The role of psycho-social factors in headgear compliance

Uğur Ağar*, Cenk Doruk*, A. Altuğ Bıçakçı* and Nagehan Büküşoğlu**

*Department of Orthodontics, Faculty of Dentistry, Cumhuriyet University, Sivas, **Department of Child and Adolescent Psychiatry, School of Medicine, Ege University, İzmir, Turkey

SUMMARY The aim of this study was to identify the role of psycho-social factors in headgear compliance. Fifty-one patients, with an Angle Class II division 1 malocclusion comprised the study sample. The treatment plan aimed to correct the malocclusion using cervical pull headgear. An electronic module timer was attached to the neckstrap to evaluate the number of hours the patients wore the headgear. One of their parents was asked to answer the Child Behaviour Checklist (CBCL), which defines a patient's behaviour. The patients were monitored for 6 months and the modules were measured at the end of each 2 month period. Mann–Whitney *U* and Chi square tests were used to analyse the data. The patients were separated into groups according to their compliance.

The results showed that although there were significant differences in the use of headgear between the groups ($P \le 0.001$), age, gender, and CBCL subgroup scores were not statistically significant (P > 0.05).

Introduction

Headgear is an essential part of orthodontic therapy, and lack of compliance can reduce the effectiveness of the best treatment plan, and the most promising treatment mechanics (Allan and Hodgson, 1968; Weiss and Eiser, 1977). Many clinicians have tried to clarify factors that would predict compliance.

It has been suggested that gender and age can be used to predict patient compliance (Kreit *et al.*, 1968; Allan and Hodgson, 1968; Starnbach and Kaplan, 1975; Weiss and Eiser, 1977; Clemmer and Hayes, 1979; Cucalon and Smith, 1990; Cureton *et al.*, 1993; Güray *et al.*, 1994). However, some studies have found contradictory results (Crawford, 1972; McDonald, 1973; Nanda and Kierl, 1992).

Sergl *et al.* (2000) studied 84 patients and concluded that patients with the least concern with their appearance showed the highest compliance with their appliance.

It has been suggested that compliance is correlated with personality traits. Allan and Hodgson (1968) characterized co-operative patients as enthusiastic, energetic, outgoing, self-controlled, responsible, trusting, obliging and hard working, while the unco-operative patients were described as hard headed, independent, temperamental, impatient, individualistic, easygoing, intolerant of prolonged effort, and disregarding the wishes of others.

Kreit *et al.* (1968), in a study of 1386 patients and 120 clinicians, described uncooperative patients as being concerned with appearance, having conflict with their parents, and requiring the presence of authority to enforce ethical behaviour. El-Mangoury (1981) and Egolf *et al.* (1990) demonstrated that internally motivated patients cooperate better than externally motivated patients and affiliation motivation was selected as the first predictor for headgear wear. However, Nanda and Kierl (1992) found

that orthodontic compliance was not predictable through psychological testing, but the doctor-patient relationship had a positive impact on the co-operative behaviour of patients. Similarly, Bos *et al.* (2003) concluded that personality characteristics alone enabled the prediction of compliant behaviour in orthodontics.

The aim of the present study was to investigate the role of psycho-social factors that might be used as potential predictors to determine headgear compliance.

Subjects and methods

Fifty-one patients, 34 girls and 17 boys, 9–15 years of age (mean 12.92 years) with an Angle Class II division 1 malocclusion comprised the study sample. They were derived from a cohort of 67 subjects from which 16 had been excluded because of incomplete records due to the limited battery life of the electronic module timer. The patients provided orthodontic materials, but did not pay for therapy. The patients were treated by three different orthodontists.

The treatment plan aimed to correct the malocclusion using cervical pull headgear. An electronic module timer, which is part of the Compliance Science System (Ortho Kinetics Corporation, Vista, California, USA), was attached to the neckstrap to evaluate the number of hours the patients wore the headgear (Doruk *et al.*, 2004). One of their parents was requested to complete the Child Behaviour Checklist (CBCL). Both the parents and their children were informed of why they were completing the CBCL. The data were analysed with the 'Assessment Data Manager Software for the Achenbach System of Empirically Based Assessment' (University of Vermont Department of Psychiatry, Burlington, Vermont, USA). The CBCL was developed by Achenbach and Edelbrock (1991) to evaluate the competence areas and behavioural problems of children and teenagers between the ages of 4 and 18 years with the guidance of the information gained from the parents. The items of the CBCL were factor analysed to empirically identify the forms of psychopathology that actually occur in children. High validity and confidence scores have been obtained for this scale, which has been used both nationally and internationally (Erol and Şimşek, 1998; Dutra *et al.*, 2004).

In the competence section, there are 20 questions concerning the child's efficiency, social involvement, school performance, as well as a composite scale (total competence) and in the behaviour problem section, 112 questions grouped to produce subscales such as withdrawn behaviour, somatic anxious/depressed behaviour, complaints. delinquent behaviour, aggressive behaviour, social problems, attention problems, and thought problems. Three global scale scores (internalizing, externalizing, total behavioural problems) can be calculated from these symptom ratings. The internalizing scale score can be calculated from withdrawn, somatic complaints, and anxious/depressed scale scores and the externalizing scale score from delinquent and aggressive scale scores. Total behavioural problem scale scores can be calculated from all these symptom ratings.

