Current self-related cognitions in adolescents with orthodontic treatment

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Abstract. Objectives: The aim of this study was to evaluate at different stages of the orthodontic treatment, the global level of patients' current thoughts, but also separately the physical aspect, social perception and performances by using a specific program of improving patients' current thoughts. Material and method: The study consisted of three steps (T1 test phase, T2 and T3 retest phases). T1 test phase was carried out during the first consultation, T2 phase after 4-5 sessions and T3 phase at the end of the active treatment, at the session the orthodontic appliance was removed. The study group consisted of 90 adolescents, age 12 to 18, average age 14.64 and standard deviation 1.61. Gender repartition was 38 male patients (42.2%) and 52 female patients (57.8%). The sample was also randomly divided into 3 equal groups: control group, study group no.1 and study group no.2. Study group no.1 consisted of patients to whom we applied verbal techniques, while study group no.2 consisted of patients to whom we applied visual techniques. During the first consultation, in T1 test phase patients were asked to answer Heatherton & Polivy Current Thoughts Scale - CTS. During T2 first retest phase, patients had to complete the same questionnaire that was applied during the session of setting the fixed orthodontic appliance. In phase T3, at the end of the active treatment, all patients completed the CTS. Results: Patients treated using verbal techniques presented an improvement of current thoughts related to physical aspect in both genders (p<0.05). Patients from study group no.2 showed an increased frequency of current self-related thoughts and current thoughts related to physical aspect (p<0.05) in both genders. Girls from this group presented a significant increase of current thoughts related to their social perception when wearing the orthodontic appliance (p<0.05), while boys showed more concern about their performances. At the end of the orthodontic treatment, regardless of group or gender, current self-related thoughts, appreciation of physical aspect, social self-esteem and personal performances were considerable improved (p<0.001). Conclusion: The effectivenesss of the verbal techniques and visual techniques used by us is revealed by the patients' psychological reevaluation, during treatment as well as at the end of the treatment.

Key Words: orthodontic treatment, current self-related thoughts, physical aspect, social self-esteem, performances.

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Introduction

Inevitably, orthodontic patients react on a psychological level. The orthodontist, often preoccupied by the patient's medical aspect, tends to overlook the affective, motivational, attitudinal and social aspect. In most cases, dental-maxillary anomalies generate psychological discomfort; therefore diagnosis investigations should be completed with psychological ones in order to increase the patient's quality of life.

The dual doctor-patient relationship is marked by psychological elements. Since most orthodontic patients are children and adolescents, each of them with their own individuality and emotional reactions due to their still developing personality and to the very presence of their malocclusions, the orthodontist must meet the patient's medical and psychological needs in order to improve and to prevent adapting disorder that might occur.

It is highly recommended that orthodontists develop their interpersonal abilities and these orthodontic techniques should be performed in an emphatic, warm and honest manner, accepting unconditionally the patient's condition, thoughts or feelings.

Unconditioned acceptance means that each human being might be wrong or act in opposition with the doctor's interests. The orthodontist should not be influenced by the patient's condition, thoughts or feelings (Marian et al 2006).

Orthodontists with psychological preoccupations and interests had taken into consideration patients' personality characteristics, patients' relation with family, peers and doctor-patient relationship, demographic factors, performances in school, and used all these elements to predict patient's management and compliance in orthodontic practice (Tung and Kiyak 1998; Albino et al 1991; Sergl et al 1992; Peterson and Kuipers 1997; Nanda and Kierl 1992; Richter et al 1996; Mehra 1996; Jay 1997; Sergl et al 1998).

Our study evaluates at different stages of the orthodontic treatment, at the beginning of the treatment, during the treatment and at the end of the treatment, the global level of patients' current thoughts, but also separately the physical aspect, social perception and performances. By using verbal and visual techniques from the first treatment sessions, we have applied

specific psychological interventions within a program of improving patients' current thoughts.

In this study, we used specific methods like verbal and visual techniques that were conceived to help the patients and their parents to take the right decision concerning orthodontic treatment and increase self-confidence and confidence in the treatment's outcome.

Material and method

The study consisted of three steps (T1 test phase, T2 and T3 retest phases). T1 test phase was carried out during the first consultation, T2 phase after 4-5 sessions that were absolutely required for the patient's evaluation, setting the orthodontic diagnosis and the treatment plan, and T3 phase, at the end of the active treatment, at the session when the orthodontic appliance was removed.

