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# Psychological impact on implant patients' oral health-related quality of life

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**Key words:** implant-supported prostheses, neuroticism, psychological traits, questionnaire, satisfaction

## Abstract

**Objectives:** The literature has shown that patients' satisfaction with dental prostheses is associated with the existence of certain personality profiles. It is important to study such relationships in dental implant patients.

**Material and methods:** Fifty patients (28 men and 22 women), aged between 22 and 71 years (mean age 43.22 years, SD 12.24 years), who were partially edentulous and were seeking dental implant therapy were entered into this study. The patients were requested to answer two reliable and valid questionnaires – the Dental Impact on Daily Living (DIDL) and the Neuroticism Extraversion Openness Five-Factor Inventory (NEO-FFI) – before implant treatment and 2–3 months after prosthodontic rehabilitation therapy.

**Results:** Certain personality traits were found to have a significant relationship with patients' satisfaction with dental implants both before and after implant therapy ( $P < 0.05$ ). Neuroticism score had valuable features in predicting patients' total satisfaction ratings ( $P = 0$ ), satisfaction with appearance dimension ( $P = 0$ ), satisfaction with oral comfort dimension ( $P = 0.005$ ) as well as satisfaction with general performance dimension ( $P = 0$ ).

**Conclusion:** Personality traits have an impact on patients' satisfaction with dental implant therapy. In addition, personality traits provide valuable information for the prediction of patients' satisfaction with their implant-supported prostheses. Neuroticism, openness, agreeableness and conscientiousness are very helpful in this regard. Neuroticism was found the main predictor of the patients' oral health-related quality of life following implant treatment.

Dental implant therapy is one of the pioneering treatment modalities for replacement of missing teeth. This treatment modality has gained popularity and acceptance among patients as well as among treating dentists. It is understandable that patients are more satisfied with implant-supported prosthetic rehabilitation in terms of comfort, stability and esthetics in comparison with conventional prostheses (de Grandmont et al. 1994; Feine et al. 1994; Awad & Feine 1998; Vermynen et al.

2003). Patients considered implant-supported prostheses as an integral part of their body that clearly enhanced their daily lives (Blomberg 1985).

Most of the previous studies showed that implant therapy has a satisfactory effect on patients' oral health-related quality of life. Investigations of the psychological impact following dental implant therapy are still scarce. Blomberg & Lindquist (1983) reported that edentulous patients experienced severe psychological complications

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that were reduced by implant-supported prostheses. Meanwhile, Kiyak et al. (1990) carried out a similar investigation of the psychological influence of dental implant treatment, and reported that patients with higher neuroticism showed less satisfaction with their dental implant therapy. In another study, Kent & Johns (1994) suggested that dental implant therapy has a significant effect on psychological well-being when compared with conventional prostheses.

The assessment of personality characters might be useful in predicting patient behavior and may have an effect on the provision of therapy (Piedmont 1998). This prompted dental researchers to investigate the effect of different psychological characteristics on the success and acceptance of conventional dental treatment. Guckes et al. (1978) found that patients with higher neuroticism showed less satisfaction with their conventional complete denture prostheses. Similarly, Reeve et al. (1982) reported that less stable, less intelligent, more self-centered, more careful patients were less satisfied with their conventional complete denture prostheses. Psychological factors have been shown to have a profound role in shaping patient satisfaction with dental status and treatment (Freeman 1999).

Unfortunately, the literature lacks valid studies of the relationship between patients' oral health-related quality of life and personality traits and their impact on the success of dental implant treatment. Further evaluation and careful scientific-based evidence are required to explore whether the assessment of certain patients' psychological traits can predict their oral health-related quality of life following dental implant treatment. This study was conducted in order to shed light on this issue.

In this study, the relationship between patients' oral health-related quality of life and psychological traits was compared before implant therapy and 10 weeks after prosthodontic rehabilitation. The null hypothesis was that there is no impact of psychological profiles on patients' oral health-related quality of life with dental implants either before or after treatment.

