger data set to extrapolate from. By determining the satisfaction with treatment at various stages during the treatment the bias that satisfaction with the treatment outcome can have on the satisfaction with the treatment process can be minimized.

This study has shown that there is a weak correlation between certain patient personality characteristics and perceived orthodontist behaviours.

NEO_N is negatively associated with OBQ_prof (rho= -0.244) and OBQ_tot (rho= -0.265). Patients with higher neuroticism scores, will therefore score the orthodontist lower on aspects pertaining to professionalism and by proxy, the total score will be lower as well.

The researcher has not yet seen this correlation in the available literature.

One reason for this result may be due to the fact that people with a higher Neuroticism score tend to be more emotional; they may not respond that well to a highly professional caregiver. Instead of professional, the neurotic patient may perceive the caregiver as cold and clinical and therefore not perceive his behaviour as positive.

Further study to confirm or disprove this result should be done, because the knowledge gained could be used to alter the caregiver's professional behaviour with more neurotic patients, and thereby increasing satisfaction with the treatment process.

Another correlation between personality traits and OBQ were found, where there is a weak positive correlation between NEO_C and all sub-categories of OBQ.

The researcher has not yet seen this correlation in the available literature.

The OBQ_c was correlated the most however (rho=0,326). Patients with higher Conscientiousness scores will score a caregiver higher on their communication skills. This correlates well with their tendency to be highly organized and goal orientated. A caregiver with good communication skills will give pertinent information as to what will happen and what the patient can expect. A good communicator will also listen to the questions a patient has regarding his treatment. A more conscientiousness person should experience all of this more positively. The information gathered from this study should be used by caregivers to focus their communication skills in such a way that it would influence the conscientious patient more positively.

Due to the fact that certain patient personality traits may have an effect on the perceived caregiver behaviour, the researcher advises that a NEO FFI test should be done on all new patients to determine their personality profile and be kept in mind when treating the patient. This could of course only be done if the patients are willing to consent to have the evaluation done.

It is important to note that all the correlations of personality traits were weak and should thus only be seen as a tool to try and improve the satisfaction with the treatment process, and not be a guideline as to how definitively treat specific personality groups.

Correlation between Orthodontic caregiver behaviour and satisfaction with treatment.

The orthodontist's behavioural characteristics were measured using the Orthodontist Behaviour Questionnaire; an adaptation to a questionnaire used in a previous study (Sinha, Nanda and McNeil 1996: 373), and derived from a questionnaire to evaluate general dental practitioners (Corah, O'Shea and Bissell 1985: 443-446). The questionnaire is used to evaluate verbal communication of information about the procedure, comforting the patient and reassuring the patient. Non-verbal aspects that were evaluated included professionalism, hygiene and work methodology.

In the study, individual questions, as well as sub-groups of behavioural traits were compared to satisfaction with treatment.

All the sub-groups of behaviour traits correlated significantly with satisfaction with treatment, but Empathy and Care showed the highest correlation (rho = 0,586). (Table 13, page 60)

Historically dentistry has always been associated with painful procedures, so it may be that patients are more satisfied with treatment if the care giver is empathetic to their needs and fears and shows that they care for the patient.

The behaviour sub-group that scored the lowest was Motivation. Even though Motivation scored the lowest, it still had a very significant correlation to satisfaction, with rho= 0,450. The average score of Motivation was 3,96 on the Likert Scale, indicating that the caregivers did motivate the patients sufficiently. The reason why Motivation correlates less with satisfaction with treatment may be due to the fact that it is done on a less personal level, and more on a level of giving instructions on care and maintenance. By making motivation more personal and engaging the patient more to reach an ideal treatment outcome, the role of motivation may have a greater influence on total satisfaction with treatment.

Each of the individual behaviour characteristics within the four sub-groups of OBQ showed a positive correlation coefficient with perceived satisfaction, while certain behaviour traits had a very strong positive correlation. The following questions were strongly correlated: " Was polite and friendly during my visit", "He paid attention to what I said", " He had good communication skills" and " Was patient with me". All of these behaviours are specific to let the patient feel welcome, safe and wanted. Unfortunately, due to the time constraints in the modern orthodontic practice, it can be difficult to communicate effectively and treat the person behind the patient with the necessary care. It has been shown in past studies that proper communication and care can allay the fears, stress and anxiety of patients, which in turn leads to better treatment outcomes, patient and doctor satisfaction (Laskin, 1979: 786).

It is interesting to note that the behavioural traits that correlate strongest with increased patient satisfaction are all non-verbal communication. The same can be seen from the OBQ sub-group correlation to satisfaction, where motivation, which is highly verbal, has the lowest correlation with increased satisfaction. Caregivers should therefore improve

their non-verbal communication skills to a greater extent because it may improve satisfaction exponentially more than verbal communication.

Understanding this relation and equipping the whole orthodontic care team to communicate effectively on a verbal, as well as non-verbal level, may improve total satisfaction in the workplace, as well as with the treatment received.

The **Null hypothesis** for this study was that there is no correlation to orthodontic caregiver behavioural traits or patient personality profiles and the perceived satisfaction with the orthodontic treatment process. The data obtained has however disproved this Null hypothesis, as satisfaction with the treatment process has been shown to have a good correlation to Orthodontist behaviour traits. Although weak, some patient personality traits did show a relationship (positive and negative) with Orthodontist behaviour traits.

7. Conclusion

The results of this study has brought the following to attention:
To gain better response rates for questionnaires sent to patients, it is preferable to send it via e-mail, rather than normal post. A financial incentive, even if it is quite small, may contribute to a better response rate as well.

Age, Sex and Treatment indicator did not have a statistically significant effect on satisfaction with the treatment process or the perceived caregiver behavioural traits.

Being treated by a single or multiple caregivers did have an effect on the perceived satisfaction with treatment as well as the caregiver behavioural traits. Patients treated by multiple caregivers showed lower scores on satisfaction with the treatment process as well as the total score for OBQ.

Different patient personality traits did not have a statistically significant effect on the perceived satisfaction with treatment.

Neuroticism had a weak negative correlation with the Professionalism sub-group of the OBQ and with OBQ_tot. Therefore a more neurotic person will give a lower score for caregiver professionalism and by extension, the total OBQ score will be lower.

Conscientiousness had a weak positive correlation with all the sub-categories of the OBQ. The sub-group Communication was correlated the most with conscientiousness.

As seen in the data obtained from the study, the behaviour of the orthodontic caregiver had a strong influence on the perceived satisfaction of the patient during orthodontic treatment.
All sub-groups of orthodontic caregiver behaviour have a positive correlation on the perceived satisfaction with orthodontic treatment, but Empathy and Care correlates the strongest.

Non-verbal communication seems to be better correlated to increased satisfaction.
The individual caregiver behavioural trait that had the highest correlation with better satisfaction with treatment was " Was polite and friendly during my visit" (OBQ question 22).

For this reason, it should be the goal of every orthodontic practitioner to equip him/her self, as well as the whole team involved in patient care, to have effective communication skills and show behaviour that is empathetic, professional and inductive to creating an environment of care that increases patient comfort and satisfaction.

Further studies in this field should be carried out to determine with more accuracy, which behavioural traits could positively influence each patient personality group.

9. Critique and Recommendations

As with many studies, there are areas upon which this study can approve and where, in retrospect could have been done differently.

The main concern was the sample size of 100 patients, which is quite small and thus the power of the study is not as high as the researcher would have liked. The total population was only 157, which is quite small as well. To gain statistically more significant results the researcher will advise that a similar study be done over the next few years with current and future patients at the Orthodontic clinic of the Faculty of Orthodontics at UWC.

