Original Article

The relationship between personality traits, pain perception and attitude toward orthodontic treatment

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ABSTRACT

Objective: To investigate the relationship between personality traits and a person's attitude toward orthodontic treatment and perception of pain during orthodontic treatment.

Materials and Methods: The sample consisted of two groups: group 1 consisted of 200 untreated subjects (100 males, 100 females; average age, 21.50 ± 3.35 years), and group 2 consisted of 200 treated subjects (100 males, 100 females; average age, 20.92 ± 2.48 years). The instrument for data collection was a questionnaire that included assessment of patients' personality profiles, pain expectation for untreated subjects, pain experience for treated subjects, and attitudes toward orthodontic treatment.

Results: Gender, treatment status, and personality traits did not affect subjects' average attitude toward orthodontic treatment, whereas gender was the only variable that affected subjects' average pain perception ($P < .01$). The average attitude score in subjects who experienced pain during orthodontic treatment was 5.06 ± 1.43, compared to 4.32 ± 1.35 for subjects who did not experience pain ($P < .001$). The average pain perception scores in treated subjects with previous knowledge of orthodontic treatment was 5.29 ± 1.94, compared to 6.07 ± 1.95 in subjects who did not have previous knowledge of orthodontic treatment ($P < .01$).

Conclusions: Personality traits did not affect attitude toward orthodontic treatment and pain perception/experience during orthodontic treatment. A more positive attitude was found in patients who experienced less pain during orthodontic treatment. (*Angle Orthod.* 2010;80:1141–1149.)

KEY WORDS: Personality; Attitude; Pain

INTRODUCTION

Efficient clinical management of patients seeking orthodontic treatment requires patient motivation and cooperation, which may be affected by their attitude toward orthodontic treatment.[1,2] It has been reported that gender and age of subjects were correlated with general attitude toward orthodontic treatment. Females had a greater desire to accept, undergo, and to be satisfied with orthodontic treatment than males,[3,4] and younger subjects had a more positive attitude than older subjects.[5]

Bos et al.[6] evaluated treated and untreated subjects' attitudes toward orthodontic treatment. They reported that previously treated subjects had a more positive attitude toward orthodontic treatment than untreated subjects.

Sergl et al.[7] suggested that there is a strong correlation between patient's attitude toward orthodontic treatment and discomfort felt after appliance insertion. Bergius et al.[8] found that patients with prolonged pain reactions were less motivated for orthodontic treatment compared with those who did not report pain after 1 week.

Recent studies have highlighted personality characteristics as intrinsic factors that affect patients' motivation for orthodontic treatment.[9–11] Abrahamsson[10] reported that psychological disorders may lead to

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a patient's missing orthodontic appointments. On the other hand, Bos et al.[9] and Amado and Sierra[11] reported that the personality traits of adolescents do not solely predict cooperation during treatment.

In-depth understanding is important in orthodontic treatment because it requires long-term cooperation by children and their parents.[12] Patients who are well informed about medical procedures have been found to require less pain medications than patients who did not comprehend the medical procedures they subsequently underwent.[13]

The aim of the study was to investigate the relationship between personality traits and a person's attitude toward orthodontic treatment and pain perception during orthodontic treatment.

MATERIALS AND METHODS

Included in this study were 200 males and 200 females. The sample consisted of two groups: Group 1 consisted of 200 untreated subjects (100 males, 100 females; average age, 21.50 $\pm$ 3.35 years). The participants in this group were selected from university campuses in Irbid (north of Jordan). Subjects in this group had not experienced any type of orthodontic treatment before the study. Group 2 consisted of 200 treated subjects (100 males, 100 females; average age, 20.92 $\pm$ 2.48 years). Subjects in this group were recruited from orthodontic clinics at Jordan University of Science and Technology/Dental Teaching Center. The subjects were patients currently undergoing orthodontic treatment or in the retention stage of treatment who agreed to participate in this study.

The instrument for data collection was a questionnaire that was developed for the purpose of this study based on existing validated questionnaires.[6,14,15] The questionnaire contained a series of questions about the demographic characteristics of the subjects and whether the respondent thinks orthodontic treatment is painful (yes/no). Each subject's previous knowledge of orthodontic treatment was assessed by asking if he or she had any idea about orthodontic treatment before (yes/no).

A brief explanation about the scope of this study and clarification of some questions included in the questionnaire and how to score them were given to all subjects. Patients were encouraged to ask for help or further explanation if they encountered any difficulty in understanding or scoring the questionnaires.

