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Does orthodontic treatment affect patients' and parents' anxiety levels?

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SUMMARY The aims of this study were (1) to determine and compare the anxiety levels of two groups of patient and parents, (2) to identify possible gender differences between male and female subjects and (3) to evaluate any changes in anxiety levels after 1 year of treatment. The first group consisted of 40 subjects with a mean age of 15.6 ± 1.2 years awaiting orthodontic treatment, plus one parent of each subject (mean age 43.4 ± 2.3 years). The second group comprised 43 patients with a mean age of 16.0 ± 1.1 years who had been undergoing treatment for a period of 1 year, plus one parent of each patient (mean age 41.0 ± 1.9 years).

Personal information forms and Spielberger's 'State and Trait Anxiety Inventory' (STAI) were applied to both groups. To compare the two groups and to determine the differences between males and females, independent-sample *t*-tests were used. Internal consistencies for the two scales of the STAI were evaluated with Cronbach's alpha coefficient.

Trait anxiety levels of parents (51.05 ± 5.1) and state anxiety levels of subjects (58.57 ± 6.73) who were about to start orthodontic treatment were both high. The difference between the groups was statistically significant ($P < 0.05$). In patients who had undergone treatment for 1 year, the scores were found to be normal (43.28 ± 5.91). However, their parents' high levels of trait anxiety remained unchanged (50.41 ± 4.2).

Introduction

Facial aesthetics have been suggested as one of the most important variables in terms of an individual's own self-esteem and social acceptance (Kiyak *et al.*, 1986). As facial appearance changes from childhood to adulthood, it has a great impact on an individual's psychology (Tung and Kiyak, 1998).

There have been previous reports in the orthodontic literature of the psychological outcomes of patients with dental or dentofacial deformities treated with different approaches (Kiyak *et al.*, 1985, 1986; Egolf *et al.*, 1990). Most studies are of a longitudinal prospective design, analysing basic personality characteristics, such as anxiety, fear, depression, self-concept and body image in adult patients treated surgically, not with conventional orthodontics (Goin, 1977; Ohlsen *et al.*, 1979; Rittersma *et al.*, 1980; Cunningham *et al.*, 2000, 2001).

Dental anxiety and fear are widespread problems that represent one of the major barriers to dental care (Levitt *et al.*, 2000). Anxiety is defined as a set of behavioural manifestations that can be divided into state and trait anxiety (Caumo *et al.*, 2000). State anxiety is a transitory emotional condition that varies in intensity and fluctuates over time, whereas trait anxiety is a personality trait that remains relatively stable over time (Caumo *et al.*, 2000).

A high degree of anxiety before a medical or surgical procedure can have adverse consequences. In addition to being unpleasant, there is evidence that it increases sympathetic outflow (Williams, 1993), and causes a stress response with raised corticosteroid and catecholamine release (Fell *et al.*, 1985). The need for anaesthetic agents may also be increased (Goldman *et al.*, 1988). Kulik and Mahler (1987) showed that less anxious patients were more mobile post-operatively.

In a study of 50 7–14-year-old boys and 50 6–14-year-old girls, Maj *et al.* (1967) found that 77 per cent of children had experienced considerable difficulty in adjusting psychologically to orthodontic treatment. Forty-two per cent of the sample reported that the appliance was painful and distress was especially noted in older children. However, in a study of 100 British children, 9–18 years of age, Lewis and Brown (1973) found that only 25 per cent reported that they were anxious about wearing orthodontic appliances. Those authors concluded that the level of anxiety induced by appliance therapy was lower than that reported by Maj *et al.* (1967), perhaps because of increasing acceptance by peers. If the age of the patient is a significant factor affecting psychological adjustment to therapy, then the difference in age range between these two studies confounds any direct comparison.

Attempts have been made to investigate the difference in anxiety scores of subjects in various medical specialties, including anaesthesia (Fell *et al.*, 1985; Elsass *et al.*, 1987; Goldman *et al.*, 1988; Caumo *et al.*, 2000), general surgery (Goin, 1977), oral surgery

Table 1 Distributions and the mean ages of two randomly selected patient groups and their parents.

Group A		Group B	
Subjects	Parents	Patients	Parents
23 females 17 males 15.6 ± 1.2 years	28 mothers 12 fathers 43.4 ± 2.3 years	24 females 19 males 16.0 ± 0.9 years	24 mothers 19 fathers 41.0 ± 1.9 years

(George *et al.*, 1980; George and Scott, 1982), neurology (Aydin, 1977), oncology (Turan, 1985), bypass surgery (Kulik and Mahler, 1987), general dentistry (Locker, 2003), periodontology (Vettore *et al.*, 2003), and plastic surgery (Ohlsen *et al.*, 1979). However, there have been no investigations of the treatment effects on anxiety scores among orthodontic patients.

The aims of this study were, therefore:

1. To determine and compare the anxiety levels of two different patient and parent groups.
2. To identify possible gender differences in the patient and parent groups.
3. To evaluate possible changes in anxiety levels during a treatment period of 1 year.

Subjects and methods

The participants consisted of two different randomly selected patient groups and their parents (Table 1).