There are no cut-off points for clinical and non-clinical scores for competence areas, but there are cut-off points for clinical and non-clinical scores for problem areas: (1) 0–66: non-clinical; (2) 67–70: borderline; (3) 71–100: clinical.

The patients were instructed to wear the headgear appliance for at least 16 hours per day, but were not told that the time this was used was being monitored. After a 2 month period, wear time was measured. At this stage the patients were divided into two groups: group 1 (cooperative patients), who wore the headgear at least 16 hours per day, and group 2 (uncooperative patients), who wore the headgear for less than 16 hours per day. Uncooperative patients were informed about the electronic module timer, and a subsequent 2 month treatment period was initiated for both groups. The wear time was re-measured at the end of the second 2 month treatment period. At this stage the unco-operative patients were divided into two groups: group 2a (co-operative patients), who wore the headgear at least 16 hours per day, and group 2b (uncooperative patients), who wore the headgear for less than 16 hours per day. Group division and the treatment sequence have been reported previously (Doruk et al., 2004). All the groups were then monitored for a further 2 month treatment period. The co-operative patients (group 1), who wore the headgear for the recommended 16 hours minimum during 6 months were informed at the end of treatment that they had been monitored. The formation of the groups by periods is shown in Figure 1.

Statistical analysis

SPSS package 9.05 (Statistical Package for the Social Sciences, Chicago, Illinois, USA) was used to analyse the

results. Mann–Whitney U and Chi square tests were performed to analyse the data.

Results

The modules were read following the first 2 months of headgear wear. Twenty-three patients (group 1) were found to have worn their headgear as recommended, but 28 patients were found not to have worn their headgear as recommended (group 2). Group 1 used the headgear for 18.34 hours/day and group 2 for 9.10 hours/day. Significant differences were observed in the use of the headgear between groups 1 and 2 (P < 0.001). When age, gender (Table 1), and CBCL subgroup scores (Table 2) for groups 1 and 2 were compared, no statistical difference was found (P > 0.05). At the end of the second 2 month period when the modules were again read, it was found that eight of the previously unco-operative patients (group 2a) had worn their headgear for 18.62 hours/day, while 20 of them (group 2b) used it for 10.20 hours/day after they had been introduced to the electronic module timer. Significant differences were observed in the use of the headgear between groups 2a and 2b (P < 0.001). When age, gender (Table 3), and CBCL



Figure 1 Formation of groups by periods: first period: 0–2 months; second period: 2–4 months; third period: 4–6 months.

Table 1 Distribution by gender of the patients in groups 1 and 2.

	Girls		Boys		Total	
	n	%	п	%	п	%
Group 1 Group 2 Total	13 21 34	56.5 75.0	10 7 17	43.5 25.0	23 28 51	100 100

Chi square = 1.94; P > 0.05.

Table 2 Comparison of the competence and problem scoresbetween groups 1 and 2.

	Group 1		Group 2		
	Mean	SD	Mean	SD	Р
Total competence	44.95	1.55	45.53	2.32	NS
Efficiency	43.08	1.86	43.21	1.40	NS
Social	46.43	1.37	45.78	1.29	NS
School	48.52	1.10	47.82	2.20	NS
Total problems	49.86	2.03	52.10	1.63	NS
Internalizing problems	53.82	1.92	55.92	1.43	NS
Withdrawn	55.08	1.22	56.39	1.55	NS
Somatic complaints	56.39	1.56	54.82	0.99	NS
Anxious/depressed	56.86	1.30	58.39	1.09	NS
Externalizing problems	51.86	2.88	56.67	1.36	NS
Delinquent	52.60	1.11	53.92	0.99	NS
Aggressive	54.43	1.28	54.35	1.17	NS
Social problem	53.26	1.09	55.78	1.25	NS
Thought problem	56.65	1.23	56.57	1.31	NS
Attention problem	55.78	1.23	57.42	1.23	NS

SD, standard deviation; NS, not statistically significant, P > 0.05.

Table 3Distribution by gender of the patients in groups 2aand 2b.

	Girls		Boys		Total	
	n	%	n	%	n	%
Group 2a	7	87.5	1	12.5	8	100
Group 2b	14	70	6	30	20	100
Total	21		7		28	

Chi square = 2.72; P > 0.05.

subgroup scores (Table 4) for groups 2a and 2b were compared, no statistical differences were found (P > 0.05). At the end of the third 2 month period, five of the unco-operative patients had begun to use their headgear, while 15 of them still did not use their headgear as recommended (group 2c). Group 1 also used their headgear in the second and third 2 month treatment periods. Significant differences were observed in the use of the headgear between groups 1 and 2c (P < 0.001). However, when age, gender (Table 5), and CBCL subgroup scores for groups 1 and 2c (Table 6) were compared there was no statistically significant difference (P > 0.05).

