

The Life-course Approach in Assessment of Dental Health: A Cross Sectional Study among Finnish and Turkish Pre-adolescents

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ABSTRACT

Objectives: Interest is growing on conceptualizing dental disease aetiology under the life-course approach. The aim of this study was to assess the association of dental caries experience with the major components of life-course approach, health- and behavioural capital, among Turkish and Finnish pre-adolescents, with different family-related characteristics, as this association has not been explored yet.

Methods: A cross-sectional study of Finnish (n=338) and Turkish (n=611) pre-adolescents was undertaken with questionnaires and oral health data.

Results: Turkish pre-adolescents, more dentally diseased (84%) than the Finnish (33%) ($P < .01$), had lower means of health (body height-weight) and behavioural (self-esteem, tooth-brushing self-efficacy) capital, ($P < .01$). Finnish pre-adolescents were less likely to live in two-parent families ($P = .001$) and spent less time with their mothers ($P < .05$). Turkish pre-adolescents with high levels of self-esteem were more likely to spend time with their mothers and less likely to live in families with three or more children (28%) than were their counterparts with low levels of self-esteem (41%). Such associations were not evident among Finnish pre-adolescents ($P > .05$). Health capital, in terms of body height, and family-related characteristics in differing patterns, contributed to DMFT, in common, among Turkish and Finnish pre-adolescents. Self-esteem, behavioural capital was explanatory variable for DMFT only for the Turks.

Conclusions: Dental health of pre-adolescents was associated with health- and behavioural capital in different pathways under the influence of family-related characteristics. The cooperation of paediatricians and dentists is vital in assessment of general and dental health in a holistic context throughout the life-course, to enhance the well-being of pre-adolescents. (Eur J Dent 2008;2:153-160)

Key words: Life-course approach; Dental health; Body height-weight; Self-esteem; Pre-adolescents; Family-related characteristics.

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INTRODUCTION

The life-course approach, recently popular in conceptualizing chronic disease aetiology, proposes assessing the effects of physical and psycho-social exposures on chronic disease risk at different stages of life such as gestation, childhood, and adolescence.^{1,2} Exposure to one factor at one stage of life is likely to be connected with exposure to other factors at another life stage,

and these exposures are likely to accumulate over the life-span of the individual.³

In the life-course approach, major determinants of current and future health are health- and behavioural capital, which are inherited and acquired during the early stages of life. These two types of capital develop through childhood into adolescence under the impact of family-related characteristics.⁴ Body height and weight are commonly used indicators of health capital.⁴ Nicolau et al⁵ has shown that adolescents with high rates of caries were more likely to be shorter in height, to be in a lower income group, and to have high levels of parental punishment. Likewise, babies with low birth weight and a poor socio-economic condition had high levels of caries at adolescence.⁶ Furthermore, children at an increased risk for obesity (increased body weight relative to body height) are more likely to have caries and to be from families in low socio-economic groups.⁷

Behavioural capital, a psychological resource, refers to the accumulation of social and cognitive skills such as self-esteem, self-efficacy, and coping strategies.⁴ These skills, interrelated with family-related characteristics, are among the important risk and protective factors in chronic-disease aetiology, especially for chronic diseases relevant to adolescents' eating disorders and poor dietary habits.^{8,9} There is some indication of an association between high self-efficacy and low caries¹⁰ and between poor family-related characteristics and high caries among pre-adolescents.^{11,12} However, assessment of the relation between individual's behavioural capital (e.g., self-esteem, self-efficacy) and his/her caries and family-related characteristics among children or adolescents has been a neglected issue.

The life-course approach is recommended for the prevention of obesity as well as of other chronic diseases by the World Health Organization (WHO).¹³ This approach is important among school aged-children in attainment of a common preventive approach for general and dental well-being,¹⁴ because increased body weight relative to body height (overweight and obesity) are more likely to be common among adolescents with higher caries,^{15,16} and with low self-efficacy beliefs and parental income,⁸ and with single mothers¹⁷ and with low self-esteem.¹⁸

The aim of our study was to assess the association of dental caries experience with health- and behavioural capital among Turkish and Finnish pre-adolescents with differing family-related characteristics.

MATERIALS AND METHODS

In spring 2004, a cross-sectional study of Finnish and Turkish pre-adolescents, 10- to 12-year-olds, was undertaken with questionnaires and oral health examinations in Munkkiniemi, (a suburb of Helsinki) (n=338) and Kadikoy (a managerial district of Istanbul) (n=611). In Turkey, two schools were selected by cluster sampling from high and low socio-economic suburbs to represent the general profile of that district. In Finland, two primary schools were randomly chosen to represent the pre-adolescents living in Helsinki. The sample selection is described elsewhere.¹⁹

Self-administered health behaviour questionnaires meant for these pre-adolescents and their mothers were revised after testing in a pilot study in 2003 on a sample of fourth-grade elementary school pre-adolescents (n=63) in Istanbul.¹⁰

The Turkish Ministry of Education, the local administration authorities, and the school authorities in Turkey as well as the Ethics Committee of Finland granted ethical clearance and written permission to conduct the study. All of the participating mothers and pre-adolescents provided written informed consent.