Dental Impact on Daily Living (DIDL) scale was used to analyze patients' oral health-related quality of life. In addition,

the Neuroticism Extraversion Openness Five-Factor Inventory (NEO-FFI) scale was also used to measure five personality traits: neuroticism, extraversion, openness, agreeableness and conscientiousness.

The investigation was approved by the Deanship of Scientific Research at Jordan University of Science and Technology.

## Material and methods

### Subjects

Fifty patients were recruited into this study (28 men and 22 women), aged between 22 and 71 years (mean age: 43.22 years, SD: 12.24 years), who were partially edentulous and were seeking dental implant therapy. The patients were referred by general practitioners and/or specialists to six specialized dental implant centers in Jordan. Those centers receive dental implant patients from the entire country.

Each patient was given a brief explanation of the investigation and the procedures to be undertaken. Informed consent was obtained from each participant. To be included in the study, recruited patients had to fulfill the following criteria:

- Each patient should be 18 years of age or older in order to understand and score the questionnaires. Patients below 17 years of age were reported to have problems in scoring the NEO-FFI test (De Fruyt et al. 2000).
- Each patient must be about to have dental implant treatment and should not have received any previous implant therapy.
- Each patient should not be medically compromised with disease that might affect their ability to understand and/or to score the questionnaires.
- Each patient must be eligible to receive dental implants and no contraindication to implant therapy should exist.
- Each patient must have successful implant treatment throughout the study.

However, patients with a history of severe medical disease (including mental problems and psychological disorders), local or systemic contraindication to dental implant therapy or previous implant therapy were excluded from the study. Patients were also excluded if any sign of treatment

failure occurred during any stage of the treatment.

The null hypothesis was that in patients treated with implant therapy, no relationship could be established between psychological traits and patients' satisfaction with implant therapy.

### Questionnaires

Before undertaking the surgical phase of the treatment, each patient was assessed using two reliable and valid questionnaires. The first one was the DIDL (Leao 1993; Leao & Sheiham 1995; AL-Omiri 2002), which was used to measure patients' satisfaction with their dentition. The second one was the NEO-FFI test, which was selected to evaluate patients' personality profiles (Costa & McCrae 1992).

The DIDL questionnaire measures five dimensions of satisfaction: appearance, pain, oral comfort, general performance and eating ability (Fig. 1). It was chosen in this study because it is a smooth and easy tool for use by the patients and clinicians. The items of this tool were simple and could be easily understood and scored. In addition, this test can be completed in a relatively short time period. The literature reveals that this test is considered reliable, accurate and reproducible (Leao 1993; Leao & Sheiham 1995; AL-Omiri 2002).

To the best of our knowledge, this study was the first to use the DIDL in the assessment of satisfaction among dental implant patients. However, many previous studies used different types of questionnaires and tools to rate patients' satisfaction with dental implant therapy. For example, the long version of Oral Health Impact Profile (Slade & Spencer 1994) was shown to be valid and reliable in assessing patients' satisfaction with dental implants, but it is considered a complex, lengthy test, and it may confuse patients due to its psychological evaluation. In addition, Cibirka et al. (1997) developed structural questionnaires to measure satisfaction without any reliability or validity tests. Two of the widely used methods to assess patients' satisfaction are the visual analogue scale (Awad et al. 2003) and the categorized scale (de Grandmont et al. 1994). However, these tools provide only an indication about satisfactory outcomes of the

1. I am satisfied with my teeth in general.
2. I am satisfied with the appearance of my teeth.
3. I am satisfied with the colour of my teeth.
4. I am satisfied with the position of my teeth.
  
5. I feel spontaneous pain in my teeth.
6. I feel dental pain when eating or drinking hot or cold.
7. I changed my food because of pain.
8. I feel pain in my jaw joint.
  
9. I have worries with my teeth.
10. I suffer from food packing between my teeth.
11. I have halitosis and bad smelling breath.
12. I have loose teeth.
13. I am not satisfied with my gums.
14. I have bleeding gums.
15. I have sensitivity to hot or cold due to gum recession.
  