Discussion

The CBCL is a measure of behaviour problems with comparable data and was used in this study to standardize the psycho-social characteristics of the patients. It is a widely used measure and high scores have been obtained from validity and confidence studies (Biederman *et al.*, 1995; Erol and Şimşek, 1998; Hayman-Abello *et al.*, 2003; Dutra *et al.*, 2004).

Table 4Comparison of the competence and problem scoresbetween groups 2a and 2b.

	Group 2a		Group 2b		
	Mean	SD	Mean	SD	Р
Total competence	47.12	7.67	44.90	1.42	NS
Efficiency	42.37	2.98	43.55	1.61	NS
Social	43.50	1.79	46.70	1.65	NS
School	49.87	7.10	47.00	1.45	NS
Total problems	47.37	2.20	54.00	1.99	NS
Internalizing problems	53.50	2.32	56.90	1.75	NS
Withdrawn	56.12	2.50	56.50	1.96	NS
Somatic complaints	55.12	1.72	54.70	1.23	NS
Anxious/depressed	57.87	2.18	58.60	1.29	NS
Externalizing problems	57.12	2.37	56.50	1.70	NS
Delinquent	52.62	1.51	54.45	1.25	NS
Aggressive	51.12	0.85	55.65	1.52	NS
Social problem	54.75	1.97	56.20	1.59	NS
Thought problem	53.62	1.97	57.75	1.62	NS
Attention problem	56.12	2.25	57.95	1.48	NS

SD, standard deviation; NS, not statistically significant, P > 0.05.

Table 5Distribution by gender of the patients in groups 1and 2c.

	Girls		Boys		Total	
	n	%	n	%	n	%
Group 1 Group 2c Total	13 9 22	56.5 60 57.9	10 6 16	43.5 40 42.1	23 15 38	100 100 100

Chi square = 0.03; *P* > 0.05.

In the present study, age and gender were evaluated separately, but neither of them seemed to have an impact on headgear compliance. This is in agreement with the findings of Crawford (1972), McDonald (1973), and Nanda and Kierl (1992).

Similarly, no significant correlation was found between the variables obtained from the CBCL and headgear compliance. The characteristics under the scope of the scale seem insufficient to explain compliance. The patients who showed similar behaviour demonstrated complex and interactive reactions instead of monotonous and standard attitudes. This fact raises difficulty in the estimation of an individual's behaviour. The results of many studies (Stricker, 1970; Crawford, 1972; Grewe and Hermanson, 1973; McDonald, 1973; El Mangoury, 1981; Jones and Richmond, 1985; Oliver and Knappman, 1985; Cucalon and Smith, 1990; Nanda and Kierl, 1992; Tedesco *et al.*, 1992; Güray *et al.*, 1994) are congruent with these conclusions.

Even though previous studies (Allan and Hodgson, 1968; Crawford, 1972; Starnbach and Kaplan, 1975; Dorsey and

Group 1 Group 2 SD Р SDMean Mean 44.95 1.55 45.73 1.61 NS Total competence Efficiency 43.08 1.86 45.26 1.73 NS 47.13 Social 46.43 1.37 1.67 NS 48 52 1 10 46.26 1 55 NS School Total problems 49.86 2.03 53.53 2.52 NS 1.92 56.40 2.29 NS Internalizing problems 53.82 Withdrawn 55.08 1.22 57.40 2.58 NS Somatic complaints 56.39 1.56 55.73 1.53 NS 1.30 58.26 1.39 NS Anxious/depressed 56.86 2.88 56.73 1.99 Externalizing problems 51.86 NS 52.60 1.11 54 60 1.62 NS Delinquent Aggressive 54.43 1.28 55.53 1.89 NS Social problem 53.26 1.09 56.60 1.91 NS Thought problem 56.65 1 23 57.00 1.94 NS 1.23 1.90 Attention problem 55.78 58.13 NS

 Table 6
 Comparison of the competence and problem scores between groups 1 and 2c.

SD, standard deviation; NS, not statistically significant, P > 0.05.

Korabik, 1977; Swetlik, 1978; Clemmer and Hayes, 1979; El Mangoury, 1981; Cucalon and Smith, 1990; Egolf *et al.*, 1990; Güray *et al.*, 1994) indicate that co-operation is influenced by basic factors such as age, gender, psychosocial, socio-cultural and socio-economic factors There is marked individual variation.

Although the patient's opinion about the necessity for treatment is important for co-operation, it is also essential to analyse the patient's defence mechanisms, such as denial and rejection. Besides constructed scales, patient defences and characteristics should be investigated in future studies.

Human behaviour is open to complex and multifactorial influences (Nanda and Kierl, 1992; Güray *et al.*, 1994; Bos *et al.*, 2003). To say which parameter is more influential, even to predict, is quite difficult. In order to clarify these influences, larger numbers are required in the studies.

Conclusions

The evaluation of the results of this study reveals that the competence areas and behaviour problems of patients are alone insufficient to predict headgear compliance.

Address for correspondence

Cenk Doruk Cumhuriyet Üniversitesi Dişhekimliği Fakültesi Ortodonti AD Sivas 58140 Turkey E-mail: cdoruk@cumhuriyet.edu.tr

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