Group A comprised 40 individuals awaiting orthodontic treatment (23 females, 17 males) over 14 years of age, and one parent of each child (28 females and 12 males).

Group B consisted of 43 patients (19 males and 24 females) with moderate malocclusions who had been undergoing orthodontic treatment for 1 year, and one parent of each patient (24 females, 19 males). All participants in group B had non-extraction orthodontic treatment and were over 14 years of age. The treatment procedures in all patients were very similar.

The patients in group A were informed of the type of treatment they would be receiving before the questionnaires were administered. During the selection of patients for group B, care was taken to ensure that they were being treated by only one person so that the positive and negative effects of different doctor–patient relationships on patient psychology could be eliminated. The minimum age limit (14 years) was chosen because it is accepted that by this age stable psychological characteristics have been attained (Spielberger *et al.*, 1970, 1980).

Procedure

The questionnaires consisted of anxiety scales and personal information forms. The personal information forms contained questions about demographic items relating to the respondent's age, sex, and education.

Personal information form. Two types of question (multiple-choice and open-ended) were included in this form. The participants were asked to tick one answer (or more for some questions) from the multiple-choice questions, but in the open-ended questions they were asked to write the answers.

State and Trait Anxiety Inventory (STAI). Two scales were used to measure the changes in anxiety levels of patients during the treatment. The STAI was developed by Spielberger *et al.* (1970) to provide an operational measure of state anxiety and trait anxiety. Each of the two scales consists of 20 items, approximately half of which are positively worded (e.g. 'I feel regretful' about anxiety that is present) and the other half negatively worded (e.g. 'I feel pleasant' about anxiety that is absent). The arrangement of anxiety-present and anxiety-absent items was identical to the original version (Spielberger *et al.*, 1970). There were seven trait anxiety-absent items, 13 trait anxiety-present items, 10 state anxiety-absent items, and 10 state anxiety-present items in the Turkish version of the STAI (Oner and Le Compte, 1983).

The participants responded to each state anxiety question (e.g. 'I feel tense') by rating themselves on the following four-point intensity scale: 1, not at all; 2, somewhat; 3, moderately so; 4, very much so. Each trait anxiety item was rated on the following four-point frequency scale: 1, almost never; 2, sometimes; 3, often; 4, almost always. Anxiety-absent items were scored in reverse.

The answers produced scores between 20 and 80 (Spielberger *et al.*, 1970, 1980), but Spielberger *et al.* (1980) proposed no norm scores for these inventories; they simply indicated that higher scores reflected higher anxiety and lower scores lower anxiety. The scores were analysed statistically.

The subjects were not informed about the purpose of the study. They were only asked to read the instructions at the top of the questionnaire and indicate the best choice that applied to them. No time limitation was imposed for filling in the forms. In order to prevent the subjects being influenced by each other, they were directed to complete the questionnaires alone.

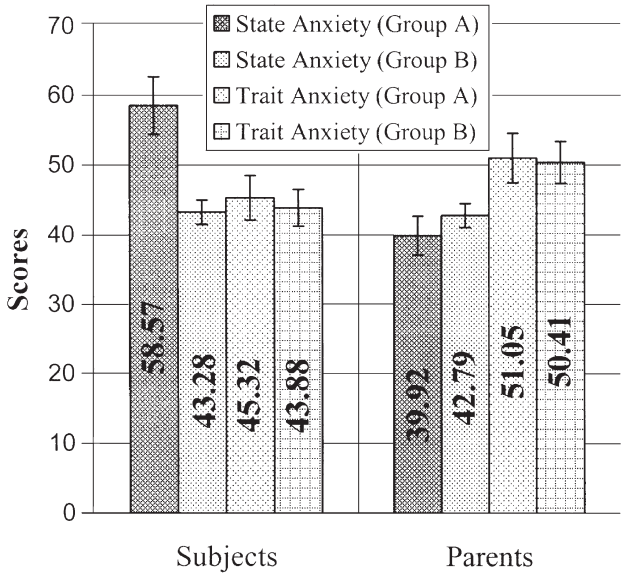

Figure 1 State and trait anxiety levels of patients who were at the beginning of orthodontic treatment and their parents (group A) and patients who were 1 year into orthodontic treatment and their parents (group B).

Statistical method

Statistical analyses were performed using the Statistical Package for Social Services software package (SPSS for Windows 98, version 10.0, SPSS Inc., Chicago, Illinois, USA). For each group the mean anxiety levels and standard deviations (SD) were calculated. To compare the two groups and to determine the differences between males and females, independent-samples *t*-tests were used. Internal consistencies for the two scales of the STAI were evaluated with Cronbach's alpha coefficient. Significance was set at $P < 0.05$.

Results

According to the personal information forms, there were no significant differences between the groups with regard to age, sex and educational attainments ($P > 0.05$).