The study group consisted of 90 adolescents, aged 12 to 18, average age 14.64 and standard deviation 1.61. Gender repartition was 38 male patients (42.2%) and 52 female patients (57.8%). The sample was also randomly divided into three equal groups, each consisting of 30 subjects: control group, study group no.1 and study group no.2. Study group no.1 consisted of patients treated using verbal techniques, while study group no.2 consisted of patients treated using visual techniques. From the ethical point of view, a written informed consent for the study was obtained for each patient.

Verbal techniques include the entire amount of information that the patient needs to know starting with the first sessions. This information refers to the orthodontic treatment, to the type of the orthodontic appliance recommended at the beginning of the treatment and the association of other types of appliances recommended during treatment, to the therapeutic alternatives, to details concerning the duration and main therapy stages, to benefits and risks, to risks of early ending of treatment, to the importance and role of connected interventions such as: oral surgery (extractions for orthodontic reasons, frenectomy, frenoplasty, orthognatic surgery, temporary anchorage implants, periodontology, ENT, endocrinology etc). Orthodontists shall always use a proper language when addressing the patients, according to patients and parents' education. It is highly recommended to repeat this information for at least 2 sessions regardless of their compliance with the treatment.

In addition, visual techniques complete verbal techniques with images allowing patients to see the orthodontic appliances: removable or fixed ones or to see patients with similar malocclusions at the beginning and at the end of the orthodontic treatment. We preferred digital images because of their superiority to classical pictures, including: rapid production of clichés, image quality amelioration and multiple possibilities of composing, facilities of editing and storing, easy communication with patients after viewing images of similar cases of malocclusions (Palomo JM, 2004). For this purpose we used ACDSee and Corel PHOTO-PAINT 12.

During the first consultation, in T1 test phase patients were asked to answer Heatherton & Polivy Current Thoughts Scale - CTS. In T2 first retest phase, patients had to complete the same questionnaire during the session of setting the fixed orthodontic appliance.

Current Thoughts Scale (CTS) was developed by Heatherton T. and Polivy J. in 1991 based on Rosenberg Self-Esteem Scale

(1958) and Feelings of Inadequacy Scale developed by Janis and Field in 1959. Current Thoughts Scale includes 20 items (e.g. I'm not content with myself; I feel unattractive). The psychometric analysis reveals that it contains three main correlation factors, such as: self-esteem related to performances, social self-esteem and self-esteem related to physical aspect. Each of these three main factors is evaluated by several items. There are five types of answers for each item: 1 = none (not a bit) up to 5 = extremely. The internal consistency grade is high, the alfa coefficient being 0.92 (Heatherton et al 1991).

Some items were adapted according to the specific requirements of this particular research. Thus, we considered the dental aspect as the main feature of the physical aspect, and the presence of the malocclusion and orthodontic appliance were correlated to social perception and performances aspects.

During the first consultation, patients and their parents received information on the type of their anomaly, the recommended orthodontic appliance, the duration and main stages of the treatment, the frequency of sessions, treatment associated costs, the need for some preliminary stomatological and/or surgery interventions or of some interventions associated to the orthodontic treatment, and the necessity of some ENT, pediatric, endocrinologic or other type of investigations. Afterwards, we applied T1 phase of the study – filling in the CTS questionnaire.

The following sessions were differentiated according to the three study groups. Patients from the first group – control group – received any information about the treatment. The second group – study group no.1 – treated with verbal techniques, received, in addition to general knowledge about the orthodontic treatment, information about similar cases with favorable outcome. To the patients from the third group - study group no.2 – we presented images (pictures or videos) of patients with similar malocclusions that were completed with verbal explanations.

The phase T2 of the research was performed during the setting of the orthodontic appliance and it consisted of the patients' psychological reevaluation using the same questionnaire.

In the phase T3, at the end of the active treatment, all patients filled in the CTS. At this point, the number of patients was reduced to 86, as 4 patients abandoned the treatment. The study groups consisting of adolescents had their advantages from the verbal and visual techniques applied during the active phase of the treatment.

Under these circumstances, we created models of psychological approach of patients during early treatment sessions, from the first appointment until the setting of the appliance. These algorithms of psychological intervention were individualized according to each patient.

The data were processed with 15.0 SPSS for Windows. The analysis of the means differences for each group was obtained with Student Test (t).

Results

The results related to the three adolescents' groups according to the average age, standard deviation (SD) and gender repartition, separately for each group (see Table 1).