Two native speakers translated the questionnaires from English to Turkish and Finnish to ensure accuracy compared with the original forms in English. The oral health behaviour questionnaires meant for the pre-adolescents were completed in classes, whereas those for mothers were taken home and returned from their homes by the pre-adolescents during the following two weeks.

The pre-adolescents' number of decayed, missing, and filled permanent (DMFT) was measured by dental examinations in Turkey and Finland, based on WHO criteria.²⁰ In Finland, children under 18 years of age are entitled to comprehensive regular oral health care free of charge, and their dental health records are regularly collected by dentists in the municipal

public health centers.²¹ Each dentist follows detailed guidelines and treatment decisions outlined by the Helsinki City Health Department according to WHO criteria.²⁰ For this study, oral health data of Finnish pre-adolescents were taken from the records stored at the Helsinki City Health Department with permission.

The dental examinations in Turkey were carried out in the classrooms two weeks before the survey by two calibrated paediatric dentists who worked professionally in dental university clinics. The dental examinations were performed under field conditions using natural light. The pre-adolescent was seated in a chair with a high backrest; the examiner stood in front of the chair. Plane mouth mirrors and blunt dental probes were used for the examination. Following WHO recommendations,²⁰ the examiners first recorded caries on dental charts, in terms of DMFT/dmft (number of decayed, missing, and filled permanent/primary teeth) and DMFS/dmfs (number of decayed, missing, and filled surfaces of permanent/primary teeth). Those scores for each pre-adolescent were calculated, and lesions were recorded as present when a carious cavity was detected on manual inspection. In the present study, only DMFT scores were used. Of the study group, 10% were re-examined for inter-examiner and intra-examiner reliability of DMFT (0.89; 0.96, 0.92), respectively ($P < .05$). DMFT values of both groups were dichotomized into healthy (DMFT=0) and diseased (DMFT>0) subgroups for further analysis.

Behavioural capital measures were selected from the pre-adolescent oral health behaviour questionnaire that was designed to survey pre-adolescents' self-reported oral health and behaviour and psychological measures. The design of those measures, Tooth-brushing Self-efficacy (TBSES) and Modified Self-esteem were described in earlier studies.^{10,19} Sum scores for TBSES were coded as low and high by taking the medians as the cut offs;²² 4 for the Turkish and 9 for the Finnish pre-adolescents. The Modified Self-esteem Scale,²³ composed of nine items, each ranging along a three-point scale (agree=1 to disagree=3), was coded with medians as cut-off points, 4 for Turks and 5 for Finns.

A maternal oral health behaviour questionnaire, modified from Pine et al,²⁴ analyses family-related factors and oral health behaviours, along

with health capital measures (body height and weight) of pre-adolescents. Number of children in the family, family type, and time spent with mother (Table 1) were used as the family-related indicators related to family context as defined in the life-course approach.^{25,26} Mothers were asked in the maternal questionnaires to measure height to the nearest 0.1 cm and weight to the nearest 0.1 kg with pre-adolescents standing wearing only underwear in bare feet, standing erect against a wall-mounted measuring tape. Parents were not to include earlier measurements available, and to have new measurements after the arrival of the questionnaires at homes. Of the Turkish study group, 10% of mothers were asked to re-complete the maternal health behaviour questionnaires two weeks after the cessation of the survey. Intra-examiner reliability for the measurement of the height (the Spearman Brown coefficient) was $r_s = 0.789$, and was $r_s = 0.747$ for the weight ($P < .05$). Further, intraclass correlation was applied to test the reliability of the scales and it was $r_l = 0.788$ and $r_l = 0.746$ ($P < .001$), respectively, for the Turkish and Finnish pre-adolescents.

The Turkish response rate was 97% for the oral health behaviour questionnaire for the pre-adolescents ($n = 591$; 345 public- and 246 private school pre-adolescents) and 87% for that of the mothers ($n = 533$; 334 public- and 199 private school mothers). The participation rate totalled 95% for participation in dental examinations by the pre-adolescents ($n = 584$; 348 public- and 236 private school pre-adolescents). Finnish data showed a response rate for pre-adolescents of 65% ($n = 223$), and for their mothers 53% ($n = 180$). The Finnish dental examination rate was 65%. Boys comprised 57% of the Finnish and 51% of the Turkish population.

Descriptive statistics, frequency distributions were performed and for each further statistical analysis, those mother-pre-adolescent pairs not responding the body-height measures, 14% ($n = 74$) and 14% ($n = 25$) among Turkish and Finnish pre-adolescents, were extracted. Therefore mother-pre-adolescents pairs included in further analysis were $n = 459$ for the Turks and $n = 155$ for the Finns. Pearson's correlation and the contingency coefficient for determining associations between variables were applied. The Chi-square (χ^2) test by cross-tabulation was used to compare frequencies,

and the corresponding odds ratios were calculated. In addition, Student t-test was applied. The statistical significance was set at $P < .05$.

