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Social judgements made by children in relation to visible incisor trauma

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Abstract – *Aim*: There is evidence to suggest that negative social judgements are made on the basis of poor dental aesthetics. This study sought to determine how children view other children with visible incisor trauma. *Material and methods*: Year 7 (aged 11–12 years) and year 10 (aged 14–15 years) school children (the participants) were invited to look at colour photographs of four different children's faces and to make a social judgement about these children (the subjects). Participants were randomly allocated either: (i) pictures of children with visible incisor trauma or, (ii) pictures of the same children whose photographs had been digitally modified to restore incisor aesthetics. Using a previously validated child-centred questionnaire, participants rated subjects using a four-point Likert scale for three negative and six positive attributes. Total attribute scores were tested for significant differences, according to whether the subject had visible incisor trauma or not, using multivariate analysis of variance ($P < 0.05$, MANOVA). *Results*: 291 children completed the questionnaires, giving a response rate of 73%. Year 7 children viewed children with visible incisor trauma more negatively than the same child with normal incisor appearance. However, the converse was true for year 10 participants. *Conclusion*: Findings from this study concur with those from adult populations in that negative social judgements may be made on the basis of poor dental appearance. Interestingly, this would not appear to be the case in adolescence, which may relate to high levels of self-monitoring in this age-group. In view of the importance of appearance in adolescent social interaction, aesthetic dental treatment for children with incisor injury may yield important psychosocial benefits.

Appearance, and particularly facial appearance (1), is recognized as being central to social interactions throughout life (2–4). We live in a society where appearance matters and stereotypically idealized body and facial images are applauded by the media (5, 6). A wealth of evidence indicates that we are judged by others on the basis of our appearance, including dentofacial aesthetics. Indeed, a dental appearance that deviates from acceptable norms may even negatively affect an individual's employment prospects (7).

The orthodontic literature provided some of the earliest evidence for the influence of dentofacial appearance on social perceptions. Studies by Shaw and co-workers in the 1980s explored this concept using digitally-modified photographs of individuals with a variety of malocclusions (8, 9). Participants were asked to rate the subjects portrayed in the photographs for a number of personal characteristics. Key findings were that faces displaying a normal incisor relationship had significantly higher ratings for friendliness, social class, popularity, and intelligence. Photographs of individuals with prominent incisors attracted the highest scores for compliance and honesty, whereas faces depicting a missing incisor were viewed as the most aggressive. In a similarly designed study, involving both young people and adults, children with a 'normal' dental appearance were judged as better looking, more desirable as friends, more intelligent, and less likely to behave aggressively (8, 10). On the basis of these investigations, children and young adults with a normal dental occlusion are attributed with having a range of preferable personal characteristics.

Similar attribution studies have explored the effect of dental disease, notably caries, on social perceptions among adults. There is a general consensus that individuals with a healthy dentition are perceived as more socially competent, intellectually competent and better psychologically adjusted than subjects with visible dental disease (11, 12). Likewise, Kershaw et al. (13) investigated the influence of tooth colour and showed that individuals with artificially whitened teeth received a more positive appraisal in terms of social competence, intellectual ability, psychological adjustment, and relationship satisfaction. In contrast, where teeth are discoloured, as in the case of severe fluorosis or caries, individuals may be viewed negatively in terms of sociability, reliability and cleanliness (14).

A wide spectrum of inherited and acquired conditions affect the human dentition: teeth may demonstrate marked abnormalities of colour, morphology, position or number (15). When anterior teeth are affected, not only may the individual be self-conscious of their dental appearance, but visible differences may be more readily seen by others during everyday social interactions. Dento-alveolar trauma is a very common occurrence in childhood and frequently results in compromised incisor aesthetics. A recent UK survey found that 11% of 12-year olds and 13% of 15-year olds had visible evidence of trauma affecting one or more permanent incisors (16). A prospective study of Danish children found that almost 50% of all school leavers had experienced at least one episode of dental trauma (17). Crown fractures are by far the most common injury seen in children (18).