16. My work capacities are affected by the appearance of my teeth.
17. My work capacities are affected by my ability to eat and talk.
18. My contact with people is affected by the appearance of my teeth.
19. My contact with people is affected by my ability to eat and talk.
20. My contact with people is affected by dental pain.
21. My romance is affected by dental pain.
22. My romance is affected by my ability to eat and talk.
23. My self-confidence is affected by appearance of my teeth.
24. I feel embarrassment because of my teeth.
25. My romance is affected by the appearance of my teeth.
26. I try to avoid showing my teeth when I smile.
27. I am not satisfied with my smile.
28. My work capacity is affected by pain.
29. I feel stress because of pain.
30. I sleep badly because of pain.
  
31. I am satisfied with my capacity to chew.
32. I am satisfied with chewing in general.
33. I am satisfied with my capacity to bite.
34. I am satisfied with biting in general.
35. I did not change the way of food preparation because of my teeth.
36. I did not change the type of food because of my teeth.

Fig. 1. DIDL (Dental Impact on Daily Living) questionnaire items.

treatment without any mention of the effects of such therapy on various aspects of patients' quality of life.

Regarding the NEO-FFI test, it was used to measure the five dimensions of personality: neuroticism, extraversion, openness, agreeableness and conscientiousness (Fig. 2).

In this context, many studies used different models of psychological tests to assess the impact of dental implant therapy on patients. For example, Blomberg & Lindquist (1983) used the Eysenk Personality Inventory (EPI), which was the same tool utilized by Kiyak et al. (1990), in addition to the Tennessee Self-Concept Scale. However, Kent and Johns (1991) attempted to measure the psychological impact of dental implants via Rosenberg's Self-Esteem (S-E) and Goldbergs's General Health Questionnaire (GHQ).

At first glance, these instruments could be used in further investigations of the psychological effect of dental implant therapy. However, these tests suffer from some flaws. For instance, the GHQ was considered very long and did not identify the nature of the measured psychological disorder (Zigmond & Snaith 1983).

Also, the Tennessee Self-Concept Scale was used to measure a small number of personality traits, which might cause statistical problems and limit the range of patients' responses (Kline 2000).

Although the Eysenk Personality Inventory test was shown to have acceptable validity and reproducibility, this test has only yes or no responses, which cause problems in the statistical analysis and only rates three domains of personality: extraversion, neuroticism and psychoticism.

In this study, the NEO-FFI test was used for the first time in implant research in an attempt to measure the psychological profiles of the subjects, because it is valid, reliable, simple, needs a short duration to answer, is easy to use statistically and measures five dimensions of personality (Saucier 1998; Kline 2000; AL-Omiri 2002).

### Rating patients' satisfaction and personality before implant therapy

The original English formats of both questionnaires (DIDL and NEO-FFI) were translated into Arabic language by two expert and fluent bilingual individuals. Fifty undergraduate dental students at Jordan University of Science and Technology were asked to score the original English format of both questionnaires and then they were asked to score the translated Arabic version. The two formats were compared using the *t*-test, and no statistical significant differences were found.

The questionnaires were administered to the patients before commencing the surgical phase of the implant therapy, and the process of completing the questionnaire was supervised by the principal investigator.

Each patient was provided with a full explanation of the dimensions as well as the methods of scoring the questionnaires.

Assessment of patients' satisfaction was performed using the DIDL test and its scale (Leao 1993; Leao & Sheiham 1995; AL-Omiri 2002).

Regarding the DIDL scale, patients were asked to rate each dimension by assigning a score from 0 to 10 to measure the relative importance of each dimension to the patient. After this, patients were asked to begin scoring the items of the questionnaire by selecting one answer for each item to measure their response to that item. Patients' ratings were assessed by three scales: positive, neutral or negative.

