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Individual changes in dental fear among children and parents: A longitudinal study

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Abstract

Objective. The aim was to study longitudinal changes in dental fear among children and one of their parents separately for girls, boys, mothers and fathers over a 3.5-year period. ***Materials and methods.*** 11–12-year-old children in Pori, Finland (n = 1691) and one of their parents were invited to participate in this longitudinal study. Dental fear was measured in 2001, 2003 and 2005 when the children were 11–12, 13–14 and 15–16-years-old, respectively. The participants were asked if they were afraid of dental care (1 = 'not afraid', 2 = 'slightly afraid', 3 = 'afraid to some degree', 4 = 'quite afraid', 5 = 'very afraid' and 6 = 'I don't know'). The participants' gender was also registered. Mean values of the change scores were studied. Prevalence and incidence of dental fear and changes in dichotomized dental fear (responses 4–5 = high dental fear and responses 1–3 = low dental fear) were studied using cross-tabulations and Cochran's Q test. ***Results.*** Overall, the prevalence of dental fear slightly increased and female preponderance in dental fear became more evident during the follow-up. Of the mothers and children with high dental fear at the baseline, 24% and 56%, respectively, reported not to be fearful at the end of the follow-up. ***Conclusions.*** Dental fear seems to be more stable in adulthood than in childhood. Thus, it might be better to intervene in dental fear during childhood rather than during adulthood.

Key Words: *adolescent, dental anxiety, incidence, prevalence*

Introduction

The prevalence of 5–18-year-olds' self-reported dental fear has been reported to vary from 7.1–19.5% [1–5] depending on the age of the children, study design, methods used and measures of dental fear. Younger children are reported to be more fearful and more often fearful than older children [1,5,6]; however, Rantavuori et al. [7] have found opposite results. In their study, 21–36% of 3–15-year-old Finnish children reported feeling dental fear, dental fear being more frequent among 12–15-year-olds than 3–9-year-olds [7].

In nationally representative studies, the prevalence of adults' dental fear has been reported to vary between 12–45% [8–11] depending on population, age of the respondents and measure used. Younger age groups are reported to have more dental fear and more often dental fear compared to older age groups [11]. In a Finnish nationally representative study, 5–19% of 30-year-olds and older reported dental fear, dental fear being higher among the younger age groups [8].

Gender is evidently associated with dental fear among children [2,3,7,12], adolescents [11,13,14] and adults [8,11,15–17], with females being more likely to report dental fear than males. In a Finnish cross-sectional study [2], the gender differences in dental fear started to show during the teenage years: 15-year-old girls were more likely to report dental fear than boys, but gender differences were not found at

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younger ages. However, among over 65-year-old Finns, no gender differences in dental fear were observed [8].

Most reports on children's self-reported dental fear are from cross-sectional studies [1–7], whereas only few longitudinal studies of changes in children's self-reported dental fear have been published [18,19], particularly on under 16-year-old children [20]. No clear trends in the changes in dental fear have been observed, rather it seems to fluctuate: in longitudinal studies, self-reported dental fear has been reported to increase between the ages of 9–12 years [20] and to decrease in late adolescence between the ages of 15–18 years [18]. In longitudinal studies where parent-reported measures (which have been shown to be biased [21,22]) were used, children's dental fear increased between the ages of 5–9 years [23] but also decreased between the ages of 5–8 and 10–13 years [24]. In young adults, dental fear has been reported to increase between the ages of 18–26 years [25] and 18–24-year-olds have reported being more likely to become dentally fearful than older people, with a 5-year incidence of 12.2% [26]. Over time, among middle-aged to elderly women, dental fear has been reported to decrease [27]: over 65-year-olds have been reported to be less likely to become dentally fearful than younger women, with a 5-year incidence of 1.7% [26].

Gender has been reported to be associated with dental fear also in longitudinal studies. Females are reported to be more likely to be fearful than males [18,19,23–26,28]. Boys' dental fear has been reported to decrease between the ages of 5–8 and 10–13 years, but, for girls, the decrease in dental fear was not statistically significant [24]. To our knowledge, the incidence of dental fear has been reported separately for females and males only in one longitudinal dataset of 18–26-year-olds [25,28]. The incidence of dental fear between the ages of 18–26 has been reported to be 16.5%, while among males and females the rates were 14.7% and 18.4%, respectively [28]. To our knowledge, no longitudinal studies have reported the incidence of dental fear separately for girls, boys, mothers and fathers.

The aim was to study the longitudinal changes in dental fear and incidences of dental fear among children and their parents separately for girls, boys, mothers and fathers over a 3.5-year period.