By doing the study at the Orthodontic Clinic the participants can be informed on the importance of scientific studies, it will incur no further costs and proper avenues of communication and information can be established between the researcher and subject. To ensure that patients do not feel intimidated to complete the questionnaire, the questionnaire should still be completed at their homes, with anonymity.

A further critique of the study is the fact that the subjects that participated had different times between completion of treatment and completing the questionnaire. Their memory of their perceived satisfaction with the treatment process may thus have been affected to different rates. By doing a similar study with current patients, their memory of their satisfaction will not be affected by time.

The questionnaires should also be adjusted in future study, as some wording may inadvertently have confused the participants. In the OBQ questionnaire, the questions were asked pertaining the orthodontic care team. This implied that they had to evaluate the clinician and supporting staff, but the participant could very likely only think of the clinician when thinking of the treatment. In future the OBQ should thus focus on the clinician only.
In the STQ most of the questions pertained to the treatment process, but there were also questions to evaluate the treatment outcome, which should not have been part of this study where the researcher wanted to specifically evaluate the satisfaction with the treatment process. Future STQ questionnaires should thus have more extensive questions on the treatment process itself.

8. Appendices

A-Information sheet

<div style="text-align:center">

Candidate number

</div>

LETTER OF INFORMATION FOR CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Influence of orthodontic care team behaviour on the perceived satisfaction of patients during orthodontic treatment.

You are asked to participate in a research study conducted by Dr. F.J. du Raan, Prof. A.M.P. Harris and Dr. A. Hudson from the Department of Orthodontics at the Dental Faculty of the University of the Western Cape.
If you have any questions or concerns about the research, please feel free to contact Dr. F.J. du Raan (main investigator) at **erickduraan@orthoresearch.net or tel: 072 511 7415**

PURPOSE OF THE STUDY

In this study we are exploring how the behaviour of the orthodontic care team will influence the perception of the patient's satisfaction of the treatment process, and if certain patient personality groups react differently.

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:
You will be asked to complete a survey that includes questions about general demographic information, a personality survey and several self-report measures regarding your experience of your orthodontic treatment. It is estimated that the survey will take on average anywhere from 15 to 20 minutes to complete.
Anyone who has had orthodontic treatment at UWC since 2008 is eligible to participate.

POTENTIAL RISKS AND DISCOMFORTS

There are no anticipated risks or discomforts associated with participating in this study.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

You may become more aware of how you were treated by the staff during your orthodontic treatment, which may increase your understanding of your perceived satisfaction of the whole treatment process.
By doing the personality trait questionnaire you may have self-discovery of your own personality.
Your input may be of use to alter the way orthodontic care is give to improve patient satisfaction.

PAYMENT FOR PARTICIPATION

There is no direct compensation for participating in this research.

CONFIDENTIALITY

Any information that is obtained in connection with this study will be anonymous and will not be disclosed without your permission.
All survey responses received will be stored in a safe environment.
Only the researchers directly associated with this study will have access to this information for the purposes of analysis and conducting the study.
Any reports of this study made available to participants or sent to a scientific journal for publication will contain information that reflects group results and not information about specific individuals.
The identity of the treating orthodontic registrars will not be made known in any reports or publications arising from this study.
Following international guidelines, data will be retained for a period of 5 years post publication in a secure place, after which time it will be disposed of in a secure manner (e.g. shredded).

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind.
You may also refuse to answer any questions you don't want to answer and still remain in the study.
The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

Once the research is complete a brief report explaining the findings from this study will be available for those interested. The report will be available on the study website.
Web address: www.orthoresearch.net
Date when results will be available: End of 2013

SUBSEQUENT USE OF DATA

This data will not be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty.
If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Western Cape.

SIGNATURE OF INVESTIGATOR
These are the terms under which I will conduct research.
Dr. F.J. Du Raan
Department of Orthodontics
University of the Western Cape

It is recommended that you make a copy of this letter of information for your records.

B- Letter of consent

To acknowledge that you have read and understood the information given in the information sheet, and would like to continue with the survey, please sign and return the letter of consent together with the completed questionnaire in the supplied envelope.

------------------------------   ----------------------------

Signature parent/guardian/   Date
candidate (if older than 18)

UNIVERSITY *of the*

WESTERN CAPE

It is recommended that you make a copy of this letter of consent for your records.

C-General Information and demographics Questionnaire

1. Age at end of treatment: _____ years.

2. Duration of treatment: _____ years.

3. Sex: ☐Male
                                              ☐Female

4. Home language   ☐English
                                            ☐Afrikaans
                                              ☐Xhosa
                                              ☐Other☐

5.Type of braces: ☐Fixed
                                                ☐Removable
                                              ☐Combination

6.Who indicated that you be treated   ☐Self
                                              ☐Parents
                                              ☐Dentist

7. Were you happy with how your   ☐Yes
    teeth looked before treatment?   ☐No

8. Are you happy with the outcome   ☐Yes
    of the treatment?   ☐No

9. Were you treated by a single or   ☐Single
    multiple orthodontists?   ☐Multiple

10. If you were treated by more than
    one orthodontist, was there a difference
    in your level of satisfaction between the   ☐Yes
    treatment received by the different
    orthodontist?   ☐No

D- Orthodontic Care Team Behaviour Questionnaire (OBQ)

Instructions: The following questions needs to be answered on a scale. Indicate which best describes how you feel.
Scoring goes from strongly disagree; disagree; neutral; agree and strongly agree.
(Please try to minimize neutral answers as much as possible)

Communication
1. They carried on casual conversation and small talk with me.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

2. They told me what they were going to do before starting to work.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

3. They gave a step-by-step explanation of what they were doing.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

4. They used words that were understandable about my treatment.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

5. They encouraged me to ask questions about my treatment.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

6. They listened to my questions and gave adequate answers.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

7. They showed me that they paid attention to what I said.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

8. I feel they have good communication skills
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

Motivation
9. I was motivated to improve my oral hygiene.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

10. I was told beforehand what I could expect the outcome to be.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

11. They positively reinforced the goals we are working towards

Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

12. They criticized my teeth or how I have been taking care of them.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

13. I feel they had good motivational skills
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

Empathy and care
14. They smiled during the treatment.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

15. Showed that they knew what I was feeling.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

16. Made me feel welcome.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

17. Had a calm manner.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

18. Warned me when they felt the procedure might hurt.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

19. Asked during the visits if I was concerned or nervous.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

20. Asked during the procedure if I was having any discomfort.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

21. I feel they have empathy for their patients.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

Professionalism
22. Was polite and friendly during my visit.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

23. Was patient with me.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

24. Worked quickly but didn't rush.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

25. He worked in a hygienic way.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

26. I trust their judgement and advice.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

27. They are competent as orthodontic caregivers.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

28. I feel they are a professional unit.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

Candidate number

E- Satisfaction with treatment and process questionnaire (STQ)

Instructions: The following questions needs to be answered on a scale. Indicate which best describes how you feel.
Scoring goes from strongly disagree; disagree; neutral; agree and strongly agree.
(please try to minimize neutral answers as much as possible)

1. I feel the treatment outcome is worth the expense and time that I (and my parents) had to invest.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

2. My treatment took about as long as I expected it would.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

3. Even though some appointments were short, each was necessary for my treatment to be successful.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

4. Plenty of time was spent with me during each appointment.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

5. I was rarely kept waiting for appointments.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

6. I was satisfied with the selection of days and times when I could be seen for orthodontic appointments.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