The next tables reveal for each group of adolescents the differences between test phase (at the time T1) and retest phase (at the time T2) for the following variables: global self-related cognitions (current thoughts – Ct) and then, separately, for the three subscales: physical aspect – Pa, social perception – Sp, and performances - Pf.

Table 1. Distribution of groups according to age and gender in adolescents' sample

Adolescents semple	No. of Subjects	Average age	SD	Gender			
				Male	Female	Male %	Female %
Control group	30	14.66	1.84	13	17	43.3%	56.7%
Study group no.1	30	14.66	1.42	12	18	40%	60%
Study group no.2	30	14.6	1.61	13	17	43.3%	56.7%

Table 2. Mean values of the variables investigated during phase T1 and T2 in female and male subjects from the control group

Variable	Phase	Male				Female			
		Mean	SD	T	p	Mean	SD	t	P
Ct	T_1	53.61	5.89	-2.115	0.056	53.58	8.8	-0.791	0.44
	T_2	55.53	4.01			54.52	6.45		
Pa	T_1	14.23	2.97	-1.336	0.206	13.94	3.15	-0.891	0.386
	T_2	14.84	2.07			14.35	2.78		
Sp	T_1	16.84	2.51	-1.215	0.248	16.94	3.36	-0.879	0.393
	T_2	17.69	2.01			17.64	2.28		
Pf	T_1	22.53	2.6	-1	0.337	22.7	3.63	0.306	0.764
	T_2	23	1.58			22.52	3.22		

Table 3. Mean values of variables investigated in phase T1 and T2 in male and female subjects from study group no.1

Variable	Phase	Male				Female			
		Mean	SD	T	p	Mean	SD	T	P
Ct	T_1	54.33	10.68	-2.165	0.053	55.72	9.03	-2.031	0.058
	T_2	58.66	5.38			58.05	6.9		
Pa	T_1	14.5	3.11	-2.569	0.026	14.61	3.38	-2.149	0.046
	T_2	16	2.33			15.72	2.27		
Sp	T_1	17.66	4.11	-1.663	0.125	16.83	4	-1.054	0.307
	T_2	19.41	2.31			17.55	3.58		
Pf	T_1	22.16	4.34	-1.458	0.173	24.27	3.84	-1.073	0.298
	T_2	23.25	2.89			24.77	3.07		

Table 4. Mean values of variables investigated in phase T1 and T2 in male and female subjects from study group no. 2

Variable	Phase	Male				Female			
		Mean	SD	T	p	Mean	SD	T	P
Ct	T_1	53.84	11.35	-2.99	0.011	55.05	9.31	-2.285	0.036
	T_2	58.07	8.86			58.29	4.93		
Pa	T_1	13.92	3.88	-3.026	0.011	13.52	3.31	-2.472	0.025
	T_2	16.38	2.06			15	1.54		
Sp	T_1	18.38	4.01	-0.697	0.499	17.94	3.57	-2.742	0.014
	T_2	18.92	3.52			19.41	2.37		
Pf	T_1	21.53	5.54	-2.086	0.059	23.58	3.84	-0.491	0.63
	T_2	22.76	4.74			23.88	2.68		

Table 5. Distribution of groups according to age and gender in the adolescent sample in phase T3 and abandonment rate

| Adolescent sample | No. of subjects | Average age | SD | Gender | | | | Abandonment rate |
				Male	Female	Male %	Female %	
Control group	27	14.77	1.82	11	16	40.7%	59.3%	3	10%
Study group no.1	30	14.66	1.42	12	18	40%	60%	0	0%
Study group no.2	29	14.58	1.63	13	16	44.8%	55.2%	1	3.33%

Table 6. Mean values of all 4 variables in phases T1 and T3 in male and female subjects from the control group

| Variable | Phase | Male | | | | Female | | | |
		Mean	SD	T	p	Mean	SD	T	p
Ct	T_1	54.18	6.27	-24.943	0	52.31	7.29	-24.448	0
	T_3	85.27	3.71			85.37	3.93		
Pa	T_1	14.18	3.18	-21.038	0	13.5	2.65	-20.706	0
	T_3	25.9	2.62			26.25	1.39		
Sp	T_1	17.09	2.58	-21.426	0	16.62	3.2	-22.16	0
	T_3	30.27	1.1			30.56	1.41		
Pf	T_1	22.9	2.66	-9.815	0	22.18	3.03	-12.568	0
	T_3	29.09	1.3			28.56	1.86		