Assessment of patients' personality profiles and traits was carried out using the NEO Five Factor Inventory (NEO-FFI; Appendix 1).[14] NEO refers to neuroticism (N), extraversion (E), and openness (O). This test provides a comprehensive assessment of personality using five major domains: neuroticism, extraversion, openness, agreeableness, and conscientiousness. The test consists of 60 items, 12 for each domain, and subjects fill in their response to each statement by choosing one of five answers: strongly agree, agree, neutral, disagree, and strongly disagree. Each domain was classified as very high, high, average, low, and very low. For convenience in performing statistical analysis, very high and high classes were considered high, and very low and low classes were considered low. After completing the scoring, each questionnaire was checked to see if all the items were scored or not, and the subject was asked to score any missed items. The NEO-FFI test is a short and comprehensive test of personality. Although it is short, it is highly valid, reliable, and accurate in measuring personality traits.[14] Also, it is easy to answer and score, easy to interpret, and well documented in the literature.[16] It has been used to measure personality traits for patients with postorthodontic treatment satisfaction.[15]

Pain expectation for untreated subjects and pain experience for the treated subjects was assessed using a visual analogue scale (VAS) based on a line marked at 10-mm intervals whose ends are anchored and defined with verbal descriptors such as ''extremely likely'' and ''extremely unlikely.'' This questionnaire consisted of nine questions regarding pain (Appendix 2). Each patient was asked to place a mark on the line nearest to his or her expectation or experience. The Likert response format was used for all questions. The scores for the nine questions were averaged to get one score referred to as the average pain perception score. On the VAS line the lowest scores indicate less pain experienced/expected from orthodontic treatment and the highest scores indicate more pain experienced/expected. The VAS is widely used for measuring pain, and other investigators have described it as a sensitive, reliable, easy subjective method of measuring pain intensity with certain advantages over verbal scales; even small children manage it very well.[17]

Attitude toward orthodontic treatment for participants in this study was assessed using a VAS marked at 10-mm intervals. A questionnaire consisting of 12 questions, mainly about attitude toward orthodontic treatment, was given to each subject (Appendix 3). Subjects were asked to answer questions by placing a mark on the line nearest to their attitude toward the treatment. On the VAS line the lowest scores indicate a more positive attitude toward orthodontic treatment, and the highest scores indicate a more negative attitude toward orthodontic treatment.

Method Error

The reliability of the questionnaires was tested on all questions using Cronbach's alpha.[18] The Cronbach's

Table 1. F values of Wilks' Lambda and Significance of Different Variables According to Multivariate Tests with Average Attitude Toward Orthodontic Treatment and Average Pain Perception as Dependent Variables

	Average Attitude		Average Pain Perception	
Variable	F Value	*P* Value	F Value	*P* Value
Neuroticism	1.625	.198	1.852	.158
Extroversion	1.844	.160	2.616	.074
Openness	0.107	.898	1.106	.332
Agreeableness	0.060	.942	2.537	.080
Conscientious-ness	0.765	.466	0.307	.736
Gender	0.548	.460	9.641	.002**
Treatment	0.889	.346	0.010	.921

** $P \leq .01$.

alpha scores were 0.85, 0.92, and 0.82 for the personality, pain, and attitude questionnaires, respectively, indicating good internal consistency. Ten subjects answered the questionnaire twice over a 2-week interval. Reliability was carried out on all questions using the correlation coefficient test. The correlation coefficients were high and ranged from 0.87 to 0.90.

Statistical Analysis

Data analysis was carried out using the Statistical Package for Social Science computer software for windows (Version 15.0, Chicago, Ill). Comparison between groups was performed using the Univariate General Linear Model with average attitudes and average pain perception as the dependent variables and personality traits, gender, and treatment status as the fixed variables. Bonferroni post hoc multiple comparisons were used. An independent *t*-test was used to compare treated and untreated groups. Significant probability levels were set at $P \leq .05$.

RESULTS

Table 1 presents F values of Wilks' lambda and significance of different variables according to multivariate tests with average attitude toward orthodontic treatment and average pain perception as the dependent variables. Gender was found to be the only variable that had an effect on patients' average pain perception ($P < .01$).

Average Attitude Toward Orthodontic Treatment

Table 2 shows subjects' attitudes toward orthodontic treatment.