7. The waiting area was comfortable.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

8. The treatment area was modern and up to date.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

9. The treatment area was clean and sanitary.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

10. The orthodontist's office was conveniently located.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

11. Problems that arose during treatment were quickly taken care of.

Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

12. Now that orthodontic treatment is complete, my teeth are straighter.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

13. Now that orthodontic treatment is complete, I have a better bite.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

14. Now that orthodontic treatment is complete, I think I have a more attractive face.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

15. My teeth fit very well since I have been treated.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

16. My appearance has changed exactly like I expected.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

17. When I look in the mirror, I feel very satisfied about the way my appearance has improved since orthodontic treatment.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

18. My orthodontic treatment was inconvenient for me.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

19. I take better care of my teeth since having braces.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

20. I am satisfied with the results of my orthodontic treatment.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

21. If I had it to do over again, I would still want orthodontic treatment.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

Candidate number ☐

F- NEO Five Factor Inventory (NEO-FFI) for assessment of personality profiles

Instructions: The following questions needs to be answered on a scale. Indicate which best describes how you feel.
Scoring goes from strongly disagree; disagree; neutral; agree and strongly agree.
(please try to minimize neutral answers as much as possible)

1. I am not a worrier.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

2. I like to have a lot of people around me.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

3. I don't like to waste my time daydreaming.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

4. I try to be friendly to everyone I meet.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

5. I keep my belongings neat and clean.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

6. I often feel inferior to others (I feel others are better than met).
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

7. I laugh easily.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

8. Once I find the right way to do something, I stick to it.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

9. I often get into arguments with my family and classmates.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

10. I'm pretty good about pacing myself so as to get things done on time.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces (I cannot function properly when stressed).
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

12. I **don't** consider myself especially ''light hearted''.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

13. I am intrigued by the patterns I find in art and nature.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

14. Some people think I'm selfish and think too highly of myself.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

15. I am not a very methodical person (I can not work in a structured way).
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

16. I rarely feel lonely or blue.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

17. I really enjoy talking to people.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

18. I believe hearing controversial speakers can only confuse and mislead you.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

19. I would rather cooperate with others than compete with them.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

20. I try to perform all the tasks assigned to me thoroughly.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

21. I often feel tense and nervous.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

22. I like to be where the action is.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

23. Poetry has little or no effect on me.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

24. I tend to be cynical and sceptical of others' intentions.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

25. I have a clear set of goals and work toward them in an orderly fashion.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

26. Sometimes I feel completely worthless.

Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

27. I usually prefer to do things alone.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

28. I often try new and foreign foods.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

29. I believe that most people will take advantage of you if you let them.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

30. I waste a lot of time before settling down to work.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

31. I rarely feel fearful or anxious.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

32. I often feel as if I'm bursting with energy.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

33. I seldom notice the moods or feelings that different environments produce.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

34. Most people I know like me.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

35. I work hard to accomplish my goals.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

36. I often get angry at the way people treat me.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

37. I am a cheerful, high-spirited person.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

38. I believe we should look to our religious authorities for decisions on moral issues.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

39. Some people think of me as cold and calculating.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

40. When I make a comment, I can always be counted on to follow through.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

41. Too often when things go wrong, I get discouraged and feel like giving up.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

42. I am **not** a cheerful optimist.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

44. I'm hard-headed and tough-minded in my attitudes.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

45. Sometimes I'm not as dependable or reliable as I should be.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

46. I am seldom sad or depressed.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

47. My life is fast-paced (I am very busy doing things the whole time).
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

48. I have little interest in speculating on the nature of the universe or the human condition.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

49. I generally try to be thoughtful and considerate.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

50. I am a productive person who always gets the job done.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

51. I often feel helpless and want someone else to solve my problems.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

52. I am a very active person.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

53. I have a lot of intellectual curiosity.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

54. If I don't like people, I let them know it.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

55. I never seem to be able to get organized.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

56. At times I have been so ashamed I just wanted to hide.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

57. I would rather go my own way than be a leader of others.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

58. I often enjoy playing with theories or abstract ideas.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

59. If necessary, I am willing to manipulate people to get what I want.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

60. I strive for excellence in everything I do.
Strongly Disagree☐ Disagree☐ Neutral☐ Agree☐ Strongly Agree☐

UNIVERSITY *of the*
WESTERN CAPE

G-Tables

Table1: Descriptive statistics on variable: age

```
. summarize age

    Variable |      Obs       Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
         age |       67   18.92537    4.530414         14         46
```

Table 2: Descriptive statistics on variable: treatment duration

```
. summarize trt_dur

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
     trt_dur |        72    3.451389    1.811854          2         13

. tab trt_dur

     trt_dur |      Freq.     Percent        Cum.
------------+-----------------------------------
          2 |         18       25.00       25.00
        2.5 |         10       13.89       38.89
          3 |         20       27.78       66.67
        3.5 |          1        1.39       68.06
          4 |         10       13.89       81.94
          5 |          5        6.94       88.89
          6 |          5        6.94       95.83
          7 |          1        1.39       97.22
          9 |          1        1.39       98.61
         13 |          1        1.39      100.00
------------+-----------------------------------
      Total |         72      100.00
```

Table 3: Descriptive statistics on variable: sex

```
. tab sex

         sex |      Freq.     Percent        Cum.
------------+-----------------------------------
           F |         55       74.32       74.32
           M |         19       25.68      100.00
------------+-----------------------------------
      Total |         74      100.00
```
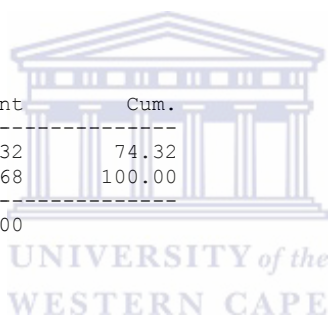
Table 4: Descriptive statistics on variable: language

```
. tab language

    language |      Freq.     Percent        Cum.
------------+-----------------------------------
         Eng |         54       72.97       72.97
         Afr |         15       20.27       93.24
         Xho |          2        2.70       95.95
         Oth |          3        4.05      100.00
------------+-----------------------------------
      Total |         74      100.00
```

Table 5: Descriptive statistics on variable: Type of braces

```
. tab braces_type

 braces_type |      Freq.     Percent        Cum.
------------+-----------------------------------
       Ficed |         58       82.86       82.86
      Remove |          5        7.14       90.00
      Combin |          7       10.00      100.00
------------+-----------------------------------
      Total |         70      100.00
```

Table 6: Descriptive statistics on variable: Treatment indicator

```
trt_indicat |      Freq.     Percent        Cum.
------------+-----------------------------------
       Self |         24       32.43       32.43
    Parents |         27       36.49       68.92
      Other |         23       31.08      100.00
------------+-----------------------------------
      Total |         74      100.00
```

Table 7: Descriptive statistics on variable: happiness with teeth

```
. tab happ_b happy_a, row


           |        happy_a
    happ_b |       yes         no |     Total
-----------+----------------------+----------
       yes |         7          1 |         8
           |     87.50      12.50 |    100.00
-----------+----------------------+----------
        no |        59          6 |        65
           |     90.77       9.23 |    100.00
-----------+----------------------+----------
     Total |        66          7 |        73
           |     90.41       9.59 |    100.00
```

Table 8: Descriptive statistics on variable: Amount of caregivers

```
. tab caregivers

     single |      Freq.     Percent        Cum.
------------+-----------------------------------
     Single |         44       60.27       60.27
   Multiple |         29       39.73      100.00
------------+-----------------------------------
      Total |         73      100.00
```

```
. tab diff_sat

   diff_sat |      Freq.     Percent        Cum.
------------+-----------------------------------
         NA |         44       60.27       60.27
        yes |         19       26.03       86.30
         no |         10       13.70      100.00
------------+-----------------------------------
      Total |         73      100.00
```