Management of dento-alveolar trauma for young people has been shown to be deficient in some settings (19–21). Clinical impression suggests that practitioners may be reluctant to provide 'cosmetic' treatment for traumatized incisors until the child is older. Failure to provide prompt and appropriate intervention may not only adversely affect the long-term prognosis of the injured tooth (22), but may have a negative psychosocial effect on the child. A recent study on the impact of dental trauma on children's quality of life showed a significant association with emotional well-being (23). Children with untreated dental trauma were three times more likely to avoid smiling or laughing and four times more likely to report not wanting to talk to other children. Social effects of dental trauma were reportedly more important than functional effects. Cortes et al. (24) reached similar conclusions and reported significant negative associations between smiling, eating, and enjoying contact with other people and visibly traumatized permanent teeth. However, these studies used questionnaires which had been designed wholly by adults, without involvement of children and the properties of the measures were not evaluated. Moreover, the effects studied were internal and ignored the impacts that visible incisor trauma may have on other people.

In summary, it is evident that a number of personality traits are attributed on the basis of dental appearance, particularly among adults. However, there is a paucity of data about children's judgements in relation to dental status. This is surprising against a background of high reported levels of distress from appearance-related teasing or bullying in adolescents (4). The overall aim of the present study, therefore, was to determine whether children make negative social judgements about other children with visible incisor trauma. The study also sought to explore the effect of age and gender on character perceptions.

Materials and methods

The overall study design took the form of a cross-sectional self-completed questionnaire. Participants were year 7 (11- to 12-year olds) and year 10 (14- to 15-year olds) pupils from a state secondary school in the Southwest of England. Ethical approval for the study was granted by the University of Sheffield Ethics Committee.

Experimental tools

Standardized full face colour photographs (A5 portrait) were obtained of two boys and two girls, aged between 11 and 15 years, who had suffered visible trauma to one or more of their upper permanent incisors (Fig. 1). These children were under the care of the paediatric dentistry clinic, Charles Clifford Dental Hospital, Sheffield. Their visible injury included a variety of crown fracture and intrusion injuries. Two subjects also had a non-vital discoloured incisor. The pretreatment images were then digitally manipulated to completely restore incisor aesthetics (Fig. 1). The use of 'real-life' post-treatment photographs was explored, but a digital manipulation

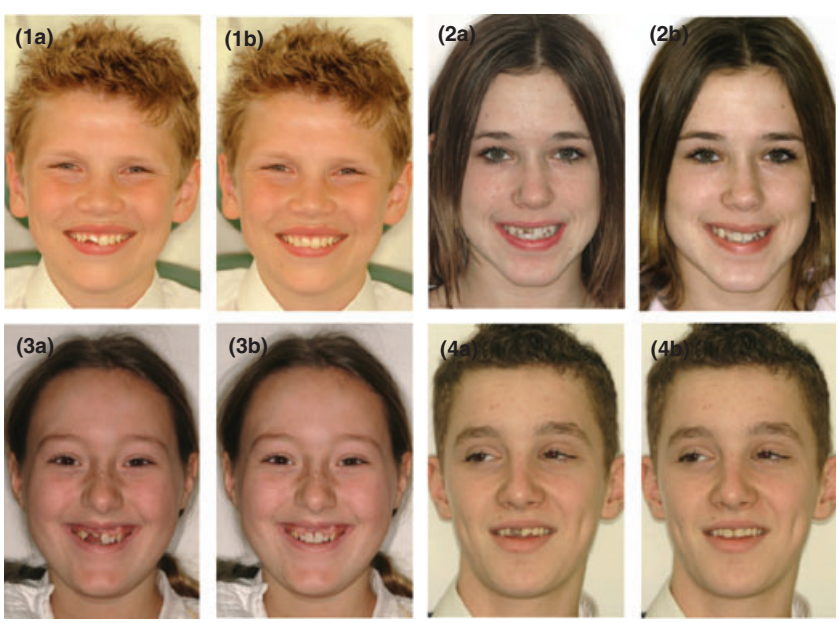

Fig. 1. Full face photographs of the four different subjects used in the study (a) with visible incisor trauma and (b) with incisor aesthetics digitally restored.

approach was adopted to reduce the potential confounding effects of a different facial smile or hairstyle on overall appearance. Informed consent was obtained from the children and their parents/guardians to allow the use of these photographs for the specific purposes of the study.

Development of the instrument

A two-page questionnaire containing closed questions was developed for specific use among the study population. The investigators first conducted 20 qualitative interviews and then distributed self-completed pilot questionnaires to 37 children aged 11–15 years. The interviews were used to capture the children's own words for describing other people and the pilot questionnaire contained the 20 most common descriptors used by children to describe both positive and negative social traits in their friends and themselves (Table 1).