Each potential subject completed the NEO-FFI test to assess their personality profiles. The test consisted of 60 questions analyzing the five major personality dimensions. Each dimension was assessed using 12 questions. This short test was shown to be a comprehensive method of measuring personality (Costa & McCrae 1992). In addition, this test has a good reliability and validity structure (Saucier 1998; Kline 2000). An experienced oral

1. I am not a worrier.
2. I like to have a lot of people around me.
3. I don't like to waste my time daydreaming.
4. I try to be courteous to everyone I meet.
5. I keep my belongings neat and clean.
6. I often feel inferior to others.
7. I laugh easily.
8. Once I find the right way to do something, I stick to it.
9. I often get into arguments with my family and co-workers.
10. I'm pretty good about pacing myself so as to get things done on time.
11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
12. I don't consider myself especially "light hearted".
13. I am intrigued by the patterns I find in art and nature.
14. Some people think I'm selfish and egotistical.
15. I am not a very methodical person.
16. I rarely feel lonely or blue.
17. I really enjoy talking to people.
18. I believe letting students hear controversial speakers can only confuse and mislead them.
19. I would rather cooperate with others than compete with them.
20. I try to perform all the tasks assigned to me conscientiously.
21. I often feel tense and jittery.
22. I like to be where the action is.
23. Poetry has little or no effect on me.
24. I tend to be cynical and skeptical of others' intentions.
25. I have a clear set of goals and work toward them in an orderly fashion.
26. Sometimes I feel completely worthless.
27. I usually prefer to do things alone.
28. I often try new and foreign foods.
29. I believe that most people will take advantage of you if you let them.
30. I waste a lot of time before settling down to work.
31. I rarely feel fearful or anxious.
32. I often feel as if I'm bursting with energy.
33. I seldom notice the moods or feelings that different environments produce.
34. Most people I know like me.
35. I work hard to accomplish my goals.
36. I often get angry at the way people treat me.
37. I am a cheerful, high-spirited person.
38. I believe we should look to our religious authorities for decisions on moral issues.
39. Some people think of me as cold and calculating.
40. When I make a comment, I can always be counted on to follow through.
41. Too often when things go wrong, I get discouraged and feel like giving up.
42. I am not a cheerful optimist.
43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
44. I'm hard-headed and tough-minded in my attitudes.
45. Sometimes I'm not as dependable or reliable as I should be.
46. I am seldom sad or depressed.
47. My life is fast-paced.
48. I have little interest in speculating on the nature of the universe or the human condition.
49. I generally try to be thoughtful and considerate.
50. I am a productive person who always gets the job done.
51. I often feel helpless and want someone else to solve my problems.
52. I am a very active person.
53. I have a lot of intellectual curiosity.
54. If I don't like people, I let them know it.
55. I never seem to be able to get organized.
56. At times I have been so ashamed I just wanted to hide.
57. I would rather go my own way than be a leader of others.
58. I often enjoy playing with theories or abstract ideas.
59. If necessary, I am willing to manipulate people to get what I want.
60. I strive for excellence in everything I do.

Fig. 2. NEO-FFI (Neuroticism Extraversion Openness Five-Factor Inventory) items.

implant surgeon in each of the specialized implant centers carried out operations on all patients according to six different implant systems following protocols that were established in close cooperation with the manufacturers of each implant system. The prosthetic procedures were also carried out by experienced prosthodontists following specific protocol procedures for each treatment modality.

All recruited patients in this study were assessed clinically and radiographically by a specialist oral surgeon and specialist prosthodontist to ensure the success of the implant treatment in accordance with the Albrektsson criteria (Albrektsson et al. 1986). Successfully installed implant fixtures were allowed to proceed into the next phase of the treatment (prosthetic phase). It was decided to exclude failed cases. After the successful implant installation phase, a waiting period ranging from 3 to 6 months (depending on the site of the fixture) was observed before undertaking the prosthetic part of the implant therapy. Patients received either single crowns or fixed partial denture prosthodontic rehabilitation.

In this study, all the recruited patients were found to have successful implant therapy (both surgically and prosthodontically), and none were excluded from the study.

