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## The role of social comparison in social judgments of dental appearance: An experimental study

### *Abstract*

*Objective: The objective of this study was to examine the influence of social comparison on social judgments of dental malalignment in a sample of females. Method: In a Repeated measures design, N=218 female participants of which N=128 were orthodontic patients (mean age 31.4) and N=90 controls (mean age 26.1) rated their satisfaction with their facial appearance after viewing stereotypically beautiful images of faces (experimental condition) or houses (neutral condition). After 4-6 weeks participants returned to view an image of a female with severe crowding and were asked to make judgments of social competence (SC), intellectual ability (IA), psychological adjustment (PA) and attractiveness (A). Results: The comparison of social judgments between high comparers (High SocComp) and low comparers (Low SocComp) was not statistically significant; SC ( $t(204) = 0.30, p = 0.76$ ), IA ( $t(204) = 0.14, p = 0.89$ ) PA ( $t(204) = 0.004, p = 0.996$ ), A ( $t(204) = 1.26, p = 0.209$ ). However, dentally induced social judgments (DISJ) was statistically significant in the clinical sample than the non-clinical sample SC ( $t(204) = 0.784, p = 0.434$ ), IA ( $t(204) = 0.2.15, p = 0.033$ ) PA ( $t(204) = -0.003, p = 0.997$ ) A ( $t(204) = 1.58, p = 0.116$ ). Conclusion: Social comparison has little impact on DISJ. However, there are differences in DISJs between individuals who seek treatment for their malocclusion versus the nonclinical population; the reason for this is unclear but does not appear to be the result of adoption of societal standards of beauty and instead suggests individual ranking of important 'beauty areas' may play a role.*

### *Clinical significance statement*

This paper uses social comparison theory to investigate the basis of judgments in regards to dental appearance. The findings of this research may help to identify individuals who are more susceptible to societal pressures towards non-ideal dentitions. This will help clinicians become more aware of the patient's comparison orientation, which seems to have an impact on satisfaction with treatment outcomes.

This study may form the foundation for future behaviour studies seeking to alleviate the negative effects of social comparison.

### *Introduction*

The demand for adult orthodontic treatment has increased since the 1980s, and the increasing popularity of adults wearing orthodontics is seemingly becoming a global phenomenon [1]. In the UK, the prevalence of adult orthodontic cases showed that these cases comprise an estimated 28.2 new cases per specialist per year within the NHS and 28.2 new cases per specialist per year in private clinics [2]. Women tend to visit the orthodontic clinics more than men [3]. The motivating factor for females to seek orthodontic treatment seems to be for enhancing facial aesthetics [4]. Similar trends have been reported worldwide [5-7].

Studies show that the desire to change the face and body may come from medias' unrealistic portrayal of celebrities which affect the individuals' self-perception, particularly influencing their ideals pertaining to beauty and attractiveness [8-10]. However, not everyone is affected the same way, certain individuals are more vulnerable to the effects of idealized media images than others and may be highly sensitive to the idealised media images portrayed in mass media such as, people with anorexia or bulimia, pregnant females and adolescents [11-14]. The impact of idealized images has been studied in dentistry showing that the appearance of "pretty faces" represented in the media tends to impact ones psychological construct [15, 16].

People engage in social comparison without awareness all the time. Social comparison is defined as the process of comparing oneself to similar others [17]. However people are not always un-biased evaluators when selecting a relevant reference for comparison. For instance, some individuals may compare themselves

to others who are better off, a process called upward social comparison, which makes the comparer feel unhappy [18-20]. In contrast, others engage in downward social comparison by which they compare themselves to those who are worse off [21]. Research in the field of social comparison shows that individuals with high levels of uncertainty tend to engage in upwards social comparison in order to seek out information about their own self and to determine where they stand in relation to others [22]. However, these sensitive individuals gradually become dissatisfied with their own selves as they become trapped in the consequences of comparison [22]. Evidence suggests that females are more susceptible to the negative effects of social comparison than males [20, 23, 24].