The properties of the questionnaire were then evaluated among 56 schoolchildren, aged 11–15 years. Participants were given either a photograph of a boy and girl with visible incisor trauma, or photographs of the same two children where incisor aesthetics had been digitally restored. They were asked to rate each child for the 20 social attributes. A four-point Likert scale was used to record responses, ranging from 'strongly agree', 'agree', and 'disagree' to 'strongly disagree' (Fig. 2). The participants were not told that the study was dentally related. The data were then analyzed to determine internal consistency, factor analysis and face, content and construct validity. Attributes found to have poor internal consistency (Cronbach's alpha < 0.7) were removed and the questionnaire re-piloted.

Following this analysis, the final questionnaire was refined to include nine descriptors (six positive and three negative attributes) within three different domains: social competence, psychosocial adjustment and intellectual competence (Fig. 2). The instrument was then re-piloted and was found to have good internal consistency (Cronbach's alpha > 0.8) and was thus considered an appropriate measure for the purposes of this research.

Main study

Study participants included all year 7 and year 10 pupils at a secondary school in South East England. An information sheet was provided for prospective participants and their parents/guardians 1 week before the study took place. Parents who did not wish their child to participate were asked to sign and return a withdrawal form. In addition, children were given the option of not having their responses included in any subsequent analysis by signing their completed questionnaire (4). On the day of the study (10th October, 2007), the school administrator randomly allocated the questionnaires to each class, so that half of the year 7 and year 10 class groups received the trauma photographs and the remaining classes received the non-trauma photographs. Participants were not allowed to confer during completion of their questionnaire.

Table 1. Descriptors most commonly used by children to describe positive and negative social attributes

Positive attributes	funny, happy, popular, friendly, confident, careful, helpful, kind, honest, clever
Negative attributes	shy, bossy, clumsy, annoying, forgetful, unpopular, unhappy, naughty, stupid, rude

Data analysis

The principal outcome measure was the total attribute score, which was calculated by summing the response codes. The positive attributes namely clever, kind, honest, confident careful and helpful were coded as: 'strongly agree' = 4; 'agree' = 3; 'disagree' = 2; 'strongly disagree' = 1. The negative attributes, rude, stupid and naughty had the scoring reversed. Thus a high score (maximum of 36) would correlate with positively judged subject and a low score (minimum of 9) would correlate with a negatively viewed subject (see example in Fig. 2).

The data (total attribute scores) were found to be normally distributed and therefore fulfilled the requirements of size and distribution to allow use of parametric tests. The use of parametric tests has been reported as appropriate for analysis of similarly-obtained social attribute scales in previous studies (13). Thus a multivariate analysis of variance (MANOVA) was used to test the null hypothesis that there was no significant difference in the attribute score assigned by participants to subjects with or without visible incisor trauma. The four dependent variables were the mean total attribute score for each of the paired photographs. The fixed factors were gender of the participant (male or female), the school year (year 7 or year 10), and incisor status (presence or absence of visible incisor trauma). Significant results from the MANOVA were examined using descriptive statistics and *post hoc* multiple comparisons. The significance level was set at $P < 0.05$.

	Strongly agree	Agree	Disagree	Strongly disagree
This girl is clever	√ (=4)			
This girl is rude			√ (=2)	
This girl is kind		√ (=3)		
This girl is honest				√ (=1)
This girl is confident	√ (=4)			
This girl is careful			√ (=2)	
This girl is helpful			√ (=2)	
This girl is stupid	√ (=1)			
This girl is naughty		√ (=2)		

Fig. 2. An example of a response received from a 12-year-old female participant rating a female subject with no incisor trauma according to nine different attributes using a 4-point Likert scale. The total attribute score in this case is 21.

Results

Participants

Figure 3 outlines details of potential and actual participants in the study. A small number of parents of children from both year groups returned a form requesting that their child did not partake in the study. Twenty-two year 7 participants and 20 year 10 participants indicated that, although they had completed the questionnaire, they did not want their responses to be included. These were therefore excluded from the analysis. On the day of the study 29 year 7 and 24 year 10 students were absent from their classes, for a variety of reasons. Therefore data were analyzed from 120 (68%) year 7 and 171 (77%) year 10 students, giving an overall total of 291 responses (73%). Overall, there was a similar proportion of male (54%, $n = 157$) and female (46%, $n = 134$) participants (see Table 2 for further details according to age-group).