Materials and methods

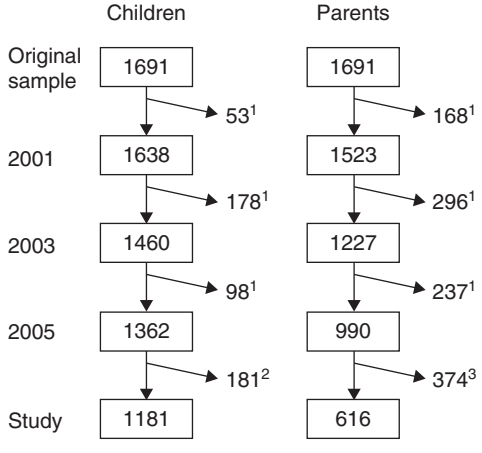
Study group

The study group consisted of all 11–12-year-old children in the Finnish city of Pori (n = 1691) and one of their parents, all of whom were invited to participate in this survey (except for mentally disabled and handicapped children attending special schools, who were excluded from the study group). This study was part of a randomized clinical trial for controlling caries, which also included an oral health promotion program. For details about the clinical trial, see Hausen et al. [29] and about the health promotion program, see Tolvanen et al. [30].

This study used a longitudinal design where the children's and one of their parents' dental fears were measured using a questionnaire. Dental fear was measured at three time points: in 2001 when the children were 11–12 years old, in 2003 when the children were 13–14 years old and in 2005 when the children were 15–16 years old. The mean age of the parents was 40 years. A description of the participants at different phases of the study is presented in Figure 1. Altogether, 1181 eligible children and 616 eligible parents were included in the analyses. Of the children, 52% were girls and, of the parents, 95% were mothers.

Questionnaires

The children and the parents answered the questionnaire independently of each other: oral health personnel administered the questionnaires for the children at school and the parents filled in the questionnaire at home. The parents' questionnaire was returned to the school in a sealed envelope. Dental fear was measured using a single-item question with Likert-like 5-point response categories. The children and their parents were asked if they were afraid of dental care ('Are you afraid of dental care?'). The Likert-like response alternatives were: 1 = 'not afraid', 2 ='slightly afraid', 3 = 'afraid to some degree', 4 = 'quite afraid', 5 = 'very afraid' and 6 ='I don't know'. Details of the procedures used in the baseline survey have been reported previously [31] and in the follow-up surveys the procedures used were similar.



[1]Lost or questionnaire unproperly filled
[2]I do not know-answers to fear questions
[3]I do not know-answers or not the same parent every year

Figure 1. Description of participants at different phases of the study.

Table I. Mean (95% CI) of changes in dental fear and the percentages of those whose dental fear changed for two or more points in 2001–2003.

2001–2003	Mean	95% CI	Decreased, % (*n*)	Increased, % (*n*)	Stable, % (*n*)
Boy	−0.17	−0.25– −0.09	8 (44)	3 (17)	89 (503)
Girl	−0.01	−0.09–0.08	7 (43)	6 (37)	87 (537)
Mother	0.06	0.00–0.12	2 (13)	4 (22)	94 (551)
Father	−0.03	−0.30–0.23	3 (1)	0	97 (29)

Statistical analyses

The changes in dental fear were analyzed in three ways separately for girls and boys and for mothers and fathers. First, the mean change scores with 95% CI were calculated, negative values indicating decreasing dental fear. Second, the percentages of subjects with increased, stable or decreased dental fear were calculated. A difference of two or more points on the scale of dental fear was considered a change. Third, the responses to the fear question were dichotomized to indicate clinical cases of dental fear.

Those responding 'quite afraid' or 'very afraid' were considered to have high dental fear and those responding 'not afraid', 'slightly afraid' or 'afraid to some degree' were considered to have low dental fear. Those responding 'I don't know' were omitted from the analyses. In previous analyses of the same data [21], dental fear was categorized besides this cut-off point also with a lower cut-off point (very afraid, quite afraid or afraid to some degree vs. slightly afraid, not afraid) and the sensitivity analyses (data not shown) showed that the results were not conditional on the cut-off point used in the categorization. Thus, in this study, dental fear was categorized according to the more stringent cut-off point (high dental fear).

Prevalence and incidence of dental fear were studied using cross-tabulations. The statistical significance of the change in dichotomized dental fear was studied using Cochran's Q test across time points. Data management and analyses were conducted using SPSS version 21.0. The Ethics Committee of the Northern Ostrobothnia Hospital District and the City of Pori gave their approval for the study.

Results

The level of dental fear was stable among a majority of the children and the parents throughout the study (Tables I and II). Between the years 2001–2003, the children's dental fear tended to decrease more among the boys than among the girls (Table I). Between 2003–2005, the children's dental fear tended to increase more among the girls than among the boys (Table II).