Table 7. Mean values of all 4 variables in phases T1 and T3 in male and female subjects from study group no.1

| Variable | Phase | Male | | | | Female | | | |
		Mean	SD	T	p	Mean	SD	T	p
Ct	T_1	54.33	10.68	-14.365	0	55.72	9.03	-17.066	0
	T_3	84.41	4.46			83.77	5.44		
Pa	T_1	14.5	3.11	-17.509	0	14.61	3.38	-17.23	0
	T_3	26.5	1.67			25.05	2.01		
Sp	T_1	17.66	4.11	-14.881	0	16.83	4	-15.292	0
	T_3	30	1.8			30.33	2		
Pf	T_1	22.16	4.34	-6.878	0	24.27	3.84	-6.684	0
	T_3	27.91	2.15			28.38	2.19		

Table 8. Mean values of all 4 variables in phases T1 and T3 in male and female subjects from study group no. 2

| Variable | Phase | Male | | | | Female | | | |
		Mean	SD	T	p	Mean	SD	T	p
Ct	T_1	53.84	11.35	-17.743	0	55.56	9.38	-19.447	0
	T_3	83.84	7.65			85	4.64		
Pa	T_1	13.92	3.88	-18.37	0	13.62	3.4	-17.35	0
	T_3	25.15	2.51			25.25	1.98		
Sp	T_1	18.38	4.01	-14.672	0	17.93	3.69	-23.164	0
	T_3	30.23	2.52			30.12	2.02		
Pf	T_1	21.53	5.54	-7.444	0	24	3.55	-9.41	0
	T_3	28.46	3.12			29.62	1.89		

The next step of the research was made at the end of the active treatment (T3) and at the beginning of the retainer setting phase. The fixed appliance was removed and the retainer was bonded. The psychological evaluation instrument CTS was used after the removal of the appliance.

There were 4 cases (4.44%) of patients who abandoned the therapy, 3 from the control group and 1 from study group no.2 (table 5). The remaining number of patients in T2 was 86, average age 14.67, standard deviation 1.61, 36 male subjects (41.9%) and 50 female subjects (58.1%).

The differences between phase T1 and T3 for the variables investigated in the 3 groups of adolescents are displayed in the following tables. Student Test t was applied to analyze and compare the results.

The following charts highlight the evolution of the psychological variables throughout the orthodontic treatment according to each study group and gender.
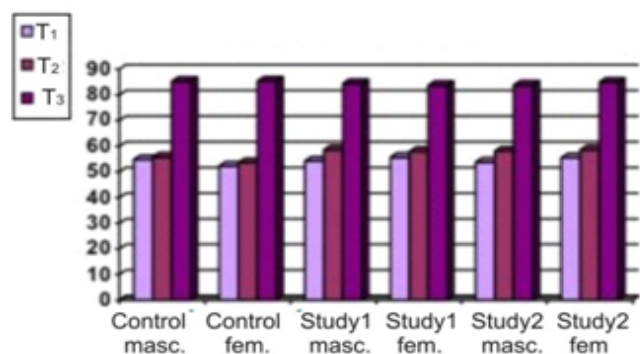
Figure 1. Current self-related thoughts variable in all 3 phases (T1, T2 and T3) in adolescents from all study groups
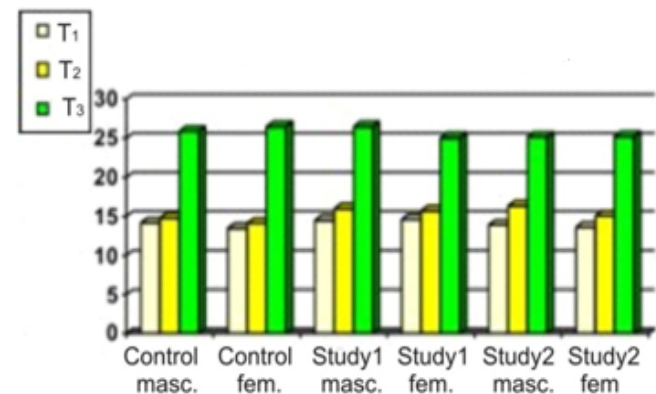
Figure 2. Physical aspect variable in all 3 phases (T1, T2 and T3) in adolescents from all study groups
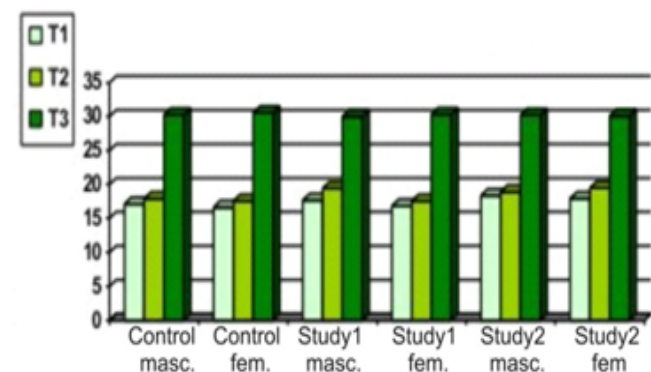

