

# Self-reported satisfaction with teeth and associated factors in 12-year-olds

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**Objectives:** To explore self-reported satisfaction with teeth in 12-year-old children, and to study whether satisfaction was associated with child characteristics, oral health behaviours and previous experiences with teeth and dental treatment. **Methods:** Data were retrieved from dental records of 4725 children and questionnaires including information on satisfaction with teeth, gender, parents' origin, parents' education, dental anxiety, tooth brushing frequency, use of dental floss, toothache, pain at last dental visit and caries. Informed consent was obtained from all participants. Data were crosstabulated and tested using Chi-square statistics and multivariable logistic regression. The study was ethically approved. **Results:** Most children (68%) were satisfied with their teeth. Children who were dissatisfied with teeth were more likely to have negative experiences with their teeth and dental treatment with higher probability of having experienced toothache (OR 1.6, CI 1.4-1.8), pain at last dental visit (OR 1.4, CI 1.2-1.6) or dental anxiety (OR 1.2, CI 1.1-1.4) than other children. In addition, children with caries in their primary (OR 1.4, CI 1.2-1.7) and permanent teeth (OR 1.2, CI 1.0-1.4) were more likely to be dissatisfied than those without caries. **Conclusions:** Most 12-year-olds were satisfied with their teeth. The strongest indicator for being dissatisfied was experiences with toothache, pain at last dental visit or caries while parents' origin and education were less important.

**Keywords:** Caries, children, dental anxiety, pain, self-reported satisfaction

## Introduction

Oral health is part of general health and well-being and contributes to the development of healthy children and adolescents (Sheiham, 2005). Up to the age of 12 years, most parents take care of their children's oral health (Christensen, 2004). After this age, children enter adolescence and gradually become responsible for own oral health and well-being (Broberg and Klingberg, 2017).

Adolescence is a sensitive developmental period in which puberty and rapid brain maturation lead to new behaviours (Viner *et al.*, 2012). Consciousness of body image and oral health increase during childhood, and early adolescence is a relevant age for studying satisfaction with teeth and oral health.

The term satisfaction with teeth and oral health includes several components. Satisfaction is a subjective term that includes all positive and negative experiences with teeth or oral health. Being satisfied with one's teeth includes for instance no pain, cavities, tooth discoloration and other issues related to oral health. Subjective well-being is usually measured with self-reports that evaluate teeth and oral health and one's own level of satisfaction (Diener 2000). In one study, two-thirds of adults reported satisfaction with their teeth. Satisfaction was related to various factors, such as education and economy, oral health-related factors, oral symptoms and functional problems caused by poor oral health (Ekbäck *et al.*, 2010). Another study including adolescents found that a quarter were dissatisfied with oral health. Satisfaction was linked to gender and ethnicity, perceived treatment needs, oral health impact on daily activities and clinical aspects, such as toothache, malocclusion and caries (Rebouças *et al.*, 2018). Studies of children's satisfaction with their teeth and

oral health have been conducted using parents' reports, but parental satisfaction is not necessarily valid as it may differ from children's opinions (Woodward *et al.*, 1996). During early life children have their own experiences with dental health and dental care that may influence their satisfaction with their teeth.

The use of single-item global indicators is one method to evaluate oral health (Locker and Gibson, 2005). While studies about satisfaction with teeth exist among adults, there is a paucity of studies on satisfaction with teeth in children and early adolescence.

The aim of this study was to explore self-reported satisfaction with teeth in 12-year-old children, and to study whether satisfaction was associated with child characteristic, oral health behaviours and previous experiences with teeth and dental treatment.

## Material and methods

In Norway, all children and adolescents below 19 years of age are entitled to dental treatment free of charge and nearly all children are enrolled. All 12-year-olds in one county, 7595 children, were invited and 4779 participated. Fifty-four children were excluded because of lack of data. The sample therefore included 4725 children.

Data were retrieved from dental records and questionnaires completed by the children in connection with routine examination. All examinations were performed in dental clinics in the dental services when the children were 12-years of age. The questionnaire included information about children's satisfaction with their teeth, child characteristics, oral health behaviours and previous experiences with teeth and dental treatment.

Satisfaction with teeth was reported as satisfied, unsure or dissatisfied. In the analyses, satisfaction with teeth was dichotomized as satisfied or dissatisfied (unsure and dissatisfied).

Child characteristics included gender, parents' origin, parents' education and dental anxiety. Origin of the parents was recorded according to country of birth. In the analyses, mother and father's origin was combined into one variable and dichotomized as both parents being of Western origin and one or both parents being of non-Western origin. Non-Western origin included parents born in Asia, Africa, South America, Central America and Eastern Europe. Parents' education was measured as number of years at school. Long education was defined as more than 12 years at school and short education as 12 years or less. Mother and father's education was combined into one variable and dichotomized as both parents having long education or one or both parents having short education. Dental anxiety was reported as absent, unsure, slightly or extremely anxious, and in the analyses dichotomized as no (absent, unsure) and yes (slightly, extremely).

