



## Dysmorphic level and impact of Dental aesthetics among adolescents

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### ABSTRACT

*The aim of this study was to verify the relationship between the dysmorphic level and the psychosocial impact of dental aesthetics among adolescents undergoing orthodontic treatment. 61 subjects, between 12 and 22 years, completed the Psychosocial Impact of Dental Aesthetics (PIDAQ), the Rosenberg's Self esteem Scale and were interviewed with the Body Dysmorphic Disorder Interview (BDDE). The data showed significant correlations between self esteem, self dental confidence (SDC) and dental aesthetics' psychological impact (IP). In addition, items that fulfill specific criteria for the Body Dysmorphic Disorder (BDD) showed significant relationships not only with the psychological (PI) and social impact (SI), but also with the patient's beliefs (PB) relating to the role of dental aesthetics in their lives. The body image of adolescents undergoing orthodontic treatment is moderately negative. Psychological factors involved concern not only the dental self-confidence, but also the overall assessment of self-esteem.*

**Keywords : adolescence, dental aesthetics, Body Dysmorphic Disorder**

### Introduction

The concepts of body shape and body image concern not only how and in what way we perceive our body, but also how and in what way others perceive us. Therefore it concerns what and how much importance is ascribed to, in this example, psychological and social factors of body experience (Lalli, 1997).

The body representation is shaped by perceptions, emotions and physical sensations; it can change according to mood, physical experience, and environment. Since adolescents undergo significant physical changes in their bodies during puberty, they are likely to experience highly dynamic perceptions of body image. The concern for some imaginary defect in their physical appearance, (more often referred to the face) in a person with normal appearance is called, according to the DSM-IV, Body Dysmorphic Disorder (BDD). It occurs between adolescence and early adulthood, and about 2% of these patients resort to visits dermatology, plastic and dental interventions in a continuous, excessive and ineffective way to satisfy them both physically and psychologically. This disorder can move in a continuum that ranges from a minimum to a serious level of severity, from a excessive attention to their physical appearance to a pervasive concern with their appearance. These subjects, depending on the severity of the complaints, appear worried and anxious, may be involved in frequent activities of body checking and care for themselves.

These behaviors may characterize adolescents with a high need for orthodontic treatment. Several studies have found that malocclusion negatively affect the psychosocial impact of the adolescent and his quality of life compared to adolescents who do not need orthodontic treatment (Al-Sarheed *et al.*, 2003).

In this delicate and transitional stage of physical and psychological development to new environmental and psychological structures, some elements of appearance and, more specifically, dental aesthetics have great importance for the adolescent's self-image and self-esteem (de Paula *et al.*, 2009). Malocclusion significantly affects the appearance of the smile, which is a part of notable facial attractiveness and an effective way of expressing emotions. Therefore, the aesthetic impact of malocclusion may have a more or less significant consequence on the adolescent's quality of life, can impair social interaction, interpersonal relationships, and psychological well-being; until producing feelings of inferiority (Broder *et al.*, 2000). The need for orthodontic treatment in adolescence is mainly motivated by personal concerns about appearance and other psychosocial factors, however the perception of dental aesthetics among adolescents seems to be more related to self-concept than the degree of malocclusion (Philips & Beal, 2009). The main reasons to the treatment seems to be: have straight teeth (80%), to prevent future dental problems (69%) and to improve self-confidence (68%). Females mainly

require treatment to improve their smile and self-confidence. The males, however, require treatment to improve their social life (Williams *et al.*, 2005).

The studies reviewed by Rongo *et al.* (2011) found that the majority of adolescents attribute to dental aesthetics a key role in social interactions and in the judgment of others. Among children malocclusions are source of jokes and strong disturbances due to the feeling of diversity, but also among adults, the perception of not having perfect teeth leads to feelings of shame and can lead to shyness and discomfort in social contacts.