**Assessment of satisfaction and personality after the prosthodontic rehabilitation**

Each patient was asked to complete the same questionnaires (the DIDL and the NEO-FFI) 10 weeks after the delivery of the prostheses. This duration was shown to be an adequate period for the patients to adapt to new prostheses and give a stable assessment (de Grandmont et al. 1994; Awad et al. 2003).

Patients were provided with the same environment and conditions during scoring of the questionnaires as those that were provided before the surgical phase.

However, the DIDL test format used after the prostheses placement differed from the format used before treatment as it contained specific items to assess the prosthetic rehabilitation as well (Leao 1993; Leao & Sheiham 1995; AL-Omiri 2002).

**Statistical analysis**

All the collected data were analyzed using the SPSS (Statistical Package for the Social

Sciences, version 11.0, SPSS Inc., Chicago, IL, USA).

The association between the variables was analyzed using the Pearson correlation test, while the linear regression analysis was used to predict satisfaction.

For all statistical analyses, the significance level was set at  $P \leq 0.05$ .

## Results

### Correlation between satisfaction ratings and the NEO-FFI personality dimensions in the study population before treatment

In this study, a relationship could be established between neuroticism and satisfaction ratings. There was a significant negative relationship between neuroticism and total satisfaction rating ( $P=0.011$ ), satisfaction with appearance dimension ( $P=0.013$ ), satisfaction with oral comfort ( $P=0.047$ ) and satisfaction with general performance ( $P=0.004$ ). As the levels of neuroticism increased the levels of satisfaction declined (Table 1).

However, the results revealed that there were no significant relationships between satisfaction ratings and extraversion, openness, agreeableness or conscientiousness personality dimensions before commencing the dental implant therapy (Table 1).

### Correlation between satisfaction ratings and the NEO-FFI personality dimensions in the study population after treatment

Tested personality traits were found to be stable before and after implant treatment.

It is worth mentioning that only 6% of the study population reported a truly impaired oral health-related quality of life following this treatment.

The results revealed a significant negative relationship between neuroticism and total satisfaction rating ( $P=0$ ) as well as between neuroticism and satisfaction with appearance dimension ( $P=0.009$ ), satisfaction with pain dimension ( $P=0.023$ ), satisfaction with oral comfort ( $P=0.005$ ) and satisfaction with general performance ( $P=0$ ). As the scores of neuroticism increased, the level of satisfaction declined (Table 2).

The results revealed that there was a significant positive relationship between agreeableness and total satisfaction ( $P=0.032$ ), satisfaction with oral comfort dimension ( $P=0.029$ ) and satisfaction with general performance ( $P=0.014$ ). When agreeableness scores increased, the satisfaction also increased (Table 2).

It was also found that there was a significant negative relationship between openness and satisfaction with pain dimension ( $P=0.001$ ). The higher the openness

scores, the lower the levels of satisfaction (Table 2).

A significant positive relationship was demonstrated between conscientiousness and satisfaction with pain dimension ( $P=0.035$ ). When conscientiousness scores were increased the satisfaction was improved (Table 2).

However, significant relationships were not evident between satisfaction ratings and the extraversion personality profile (Table 2).

### Factors that could be utilized for prediction of satisfaction before implant treatment

The linear regression analysis showed that neuroticism scores were the best predictors of patients' satisfaction ratings.

Neuroticism was considered to be the best predicting factor for patients' total satisfaction ratings ( $P=0.011$ ), satisfaction with appearance dimension ( $P=0.013$ ), satisfaction with oral comfort dimension ( $P=0.047$ ) as well as satisfaction with general performance ( $P=0.004$ ). The higher the neuroticism, the lesser the levels of satisfaction (Table 3).

### Factors that could be used for prediction of satisfaction after implant treatment

The linear regression analysis revealed that neuroticism, openness and conscientiousness scores were the best predictors of patient satisfaction ratings after implant therapy.