A large body of research regarding the appearance of the dentition shows that visible dental imperfections can result in negative social judgements. In dental experimental research, using digitally modified photographs, it has been shown that dentally induced social judgments DISJ are influenced by factors such as presence of decay [15], the shade of whiteness of the teeth [25], type of orthodontic retainers [26], and presence of crowding [27]. Such beliefs, pertaining to the appearance of an ideal dentition plays a pronounced role in the first impression making [28] and employment [29]. In general, these findings confirm the attractiveness theory that we assign a set of positive qualities to individuals who are seen more attractive [30]. However, the aforementioned dental studies have not been conceptualised theoretically in order to gain insight on the cause of positive social judgments associated with ideal dental alignment. In other words, exploring the mechanism by which dental stigmas are made may help consciously reduce social bias. While current research has shown the social consequences of disease free dentitions, it has not shown whether individuals who seek idealised teeth alignments are actually influenced by the

similarity hypothesis that affect individuals with increased levels of self-monitoring.

This is a prominent feature in individuals with eating disorders behaviours which has been examined in the medical literature thoroughly however it has not been investigated in dentistry.

The current study is the first to examine the plausibility of social comparison theory in dentistry. The objective is to bring two lines of research on facial aesthetics; the role that the media plays in producing dissatisfaction with facial appearance, and the role dento-facial appearance plays in one's perception of another. An integrative effort is made to determine whether the classical theory of social comparison underlies both phenomena. The hypotheses of the current study are:

- 1) Individuals high on social comparison -sensitive individuals- will make different DISJ to individuals low on social comparison
- 2) Individuals seeking clinical treatment make different DISJ to those not currently seeking clinical treatment.

### *Materials & Methods*

This was a quantitative study design; a control randomised cross over study (phase 1) followed by a cross sectional study (phase 2) (Figure 1). Ethical approval was granted from the Chelsea Ethics Committee and from the College Research Ethics Committee at Kings College London. 218 Female participants – aged 18 and above- were included from two different areas:

- The clinical sample included 128 female patients which were randomly selected from the Orthodontic Department at Guy's and St Thomas' NHS Trust. (N=91 orthodontic patients, N=37 orthognathic patients). Individuals

with serious systematic diseases and craniofacial development disorders including cleft lip and palate were excluded.

- The non-clinical sample included 90 volunteers who were recruited to take part in the study via Kings College London recruitment emails. Females who were not fluent in English were excluded, as were psychology students.

An informed consent was obtained from all participants in accordance with the Helsinki guidelines. Participants were informed that the study was about how we make judgments about others and about ourselves. Participants were deceived from the true aim of the hypothesis. However, subjects were debriefed after they completed phase 2 of the study. Participants completed a demographic questionnaire (age, self-identified ethnicity, body mass index BMI, and education level as a determinant of socioeconomic status). Additionally, the clinical sample only gave information on their perception of malocclusion using the aesthetic IOTN [31]. They were also clinically examined to identify the type of malocclusion using the British Incisor Classification [32]. The following scales were used in the current study:

#### *1- Body Satisfaction Scale (BSS)*

The dimension of social comparison was measured using the BSS scale. This 16 item self-report scale measures satisfaction in relation to appearance [33]. It is a seven point Likert scale which is anchored from "Very Satisfied" to "Very Dissatisfied". The first 7 components of the BSS questionnaire enquire about the face and the second part enquires about different parts of the body. The BSS has

been used previously in other orthodontic studies [26, 34]. Participants who score high on BSS indicate greater dissatisfaction.

### *2- A Visual Analogue Scale VAS: For attractiveness of Images (VAS)*

This was a 100mm horizontal line anchored from 0 (far left) to 100 (far right). Values closer to 0 indicated that an image was not attractive and a value close to 100 indicated that the image was attractive.