Several studies have highlighted the relationship between dental aesthetics and self-esteem, but the results are not always consistent. Kalha (2011) found that fixed orthodontic treatment was negatively associated with self-esteem and quality of life among adolescent patients. Taghavi *et al.* have shown that this negative correlation does not depend only from a visible malposition of teeth, but can also be influenced by aesthetic standards proposed by media. Adolescents with malocclusion are often reminded of their condition, which can lead to avoiding strategies to minimize the negative feelings associated with the teeth and low self-esteem.

Feu *et al.* (2012), however, in a longitudinal study showed that adolescents aged 12 to 15 years undergoing fixed orthodontic treatment, at different times of measurement, have significantly improved their self-perception of aesthetics. Seehra *et al.* (2012) reported that orthodontic treatment not only did not have negative effects on self-esteem, but it was therapeutic for teens bullied because of malocclusion, given the considerable decrease in functional limitations and social and emotional impact.

Hepburn & Cunningham (2006), have tried to evaluate the *dismorphophobic* appearance in orthodontic patients. They found a small percentage of this disorder in a sample of 40 adult patients diagnosing 2 subjects of the general public (2.86%) and 3 patients referred to private practice (7.5%). Also Yamazaki *et al.* (2010) found that the prevalence of BDD in orthodontic patients were of 7.31%, significantly higher not only in comparison to general population, but also to dental patients (1,28%).

Many studies (De Jongh *et al.*, 2009; Crerand *et al.*, 2006) showed how patients suffering of Body Dysmorphic Disorder (BDD) tend more easily both to require orthodontic treatments and to be dissatisfied about their most recent treatment. Therefore orthodontists should be alert for patients extremely concerned about insignificant or negligible dental flaws or defects, reporting multiple requests for orthodontic treatment or seeking evaluations with several professionals: in case of suspicions of BDD it is essential to avoid aesthetic or orthodontic treatment, unless it is really necessary (Hepburn, S., & Cunningham, 2006). Orthodontic and, in general, cosmetic treatment typically does not improve the appearance concerns of individuals with body dysmorphic disorder and, in some cases, may even exacerbate symptoms (Crerand *et al.*, 2006). It follows that the psychological assessment of persons requiring orthognatic surgery is an important part of the overall assessment and is important both to support patients that really require treatments and to identify patients with BDD (Juggins *et al.*, 2006; Cunningham & Feinmann 1998).

Juggins *et al.* (2006) have pointed out that important aspects of orthodontic patients such us changes in the body image, psychosocial outcomes as well as the risk factors that influence patients satisfaction are still little explored, despite the need to identify these aspects from the point of view of both orthodontists and mental health. For these reasons, this study aims to evaluate the relationship between body image and psychosocial impact of dental aesthetics in adolescents.

## Method

### Participants

Sixty-one adolescents, aged between 12 and 22 years (M =

15.7 + 2.8) including 25 males (41%) and 36 females (59%) participated to the study. All subjects was undergoing orthodontic treatment (min. 0, max. 60 months: M = 21.6 + 13.6) at the Clinic of Orthodontics and Dentistry of the "G. Martino" University Hospital of Messina.

The majority of subjects came from the city center (37.5%) or the province (29.5%) while a smaller percentage came from the suburbs (16.5%) or other provinces (16.5%). The socio-cultural level was medium - low, as one of the reasons of pointing to the clinic was the considerable reduction in costs, compared to private orthodontic treatment. As for the level of education among the respondents (65.6%) had middle school certificate, 16.4% high school diploma and 18% primary school certificate.

This study was approved by the Ethics Committee of the University Hospital of Messina. Each subject was informed in advance about the contents and purpose of the research. As for the severity of dental malocclusion assessment were collected data based on four parameters: (1) Crooked teeth (Analysis of crowding), (2) Spaced teeth (Space analysis), (3) Mandibular protrusion (Cephalometric analysis), (4) Dentist indication (Overall rating of gravity) on a scale from 0 (not at all) to 4 (very severe) for each individual case. Each year the waiting list for orthodontic treatment is, on average, of about 70 patients, of which about 30 are taken into care. In order to have a fair balancing, the sample was divided in three groups of about 20 subjects, according the treatment duration (less than a year, from one to two years, more than two years) and so were interviewed 65% of subjects eligible for the study.