Figure 3. Social perception variable in all 3 phases (T1, T2 and T3) in adolescents from all study groups
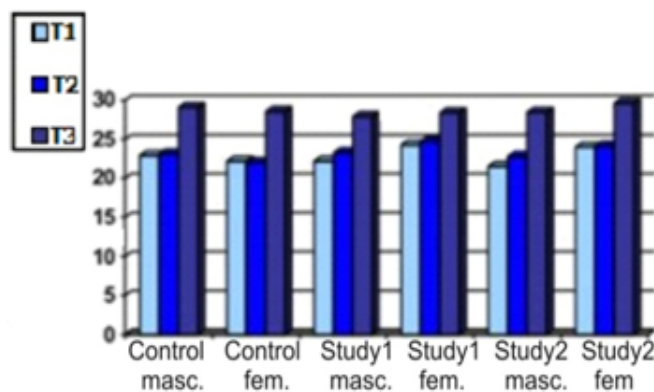

Figure 4. Performance variable in all 3 phases (T1, T2 and T3) in adolescents from all study groups

Discussions

Different verbal and visual techniques to analyze the global level of patients' current self-related thoughts, but also separately the physical aspect, social perception and performances by using a specific program of improving patients' current thoughts have been scarcely used in the current orthodontic literature. Researchers focused more on specific orthodontic mechanisms or molecular aspects of tooth movement, neglecting the patient's attitude and thoughts related to the therapy. This study brings relevant data about this topic. To our knowledge there aren't any data about this topic in the literature performed by another authors with application in orthodontics.

Analyzing the data from the Table 2 in phase T2 resulted in to a slight tendency of increase of current self-related thoughts frequency in boys from the control group ($p \sim 0.056$).

The results highlight data about the self-related thoughts, psychological aspects and social perception in the study groups at different time points.

An increasing tendency of current self-related thoughts frequency in boys ($p \sim 0.053$) and in girls ($p \sim 0.058$) from the study group no.1, in phase T2 was noticed, according to the Table 3. In addition, these patients treated with verbal techniques presented an improvement of currents thoughts related to physical aspect ($p < 0.05$).

Table 4 showed an increased frequency of current self-related thoughts and current thoughts related to physical aspect ($p < 0.05$) in both genders from study group no.2. Girls from this group presented a significant increase of current thoughts related to their social perception when wearing the orthodontic appliance ($p < 0.05$), while boys showed more concern about their performances ($p < 0.05$).

Results from tables 6, 7 and 8 confirmed that at the end of the orthodontic treatment, regardless of group or gender, current self-related thoughts, appreciation of physical aspect, social self-esteem and personal performances improved statistically significant ($p < 0.001$). The abandonment of 4 patients was not statistically significant, as 3 of them belonged to the control group, and only 1 patient was included in a study group.

Charts 1 to 4 displayed an important increase of all variables studied during phases T2 and T3 (see Figure 1- 4). In the control group, there were minimum differences between all the variables in phases T1 and T2.

Values of the physical aspect ranged between 6 and 30. At the beginning of the treatment, the values of the physical aspect subscale were low in all patients (see Figure 2), with means from 10 to 15 points. In phase T2, the values remained the same in the control groups and registered a slight increase in patients treated with verbal and visual techniques especially. Results in phase T3 showed an important improvement of means of over 25 points. In comparison to the other subscales, the physical aspect variable registered the most significant changes in phase T3. In fact, the dental aspect did not improved between phases T1 and T2, but as a result of the visual and verbal techniques applied, we contributed to the amelioration of these patients' physiognomic aspect.