Mean attribute scores

Table 2 provides the mean attribute scores for the subject of each photograph (with or without incisor trauma) according to the age and gender of the participant. Year 7 pupils gave more negative ratings for subjects with visible incisor trauma compared to those with intact incisors for all subjects, apart from the 4th case. Conversely, year 10 students rated the subjects with visible incisor trauma more positively than subjects with restored incisor aesthetics. Furthermore, mean attribute ratings given by older participants for subjects with incisor trauma were consistently higher than was the case for year 7 pupils in relation to subjects with incisor trauma. Female participants, from both year 7 and year 10, tended to rate all subjects (with or without incisor trauma) more favourably than did their male peers. The MANOVA revealed that there was an overall significant effect of group ($F(4, 240) = 4.80$, $P = 0.001$) and an age x group interaction ($F(4, 240) = 6.01$, $P < 0.001$). None of the remaining main effects or interactions were statistically significant, although the effect of gender approached significance ($F(4, 240) = 2.23$, $P = 0.07$). Further inspection of the age by group interaction revealed that this was significant for subjects 1, 2 and 4 (Fs(1, 250) = 20.81, 9.11, 4.19 respectively, all ps < 0.05) but not for subject 3 (see Fig. 1 for subject photos). *Post hoc* analysis revealed that the difference between traumatized and intact incisor ratings were significant for both year 7 and 10 pupils for subject 1 (both ps < 0.001), year 7 for subject 2 ($P < 0.001$) and year 10 for subject 4 ($P < 0.001$). In all cases, year 7 pupils rated the intact incisor photos higher (i.e. rated more positively) than the traumatized incisor photos,

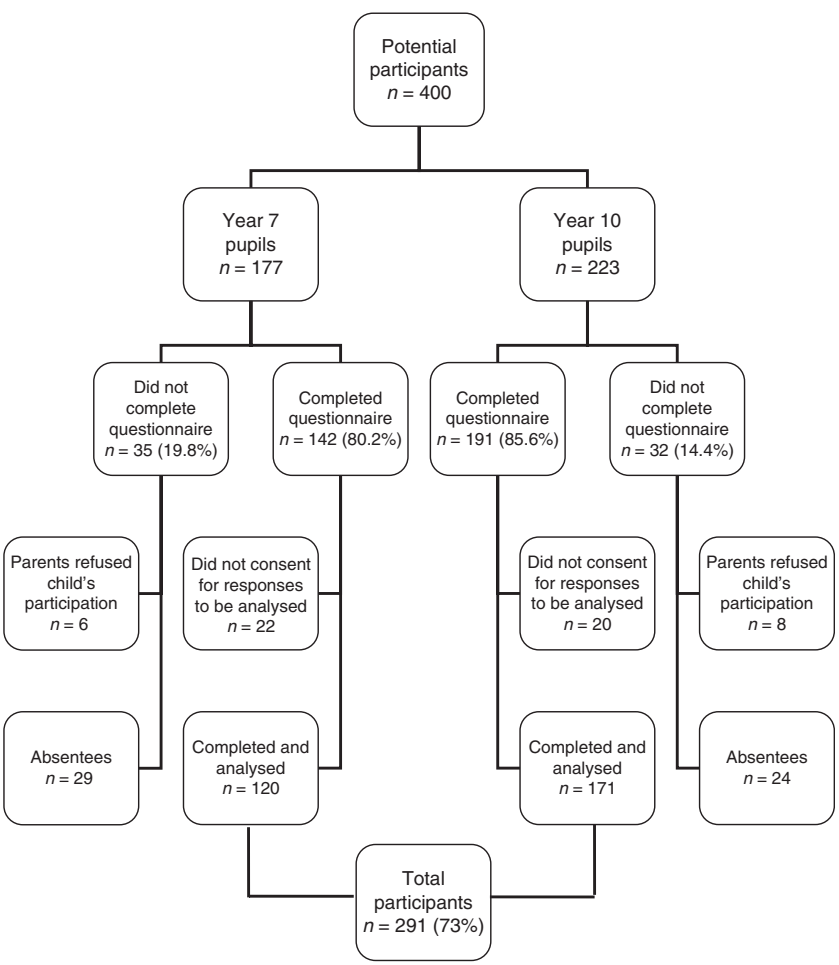

Fig. 3 Flowchart outlining the number of participants in the study.