### Measures

The assessment was conducted using three instruments: the Body Dysmorphic Disorder Examination (BDDE # 767) by Rosen & Reiter (1994), for the evaluation of dysmorphic level; the Psychosocial Impact Of Dental Aesthetics Questionnaire (PIDAQ) by Klages *et al.* (2006) for the evaluation of dental aesthetics; the Rosenberg's Self-esteem Scale (RSES, 1965) for the assessment of self-esteem.

The scale consists of a semistructured interview, a *score sheet* on which the clinical records the scores and a sheet for the patient, in which are shown the anchor points related to the score of each item, in order to enable the subject to discuss its response with the interviewer. The overall rating of gravity, between 0 and 168, derives from the sum of 28 items (all except the items 1, 2, 3, 22, 33 and 34) and represents an index of gravity, not specific for body dysmorphic disorder, but also used in other diseases characterized by a distorted view of body image, as a measure of the severity of the negative view of the body and its changes during treatment (Conti, 1999). The score of some item must reach a certain cutoff to meet the diagnostic criteria for Body Dysmorphic Disorder: for example, to satisfy the A criterion ("Preoccupation with an imagined defect in appearance"), the patient must reach the score cutoff (> 4) in five items: 2, 9, 10/11, 18, 19. In the same way to satisfy criterion B ("The preoccupation causes clinically significant distress or impairment in social, occupational, or other important aspects of functioning ") the patient must reach the cutoff score (> 4) in the items: 9, 10/11, 13 or in the items 23, 24, 25, 26, while for criterion C ("The preoccupation is not better accounted for by another mental disorder ") the item 34 must be equal to 0.

The RSES (Rosenberg, 1965) is a brief global self-esteem measure, which includes cognitive and affective components. This scale consists of 10 statements related to overall feelings of self-worth or self-acceptance. Although several studies have reported the presence of a single dimension, defined as "self-confidence" (Positive Items: 1, 3, 4, 7, 10), other studies have identified another factor, "self deprecation" (Negative Items: 2, 5, 6, 8, 9) (Owens, 1994). The responses to the items of the RSES are given on a 4-point scale, ranging from "strongly agree" to "strongly disagree". The score can vary from 0 to 30: the higher the score, the higher the level of glob-

al self-esteem of the subject (Crandall, 1973; Silber & Tippet, 1965). The values must be assigned as follows: for items 1, 3, 4, 7, 10: strongly agree = 3; agree = 2; disagree = 1; strongly disagree = 0. For the items 2, 5, 6, 8, 9: completely true = 0; agree = 1; disagree = 2; strongly disagree = 3.

The PIDAQ is a 28 items questionnaire, developed by Klages & al. (1996), assessing dental aesthetics psychosocial impact. It is composed of 4 subscales: *Dental self confidence (DSC)*; *Social Impact (SI)*; *Psychological Impact (PI)*; *Aesthetic concerns (AC)*.

In the present study we used a version that also includes the Patients Beliefs scale (PB), conceived by Gazit Rappaport (2010). This final version requires the patient to assess on a 5-point Likert scale (0 = not at all, 1 = a little, 2 = somewhat, 3 = strongly, 4 = very strongly) how much he identifies with the statements proposed.

**Results**

Data were analyzed using the software Statistical Package for Social Sciences (SPSS 0:17).

The interview on body dysmorphic disorder (BDDE) allowed us to investigate the body image quality among adolescents. Only 22% of respondents said they did not have any physical defect that causes discomfort, worry or pain while 78% of them contained at least a physical defect. More specifically 32% of these adolescents (N = 21) identifies the defect in the mouth, the braces and / or the teeth, while the remaining 45% identified such defect in another part of the body such as the nose (14%) or the weight (9%). Figure 1 shows the location of the defect based on the gender of adolescents undergoing orthodontic treatment. Subjects who identified their defect in the teeth (M = 22.5 ± 14.3) obtained similar results to BDDE to persons who have identified the defect in another part of the body (M = 22.7 ± 17.0). In the same way there were no significant differences related to gender, age or treatment duration.