Treatment status. Treated and untreated subjects had similar attitudes toward orthodontic treatment. Average scores for attitude toward orthodontic treatment were 4.94 ± 0.18 and 4.81 ± 0.17 in treated and untreated groups, respectively. No significant difference was found between treated and untreated subjects.

Table 2. Means, Standard Errors (SE), and *P* Values for Average Attitude and Pain Perception Among Study Population in Respect to Gender, Treatment Status, and Personality Traits

	Average Attitude		Average Pain Perception	
Variables	Mean ± SE	*P* Value	Mean ± SE	*P* Value
Gender				
Males	4.82 ± 0.18	.460	5.10 ± 0.26	.002 **
Females	4.92 ± 0.18		5.72 ± 0.26	
Treatment				
Treated	4.94 ± 0.18	.346	5.40 ± 0.27	.921
Untreated	4.81 ± 0.17		5.42 ± 0.26	
Neuroticism				
Low	4.98 ± 0.24	.198	5.29 ± 0.35	.158
Average	4.70 ± 0.17		5.27 ± 0.25	
High	4.94 ± 0.18		5.67 ± 0.27	
Extroversion				
Low	5.06 ± 0.23	.160	5.78 ± 0.34	.074
Average	4.70 ± 0.18		5.12 ± 0.26	
High	4.86 ± 0.18		5.32 ± 0.27	
Openness				
Low	4.83 ± 0.16	.898	5.33 ± 0.24	.332
Average	4.84 ± 0.18		5.63 ± 0.26	
High	4.95 ± 0.27		5.27 ± 0.39	
Agreeableness				
Low	4.92 ± 0.11	.942	5.53 ± 0.17	.080
Average	4.86 ± 0.18		5.97 ± 0.26	
High	4.85 ± 0.40		4.72 ± 0.59	
Conscientiousness				
Low	5.00 ± 0.20	.466	5.38 ± 0.29	.736
Average	4.81 ± 0.19		5.51 ± 0.27	
High	4.81 ± 0.19		5.33 ± 0.28	

** $P < .01$.

Gender. Average scores for attitude toward orthodontic treatment were 4.82 ± 0.18 and 4.92 ± 0.18 in males and females, respectively ($P = .460$). Gender differences were not detected within treated ($P = .183$) and untreated subjects ($P = .956$).

Personality traits. Attitude scores did not vary significantly among the three groups (low, average, and high) within the same personality trait.

Average Pain Perception of Orthodontic Treatment

Table 2 also shows the average scores for perceptions of orthodontic treatment.

Treatment status. With respect to pain, treated and untreated subjects perceived orthodontic procedures similarly. The average pain perceptions were 5.40 ± 0.27 and 5.42 ± 0.26 in treated and untreated groups, respectively. No significant difference was found between treated and untreated subjects.

Table 3. Means, Standard Errors (SE), and *P* Values for the Average Attitude in Respect to Orthodontic Previous Knowledge and Pain Experienced During Orthodontic Treatment Among Studied Groups

		Average Attitude				Average Pain Perception			
		Treated Group		Untreated Group		Treated Group		Untreated Group	
		Mean ± SE	*P* Value	Mean ± SE	*P* Value	Mean ± SE	*P* Value	Mean ± SE	*P* Value
Previous knowledge of orthodontic treatment	Yes	4.69 ± 1.37	NS[a]	4.62 ± 1.17	NS	5.29 ± 1.94	**	5.44 ± 1.99	NS
	No	5.11 ± 1.55		4.89 ± 1.19		6.07 ± 1.95		5.70 ± 2.01	
Pain experienced from orthodontic treatment	Yes	5.06 ± 1.43	***	5.04 ± 1.17	***	6.09 ± 1.84	***	6.49 ± 1.75	***
	No	4.32 ± 1.35		4.37 ± 1.09		4.36 ± 1.75		4.31 ± 1.59	

[a] NS indicates not significant; **$P < .01$; ***$P < .001$.

Gender. Females reported higher pain scores than males. The average pain perceptions were 5.10 ± 0.26 and 5.72 ± 0.26 in males and females, respectively ($P < .01$). A gender difference was only detected within treated subjects (5.17 ± 1.70 and 5.92 ± 2.17 in males and females, respectively; $P < .05$).

Personality traits. The average pain perception scores did not vary significantly between the three groups (low, average, and high) within the same personality trait.