The results showed that neuroticism score had valuable features in predicting total patients' satisfaction ratings ( $P=0$ ), satisfaction with appearance dimension ( $P=0.001$ ), satisfaction with oral comfort dimension ( $P=0.005$ ) as well as satisfaction with general performance dimension ( $P=0$ ). The higher the Neuroticism the less satisfaction in these dimensions (Table 4).

It was also shown that Openness was the best predictor of patients' satisfaction with pain dimension ( $P=0.001$ ). The higher the Openness the higher the satisfaction with prostheses due to pain dimension (Table 5).

Similarly, conscientiousness was the best predictor of patients' satisfaction with appearance dimension ( $P=0.001$ ). The higher the conscientiousness, the higher the satisfaction with appearance dimension (Table 6).

**Table 1. Correlation between satisfaction ratings and personality dimensions in the study population before treatment**

	N	E	O	A	C
<i>Total satisfaction</i>					
Pearson correlation ( $r=$ )	-0.358*	0.276	0.065	0.135	0.233
t-Test significance ( $P=$ )	0.011	0.052	0.655	0.350	0.120
<i>Appearance</i>					
Pearson correlation ( $r=$ )	-0.350*	0.258	0.133	0.108	0.132
t-Test significance ( $P=$ )	0.013	0.070	0.359	0.455	0.362
<i>Pain</i>					
Pearson correlation ( $r=$ )	-0.183	0.194	0.117	0.092	0.046
t-Test significance ( $P=$ )	0.204	0.177	0.419	0.527	0.749
<i>Oral comfort</i>					
Pearson correlation ( $r=$ )	-0.283*	0.089	-0.011	-0.089	0.154
t-Test significance ( $P=$ )	0.047	0.537	0.938	0.539	0.284
<i>General performance</i>					
Pearson correlation ( $r=$ )	-0.398*	0.239	0.032	0.167	0.228
t-Test significance ( $P=$ )	0.004	0.095	0.828	0.245	0.112
<i>Chewing ability</i>					
Pearson correlation ( $r=$ )	-0.122	0.240	-0.031	0.051	0.265
t-Test significance ( $P=$ )	0.397	0.093	0.833	0.728	0.063
*Significant relation ( $P \leq 0.05$ ).					
N, neuroticism; E, extraversion; O, openness; A, agreeableness; C, conscientiousness; $r$ , Pearson correlation coefficient; $P$ , probability level.					

**Table 2. Correlation between satisfaction ratings and personality dimensions in the study population after treatment**

	N	E	O	A	C
<i>Total satisfaction</i>					
Pearson correlation ( <i>r</i> =)	-0.525*	0.182	-0.193	0.304*	0.223
<i>t</i> -Test significance ( <i>P</i> =)	0	0.207	0.179	0.032	0.120
<i>Appearance</i>					
Pearson correlation ( <i>r</i> =)	-0.366*	0.048	0.000	0.220	-0.205
<i>t</i> -Test significance ( <i>P</i> =)	0.009	0.741	0.998	0.124	0.154
<i>Pain</i>					
Pearson correlation ( <i>r</i> =)	-0.320*	0.061	-0.456*	0.119	0.299*
<i>t</i> -Test significance ( <i>P</i> =)	0.023	0.675	0.001	0.411	0.035
<i>Oral comfort</i>					
Pearson correlation ( <i>r</i> =)	-0.392*	0.153	0.097	0.309*	0.238
<i>t</i> -Test significance ( <i>P</i> =)	0.005	0.288	0.504	0.029	0.096
<i>General performance</i>					
Pearson correlation ( <i>r</i> =)	-0.544*	0.177	-0.005	0.346*	0.278
<i>t</i> -Test significance ( <i>P</i> =)	0.000	0.219	0.972	0.014	0.051
<i>Chewing ability</i>					
Pearson correlation ( <i>r</i> =)	-0.209	0.170	-0.116	0.068	0.070
<i>t</i> -Test significance ( <i>P</i> =)	0.144	0.239	0.423	0.637	0.629

\*Significant relation (*P* ≤ 0.05).