Oral health behaviours included tooth brushing and use of dental floss. Tooth brushing frequency was reported as brushing twice daily, once daily, sometimes or never, and in the analyses dichotomized as twice daily or once daily or less often. Use of dental floss was reported as daily or more often, several times a week, once a week and less often, and dichotomized as once a week or more often or less than once a week.

Previous experiences included toothache, pain at the last dental visit and caries. Toothache was reported as no or yes. Pain at the last dental visit was reported as not at all, slightly or very painful, and dichotomized as no (not at all) or yes (slightly, very). Data on dentine caries in the primary teeth was obtained from dental records and reported as no or yes. Dentine caries was registered in the permanent teeth and dichotomized as no (caries-free) or yes (having caries).

Written and oral information about the diagnostic criteria for clinical caries was given to and discussed with the examiners before data collection. Agreement was examined using eight bitewing radiographs of permanent molars, with 12 approximal surfaces in each radiograph. A "gold standard" was developed based on the second and third authors' registrations and compared with the examiners' registrations. Intra- and inter-examiner agreements were calculated using Cohen's kappa. Mean intra-examiner and inter-examiner values were 0.69 (SD 0.16) and 0.69 (SD 0.17). Cohen's kappa values were categorised as substantial agreement (Landis and Koch, 1977).

Verbal consent was obtained from the children and the participants had the opportunity to refuse to participate or withdraw from the study whenever they wanted. In addition, written, informed consent was obtained from all parents. The investigation was approved by the Regional Committee for Medical Research Ethics in South-Eastern Norway (2013/1881).

Analyses were conducted using IBM SPSS Statistics for Windows, version 27 (Armonk, N.Y., USA). Data were cross-tabulated and tested with Chi-square statistics. Multivariable logistic regression analysis was performed with children's satisfaction with their teeth as the dependent

variable. Spearman's rank correlation was used to explore associations between the independent variables before the multivariable analysis was conducted. The level of statistical significance was set at 5%.

## Results

More than two-thirds of the 12-year-olds were satisfied with their teeth.

One-third of the children reported previous experiences with toothache, pain at last dental visit or caries in primary teeth (Table 1). At 12 years of age, 60% were diagnosed with caries in permanent teeth. Children who were dissatisfied with their teeth were more often girls, had unfavourable oral health behaviours or had negative experiences with teeth and dental treatment.

Table 2 shows results of multivariable analysis exploring the association between satisfaction with teeth and child characteristics, oral health behaviours, previous experiences with teeth and dental treatment. Children who were dissatisfied with their teeth were more likely to have experienced toothache (OR 1.6, CI 1.4-1.8) or pain at last dental visit (OR 1.4, CI 1.2-1.6) than other children. Dissatisfaction was more common among children who had been diagnosed with caries in their primary (OR 1.4, CI 1.2-1.7) or permanent teeth (OR 1.2, CI 1.0-1.4). More children who reported dental anxiety (OR 1.2, CI 1.1-1.4) were dissatisfied than other children.

## Discussion

This study aimed to explore self-reported satisfaction with teeth at 12-years of age, and to study whether satisfaction was associated with child characteristics, oral health behaviours, previous experiences with teeth and dental treatment. Most children were satisfied, and children who reported negative experiences with their teeth and dental treatment were more often dissatisfied than other children.

Fewer children who had experienced toothache, pain at last dental visit and caries were satisfied than other children. Toothache can be caused by a complex set of factors, for instance, dental treatment and oral conditions such as caries, dental abscess, dental trauma or tooth shedding. Previous studies have reported that adolescents who experienced toothache more often were dissatisfied with their oral health (Rebouças *et al.*, 2018). Toothache may lead to more dental treatment and increased dissatisfaction with well-being.

Caries in the primary and permanent teeth was related to being dissatisfied with teeth. One study has shown that treatment of caries improved satisfaction with teeth, smile and appetite in 6-7-year-old children (Alkarimi *et al.*, 2012), while another found no association between parental satisfaction with the appearance of the child's teeth and caries (Woodward *et al.*, 1996). Our results emphasise that previous experiences with teeth and dental treatment were related to children's satisfaction with teeth and should be considered when planning and conducting dental treatment.