Table 2. Mean (SD) attribution scores for children with and without visible incisor trauma according to the age and gender of the participant (36 = most positive score possible, 9 = most negative score possible)

	Mean attribute score (SD) according to school year and gender of participant					
Photographic subject	Year 7 total (n = 120)	Year 7 girls (n = 50)	Year 7 boys (n = 70)	Year 10 total (n = 171)	Year 10 girls (n = 84)	Year 10 boys (n = 87)
Subject 1 (male)						
With incisor trauma	14.84 (4.17)	16.07 (3.82)	13.95 (4.24)	16.49 (3.44)	17.10 (2.58)	15.91 (4.08)
Without incisor trauma	17.75 (3.30)	18.05 (2.42)	17.53 (3.82)	14.67 (3.34)	15.20 (3.03)	14.18 (3.57)
Subject 2 (female)						
With incisor trauma	13.81 (4.22)	13.68 (3.32)	13.90 (4.79)	15.15 (4.13)	15.98 (2.90)	14.38 (4.91)
Without incisor trauma	16.40 (4.02)	17.16 (2.95)	15.97 (4.50)	14.65 (4.58)	15.61 (3.69)	13.84 (5.12)
Subject 3 (female)						
With incisor trauma	13.97 (4.74)	15.89 (3.31)	12.62 (5.14)	14.43 (4.76)	15.51 (3.31)	13.38 (5.86)
Without incisor trauma	15.69 (5.00)	16.55 (3.75)	15.12 (5.66)	14.39 (4.32)	13.92 (4.41)	14.81 (4.24)
Subject 4 (male)						
With incisor trauma	12.78 (5.07)	13.40 (4.16)	12.28 (5.70)	13.28 (5.29)	13.61 (4.15)	12.98 (5.70)
Without incisor trauma	12.56 (5.02)	12.56 (4.48)	12.55 (5.39)	10.84 (4.10)	11.21 (3.83)	10.52 (4.33)

while the opposite was the case for year 10 pupils; subjects with traumatized incisor photos were rated more positively than the same subjects with intact incisors.

Discussion

This aim of this study was to determine whether children with visible incisor trauma are viewed more negatively than those with intact incisors. A surprising finding was the marked difference in peer evaluation according to age. Whereas younger children (aged 11–12 years) made more negative judgements about subjects with visible incisor trauma, this was not the case for the older participants (aged 14–15 years). Indeed the converse was found, with year 10 pupils actually rating subjects with traumatized teeth more positively than those with intact incisors. Such a fundamental difference in response between the two age groups warrants explanation. It is speculated that older children made a conscious and deliberate decision not to make negative judgements about subjects with traumatized incisors and, in fact, overcompensated, by rating them more positively than children with normal incisor aesthetics. There may be a number of reasons for this fascinating pattern of behaviour. Firstly, simply by virtue of their age, older children will have been more likely to have experienced dental trauma themselves or be aware of its occurrence among their peers. They may have been able to discern that the subjects had sustained an injury and adopted a more sympathetic and informed attitude towards others with obvious dental trauma. The participants may have even viewed the presence of dental trauma as signifying positive personal attributes, considering the individual as more actively engaged in everyday life events, sports or being 'tough'. This is, however, a completely different response to that found in previous studies involving young adults where subjects with poor incisor aesthetics, due to dental disease or enamel defects, received a poor attribute rating (6, 11, 13). It would therefore be very interesting to explore adult attitudes towards others with incisor trauma, to determine whether subjects with 'accidental' tooth injury do not incur the same negative perceptions that appear to be associated with dental decay or enamel discolouration.

There is, however, a more informed theory for the responses given by the 14- to 15-year-old participants, which comes from the social sciences literature. It is well recognized that adolescents demonstrate the highest degree of self-monitoring of any other age groups, with self-monitoring behaviour increasing from early to late adolescence (25). Self-monitoring relates to how an individual modifies their behaviour in different social settings. High self-monitors (as seen in adolescence) make very conscious emotional and cognitive efforts to be socially acceptable (26). They are highly motivated and thoughtful in their strategic efforts to have a positive self-affect, they are very receptive to the appropriateness of their behaviour and they have a preference for clearly defined, non-ambiguous situations (27). In view of this acknowledged personality trait, it is speculated that the year 10 participants in the present study did not wish to make negative judgements about other individuals with poor dental aesthetics. They may have held negative thoughts about the subject, but modified their responses to what they considered to be more socially acceptable. Further qualitative enquiry would be necessary to explore this theory, but investigators who conduct research with adolescents should be aware that high levels of self-monitoring behaviour may manifest as social acceptability bias.