N, neuroticism; E, extraversion; O, openness; A, agreeableness; C, conscientiousness; *r*, Pearson correlation coefficient; *P*, probability level.

**Table 3. Regression analysis for prediction of satisfaction ratings before treatment**

	Total satisfaction	Appearance	Oral comfort	General performance
Neuroticism				
<i>R</i> <sup>2</sup>	0.129	0.123	0.080	0.158
<i>F</i>	7.078	6.708	4.172	9.032
<i>P</i> -value	0.011	0.013	0.047	0.004

**Table 4. Regression analysis for prediction of satisfaction ratings after treatment**

	Total satisfaction	Appearance	Oral comfort	General performance
Neuroticism				
<i>R</i> <sup>2</sup>	0.275	0.303	0.154	0.295
<i>F</i>	18.221	10.202	8.732	20.130
<i>P</i> -value	0	0.001	0.005	0

**Table 5. Regression analysis for prediction of satisfaction ratings after treatment**

	Pain
Agreeableness	
<i>R</i> <sup>2</sup>	0.208
<i>F</i>	12.627
<i>P</i> -value	0.001

**Table 6. Regression analysis for prediction of satisfaction ratings after treatment**

	Appearance
Conscientiousness	
<i>R</i> <sup>2</sup>	0.303
<i>F</i>	10.202
<i>P</i> -value	0.001

## Discussion

The purpose of this study was to examine the relationship between patients' satisfaction and personality traits.

The results revealed that a relationship could be established between certain personality profiles and satisfaction ratings; thus, the Null hypothesis was rejected.

The DIDL questionnaire was used to rate patients' satisfaction, and the NEO-FFI

questionnaire was also used to measure the personality profiles of the subjects before and after implant treatment. These two questionnaires were previously shown to be valid and reliable, and thus were chosen for this study.

Patients' satisfaction with their dentition and dental treatment could be associated with some personality traits that might be considered as predictors for such

evaluation. Examples of these traits are: self-respect, self-confidence, compliance, accommodating, quietness, extraversion, anxiety, kindness, neuroticism and meticulousness (Mehra et al. 1998; Al Quran 1999; Dong et al. 1999; AL-Omiri 2002).

Dong et al. (1999) elucidated that certain personality profiles such as anxiety, extraversion, calmness and warmth had influential effects on patient's perception of their dentofacial appearance.

Freeman (1999) suggested that psychological aspects had a crucial impact on patients' compliance and satisfaction with their dentition and treatment.

This study supports the idea that neuroticism could be considered a good predictor for different satisfactory scales before implant therapy. Neuroticism could be helpful in predicting patients' total satisfaction, appearance and oral comfort as well as general performance with their dental status before implant therapy.

The results showed a significant negative relationship between neuroticism and satisfaction.

From the above valuable information, it is clearly evident that psychological aspects might play a vital role in patients' satisfaction with their dentition. Personality profiles might be used to explain the levels of patients' oral health-related quality of life present among the study population as well as to predict satisfactory outcomes before commencing the implant treatment. This will help clinicians in predicting their implant patient regarding the improvement in their oral health-related quality of life before the start of the treatment, which might save time and cost if the prediction is not favorable.

The literature contains many studies that explored the unique and vague relationship between psychological profiles and satisfaction with the dental status in many fields of dentistry. However, the literature lacks studies that deal with the relationship between personality and satisfaction with dentition in dental implant patients. This study might offer an explanation of such a relationship, and coincided with other studies that showed the presence of such relationship in other fields of dentistry.

This study demonstrated an interesting finding that a difference did exist in the relationship between personality profiles and satisfaction before and after treatment.

Before treatment, only neuroticism was found to be significantly related to satisfaction ratings, while after treatment neuroticism, openness, agreeableness and conscientiousness were found to be significantly related to satisfaction ratings.

A possible explanation for this observation could be attributed to the fact that before treatment, the assessment was mainly related to the present dentition and dental status in general, which would be influenced by one personality trait: neuroticism. However, after treatment the prosthesis could affect the relation and elicit the role of neuroticism, openness, agreeableness, and conscientiousness. Accordingly, neuroticism remains the only trait that maintained a relation with patients' satisfaction before and after treatment.