The prevalence of the children's high dental fear increased slightly from 11% to 13% during the follow-up ($p < 0.001$). Among the girls, the prevalence of high dental fear increased during the follow-up ($p = 0.001$), being 13%, 13% and 18% when the girls were 11–12, 13–14 and 15–16 years old, respectively. The incidence of the girls' high dental fear was 8% between 2001–2003 and 11% between 2003–2005. Of all responding girls, 5% had high dental fear throughout the study (Figure 2). Among the boys, the prevalence of high dental fear temporarily dropped during the follow-up ($p = 0.008$), being 8%, 5% and 8% when the boys were 11–12, 13–14 and 15–16 years old, respectively. The incidence of the boys' high dental fear was 3% between 2001–2003 and 6% between 2003–2005. Of all responding boys, 2% had high dental fear throughout the study (Figure 2).

Among the mothers, the prevalence of high dental fear fluctuated during the follow-up ($p = 0.043$, Cochran's Q test): in 2001, 2003 and 2005, the prevalence was 18%, 22% and 20%, respectively. The incidence of the mothers' high dental fear was 8% between 2001–2003 and 5% between 2003–2005. Of all responding mothers, 13% had high dental fear throughout the study (Figure 3). Among the fathers ($n = 30$), the prevalence of high dental fear in 2001, 2003 and 2005 was 7%, 17% and 10%, respectively. The change in high dental fear was not statistically significant ($p = 0.174$). The incidence of the fathers' high dental fear was 11% between 2001–2003 and 4% between 2003–2005. Of all responding fathers, 7% had high dental fear throughout the study (Figure 3).

Table II. Mean (95% CI) of changes in dental fear and the percentages of those whose dental fear changed for two or more points in 2003–2005.

2003–2005	Mean	95% CI	Decreased, % (*n*)	Increased, % (*n*)	Stable, % (*n*)
Boy	0.12	0.04–0.21	3 (16)	6 (35)	91 (513)
Girl	0.21	0.12–0.30	4 (23)	10 (65)	86 (529)
Mother	−0.04	−0.04–0.23	4 (24)	3 (17)	93 (545)
Father	−0.07	−0.47–0.34	3 (1)	3 (1)	94 (28)

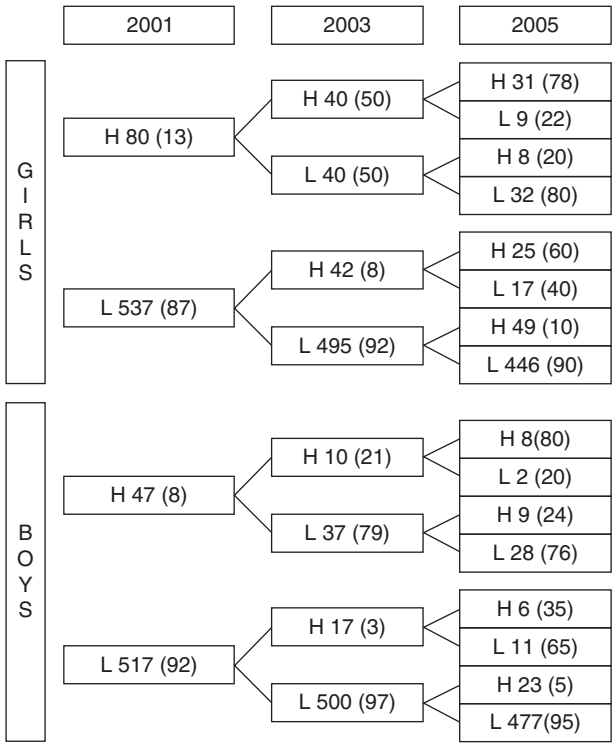


Figure 2. Numbers and percentages of the high-dental-fear (H) and low-dental-fear (L) children (n = 1181) separately for girls (n = 617) and boys (n = 564).

Of the children who initially reported high dental fear in 2001, over half (56% of the children; 51% of the girls and 64% of the boys) reported low fear or no fear at all at the end of the follow-up (Figure 2). Of the parents who initially reported high dental fear in 2001, 24% of the mothers and none of the fathers reported low fear or no fear at all at the end of the follow-up (Figure 3).