**Figure 1 - Location of the physical defect among adolescents undergoing orthodontic treatment**



Besides we investigated the presence, in our sample, of Body Dysmorphic Disorder (BDD): we identified six cases analyzing the items that indicate the presence of the diagnostic criteria for BDD (M = 45.0 + 20.2). These individuals show a significantly lower level of self-esteem [t (58) = 3.28, p < .001] and a social impact (SI) related to dental esthetics significantly higher [t (48) = -2.24, p < .05] than the rest of the sample.

The second psychological aspect we investigated concerns the global self-esteem among adolescents undergoing or-

thodontic treatment. The scale used (RSES) ranges from 0 to 30. Scores between 15 and 25 are within normal range, scores below 15 suggest low self esteem. The interviewees were found to score at the lower limits of normal (M = 17.2 + 4.2). However 18% of them showed a level of self-esteem significantly below normal. It's necessary to underline that there were significant gender differences: females show a significantly lower level of self-esteem than males [t (58) = -2.12, p < .05], and this is especially true for the relative size of Self depreciation, the sum of the negative items [t (58) = 2.63, p < .001]. On the contrary didn't emerge any difference related to age or treatment duration.

Finally we studied the dental aesthetics dimension. Table 1 shows the descriptive statistics (means, standard deviations and Z scores) obtained from our sample. In each subscale of the dental aesthetics questionnaire emerge some cases that significantly deviate from the norm. The analysis of the outliers has identified 12 subjects who show high scores on the impact of psychosocial attributed to their teeth.

**Table 1 –PIDAQ descriptive statistics**

Descriptive statistics			Z scores	
	M	SD	M	SD
Dental Self Confidence	11,77	4,84	-2,43	1,91
Social Impact	6,64	5,21	-1,27	2,37
Psychological Impact	6,02	4,33	-1,39	2,76
Aesthetic concerns	2,98	2,96	-1,01	3,05
Patient's Believes	8,47	4,12	-2,05	1,82

We also wanted to determine whether the patient's subjective perception of his malocclusion severity was related / or showed differences with the objective dentist evaluation. Table 2 shows the results of this comparison

**Table 2 – Comparison between adolescent's and dentist's evaluation**

	Patient		Dentist		Correlation		Differences	
	M	SD	M	SD	r	p value	t	p value
Crooked teeth	2,21	,61	2,14	1,24	,021	,893	,326	,746
Spaced teeth	1,28	,88	,36	1,37	,060	,690	3,95	,001
Mandibular protrusion	1,18	,83	1,58	1,31	-,204	,178	-1,59	,118
Dentist indication	2,26	,67	2,49	1,29	-,091	,545	-1,04	,301

The data showed that the relationship between the subjective perception (the patient) and objective perception (the dentist) had a very low relationship, close to 0. Furthermore, not only the judgments are not related, but showed also a difference in the analysis of the space (spaced teeth) to which the patient gave a degree of gravity greater than what estimated by the dentist. Once again gender and age did not affect the results. In contrast, significant differences are detected based on the duration of treatment. Table 3 showed the results of this comparison. The subjects wearing the braces from less than a year, which were therefore in an initial phase of treatment, showed a social and psychological impact as well as aesthetic concerns significantly higher than subjects treated for more than two years. This suggests an habit effect during the time of treatment, and an integration of the braces in their body scheme.