This finding was consistent with the study by Kiyak et al. (1990). They reported that patients who scored high on neuroticism using the EPI were more likely to have postoperative problems with surgery, oral performance and social interaction, as well as more likely to be dissatisfied with overall treatment outcomes.

While the test that they used measured three personality traits including extraversion, Kiyak et al. (1990) failed to find any relationship between extraversion and satisfaction ratings, which agreed with our finding. Although it is a valid and reliable test, the EPI is still considered to be incomprehensive.

Regarding other types of dental prostheses, Guckes et al. (1978) found that patients with high neuroticism were dissatisfied with their complete dentures. In contrast to this finding, van Waas (1990) did not find any relationship between psychological aspects and satisfaction with complete dentures. The possible reason underlying such findings might be due to the problems of psychological tests used in these studies.

From the above-mentioned points, it is of utmost importance to use valid, reliable and comprehensive tests to study the relationship between psychological profiles and satisfaction. This study used the NEO-FFI test, which could provide a more satisfactory answer for such an issue. It is evident that certain personality profiles could be relied upon in the assessment and prediction of patients' satisfaction with their implant treatment.

## Conclusions

Personality profiles might play a significant role in shaping patients' satisfaction with dental implants. Certain personality profiles were found to be associated with higher levels of patients' dissatisfaction with implant therapy.

In dental implant patients, high neuroticism scores might be associated with lower levels of total satisfaction with dental status and implant-supported prostheses as well as satisfaction with appearance, oral comfort and general performance. Low agreeableness scores might be associated with lower levels of total satisfaction with implant-supported prostheses as well as with satisfaction with oral comfort and general performance. Openness was shown to have a negative significant relationship with patients' satisfaction with their prostheses when pain is considered. Conscientiousness was shown to have a positive significant relationship with patients' satisfaction with their prostheses when pain is considered. However, the extraversion trait failed to demonstrate any relationship with satisfaction scales either before or after dental implant therapy.

Finally, within the limitation of this study, it was concluded that personality traits provide valuable information for the prediction of patients' satisfaction with their prostheses as well as dental status in

dental implant patients. neuroticism, openness and conscientiousness might be very helpful in this regard.

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## 要旨

**目的:** 本稿は、歯科補綴物に関する患者の満足度と特定の性格プロフィールの相関性を示した。歯牙インプラント患者において、このような相関性を検討することは重要である。

**材料と方法:** 本研究の被験者は、部分無歯顎で歯牙インプラント治療を希望している、年齢 22 歳から 71 歳までの (平均年齢 43.22 歳、SD 12.24 歳) 患者 50 名 (男性 28 名、女性 22 名) であった。患者は、インプラント治療を受ける前と補綴治療終了後 2、3 ヶ月後に、日常生活への歯牙の影響 (DIDL) と神経症傾向、外向性、開放性 5 因子人格インベントリー (NEO FFI) という 2 つの信頼性の高い、検証された質問表に回答することが義務づけられた。

**結果:** 特定の性格特性は、インプラント治療前後の患者の歯牙インプラントに関する満足度と有意に相関していることが認められた ( $p < 0.05$ )。神経症傾向のスコアは、患者の満足度の総合評価、外観に関する満足度 ( $p = 0.000$ )、口腔の快適さに関する満足度 ( $p = 0.005$ )、全体的な性能に関する満足度 ( $p = 0.000$ ) を予測する上で貴重な特徴を有していた。

**結論:** 性格特性は、患者の歯牙インプラント治療に関する満足度に影響を及ぼしていた。さらに性格特性は、患者のインプラント補綴物に関する満足度を予測する上で貴重な情報を提供した。神経症傾向、開放性、調和性、誠実性はこの点で非常に有用であった。神経症傾向は、インプラント治療後の口腔の健康に関する患者の QOL の主たる予知因子であった。

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