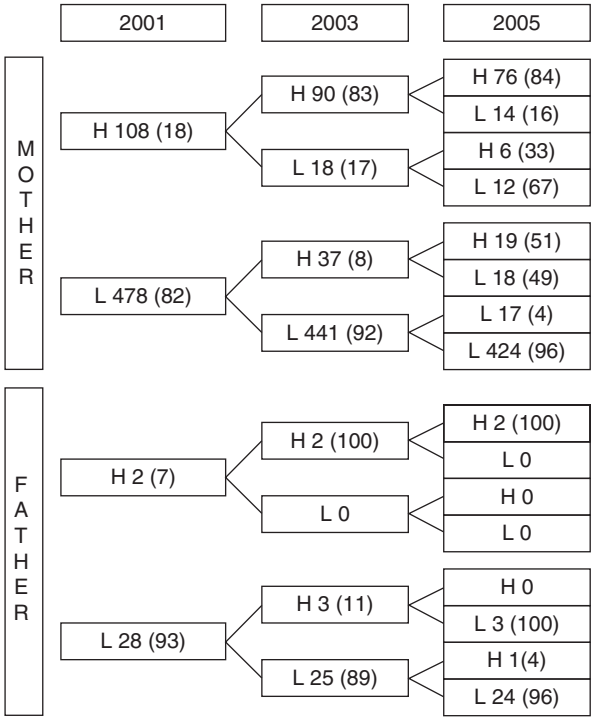


Figure 3. Numbers and percentages of the high-dental-fear (H) and low-dental-fear (L) parents (n = 616) separately for mothers (n = 586) and fathers (n = 30).

Discussion

Approximately one fifth of the children and one fourth of the parents reported high dental fear at some point of the study. Among the boys and the mothers, the prevalence of high dental fear did not seem to increase but rather fluctuated. Among the girls, the prevalence of high dental fear increased between the ages of 11–16 years. The incidence of the children's high dental fear was higher towards the end of the study period, when the children were 15–16 years old.

These results are in accordance with previous results [28] where the incidence of dental fear among 18–26-year-old females was higher than the incidence among males. However, the participants in the previous study [28] were older than in our study. For boys, these results are in accordance with previous results [24] where dental fear decreased between the ages of 5–8 and 10–13 years. However, in the previous study [24], change in dental fear occurred only among boys and no incidences were reported.

The level of dental fear was stable among a majority of the participants. However, of the children who initially reported high dental fear in 2001, fewer than half (44%) still reported high dental fear at the end of the follow-up, whereas of the parents who initially reported high dental fear in 2001, 76% of the mothers and all of the fathers reported high dental fear at the end of the follow-up.

As suggested in previous longitudinal studies [18,19,23–26,28], dental fear is associated with gender. High dental fear was almost twice more prevalent among girls and women than among boys and men. The difference in the percentages of participants reporting high dental fear between the genders started to show in this study earlier in adolescence than in a previous Finnish study [2]. The female preponderance in high dental fear became more evident as the follow-up proceeded from early adolescence to middle adolescence. This suggests that girls seem to be more vulnerable to developing high dental fear. The differences between the genders could also be partly due to social constructions [32] resulting in a response bias as fearfulness might be more acceptable for girls than for boys. In addition, hormones may play a role in the gender difference, as suggested in a previous follow-up study among pregnant families [33]. During pregnancy, dental fear of fathers increased, but mothers reported a temporary decrease in dental fear during late pregnancy—possibly due to pregnancy-related hormonal changes [33]. Furthermore, using hormone therapy in peri-menopausal and post-menopausal women has been reported to be

associated with anxiety disorders [34]. However, possible hormonal mechanisms behind these differences are not within the scope of this study and require further research.

The strengths of the study are the longitudinal data consisting of a large representative population and the fact that dental fear of children and their parents was measured independently of each other. It could be argued that dentally fearful are more likely to drop out but in this study the drop out of dentally fearful is unlikely as the questionnaires were administered in non-dental settings. However, the overall response rates each year of this study were good, being 93–98% for children and 78–90% for parents. The weakness of the study is that we did not originally require the answering parent to be the same at every time point. Moreover, the fathers were in a minority among the answering parents because we did not require both parents to answer the questionnaire. Thus, the results concerning the fathers must be interpreted with particular caution. All dental fear measurements have their limitations and there is no golden standard for measuring dental fear [35,36]. The number of dental fear questions included was limited due to the large number of questions included in the randomized clinical trial [29]. Dental fear was measured using a single-item question with Likert-like 5-point response categories. One question with a 3–5-point scale has been found to be valid in measuring dental fear [35,37].

According to this study, the percentage of those reporting high dental fear was more likely to decrease among 11–16-year-old children than among adults. Unpleasant experiences of dental treatment at a young age have been suggested to have a long-lasting effect on people with particular vulnerabilities in personality, for example, a tendency toward strong negative emotions and a tendency to be easily stressed [19]. Thus, for example, from the clinical point of view, it might be important to invest in increasing children's coping skills and control in dental situations. In clinical settings, it is important to take account of girls' higher risk for developing high dental fear in early adolescence. Furthermore, dental fear seems to be more stable in adulthood than in childhood. Thus, it might be better to intervene in dental fear during childhood rather than during adulthood.

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