Effect of Previous Orthodontic Knowledge and Pain Experience/Expectation on Attitude Scores

Table 3 shows how previous orthodontic knowledge and pain experience/expectation affected attitude scores for the treated and untreated groups (Table 3).

Treated group. The average attitude score in subjects with previous knowledge about orthodontic treatment was 4.69 ± 1.37, and the average attitude score in subjects who did not have previous knowledge about orthodontic treatment was 5.11 ± 1.55. No significant difference was found between the two groups ($P = .50$).

The average attitude score in subjects with previous pain experience from orthodontic treatment was 5.06 ± 1.43, and the average score in subjects who did not experience pain from orthodontic treatment was 4.32 ± 1.35. A significant difference was detected between the two groups ($P = .001$).

Untreated group. The average attitude score in subjects with previous knowledge about orthodontic treatment was 4.62 ± 1.17, and the average attitude score in subjects who did not have previous knowledge about orthodontic treatment was 4.89 ± 1.19. No significant difference was found between the two groups ($P = .111$).

The average attitude score in subjects who expected pain from orthodontic treatment was 5.04 ± 1.17, and the average attitude score in subjects who did not expect pain from orthodontic treatment was 4.37 ± 1.09. A significant difference was detected between the two groups ($P < .001$).

Effect of Previous Orthodontic Knowledge and Pain Experience/Expectation on Average Pain Perception Scores

Table 3 shows how previous orthodontic knowledge and pain experience/expectation affected pain perception scores in treated and untreated groups.

Treated group. The average pain perception score in subjects with previous knowledge about orthodontic treatment was 5.29 ± 1.94, and the average pain perception score in subjects who did not have previous knowledge about orthodontic treatment was 6.07 ± 1.95. A significant difference was detected between the two groups ($P < .01$).

The average pain perception score in subjects who reported pain during orthodontic treatment was 6.09 ± 1.84, and the average pain perception score in subjects who did not report pain during orthodontic treatment was 4.36 ± 1.75. A significant difference was detected between the two groups ($P < .001$).

Untreated group. The average pain perception score in subjects with previous knowledge about orthodontic treatment was 5.44 ± 1.99, and the average pain perception score in subjects who did not have previous knowledge about orthodontic treatment was 5.70 ± 2.01. No significant difference was found between the two groups ($P = .351$).

The average pain perception score in subjects who expected orthodontic treatment to be painful was 6.49 ± 1.75, and the average pain expectations score in subjects who did not expect pain from orthodontic treatment was 4.31 ± 1.59. A significant difference was detected between the two groups ($P < .001$).

DISCUSSION

The use of different questionnaires to assess the effects of personality traits on orthodontic patients in previous studies makes comparisons more difficult. Although previous studies[6,9] used Likert scales to measure attitude toward orthodontic treatment, VAS was used in this study. VAS was used to measure pain and, because of the reported similarity in response behavior between VAS and Likert scales,[19] it was

decided to use one scale in this study to avoid subjects' confusion. However, it has been reported that wording of the response alternatives in the Likert scale may affect the responses.[20]

In this study, no significant differences were detected in any of the five factors of personality traits with respect to attitude toward orthodontic treatment and pain perception. The outcome of this study agrees with the results of others[9,11] who studied the use of personality traits in predicting compliance in orthodontic practice. Bos et al.[9] concluded that a patient's personality traits alone cannot be used to predict compliance during orthodontic treatment. Also, Amado and Sierra[11] reported that no significant differences were found for any of the traits as they relate to cooperation, although introverted patients tended to be more cooperative during orthodontic treatment.

In this study, gender differences were not detected regarding attitude toward orthodontic treatment. This was consistent with the results of others[6,11] who reported that gender is not correlated with a subject's attitude and cooperation during orthodontic treatment. However, others have reported that gender correlates with the general attitude toward orthodontic treatment.[3,4,21]

In this study, treated and untreated subjects had similar attitudes toward orthodontic treatment. These results were inconsistent with the results of Bos et al.,[6] who reported that previously treated subjects had a more positive attitude toward orthodontics than untreated subjects. The use of a different questionnaire to measure attitude toward orthodontic treatment may explain this difference. On the other hand, our results were in agreement with the findings of Lagerström et al.,[22] who conducted a study to investigate the attitude toward orthodontic treatment in which previously treated and untreated subjects were compared. Attitudes toward their own teeth and orthodontic treatment were recorded by the use of a constructed questionnaire. These researchers reported no significant differences between treated and untreated individuals.