Regarding to social perception subscale, the mean resulted from filling in the questionnaire may vary from 7 to 35. In the phase T1, a mean of 15 to 20 was recorded in all patients (see Figure 3). There was a minimal increase of social self-esteem in control group in the phase T3, while in the study groups this variable presented a slight improvement. In this phase, the increases were much more significant, respectively of 30 points mainly because of the improvement of facial aesthetics at the end of treatment. The increase of social self-esteem in T2 in adolescents from the study groups may be interpreted as a consequence of the correction of their malocclusions.

In the case of the performances subscale, there is a mean of 7 to 35 points. In the phase T1, the mean varied around 20 points in all patients (see Figure 4), while in T2 the variable slightly increased in patients from the study groups, especially in boys. We considered that boys became more aware of the improvement of their quality of life due to verbal and visual techniques. There was a mean of 20 to 30 points in the phase T3.

Total score of current thoughts may vary between 20 and 100 points. In the phase T1 the mean was around 50, while in T2 the values remained the same as in first phase for patients from the control group. Instead of this, in the study groups the values slightly increased because of the psychological support. The most significant increases in the phase T2 appeared in patients treated using visual techniques. In the phase T3 the mean is 80 points (see Figure 1). The increased results for the 3 scales (physical aspect, social perception and performances) at the end of the treatment represented the outcome of the improvement of facial aesthetics.

In the last decade we have had similar concerns related to the psychological approach of orthodontic patients and published the results of a preliminary study, but on a smaller patient sample. In that study we analyzed several psychological variables such as the perception of stress and anxiety, but unlike the current study, that research included only one retest phase, T2 (Vaida and Cocarla 2008). Regarding the questionnaire CTS, the results were similar to those obtained in the T2 phase in the present study, except that the current research showed a statistically significant improvement of current self-related thoughts frequency in both sexes in T2 phase, and also, an improvement in performance variable in boys that we applied visual techniques to in the T2 phase.

There are some researchers who applied different visual techniques to patients, e.g. Hamdan A. They used in their study a set of 10 pictures with frontal occlusion of patients with different types of malocclusions in order to evaluate the patients'

expectances related to dental aspect and need for treatment. Patients were asked to rank the pictures according to the dental aesthetics and to choose the cases they considered that might require orthodontic treatment. The subjects in these studies were of different ages and gender. Differences in the way patients displayed these pictures were not significant. The results were valued according to IOTN index (Hunt et al 2002; Hamdan 2004; Mandall et al 1999). In comparison with the aforementioned study, the visual instruments were used as well, not only photos but also videos, that we consider more relevant together with verbal instruments, thus making a difference in the quantity of information provided to the patients. Furthermore they were evaluated using not a specific orthodontic tool IOTN index, but the Current Thoughts Scale Questionnaire, identifying their global level of current thoughts, as well as separately the physical aspect, social perception and performances. This opens new horizons for a modern and correct approach of an orthodontic patient.

Other studies investigating the patients' appreciation concerning different types of malocclusions using the pictures showed that females have higher claims regarding dental aesthetics (Mandall et al 1999; Pietilä and Pietilä 1996). In our study, the physical aspects related to gender showed a large degree of variation, in different stages of treatment.

Many studies have investigated the impact of orthodontic treatment on psychological variables such as self-esteem, but until now there isn't clear evidence that an orthodontic treatment improves patients' self-esteem (Shaw et al 2007; Kiyak 2008). Penacoba et al (2014) showed that orthodontic patients' self-esteem is a significant predictor variable of affective balance using the Positive and Negative Affect Scale. Another study has found a significant relationship between self-esteem and oral health-related quality of life in old children (De Baets et al 2012). The efficiency of the verbal techniques and visual techniques used by us is revealed by the patients' psychological reevaluation, during treatment as well as at the end of the treatment. In our study, we have noticed an improvement of the level of current self-related thoughts under the influence of the orthodontic treatment.

Conclusions

The experimental model proposed by us provides a much better collaboration with patients and ensure doctors with more comfort, the success of the orthodontic treatment being thus assured by the combination between a proper specialized treatment and a proper psychological approach of the patients. This brand new information emerging from the field of psychology, should be brought to the attention of the orthodontic world, in order to raise the level of competence and professionalism. However, this preliminary data should be followed by further studies. In our opinion, this technique is modern and should be followed by further studies with an increased number of patients for a solid scientific validation.

Contribution Note

All the authors equally contributed to the drawing up of the present paper.

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