**Table 3 – Dental aesthetics impact during orthodontic treatment**

	< 1 year		> 2 years	
	M	DS	M	DS
Dental Self Confidence	11,06	5,59	12,57	2,79
Social Impact	9,17*	5,86	5,36	4,68
Psychological Impact	7,67*	4,88	4,43	3,15
Aesthetic concerns	3,61*	3,50	1,79	1,71
Patient's Believes	9,44	3,46	7,79	4,64

\*p<.05

Finally, we wanted to study the relationships between all variables: level of body dysmorphism (BDDE), self-esteem (RSES) and dental aesthetics (PIDAQ), in their various sub-components. Table 4 shows the relationships between the items indicating cut-off for body dysmorphic disorder (BDDE), the PIDAQ subscales [Dental self confidence (DSC); Social Impact (SI); Psychological Impact (PI); aesthetics Concern (AC) and Patient's Beliefs (PB)] and self-esteem (Total; Items positive / Self-confidence; Items negative / Self Deprecation).

**Table 4 – Relationships between Body Dysmorphia, Dental aesthetics and Self esteem**

	DSC - Item 2	DSC - Item 3	DSC - Item 4	DSC - Item 5	DSC - Item 6	DSC - Item 7	DSC - Item 8	DSC - Item 9	DSC - Item 10	DSC - Item 11	DSC - Item 12	DSC - Item 13	DSC - Item 14	DSC - Item 15	DSC - Item 16	DSC - Item 17	DSC - Item 18	DSC - Item 19	DSC - Item 20	DSC - Item 21	DSC - Item 22	DSC - Item 23	DSC - Item 24	DSC - Item 25	DSC - Item 26	DSC - Item 27	DSC - Item 28	DSC - Item 29	DSC - Item 30	DSC - Tot	DSC - Pos	DSC - Neg
Dental Self Confidence	1.000																															
Social Impact	-.034	.255	.180	.011	.181	.098	.321	.115	-.154	-.008	-.201	.047	.223																			
Psychological Impact	-.039	.314	.234	.108	.208	.371	.328	.207	-.031	.245	-.245	.110	.324																			
Aesthetic concerns	-.174	.012	-.069	-.119	-.044	-.042	.059	-.055	-.042	.038	-.229	.071	.239																			
Patient's Beliefs	-.000	.080	.070	.060	.319	.318	.111	-.111	-.195	-.102	.040	.023	-.046																			
RSES - Tot	-.194	-.267	-.231	-.178	-.353	-.402	-.251	-.286	-.098	-.170																						
RSES - Positive Items	-.285	-.209	-.318	-.126	-.345	-.471	-.203	-.177	-.142	-.042																						
RSES - Negative Items	.147	.235	.169	.219	.319	.290	.242	.300	.050	.285																						

**Relationships between Body dysmorphism and Dental aesthetics - Frame 1.** The table shows that the greater the concern for the physical defect, the greater the psychological impact of the aesthetics of the teeth. Moreover, the more ideal are the patient's beliefs about the importance of healthy teeth and straight into the life and career, the more important is the physical defect and the negative evaluation of self that comes with it. Finally both the psychological and the social weight attributed to dental aesthetics are linked to avoidance of public situations.

**Relationships between Body dysmorphism and Self esteem - Frame 2.** Self esteem showed significant negative relationships with different aspects of body dysmorphism, such as concerns about the defect, the importance attributed to the defect, the negative evaluation of themselves because of the defect and avoidance of social situations. Specifically, self-confidence seems more related to the social aspects: the lower was the self-esteem, the higher was the concern for the defect in public or social situations and the avoidance of such situations. In contrast, the self Deprecation seemed more related to self judgment, self negative evaluation and avoidance of physical activities that entail the direct involvement of corporeality.

**Relationships between Self esteem and Dental aesthetics – Frame 3.** The last frame shows the relationship between self-esteem and Dental aesthetics. In particular, the issues of self-esteem linked to self Deprecation had a negative relationship with dental self-confidence and a positive relationship with psychological impact: the higher was self contempt the greater were consequences in terms of negative psychological assessment attributed to dental aesthetics.

**Discussion and conclusions**

This study aimed to examine the relationship between dysmorphic level, self-esteem and psychosocial impact of dental aesthetics among adolescents undergoing orthodontic treatment.