In this study, gender was found to be the only variable that had an effect on patients' average pain perception. Females reported more pain than males, which was in agreement with previous studies.[17,23] These studies found that females reported more pain and discomfort than males during fixed appliance treatment, and they are more sensitive to pain while males can tolerate more pain. In contrast to the results of the current study, others[8,24–26] found no difference in pain perception between males and females. The contradiction between the current study and the aforementioned studies can be explained by the difference in sample size and subjects' age (younger than 17 years).

Patients who were well informed about medical procedures were found to require less pain medication than patients who did not comprehend the procedures they subsequently underwent.[13] In this study, average pain perception in treated subjects was lower in patients with previous knowledge of orthodontic treatment. This finding was consistent with Touyz and Marchand[27] who suggested that dissemination of information about expected discomfort reduce pain experienced during treatment. Also, Vallerand et al.[28] found that postoperative pain control and satisfaction were greatly improved for patients undergoing third molar surgery who had more preparatory information and knowledge. However, in the current study, previous knowledge about orthodontic treatment in untreated subjects did not change pain expectation from orthodontic treatment.

In our study, pain experienced during orthodontic treatment in treated subjects and pain expected from orthodontic treatment in untreated subjects affected a subject's attitude toward orthodontic treatment. Our results were consistent with others[7,29] who reported that pain from orthodontic appliance may negatively affect patient cooperation; pain was found to be the main discouraging feature. On the other hand, Lew[30] found that few subjects cited fear of pain as a reason for not to seeking orthodontic treatment. Different social and racial background (Chinese) may explain this contradiction.

CONCLUSIONS

- Attitude toward orthodontic treatment was not affected by gender and personality traits.
- Treated and untreated subjects had similar attitudes toward orthodontic treatment.
- Average pain perception/experience during orthodontic treatment was not affected by personality traits, though it was affected by gender; females were more sensitive to pain than males.
- A more positive attitude was found in patients who experienced less pain during orthodontic treatment.
- In the treated group, pain perception was lower in patients with previous knowledge about orthodontic treatment.

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APPENDIX 1
NEO-FFI Personality Assessment

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 coworkers.
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 a 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.

*SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

APPENDIX 2
Pain Expectation/Untreated and Pain Experience/Treated Subjects

1. Do you think that placing of separators between your teeth is/will be painful?

extremely unlikely ——————————— extremely likely

2. Do you think that placing of bands on your posterior teeth is/will be painful?

extremely unlikely ——————————— extremely likely

3. Do you think that bond up of brackets causes /caused pain?

extremely unlikely ——————————— extremely likely

4. Do you think that wire changing is/was painful?

extremely unlikely ——————————— extremely likely

5. Do you feel/expect pain from wearing of elastics?

extremely unlikely ——————————— extremely likely

6. Do you feel/expect pain from wearing of head gear?

extremely unlikely ——————————— extremely likely

7. Do you feel/expect pain from wearing of retainers?

extremely unlikely ——————————— extremely likely

8. Do you think that impression taking is/was painful?

extremely unlikely ——————————— extremely likely

9. Did/Do you feel/expect pain during debonding?

extremely unlikely ——————————— extremely likely

APPENDIX 3
Patient's Attitude Toward Orthodontic Treatment

1. Braces cause a lot of trouble?

extremely unlikely  extremely likely

2. When you wear braces, you need to adjust your dietary habits?

extremely unlikely  extremely likely

3. Orthodontists always say that you have to wear your braces more often than is really necessary?

extremely unlikely  extremely likely

4. Orthodontic treatment often has no use at all?

extremely unlikely  extremely likely

5. It is absolutely necessary to care more for your oral hygiene when you are wearing braces?

extremely unlikely  extremely likely

6. People wearing braces are often more bullied than people without braces?

extremely unlikely extremely likely

7. It is nonsense visiting an orthodontist after your braces have been removed?

extremely unlikely  extremely likely

8. Elastics which should be worn with braces often have no use?

extremely unlikely  extremely likely

9. It is not a problem at all when you stop treatment as soon as your teeth are straight?

extremely unlikely extremely likely

10. Orthodontists often give indistinct information?

extremely unlikely extremely likely

11. Orthodontists always have something to complain about to their patients?

extremely unlikely extremely likely

12. Orthodontists often spend very little time with their patients?

extremely unlikely extremely likely