The data from the STAI of the subjects obtained at the beginning and after 1 year of orthodontic treatment are summarized in Figure 1. Among group A patients who had not started orthodontic treatment, the mean score for self-reported state anxiety was 58.57 ± 6.73 and for trait anxiety 45.32 ± 5.91. For group B patients, the mean score for self-reported state anxiety was 43.28 ± 4.12, which is a statistically significant lower score compared with the levels reported by the patients in group A ($P < 0.05$). The mean scores for trait anxiety in group B decreased over the year following the start of treatment (43.88 ± 5.69).

Parents in group A, whose children were about to start orthodontic treatment, had high trait anxiety levels (51.05 ± 5.1) as did the parents of group B patients (50.41 ± 4.2). These scores did not show any statistically significant difference ($P > 0.05$). The mean scores for state anxiety in parents of groups A (39.92 ± 3.23) and B (42.79 ± 4.67) were within the normal range.

All scales had a Cronbach coefficient of over 0.80 (State Anxiety Inventory's Cronbach coefficient 0.81, Trait Anxiety Inventory's Cronbach coefficient 0.85).

Discussion

This cross-sectional study was intended to identify any psychological or demographic differences between (A) patients who were at the beginning of orthodontic treatment and their parents and (B) patients who were 1 year into orthodontic treatment and their parents.

Spielberger *et al.* (1970, 1980) stated that the minimum age limit for psychology studies should be 14 years, since below that age they may not have a balanced psychological character. The study was therefore conducted on subjects who were aged 14 years or over.

Anxiety develops with the existence of anxious people around a child (Spielberger *et al.*, 1970, 1980). Oner and Le Compte (1983) claimed that anxiety is a contagious emotion. If a parent or teacher has high levels of anxiety, this will be transferred to other people or children. As it is a contagious emotion, the voice, glances and psychological state of anxious parents can affect a child's emotional condition (Spielberger *et al.*, 1970). For this reason, the study was carried out not only on patients but also on their parents.

The present findings, that state anxiety levels of subjects were high at the beginning of treatment, are in general agreement with those of Crowley *et al.* (1956) who reported that dental examinations and, in extreme cases, orthodontic treatment induce fear and anxiety. However, Breistein and Burden (1998) stated that 'It is also interesting that anxiety about dental treatment did not appear to act as a significant barrier preventing individuals in need of treatment from entering orthodontic treatment'. The probable explanation for this finding is that orthodontic treatment is perceived to be one of the less painful forms of dental therapy.

In the present study, high levels of patient anxiety were found at the beginning of orthodontic treatment. It was hypothesized that anticipation of the new treatment and concern about discomfort were the causes of these levels. The state anxiety scale helps in detecting the change in an individual's anxiety level to environmental and experimental pressure conditions. It was observed that state anxiety changed in accordance with the intensity of pressure. State anxiety is used to determine an individual's present anxiety level. In the present study, the state anxiety levels of subjects at the beginning of orthodontic treatment were greater than

those of patients who had been receiving treatment for 1 year. At the beginning of treatment it is normal for the state anxiety level to be high. It was therefore hypothesized that the subject's lack of information about orthodontic treatment or fear about pain and discomfort were the causes of high state anxiety levels. However, under the conditions of the present investigation it was not possible to determine the reason for high anxiety before treatment and lower anxiety after 1 year of treatment.

The trait anxiety scale can be used to evaluate an individual's general baseline anxiety. Trait anxiety describes an individual's long-term anxiety. In the present study, the findings indicated that trait anxiety levels of parents whose children were about to start orthodontic treatment were high and did not differ from the trait anxiety scores of parents whose child had received treatment for 1 year. High levels of trait anxiety were unchanged. It was hypothesized that, for parents, the causes of trait anxiety associated with orthodontic treatment were the long treatment time, the high level of cost, the patient's boredom and complaints they share with parents, the responsibilities of having children and anxiety towards the future.

Bergdahl and Bergdahl (2003) stated that female patients showed higher levels of dental anxiety. This finding is in agreement with other studies (Hakeberg *et al.*, 1993). However, in the current investigation, no statistically significant differences were found between male and female subjects.

Providing information to the patient and parent prior to treatment is thought to be advantageous in order to reduce anxiety levels, although it has been claimed that the provision of extra information, particularly about risks and complications, may cause patients undue anxiety (Kerrigan *et al.*, 1993). There is also evidence that the converse may be true. Wallace (1986) reported that patients with more knowledge of their surgery had fewer worries and recovered faster. Similarly, Elsass *et al.* (1987) found that patients who were given detailed information about their anaesthesia were less anxious. High situational stress has also been shown to decrease working memory capability (Sorg and Whitney, 1992), thereby intertwining knowledge and anxiety further.

Conclusions

In the present study, anxiety, which is supposed to be one of the personal characteristics of an individual, was examined. The results show that orthodontic treatment has some influence on a patient's anxiety. The current findings indicate that trait anxiety levels of parents and state anxiety levels of patients who were at the beginning of orthodontic treatment were high. While high state anxiety scores in patients 1 year into treatment were normal, their parents' trait anxiety levels were unchanged. Patients awaiting orthodontic treatment had high levels of anxiety, but these normalized after 1 year of treatment. As the parents also have high levels of anxiety and as this can affect their child's psychological conditions, educational programmes concerning orthodontic treatment should be available for parents.

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