During the first phase of the study we evaluated the quality of body image among adolescents. Many studies (De Jongh *et al.*, 2009; Crerand *et al.*, 2006) showed how patients suffering of Body Dysmorphic Disorder (BDD) tend more easily both to require orthodontic treatments and to be dissatisfied about their most recent treatment. Therefore orthodontists should be alert for patients extremely concerned about insignificant or negligible dental flaws or defects, reporting multiple requests for orthodontic treatment or seeking evaluations with several professionals: in case of suspicions of BDD it is essential to avoid aesthetic or orthodontic treatment, unless it is really necessary (Hepburn, S., & Cunningham, 2006). Adolescents in our sample showed a dysmorphic level from mild

to moderate (M = 45.0 + 20.2), except for 8% of the cases to which, according to DSM - IV criteria, could be diagnosed as a Body Dysmorphic Disorder (BDD). It 's interesting to note that 32% of subjects identifies their physical defect in the braces, mouth and / or teeth. Phillips (2006), studying the dysmorphism in a sample of 36 adolescents, found that the most common areas of concern for adolescents were, in the order, skin, hair, stomach, weight, and teeth, with no differences between male and female.

The second phase of the study focused on the overall assessment in terms of self-esteem. In our sample levels are at the lower limits of normal (M = 17.2 + 4.2) and 18% of subjects showed even lower than normal levels of self-esteem. Most of them are females and this data confirms a well-established knowledge in the literature that girls have lower levels of self-esteem than boys (Kling, 1999).

The third phase of the study explored two aspects of the psychosocial impact of dental aesthetics. The first was the comparison between the subjective judgment of the patient on its degree of malocclusion and the evaluation of the dentist. Several studies compared the self perceived gravity of dental malocclusion with the objective gravity as established by professional judgment. Most studies (Danaii & Salehi, 2010; Badran, 2010; Kerosuo *et al.*, 2004; Grzywacz, 2003; Fox *et al.*, 2000; Birkeland *et al.*, 1996) showed significant agreement (between 77% and 85%) between the professional examiner's and the subjects assessment for what concern dental aesthetic and a less agreement (usually little more than 50%) for what concern dental health component. Despite this substantial agreement between professional judgment and self perceived gravity on the appearance dental aesthetics, there is still a percentage of disagreement on which studies differ: some studies found that patients are less critical in evaluating their aesthetic appearance (Badran, 2010; Birkeland *et al.*, 1996) while others study (Grzywacz, 2003), on the contrary, have identified a significant tendency to be more critical. It's an interesting fact that, in our study, there was no relationship between the subjective judgment of the patient on its degree of malocclusion and the evaluation of the dentist.

The second point explored was the personal experience of dental aesthetics. Results showed that younger patients, who wear the braces from less time, emerged as more concerned and with higher levels of psychological and social impact linked to dental aesthetics. This is an aspect that should be considered during the treatment in order to early detect signs of discomfort in adolescent's quality of life and well-being.

Finally, these variables have been related and showed meaningful connections. From the psychological point of view, it is possible that self-esteem is a protective factor in the development of body image disorders, being strongly linked not only with each other but also to higher levels of obsessive-compulsive, depressive and somatization tendencies (Biby, 1998). Moreover, from the dental point of view, the relationship between global self-esteem and dental self-confidence suggests the need to draw attention to psychological aspects involved in the treatment in order to promote not only the dental health, but also the psychological well-being.

In conclusion, the study has some limitations, such as the geographical origin, the homogeneous cultural level and the sample size that don't produce generalizable results. Furthermore, it would be important to investigate other psychological aspects linked to dental aesthetics and to orthodontic treatment during the delicate phase of adolescence, such as eating behaviors or quality of life. Finally, in order to verify if, as suggested by the data, psychological and social effects really tend to decrease along the treatment, a longitudinal study should be carried out in order to prevent discomfort and facilitate the treatment compliance.

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