Table 9: Descriptive statistics of OBQ and NEO subgroup scores

```
. tabstat QBQ_com QBQ_mot QBQ_ec QBQ_prof QBQ_tot STQ_tot NEO_N NEO_E NEO_O NEO_A NEO_C,
statistics(
>  count min p25 p50 p75 max mean ) varwidth(10) columns(statistics)

   variable |        N        min        p25        p50        p75        max       mean
------------+------------------------------------------------------------------------
    QBQ_com |       74         17         29         32         36         40   31.28378
    QBQ_mot |       74         12         18         20         22         26   19.62162
     QBQ_ec |       74         18         29         32         35         40   31.72973
```

```
    QBQ_prof |      74        14        28        30        34        35  29.68919
     QBQ_tot |      74        68       106       113       124       138  112.3243
     STQ_tot |      74         6        76        84        90       104  80.86486
       NEO_N |      72         8        16        20        26        40    21.125
       NEO_E |      72        14      26.5        31      34.5        41  30.04167
       NEO_O |      72         9        20        24      27.5        37  23.33333
       NEO_A |      72        18        25        28        31        39  28.27778
       NEO_C |      72        14        29      35.5        40        48  34.48611
```

Table 10: Descriptive statistics of sex compared to the measured variables

```
    . tabstat QBQ_com QBQ_mot QBQ_ec QBQ_prof QBQ_tot STQ_tot NEO_N NEO_E NEO_O NEO_A NEO_C,
  statistics(
  >  count min p25 p50 p75 max mean ) by(sex) nototal varwidth(10) columns(statistics)

    sex    variable |     N       min       p25       p50       p75       max      mean
  --------------+----------------------------------------------------------------------
    F     QBQ_com |    55        17        28        32        36        40  31.43636
          QBQ_mot |    55        13        18        20        21        25  19.74545
           QBQ_ec |    55        21        29        32        36        40  32.30909
         QBQ_prof |    55        14        28        31        34        35  29.78182
          QBQ_tot |    55        72       106       113       124       138  113.2727
          STQ_tot |    55         6        77        84        90       104  81.01818
            NEO_N |    54         8        16        21        27        39  21.77778
            NEO_E |    54        14        25        31        35        41   29.7963
            NEO_O |    54         9        20        24        27        37  23.14815
            NEO_A |    54        18        25        28        31        39   28.2963
            NEO_C |    54        21        30      37.5        41        48  35.53704
  --------------+----------------------------------------------------------------------
    M     QBQ_com |    19        18        30        32        35        37  30.84211
          QBQ_mot |    19        12        16        20        23        26  19.26316
           QBQ_ec |    19        18        27        31        34        37  30.05263
         QBQ_prof |    19        19        27        29        34        35  29.42105
          QBQ_tot |    19        68        97       114       122       134  109.5789
          STQ_tot |    19        56        74        84        91       102  80.42105
            NEO_N |    18        12        16        17        22        40  19.16667
            NEO_E |    18        21        28        31        32        40  30.77778
            NEO_O |    18        13        19        23        28        36  23.88889
            NEO_A |    18        22        25        28        31        37  28.22222
            NEO_C |    18        14        26      32.5        36        43  31.33333
  --------------------------------------------------------------------------------
```

Table 11: Descriptive statistics of treatment indicator compared to the measured variables

```
. tabstat QBQ_com QBQ_mot QBQ_ec QBQ_prof QBQ_tot STQ_tot  NEO_N NEO_E NEO_O NEO_A NEO_C,
    statistics
> ( count min p25 p50 p75 max mean ) by( trt_indicat ) nototal varwidth(10)
    columns(statistics)

trt_indicat   variable |     N       min       p25       p50       p75       max      mean
-----------------------+----------------------------------------------------------------------
Self          QBQ_com |    24        17        29      32.5        36        40  32.29167
              QBQ_mot |    24        13        18      19.5        21        25  19.29167
```

	N	min	p25	p50	p75	max	mean
QBQ_ec	24	25	29	32.5	34.5	40	32.375
QBQ_prof	24	23	28.5	30.5	34.5	35	30.75
QBQ_tot	24	95	103	113.5	123.5	138	114.7083
STQ_tot	24	61	76.5	80.5	88	98	81.20833
NEO_N	23	11	15	18	29	37	21.82609
NEO_E	23	14	23	30	32	41	28.56522
NEO_O	23	9	19	24	28	36	23.30435
NEO_A	23	18	22	27	34	39	27.95652
NEO_C	23	22	29	35	40	44	34.43478
Parents QBQ_com	27	22	29	31	34	39	31.85185
QBQ_mot	27	12	18	19	21	25	19.62963
QBQ_ec	27	21	29	32	36	40	31.62963
QBQ_prof	27	20	28	29	34	35	29.7037
QBQ_tot	27	88	107	112	120	138	112.8148
STQ_tot	27	6	78	84	94	104	81.88889
NEO_N	27	12	16	21	26	39	21.33333
NEO_E	27	16	26	30	34	40	29.77778
NEO_O	27	13	18	23	26	34	22.37037
NEO_A	27	23	26	27	29	34	27.62963
NEO_C	27	24	29	35	41	47	34.55556
Dentist QBQ_com	23	18	24	32	35	39	29.56522
QBQ_mot	23	12	17	20	22	26	19.95652
QBQ_ec	23	18	26	33	36	40	31.17391
QBQ_prof	23	14	26	31	34	35	28.56522
QBQ_tot	23	68	89	114	124	137	109.2609
STQ_tot	23	46	67	86	90	102	79.30435
NEO_N	22	8	15	19.5	23	40	20.13636
NEO_E	22	19	30	33	36	40	31.90909
NEO_O	22	15	21	24	28	37	24.54545
NEO_A	22	22	26	30	31	38	29.40909
NEO_C	22	14	27	37.5	40	48	34.45455

Table 12: Descriptive statistics of amount of caregivers compared to the measured variables

```
. tabstat QBQ_com QBQ_mot QBQ_ec QBQ_prof QBQ_tot  STQ_tot NEO_N NEO_E NEO_O NEO_A NEO_C,
statistics
> ( count min p25 p50 p75 max mean ) by( single ) nototal varwidth(10) columns(statistics)
```

single	variable	N	min	p25	p50	p75	max	mean
Single	QBQ_com	44	17	29.5	33	36.5	40	32.54545
	QBQ_mot	44	13	18	20	22	26	20.22727
	QBQ_ec	44	21	29	33	37	40	32.84091
	QBQ_prof	44	15	28	32	35	35	30.45455
	QBQ_tot	44	83	108.5	114.5	129.5	138	116.0682
	STQ_tot	44	6	78.5	85.5	91.5	104	83.31818
	NEO_N	43	8	15	19	24	40	20.30233
	NEO_E	43	16	28	30	34	41	30.39535
	NEO_O	43	9	20	24	26	37	23.39535
	NEO_A	43	19	26	28	32	39	28.93023
	NEO_C	43	14	29	36	40	48	34.7907
Multiple	QBQ_com	29	18	28	30	32	39	29.41379
	QBQ_mot	29	12	17	19	21	25	18.72414
	QBQ_ec	29	18	26	31	34	40	30.06897
	QBQ_prof	29	14	27	29	31	35	28.41379
	QBQ_tot	29	68	95	112	117	135	106.6207
	STQ_tot	29	46	70	78	87	102	76.68966
	NEO_N	28	11	17.5	22	26.5	37	22.53571
	NEO_E	28	14	22.5	31	35	40	29.21429
	NEO_O	28	13	19	23	28	32	23.07143
	NEO_A	28	18	23.5	27	31	38	27.35714
	NEO_C	28	17	28.5	35	39.5	44	33.75