### *3- A measure of inferences based on physical appearance*

This questionnaire was adopted from Jeremiah et al. (2011) that allows the examiner to inquire about three different domains of persona highly affiliated with physical appearance: social competence (SC), intellectual ability (IA), and psychological adjustment (PA). This questionnaire has been used in previous dental studies [15, 26, 35]

Idealised facial images were obtained from contemporary UK magazines 2014/2015 that focused on female fashion. Images that displayed a smiling, attractive female were selected. A set of 20 images of idealized faces were scanned and standardized to portray only the head and neck region. To ensure that the images used were effective to stimulate attractiveness, 10 orthodontists were invited to rate the images using a VAS prior to the commencement of the study. They collectively rated the images with a mean score of 70.25 (SD=5.6), which was reasoned to be attractive. The nonappearance images were selected from contemporary UK homes and gardens magazines 2014/2015. To reduce other peripheral information processing by the raters, images of people in homes were excluded. A volunteers' dentition was digitally manipulated to produce severe malocclusion (Adobe® Photoshop® CS2).

The latter image was presented to participants during Phase 2 of the study. All images were presented in a sequence using the Powerpoint© software for a period of 5 seconds per image on a MacBook Pro© with an inbuilt 15.4-inch (diagonal) LED-backlit display with IPS technology; 2880x1800 native resolution at 220 pixels per inch.

After participants completed a bank of demographic questions, they were randomly allocated to an order of a condition by a coin toss. Each participant completed the BSS after viewing the first set of images. In order to draw the raters' attention to the attractiveness of the images, they were asked to rate it using the visual Analogue Scale VAS. During the follow up visit, which was after 4-6 weeks, participants were presented with a second set of images and were required to complete the BSS for the second time. Participants were shown figure 2 and were asked to complete the social judgments questionnaire. A £15 Amazon voucher was given as a thank you for all participants who completed both parts of the study.

Analysis of the data was performed using SPSS v14 on MAC. The descriptive characteristics of the participants were analysed. To test the effect of idealised faces on the satisfaction construct, the mean difference between idealised faces and houses scores was obtained. A one-way ANOVA was used to compare three groups (control, orthodontic, orthognathic) body satisfaction scale BSS ratings (Head component only). A median split was performed on the absolute difference of the facial satisfaction scores of the BSS scale creating two groups (this variable was called BSS\_difference and was treated both as a continuous variable and as a dichotomous variable with two values based on a median split: High SocCom and Low SocCom). The Independent t-test was used to compare the means of the high comparer group and low comparer group across all four domains of social judgment.

Additionally, means of the clinical and non-clinical samples were compared across all four domains of social judgment using the Independent t-test. The sample size calculations were selected based on the ability to detect a medium effect of 0.4 and with an assumption of 80% power of the test at a 95% confidence interval. It was planned that a minimum of 64 participants were required in each group (High SocCom and Low SocCom) in order to detect a difference.

## *Results*

### *1) Demographic characteristics*

Of the N= 250 participants that were approached to participate, N=32 were excluded from the study as shown in flow chart (figure 1). Table 1 shows demographic characteristics of 218 participants (control, orthodontic group and orthognathic group). The sample's mean age was 28.7 (SD = 9.4). There was a statistically significant difference in age between control, orthodontic and orthognathic groups  $F(2, 216) = 7.23, p=0.001$ , (Table 1). A Post Hoc comparison of the three means using Tukey's test at  $p=0.05$  revealed that the orthodontic ( $M=27.2, SD=10$ ) and orthognathic samples ( $M=26.11, SD=7.11$ ) were younger than the controls ( $M=31.5, SD=8.7$ ). There was no statistically significant difference between the three groups in terms of BMI,  $F(2,216) = 0.852, p= 0.45$ .