Clinical implications

Clinicians should appreciate that children with poor dental aesthetics may incur negative social judgements from their peers. It would appear that children are very aware of their own dental aesthetics irrespective of gender or social background (28). Furthermore, appearance is reportedly the most valued characteristic among adolescents (29). Shaw et al. (30) examined the issue of appearance-related bullying and found that comments about teeth were reportedly more hurtful than teasing about other features. Attitudes towards children with dento-alveaolar trauma has been little investigated

although one study found that children with a removable prosthesis, following incisor trauma, were subject to a high degree of teasing (31). Interestingly, dissatisfaction with dental appearance has been identified as the main reason for young people to seek treatment following incisor trauma (20). In view of these findings, every effort should be made to provide minimally invasive, but aesthetically optimal, restorative care for young patients. Continued improvement in composite materials and adhesive dentistry technology has made this goal an eminently achievable one. In addition, undergraduate and postgraduate curricula should include current psychosocial theory in relation to dental appearance and health. Most importantly, there needs to be greater awareness that clinicians have the ability to improve a child's dental appearance which may, in turn, improve that individual's life outcomes.

Research with children

This study strived to be inclusive of children at all stages and reflects a growing ethos to undertake research '*with*' children and not '*on*' children. Marshman et al. (32) conducted a systematic review of the child dental literature from 2000 to 2005, analyzing 3266 papers published in the English language. According to their criteria, only 0.3% of studies had fully and actively involved children. The same group (33) proposed a number of important considerations when undertaking research with children: language and setting being two important aspects. The present study tried to encompass these factors and used simple, understandable and child-friendly terminology. Furthermore, the setting (school classrooms) was a familiar environment to participants and not likely to cause anxiety, which may otherwise influence responses (34). The present study also engaged children in shaping and piloting the instrument, and the attribute terms were provided by children themselves. It is important that adult investigators do not impose their own terminology or points of reference when conducting research with children, as valuable insights may otherwise be missed.

Likert and visual analogue scales (VAS) are two commonly used approaches to capture responses in questionnaires. Van Laerhoven et al. (35) questioned 120 children after they had completed a Likert scale, a simple VAS or a numeric VAS. The children preferred the Likert scale over the two VAS measures as they found it easier to complete, thus a Likert scale was used in the present study. The development of this validated child-centred questionnaire may have applications in future dental appearance studies. An investigation of social judgements in relation to other commonly occurring dental differences, such as enamel defects, may also have important clinical and social relevance.

Limitations of the study

It is acknowledged that photographs are an artificial and incomplete representation of a living person. In real life, social judgements are reached through a complex interplay of dynamic factors, thus caution should be applied when interpreting results from photographic questionnaires (30). Furthermore, the study did not seek to understand why children made the choices they did for each of the photographic subjects. Future related research would benefit from an additional qualitative component. Feedback from the participants about their perceptions of the study process would also be helpful. Following on from this, it would have been interesting to know why year 7 participants did not rate the male subject in the fourth photograph as having a better social attribute score when incisor aesthetics were restored. However, it is possible that this was simply due to participant fatigue, and in retrospect, the sequence of the four photographs should have been randomized for different class groups.

An additional point to consider, with respect to the social attribute instrument developed by this study, was the relatively low mean scores given by participants to all subjects. These were found to range from 10–18, where a score of 36 would have represented the most positive social rating possible (Table 2). As the instrument had not been used previously, and there have been no comparable studies in a young population, we do not know whether such low scores are to be expected or not. In a similar study conducted in adults using photos of subjects with different tooth colour, the mean attribute scores were certainly more 'generous' across all subgroups (13). However, as our study was a comparative one, absolute scores are of secondary interest, and caution should be applied in interpreting the significance of the overall low ratings, without further supporting studies.

Conclusion

This study has found that 11- to 12-year-old children attribute negative personality characteristics to other children with visible incisor trauma. Interestingly, the converse was true for 14- to 15-year olds, and further enquiry is indicated to explain this surprising outcome. Nonetheless, in view of the potential for adverse psychosocial effects and life outcomes, every effort should be made to provide timely and aesthetic dental care for young patients with traumatized incisors.

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