Table 13: Spearman correlation comparing STQ_total with sub-groups of OBQ and NEO

```
. spearman QBQ_com QBQ_mot QBQ_ec QBQ_prof QBQ_tot STQ_tot NEO_N NEO_E NEO_O NEO_A NEO_C, stats(rho
```

```
> obs p) pw matrix

+----------------+
| Key            |
|----------------|
|   rho          |
|  Number of obs |
|  Sig. level    |
+----------------+

            | QBQ_com  QBQ_mot  QBQ_ec QBQ_prof  QBQ_tot  STQ_tot    NEO_N    NEO_E    NEO_O
------------+---------------------------------------------------------------------------------
    QBQ_com |  1.0000
            |      74
            |
            |
    QBQ_mot |  0.5183   1.0000
            |      74       74
            |  0.0000
            |
     QBQ_ec |  0.6260   0.5952   1.0000
            |      74       74       74
            |  0.0000   0.0000
            |
   QBQ_prof |  0.6009   0.5829   0.7408   1.0000
            |      74       74       74       74
            |  0.0000   0.0000   0.0000
            |
    QBQ_tot |  0.8416   0.7463   0.8602   0.8533   1.0000
            |      74       74       74       74       74
            |  0.0000   0.0000   0.0000   0.0000
            |
    STQ_tot |  0.5633   0.4499   0.5864   0.4813   0.5937   1.0000
            |      74       74       74       74       74       74
            |  0.0000   0.0001   0.0000   0.0000   0.0000
            |
      NEO_N | -0.2175  -0.1420  -0.1849  -0.2441  -0.2654  -0.0812   1.0000
            |      72       72       72       72       72       72       72
            |  0.0664   0.2340   0.1199   0.0388   0.0243   0.4975
            |
      NEO_E |  0.1468   0.0947   0.1138   0.0715   0.1279   0.0078  -0.2383   1.0000
            |      72       72       72       72       72       72       72       72
            |  0.2186   0.4288   0.3412   0.5509   0.2843   0.9484   0.0438
            |
      NEO_O |  0.0834   0.1756  -0.0229   0.0404   0.0747  -0.0565  -0.1018   0.1623   1.0000
            |      72       72       72       72       72       72       72       72       72
            |  0.4863   0.1401   0.8486   0.7363   0.5330   0.6373   0.3949   0.1731
            |
      NEO_A | -0.0522   0.0964   0.0576   0.1371   0.0654  -0.0568  -0.3905   0.3365   0.0595
            |      72       72       72       72       72       72       72       72       72
            |  0.6633   0.4204   0.6305   0.2508   0.5853   0.6356   0.0007   0.0038   0.6198
            |
      NEO_C |  0.3263   0.2559   0.2006   0.3242   0.3197   0.1785  -0.2492   0.3723   0.3372
            |      72       72       72       72       72       72       72       72       72
            |  0.0052   0.0300   0.0911   0.0055   0.0062   0.1335   0.0348   0.0013   0.0038
            |

            |  NEO_A    NEO_C
------------+-----------------
      NEO_A |  1.0000
            |      72
            |
            |
      NEO_C |  0.2842   1.0000
            |      72       72
            |  0.0156
            |
```

Table 14: Spearman correlation comparing STQ_total with individual OBQ traits

```
. spearman OBQ1-OBQ28 STQ_tot , stats(rho obs p) pw matrix
```

60

```
+----------------+
|  Key           |
|----------------|
|   rho          |
|  Number of obs |
|  Sig. level    |
+----------------+
```

	OBQ1	OBQ2	OBQ3	OBQ4	OBQ5	OBQ6	OBQ7	OBQ8	OBQ9
OBQ1	1.0000								
	73								
OBQ2	0.3654	1.0000							
	73	74							
	0.0015								
OBQ3	0.2398	0.5829	1.0000						
	73	74	74						
	0.0410	0.0000							
OBQ4	0.0587	0.4883	0.4915	1.0000					
	72	73	73	73					
	0.6243	0.0000	0.0000						
OBQ5	0.1269	0.3304	0.4418	0.4057	1.0000				
	72	73	73	72	73				
	0.2882	0.0043	0.0001	0.0004					
OBQ6	0.2111	0.3246	0.3947	0.3505	0.4738	1.0000			
	73	74	74	73	73	74			
	0.0730	0.0048	0.0005	0.0024	0.0000				
OBQ7	0.2718	0.4143	0.5996	0.5331	0.5827	0.7168	1.0000		
	73	74	74	73	73	74	74		
	0.0200	0.0002	0.0000	0.0000	0.0000	0.0000			
OBQ8	0.3762	0.6035	0.5617	0.4419	0.4925	0.4583	0.5048	1.0000	
	73	74	74	73	73	74	74	74	
	0.0010	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000		
OBQ9	0.3270	0.2312	0.2057	0.1351	0.1783	0.2869	0.3525	0.2506	1.0000
	72	73	73	72	72	73	73	73	73
	0.0051	0.0490	0.0808	0.2578	0.1340	0.0139	0.0022	0.0325	
OBQ10	0.3161	0.4437	0.3886	0.4384	0.2280	0.3348	0.3707	0.3647	0.4952
	73	74	74	73	73	74	74	74	73
	0.0064	0.0001	0.0006	0.0001	0.0523	0.0035	0.0011	0.0014	0.0000
OBQ11	0.1512	0.4537	0.4058	0.4415	0.3227	0.3929	0.4574	0.4472	0.4418
	73	74	74	73	73	74	74	74	73
	0.2017	0.0000	0.0003	0.0001	0.0054	0.0005	0.0000	0.0001	0.0001
OBQ12	-0.2463	0.0273	-0.1379	0.0301	0.0158	0.0326	0.1922	-0.0017	-0.1119
	73	74	74	73	73	74	74	74	73
	0.0357	0.8174	0.2415	0.8007	0.8945	0.7827	0.1009	0.9884	0.3459
OBQ13	0.1835	0.4901	0.4660	0.4146	0.3913	0.3527	0.5212	0.4834	0.3591
	73	74	74	73	73	74	74	74	73
	0.1203	0.0000	0.0000	0.0003	0.0006	0.0021	0.0000	0.0000	0.0018
OBQ14	0.0542	0.2395	0.1974	0.2469	0.1756	0.2182	0.3220	0.3631	0.2871
	73	74	74	73	73	74	74	74	73
	0.6489	0.0399	0.0919	0.0353	0.1373	0.0618	0.0051	0.0015	0.0138
OBQ15	0.1403	0.4509	0.3533	0.3244	0.4027	0.4339	0.5406	0.4354	0.3710
	73	74	74	73	73	74	74	74	73
	0.2365	0.0001	0.0020	0.0051	0.0004	0.0001	0.0000	0.0001	0.0012
OBQ16	0.2234	0.3413	0.3301	0.1412	0.4381	0.3318	0.4664	0.4060	0.3411
	73	74	74	73	73	74	74	74	73
	0.0575	0.0029	0.0041	0.2333	0.0001	0.0039	0.0000	0.0003	0.0031
OBQ17	0.2216	0.4932	0.3640	0.2870	0.2638	0.2219	0.3708	0.5332	0.2696
	73	74	74	73	73	74	74	74	73
	0.0596	0.0000	0.0014	0.0138	0.0241	0.0575	0.0011	0.0000	0.0211