The ethnic profile of participants is shown in Table 1. In this study, there was a statistically significant difference in the three groups in ethnicity,  $\chi^2(20, N=218) = 34.7, p=0.02$ . The majority of patients were White British ( $N=119, 54.5\%$ ) followed by Black or Black British ( $N= 31, 14.2\%$ ) and least common Asian Other ( $N=20, 9.1\%$ ). Table 1 also demonstrates the educational qualification level of all participants. In the current study, there was a statistically significant difference in the

level of education across the three subgroups  $\chi^2(8, N=218) = 65.8, p < 0.001$ . All participants in the control group had received education above A levels while some of the orthodontic and orthognathic group had achieved education level at GCSE (N=30, 13.8%) and A levels (N=23, 10.5%). There was a statistically significant difference between the orthodontic group and orthognathic group in terms of dental classification  $\chi^2(3, N=218) = 32.21, p < 0.001$ . Most of the clinical sample had class I incisor malocclusion (N=82, 64%) which was more common in the orthodontic group (N=70, 77%) than the orthognathic group (N=12, 32.4%). There was no statistically significant difference between the orthodontic and orthognathic groups in aesthetic IOTN  $\chi^2(10, N=218) = 6.94, p = 0.73$ .

## 2) *The role of social comparison in DISJ*

*Q1: Do people high in social comparison make different DISJ to those low in social comparison*

Table 2 shows the comparison of the three subgroups on BSS\_difference. Analysis of variance revealed that there was no significant difference in the BSS measure across the three groups ratings ( $F(2,214) = 0.27, p = 0.973$ ). This indicates that there was no difference after viewing images of faces and after viewing images of houses on satisfaction in any of the three subgroups. Ultimately, the mean (Median, SD) value of the BSS difference produced an unexpected outcome of an overall mean score of 0.31 (Median = 0, SD = 5.1)

After the BSS\_difference scores were dichotmised, the High SocCom group comprised 119 participants and the Low SocCom group 98 individuals. Table 3 shows the mean ratings of social judgments across the high social comparison group and the low social comparison group. There was no statistically significant difference

between high comparers and low comparers in relation to social judgments pertaining to SC ( $t(218) = 0.958, p = 0.339$ ), IA ( $t(218) = 0.059, p = 0.953$ ), PA ( $t(218) = 0.040, p = 0.968$ ), or attractiveness ( $t(218) = 1.261, p = 0.209$ ). This means that the type of comparison orientation - whether Hi SocCom or Low SocCom- does not impact DISJ.

### *3) The impact of clinical status on DISJ*

*Q2: Do individuals seeking clinical treatment (orthodontic & orthognathic) make different DISJ to those not currently seeking clinical treatment?*

Social appraisals of the image displayed in figure 2 were analysed using an independent t-test comparing the clinical versus the nonclinical group on DISJs (Table 4). A statistically significant difference between the non-clinical and clinical sample was shown pertaining to intellectual ability score,  $t(2.15), p = 0.033$ . The clinical group gave a lower mean score for intellectual ability 5.6 (SD=1.5) compared to the mean of the nonclinical score of 6.1 (SD=1.5). This means that the group of participants who have current orthodontic treatment gave lower ratings of perceived intelligence than the non-clinical group when viewing an image of a person with crowding.

In summary, the prediction that viewing idealised faces in comparison to viewing idealised houses would affect the domain of satisfaction more intensely was not found in this study. Observing both sets of idealised images gave very similar outcomes. The high comparer group did not give different dental judgments in comparison to the low comparer group. In contrast, when examining the clinical and the non-clinical groups' attitude towards malalignment, perceived intelligence was the most susceptible rating across all four social judgment categories.

## *Discussion*

To our knowledge, this is the first study in dentistry to examine the role of social comparison theory in the process of making judgment about others. The findings of this study suggest that dentally influenced social judgments are not mediated by social comparison. This was not expected, especially in reference to other psychological research, which indicates that certain females are highly affected by the idealised images in the media, which may ultimately draw out stereotypic behaviours [10, 36]. The hypothesis that such women are prone to the effects of idealised images as a result of tendency to engage in social comparison is not supported.