More children with dental anxiety were dissatisfied with their teeth than other children. It is well known that dental pain and complications of tooth decay, being female and young age are related to dental anxiety in children (Smith

**Table 1.** Satisfaction or dissatisfaction with teeth among 12-year old children (n=4725).

	<i>All children</i>		
	<i>Satisfied</i>	<i>Dissatisfied</i>	
	%	%	%
Child characteristics			
Gender			
Boy	51	72	28#
Girl	49	63	37
Parents' origin			
Both Western	81	69	31#
One or both non-Western	19	62	38
Parents' education*			
Both long	54	69	31
One or both short	46	67	33
Dental anxiety*			
No	68	70	30#
Yes	32	63	37
Oral health behaviours			
Brushing			
Twice daily	81	70	30#
Once daily or less often	19	58	42
Flossing*			
Once a week or more often	36	70	30#
Less than once a week	64	66	34
Previous experiences			
Toothache*			
No	61	73	27#
Yes	39	60	40
Pain at last dental visit*			
No	76	71	29#
Yes	24	58	42
Caries in primary teeth*			
No	64	73	27#
Yes	36	60	40
Caries at 12 years of age			
No	40	71	29#
Yes	60	62	38

\* Reduced number because of internal drop-out.

#  $p < 0.05$ , Chi Sq.

and Heaton, 2003; Stenebrand *et al.*, 2013; Dahlander *et al.*, 2019). Dental anxiety in children may cause behaviour management problems and is associated with poor dental health conditions (Klingberg and Broberg, 2007). A study among adults has shown that individuals with severe dental anxiety were less satisfied with their teeth (Neto, 2017). Our results indicate that dental anxiety was related to 12-year-olds' satisfaction with teeth, and that dental personnel should minimize painful and aversive situations associated with dental treatment.

More children who reported unfavourable brushing and flossing behaviours were dissatisfied with their teeth. There is a paucity of studies on satisfaction with teeth in children and oral health behaviours. The explanation for the present findings may be linked to self-reinforcement. In this study, more girls reported dissatisfaction with teeth than boys. Previous studies have reported contradictory results (Ericsson *et al.*, 2012; Boeira *et al.*, 2016). An explanation may be that boys mature more slowly and

**Table 2.** Multivariable logistic regression analysis of dissatisfaction with their teeth among 12-year old children (n=4234).

	<i>Dissatisfied with teeth</i>	
	<i>OR</i>	<i>(95% CI)</i>
Child characteristics		
Gender		
Girl	<b>1.5</b>	<b>(1.3-1.8)</b>
Parents' origin		
One or both non-Western	1.2	(1.0-1.4)
Parents' education*		
One or both short	1.0	(0.8-1.1)
Dental anxiety		
Yes	<b>1.2</b>	<b>(1.1-1.4)</b>
Oral health behaviours		
Brushing		
Once daily or less often	<b>1.6</b>	<b>(1.4-1.9)</b>
Flossing*		
Less than once a week	<b>1.2</b>	<b>(1.1-1.4)</b>
Previous experiences		
Toothache*		
Yes	<b>1.6</b>	<b>(1.4-1.8)</b>
Pain at last dental visit*		
Yes	<b>1.4</b>	<b>(1.2-1.6)</b>
Caries in primary teeth*		
Yes	<b>1.4</b>	<b>(1.2-1.7)</b>
Caries at 12 years of age		
Yes	<b>1.2</b>	<b>(1.0-1.4)</b>

Bold text indicates confidence intervals do not include 1.

\* Reduced number because of internal drop-out.

are less concerned with dental health than girls, and that gender-stereotypes based on physical appearance still exist.

This study was based on data from the dental services and included a large group of 12-year-olds. One third of the invited children did not participate. Non-participation may cause selection bias. Selection bias may influence the level of variables but has less effect on associations between them (Nilsen *et al.*, 2009). In the sample, caries prevalence, parents' origin and educational level were similar to the national average (Statistics Norway<sup>a</sup>, 2021; Statistics Norway<sup>b</sup>, 2021; Statistics Norway<sup>c</sup>, 2021) so these results may be representative for Norway in general. Limitations such as nonresponse, misconceptions and errors like social acceptability bias are present in all questionnaire studies. The probability of reporting errors was considered limited as most questions were related to daily routines and used simple terms. A single-item was used to measure satisfaction with teeth. Single-item questions have been shown to be valid (Locker, 2008). To ask a single-item global oral health question at the time when the children undergo regular examination is inexpensive and straightforward. All dental personnel in this study had the same guidelines for caries registrations and calibration of the personnel showed substantial intra- and inter-examiner agreement (Landis and Koch, 1977).

This study showed that experiences with teeth and dental treatment influenced children's satisfaction with teeth. The results should be considered in treatment planning, since

they add important information to understand this age group. Dental personnel should minimise negative experiences in the dental setting before the age of 12 years by focusing on empathic communication, care and adequate pain control during dental procedures to maintain positive relationships to teeth and oral health in the future.

In conclusion, most 12-year-olds were satisfied with teeth. The strongest indicator for being dissatisfied with teeth was experiences with toothache, pain at last dental visit and caries while parents' origin and education were less important.

### Acknowledgements

The authors thank participants, management and examiners in the dental services in Akershus County for cooperation.

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