61

OBQ18	0.1453	0.1407	0.2874	0.0879	0.2691	0.1263	0.3199	0.3737	0.2848
	73	74	74	73	73	74	74	74	73
	0.2198	0.2318	0.0130	0.4598	0.0213	0.2836	0.0055	0.0010	0.0146
OBQ19	0.1019	0.5106	0.5992	0.4845	0.4687	0.2005	0.4673	0.4371	0.3131
	73	74	74	73	73	74	74	74	73
	0.3912	0.0000	0.0000	0.0000	0.0000	0.0867	0.0000	0.0001	0.0070
OBQ20	0.2082	0.4933	0.3860	0.2793	0.2540	0.2095	0.3629	0.5283	0.4127
	73	74	74	73	73	74	74	74	73
	0.0772	0.0000	0.0007	0.0167	0.0301	0.0733	0.0015	0.0000	0.0003
OBQ21	0.2372	0.4197	0.4094	0.2056	0.3098	0.3081	0.4459	0.3586	0.2902
	73	74	74	73	73	74	74	74	73
	0.0434	0.0002	0.0003	0.0810	0.0076	0.0076	0.0001	0.0017	0.0128
OBQ22	0.2725	0.3294	0.3830	0.1959	0.4704	0.4105	0.5509	0.5028	0.3423
	73	74	74	73	73	74	74	74	73
	0.0197	0.0042	0.0008	0.0967	0.0000	0.0003	0.0000	0.0000	0.0030
OBQ23	0.2060	0.2828	0.4032	0.2261	0.4893	0.3366	0.5365	0.4737	0.3323
	73	73	73	72	72	73	73	73	72
	0.0804	0.0153	0.0004	0.0562	0.0000	0.0036	0.0000	0.0000	0.0044
OBQ24	0.3438	0.2576	0.3558	0.3168	0.4007	0.3913	0.5078	0.4531	0.2486
	73	74	74	73	73	74	74	74	73
	0.0029	0.0267	0.0019	0.0063	0.0004	0.0006	0.0000	0.0001	0.0340
OBQ25	0.1486	0.2697	0.4117	0.2616	0.1271	0.2861	0.3663	0.3894	0.3417
	73	74	74	73	73	74	74	74	73
	0.2095	0.0201	0.0003	0.0254	0.2841	0.0135	0.0013	0.0006	0.0031
OBQ26	0.2917	0.4551	0.3508	0.3523	0.3101	0.4421	0.4519	0.4771	0.3207
	73	74	74	73	73	74	74	74	73
	0.0123	0.0000	0.0022	0.0022	0.0076	0.0001	0.0001	0.0000	0.0057
OBQ27	0.2678	0.3044	0.3247	0.2278	0.3152	0.3255	0.4315	0.4097	0.1624
	73	74	74	73	73	74	74	74	73
	0.0220	0.0084	0.0048	0.0526	0.0066	0.0047	0.0001	0.0003	0.1699
OBQ28	0.1897	0.4044	0.3526	0.4589	0.3706	0.3278	0.4296	0.4675	0.1798
	73	74	74	73	73	74	74	74	73
	0.1079	0.0004	0.0021	0.0000	0.0012	0.0044	0.0001	0.0000	0.1280
STQ_tot	0.2377	0.3242	0.4952	0.2527	0.4669	0.4084	0.5077	0.5219	0.3316
	73	74	74	73	73	74	74	74	73
	0.0429	0.0048	0.0000	0.0310	0.0000	0.0003	0.0000	0.0000	0.0042

	OBQ10	OBQ11	OBQ12	OBQ13	OBQ14	OBQ15	OBQ16	OBQ17	OBQ18
OBQ10	1.0000								
	74								
OBQ11	0.5747	1.0000							
	74	74							
	0.0000								
OBQ12	0.0259	0.0636	1.0000						
	74	74	74						
	0.8267	0.5902							
OBQ13	0.5068	0.5998	0.0902	1.0000					
	74	74	74	74					
	0.0000	0.0000	0.4448						
OBQ14	0.0944	0.3577	0.0055	0.2328	1.0000				
	74	74	74	74	74				
	0.4235	0.0018	0.9632	0.0459					
OBQ15	0.4661	0.5923	0.1201	0.7231	0.4675	1.0000			
	74	74	74	74	74	74			
	0.0000	0.0000	0.3080	0.0000	0.0000				
OBQ16	0.0960	0.3806	0.1085	0.4791	0.4439	0.5211	1.0000		

```
           |      74       74       74       74       74       74       74
           |  0.4158   0.0008   0.3577   0.0000   0.0001   0.0000
           |
    OBQ17 |  0.3664   0.4353   0.1394   0.5564   0.5376   0.4264   0.4779   1.0000
           |      74       74       74       74       74       74       74       74
           |  0.0013   0.0001   0.2360   0.0000   0.0000   0.0002   0.0000
           |
    OBQ18 |  0.2418   0.3064   0.1632   0.2578   0.3808   0.3624   0.3999   0.3676   1.0000
           |      74       74       74       74       74       74       74       74       74
           |  0.0380   0.0079   0.1646   0.0266   0.0008   0.0015   0.0004   0.0013
           |
    OBQ19 |  0.5187   0.5300  -0.0458   0.5475   0.3860   0.5058   0.3002   0.5436   0.3176
           |      74       74       74       74       74       74       74       74       74
           |  0.0000   0.0000   0.6987   0.0000   0.0007   0.0000   0.0094   0.0000   0.0058
           |
    OBQ20 |  0.4335   0.4930  -0.0051   0.5485   0.3737   0.4770   0.3796   0.5780   0.3730
           |      74       74       74       74       74       74       74       74       74
           |  0.0001   0.0000   0.9658   0.0000   0.0010   0.0000   0.0009   0.0000   0.0011
           |
    OBQ21 |  0.2478   0.3020  -0.0295   0.5190   0.5281   0.4724   0.5198   0.5086   0.3699
           |      74       74       74       74       74       74       74       74       74
           |  0.0333   0.0089   0.8033   0.0000   0.0000   0.0000   0.0000   0.0000   0.0012
           |
    OBQ22 |  0.1707   0.4706   0.0405   0.4398   0.4721   0.4931   0.7099   0.6010   0.4937
           |      74       74       74       74       74       74       74       74       74
           |  0.1460   0.0000   0.7316   0.0001   0.0000   0.0000   0.0000   0.0000   0.0000
           |
    OBQ23 |  0.2467   0.5120   0.1139   0.5462   0.4900   0.5423   0.6265   0.6460   0.4289
           |      73       73       73       73       73       73       73       73       73
           |  0.0353   0.0000   0.3375   0.0000   0.0000   0.0000   0.0000   0.0000   0.0002
           |
    OBQ24 |  0.2852   0.4186  -0.0137   0.4686   0.2360   0.4578   0.5012   0.4154   0.5072
           |      74       74       74       74       74       74       74       74       74
           |  0.0138   0.0002   0.9075   0.0000   0.0429   0.0000   0.0000   0.0002   0.0000
           |
    OBQ25 |  0.3315   0.5489   0.0147   0.4964   0.4843   0.4946   0.3858   0.5146   0.4347
           |      74       74       74       74       74       74       74       74       74
           |  0.0039   0.0000   0.9010   0.0000   0.0000   0.0000   0.0007   0.0000   0.0001
           |
    OBQ26 |  0.3942   0.5138  -0.0071   0.6505   0.3664   0.6407   0.5346   0.5542   0.2871
           |      74       74       74       74       74       74       74       74       74
           |  0.0005   0.0000   0.9519   0.0000   0.0013   0.0000   0.0000   0.0000   0.0131
           |
    OBQ27 |  0.2438   0.3414   0.1015   0.5276   0.3436   0.5397   0.4470   0.3996   0.3506
           |      74       74       74       74       74       74       74       74       74
           |  0.0363   0.0029   0.3894   0.0000   0.0027   0.0000   0.0001   0.0004   0.0022
           |
    OBQ28 |  0.3789   0.4955   0.1190   0.6013   0.3104   0.5510   0.3867   0.3692   0.2726
           |      74       74       74       74       74       74       74       74       74
           |  0.0009   0.0000   0.3127   0.0000   0.0071   0.0000   0.0007   0.0012   0.0188
           |
  STQ_tot |  0.4271   0.4378   0.0757   0.3392   0.3360   0.3731   0.4711   0.4759   0.4701
           |      74       74       74       74       74       74       74       74       74
           |  0.0001   0.0001   0.5216   0.0031   0.0034   0.0011   0.0000   0.0000   0.0000
           |

           |  OBQ19    OBQ20    OBQ21    OBQ22    OBQ23    OBQ24    OBQ25    OBQ26    OBQ27
------------+--------------------------------------------------------------------------------
    OBQ19 |  1.0000
           |      74
           |
           |
    OBQ20 |  0.6341   1.0000
           |      74       74
           |  0.0000
           |
           |
    OBQ21 |  0.5305   0.4889   1.0000
           |      74       74       74
           |  0.0000   0.0000
           |
           |
    OBQ22 |  0.4690   0.5185   0.5666   1.0000
           |      74       74       74       74
           |  0.0000   0.0000   0.0000
           |
           |
    OBQ23 |  0.5447   0.5168   0.5465   0.7654   1.0000
           |      73       73       73       73       73
           |  0.0000   0.0000   0.0000   0.0000
```