In the current study the effect of viewing images of idealised faces or houses on satisfaction across the three groups was not significant. This finding needs to be interpreted carefully as it seems that viewing both sets of images affected the samples' satisfaction with their facial image leading to decreased satisfaction with participant's own face. **The images of idealised faces comprised pictures taken from fashion magazines and thus the majority were women who would be well known, particularly to a young female sample. In line with the nature of images in such magazines the majority were of White Caucasian women, there were no Black faces. It may be that the faces had no specific effect on satisfaction because the participants had built up tolerance to the particular faces by repeated exposure.** Alternatively, it could be that the choice of stimuli (beautiful faces and beautiful gardens) triggered dissatisfaction in people simply because both sets of images are associated with wealth / prestige. Future research using non celebrity faces and ordinary houses might be helpful. The randomised, controlled, cross over design was used to show the cause and effect relationship between media on facial self-

satisfaction and has been used in previous dental research indicating that media images do affect sensitive people more than others [36]. However, the absolute differences between both sets of images has not been analysed previously in dentistry. Failure to detect a difference between the three subgroups' perceived satisfaction may be attributed to the diverse ethnicity of the sample. Ethnic minorities belong to groups that have a strong sense of ethnic identity that tends to ward off the negative effects of media images [37]. This means that their attitude towards Caucasian fair skinned models is different from those of the larger society [38] . Future research using a homogenous ethnic group is required. The wide age group of the sample may have affected the ability to detect a difference between the three subgroups' perceived satisfaction. Some participants in this study were older than other published studies [16, 36] . It is assumed that females that belong to older aged groups are less judgmental than those of younger age groups [27, 39] . Limiting participant age groups to a younger adult group is more likely to give different results.

Our study found no difference in DISJ between individuals who were high on social comparison and against those who were low on social comparison. While this statistical approach is often used in psychology, Cohen suggests that dividing a sample into two groups leads to loss of the power of the sample [40]. Social comparison was operationalised in this study by use of differences in facial satisfaction as measured by the BSS measure. Further research using a more direct measure of social comparison such as the Social Comparison Orientation Scale (INCOM) could possibly yield new information [41]

In the current study, there was a statistically significant difference in DISJ between the clinical and non-clinical groups in line with other published research in dentistry

[15, 26, 34, 42]. Perhaps this may stem from TV shows which often associate an unintelligent character or villain with non-ideal teeth. Shaw displayed similar findings when he explored the influence of good dental appearance on perceived intelligence [43]. His research showed that children with normal dentitions were often rated as good looking, and more intellectual.

The effects of this study might have been subject to demand characteristics and social desirability given that data were collected from the clinical sample in clinic. Further research under different settings must be considered in order to rule out situational pressures. One possible route could be by sending images of figure (2) to participants via email, and asking them to fill out the questionnaire in private.

Some limitations of the study must be noted, in the cross sectional study, it was unexpected that participants universally did not give severe social judgments of the image (figure 2). Social studies have shown that individuals will minimize their negative judgments when filling a questionnaire in the presence of other researchers [44]. Incorporating observational measures, which means directly recording participants' responses, could be another way to understand their behaviour towards non ideal dentitions. In addition, further related research may benefit from analysing predictors of social comparison such as personality, mood, self- esteem and ethnicity. The theory of social comparison is increasingly expanding to new fields and different disciplines. It is assumed that more emerging issues will be examined using the SCT as the framework for understanding many societal attitudes and behaviours that may lead to social stigma.

### *Conclusion*

Social comparison has little impact on dentally induced social appraisals. However, there are differences in dentally induced social judgments between individuals who seek treatments for their malocclusion versus the non-clinical population. The reason for this is unclear but doesn't appear to be the result of adoption of societal standards of beauty.

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