63

```
            |
     OBQ24 |  0.2638   0.2806   0.3583   0.5748   0.5885   1.0000
            |      74       74       74       74       73       74
            |  0.0231   0.0154   0.0017   0.0000   0.0000
            |
     OBQ25 |  0.4727   0.4040   0.4519   0.4724   0.6012   0.4790   1.0000
            |      74       74       74       74       73       74       74
            |  0.0000   0.0004   0.0001   0.0000   0.0000   0.0000
            |
     OBQ26 |  0.4642   0.3976   0.5052   0.5139   0.5398   0.5879   0.6636   1.0000
            |      74       74       74       74       73       74       74       74
            |  0.0000   0.0005   0.0000   0.0000   0.0000   0.0000   0.0000
            |
     OBQ27 |  0.4677   0.3693   0.4041   0.5404   0.6613   0.5081   0.6369   0.6443   1.0000
            |      74       74       74       74       73       74       74       74       74
            |  0.0000   0.0012   0.0004   0.0000   0.0000   0.0000   0.0000   0.0000
            |
     OBQ28 |  0.4397   0.3621   0.4737   0.4091   0.5353   0.4350   0.5984   0.7065   0.6497
            |      74       74       74       74       73       74       74       74       74
            |  0.0001   0.0015   0.0000   0.0003   0.0000   0.0001   0.0000   0.0000   0.0000
            |
    STQ_tot |  0.4787   0.3894   0.4756   0.5861   0.5261   0.3794   0.3564   0.4051   0.3220
            |      74       74       74       74       73       74       74       74       74
            |  0.0000   0.0006   0.0000   0.0000   0.0000   0.0009   0.0018   0.0003   0.0051
            |

            |   OBQ28  STQ_tot
-------------+------------------
     OBQ28 |  1.0000
            |      74
            |
            |
    STQ_tot |  0.2902   1.0000
            |      74       74
```

9. References

1. Abu Hantash RO, AL-Omiri MK, AL-Wahadni AM. (2006). Psychological impact on implant patients' oral health related quality of life. *Clinical Oral Implants Research*, 17: 116–23

2. Agou S, Locker D, Muirhead V, Tompson B, Streiner DL. (2011). Does psychological well-being influence oral-health-related quality of life reports in children receiving orthodontic treatment? *Am J Orthod Dentofacial Orthop*, 139: 369-77.

3. Al-Omiri MK, Abu Alhaija ES. (2006). Factors affecting patient satisfaction after orthodontic treatment. *Angle Orthod*, 76: 422-431.

4. Al-Omiri MK, Sghaireen MG, Al-Qudah AA, Abu Hammad O, Lynch CD, Lynch E.. (2014). Relationship between impacts of removable prosthodontic rehabilitation on daily living, satisfaction and personality profiles. *Journal of Dentistry*, 42: 366-372.

5. Anderson LE, Arruda A, Inglehart MR. (2009). Adolescent Patients' Treatment Motivation and Satisfaction with Orthodontic Treatment. *Angle Orthod*, 79 (5): 821-7.

6. Ball R. (1996). Practical marketing for dentistry 3: relationship marketing and patient/consumer treatment. *Angle Br Dent J* ,180: 467–72.

7. Barbat LD. (1992). Orthodontic TMJ litigation in the 1990s: an ounce of prevention is worth a pound of cure. *Am Orthod Dentofac Orthop*, 101: 97-8.

8. Bennett ME, Tulloch JF. (1999). Understanding orthodontic treatment, the patients' perspective: a qualitative approach. *Clin Orthod Res*, 2: 53–61.

9. Bennett M, Tulloch J, Vig K, Phillips C. (2001) Measuring Orthodontic Treatment Satisfaction: Questionnaire Development and Preliminary Validation. *J Public Health Dent*, 1 (3): 155-160.

10. Bos A, Vosselman N, Hoogstraten J, Prahl-Andersen B. (2005). Patient compliance: a determinant of patient satisfaction? *Angle Orthod*, 75: 526–531.

11. Bramadat IJ, Drieger M. (1993). Satisfaction with childbirth: theories and methods of measurement. *Birth*, 20: 22-29

12. Burke L, Croucher R. (1996). Criteria of good dental practice generated by general dental practitioners and patients. *Int Dent Jour*, 46: 3–9.

13. Chang W, Chang Y. (2013).Patient satisfaction analysis: Identifying key drivers and enhancing service quality of dental care. Journal of Dental Sciences, 8 (3): 239-247.

14. Corah NL, O'Shea RM, Pace LF, Seyrek SK. (1984). Development of a patient measure of satisfaction with the dentist: the dental visit satisfaction scale. *J Behav Med*, 7: 367-73.

15. Converse PD, Wolfe EW, Oswald FL.(2008) Response rates for mixed-mode surveys using mail and e-mail/web. Am J Eval., 29 (1): 99–107

16. Corah NL, O'Shea RM, Bissell GD. (1985). The dentist-patient relationship: perceptions by patients of dentist behaviour in relation to satisfaction and anxiety. *J Am Dent Assoc*, 111: 443-6.

17. Corah NL. (1988). Dental anxiety. Assessment, reduction and increasing patient satisfaction. *Dental Clinics of North America*, 32 (4): 779-790

18. Costa PT, McCrae RR. (1992). *NEO PI-R professional manual*. Odessa, FL: Psychological Assessment Resources, Inc.

19. Costa PT, McCrae RR. (2006) Age Changes in Personality and Their Origins: Comment on Roberts, Walton, and Viechtbauer .*Psychological Bulletin* 132 (1): 26–286.

20. Cunningham SJ, Gilthorpe MS, Hunt NP. (2000) Are orthognathic patients different? *Eur J Orthod*, 22: 195–202.

21. Dougherty HL. (1985) Qno vadis (guest editorial). Am J Orthod, 87: 345-6.

22. Erdinc AM, Dincer B. (2004). Perception of pain during orthodontic treatment with fixed appliances. *Eur J Orthod*, 26 (1): 79–85.

23. Feu D, de Oliveira BH, de Oliveira Almeida MA, Kiyak HA, Miguel JA. (2010). Oral health-related quality of life and orthodontic treatment seeking. *Am J Orthod Dentofacial Orthop*, 138: 152–159.

24. Gehlbach SH. (1993). *Interpreting the Medical Literature*. New York, NY: McGraw-Hill.

25. Gerbert B, Bleecker T, Saub E. (1994). Dentists and the patients who love them: professional and patient views of dentistry. *J Am Dent Assoc*, 125: 264-72.

26. Hansen AC. (1991). Health-care delivery to minority citizens: An update. *J Natl Med Assoc*, 83: 769–771.

27. Harris Y, Gorelick PB, Samuels P, Bempong I. (1996) Why African Americans may not be participating in clinical trials. *J Natl Med Assoc*, 88: 630–634.

28. Hjortdahl P ,Laerum, E. (1992). Continuity of care in general practice: effect on patient satisfaction. *BMJ*, 304(6837): 1287–1290.

29. Jackson JL, Chamberlin J, Kroenke, K. (2001). Predictors of patient satisfaction. *Social Science and Med*, 52: 609-620.

30. Jenkinson C, Coulter A, Bruster S, Richards N, Chandola T. (2000). Patients' experiences and satisfaction with health care: results of a questionnaire study of specific aspects of care. *Qual Safe Health Care*, 11: 335–339.

31. Keles F, Bos A. (2013). Satisfaction with orthodontic treatment. *Angle Orthod*,83 (3): 507-511.

32. Kiyak HA, McNeil RW, West RA, Hohl T, Heaton PJ. (1986). Personality characteristics as predictors and sequelae of surgical and conventional orthodontics. *Am J Orthod*, 89: 383–392.

33. Larsson BW, Bergstrom K. (2005). Adolescents perception of the quality of orthodontic treatment. *Scad J Caring Sci*, 19: 95-101.

34. Laskin D. (1979). The doctor-patient relationship: a potential communication gap. *J Oral Surg*, 37:786.

35. Like R, Zyzanski SJ. (1987). Patient satisfaction with the clinical encounter: social psychological determinants. *Soc. Sci. Med.*, 24: 351-357.

36. Locker D, Dunt D. (1978). Theoretical and methodological issues in sociological studies of consumer satisfaction with medical care. *Soc. Sci. Med.*, 12: 283-292.

37. i)Maia NG, Nomando ADC, Feitosa MS, Ferreira MA, Maia FA. (2010). Factors associated to orthodontic stability- a longitudinal retrospective study of 209 patients. *World J Orthod*, 11: 61-66.

38. ii)Maia NG, Normando D, Maia FA, Ferreira MA, do Socorro Costa Feitosa Alves M. (2010). Factors associated with long-term patient satisfaction. *Angle Orthod*, 80: 1155-1158.

39. Markus H, Nurius P. (1986). Possible selves. *Am Psychol*, 41: 954–969.

40. Mayerson M. (1990). Patient appreciation: the cornerstone of internal marketing. *J Clin Orthod,* 24: 747-51.

41. McCrae RR, Costa PT. (1983). Joint factors in self-reports and ratings: Neuroticism, extraversion and openness to experience. *Personality and Individual Differences*, 4 (3): 245–255

42. McNair A, Drage K, Ireland A, Sandy J, Williams A. (2009). Piloting a Patient-based Questionnaire to Assess Patient Satisfaction with the Process of Orthodontic Treatment. *Angle Orthod*. 79: 759-765.

43. Mehra T, Nanda RS, Sinha PK. (1998). Orthodontists' assessment and management of patient compliance. *Angle Orthod*, 68 (2): 115–122.

44. Moltzer G, Van der Meulen MJ, Verheij H. (1996). Psychological characteristics of dissatisfied denture patients. *Community Dent Oral Epidemiol*, 24: 52–55.

45. Muray BP, Kaplin AL. (1981). *Patient satisfaction in 14 private dental practices*. Presented at the 1981 Annual Meeting of the International Association of Dental Research, Chicago, March 1981 [Abstr 892]

46. Nanda RS, Kierl MJ. (1992). Prediction of cooperation in orthodontic treatment. *Am J Orthod Dentofac Orthop*, 102: 15-21.

47. Ngan P, Kess B, Wilson S. (1989). Perception of discomfort by patients undergoing orthodontic treatment. *Am J Orthod Dentofacial Orthop*, 96 (1): 47–53.
48. Panayiotou G, Kokkinos CM. (2004). Searching for the "Big Five" in a Greek context: the NEO-FFI under the microscope. *Personality and Individual Differences*. 36(8):1841-1854.
49. Pascoe GC. (1983). Patient satisfaction in primary health care: a literature review and analysis. *Eval Prog Plan*, 6: 185–210.
50. Richmond S, Andrews M, Roberts CT. (1993). The provision of orthodontic care in the general dental services of England and Wales: extraction patterns, treatment duration, appliance types and standards. *British Journal of Orthodontics*, 20: 345-350.
51. Shaw WC. (1981). Factors influencing the desire for orthodontic treatment. *Eur J Orthod*, 3: 151–162.
52. Sheats RD, McGorray SP, Keeling SD, Wheeler TT, King GJ. (1998). Occlusal traits and perception of orthodontic need in eighth grade students. *Angle Orthod*, 68: 107–114.
53. Scheurer PA, Firestone AR, Burgin WB. (1996). Perception of pain as a result of orthodontic treatment with fixed appliances. *Eur J Orthod*, 18 (4): 349–357
54. Sherry SB, Hewitt PL, Flett, GL, Lee-Baggley DL, Hall PA. (2007). Trait perfectionism and perfectionistic self-presentation in personality pathology. *Personality and Individual Differences*, 42 (3): 477–490.
55. Sinha PK, Nanda RS, McNeil DW. (1996) Perceived orthodontist behaviors that predict patient satisfaction, orthodontist-patient relationship, and patient adherence in orthodontic treatment. *Am J of Orthod and Dent Orthop*, 110: 370-377.
56. Slade GD, Spencer AJ. (1994). Social impact of oral conditions among older adults. *Aust Dent J*, 39 (6): 358–364.
57. Theunissen NC, Vogels TG, Koopman HM, Verrips GH, Zwinderman KA, Verloove-Vanhorick SP, Wit JM. (1998). The proxy problem: child versus parent report in HRQOL research. *Qual Life Res*, 7: 387–397.
58. Van Groenestijn MA, Maas-de Waal CA, Mileman PA, Swallow JN. (1980). The ideal dentist, *Soc Sci Med*, 14 (A): 533-540
59. Vogels T, Verrips GH, Verloove-Vanhorick SP, Fekkes M, Kamphuis RP, Koopman HM, Theunissen NC, Wit JM. (1998). Measuring health-related quality of life in children: the development of the TACQOL parent form. *Qual Life Res*, 7: 457–465.
60. Warwick DP, Lininger CA. (1975). *The Sample Survey: Theory and Practice*. New York, NY: McGraw-Hill: 126–181.
61. Williams B. (1994). Patient satisfaction: a valid concept? *Soc. Sci. Med*, 38: 509-516.
62. Williams B, Coyle J, Healy D. (1998). The meaning of patient satisfaction: an explanation of high reported levels. *Soc. Sci. Med*, 47: 1351-1359.
63. Zachrisson BU. (1976). Cause and prevention of injuries to teeth and supporting structures during orthodontic treatment. *Am J Orthod*, 69: 285-300.