Logistic regression analysis was then conducted to determine the DMFT and its association with health- and behavioural capital measures of pre-adolescents, and family-related characteristics, after adjusting for gender and age.

RESULTS

Mean DMFT for Finnish pre-adolescents (0.74 ± 1.57) was lower than that of their Turkish counterparts (2.96 ± 2.03) ($P < .05$). Turkish pre-adolescents were more dentally diseased (84%) than were the Finnish (33%), ($P < .01$) (Figure 1).

Table 1 shows the measures of health- and behavioural capital and family-related characteristics. Mean body height and weight of Finnish pre-adolescents were higher than those of the Turkish ($P = .01$). High levels of self-esteem and tooth-brushing self-efficacy (above the median cut-off points) were reported at a similar percentage among Turkish and Finnish pre-adolescents ($P > .05$). Finnish pre-adolescents, compared to their Turkish counterparts, were less likely to live in two-parent families (OR=0.22: CI95% 0.14 -0.36), ($P = .001$) and spent less time with their mothers ($P < .05$).

Body height and weight of Turkish pre-adolescents were inversely correlated with number of children in the family ($r_p = -0.154$, $r_p = -0.216$, $P < .01$). Turkish pre-adolescents with high levels of self-esteem were more likely to spend time with their mothers ($P < .05$) and less likely to live in families with three or more children (28%) than were their counterparts with low levels of self-esteem (41%) (OR=0.57: CI95%=0.16-0.82), ($P = .002$). Such associations were not evident among Finnish pre-adolescents ($P > .05$).

Health capital, in terms of body height, and family-related characteristics in differing patterns, contributed to DMFT, in common, among Turkish and Finnish pre-adolescents ($P < .05$). Self-esteem, behavioural capital was explanatory variable for DMFT only for the Turks (Table 2).

DISCUSSION

Findings of the present study supported the life-course approach that health- and behavioural capital, along with family-related characteristics

contribute to well-being, and to dental health in the context of the present study, with different patterns among Turkish and Finnish pre-adolescents.

Body height was used as a potential indicator of the long-term, cumulative effects of inadequacies of health; weight was an indicator of malnutrition, revealing short- or long-term accumulation of weight.²⁷ Body height of Turkish and Finnish pre-adolescents was statistically significantly associated with DMFT, in common. This association, as also found by Nicolau et al,⁵ speaks for understanding the impact of family-related disadvantages, either economic or social or both, on developmental patterns and dental health of the pre-adolescent over the whole life span.

A higher number of children in the family reflects early-life socio-economic disadvantages in the life-course-approach; as family size grows, human and material resources diminish.¹⁹ In the present study, the Turkish pre-adolescents living in families with a higher number of children were more likely to have caries and shorter body height. This has also been shown among adolescents.⁵ Additionally, the negative correlation found between weight and number of children in the family among the Turkish pre-adolescents may result from the contribution of low socio-economic status to consumption of food inadequate in nutrition, as suggested earlier.^{28,29}

Finnish pre-adolescents with high levels of caries were more likely to have lower body height and higher weight, to come from single-parent families, and to spend less time with the mother. Finnish adolescents living in single-parent families, a situation increasing in Finland, are more likely to be at increased risk for health problems,²⁸ and financial difficulties.³¹ They are

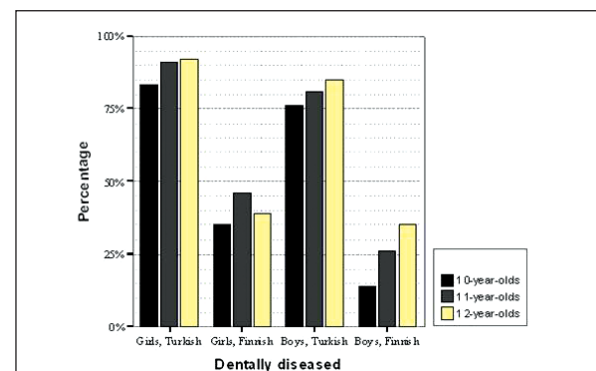


Figure 1. Distribution of dentally diseased (DMFT > 0) Turkish (n=459) and Finnish (n=155) pre-adolescents by age and gender.

also more likely to consume snacks if they spend less time with their parents.³² These patterns may signal the association between caries and obesity, as recently found by Willershausen et al,¹⁶ in the light of early studies that have found obesity and higher caries rates to be associated with family-related economic and social disadvantages such as single-parent family and poor parenting (e.g., parental punishment, less time spent with child).^{5,33}

To our knowledge, among school-aged children the relation between caries and self-esteem has not been investigated before. Studies on the self-esteem of children and adolescents in dentistry mostly focus on dental health behaviour and have found pre-adolescents and adolescents with low

levels of self-esteem brushing their teeth twice a day less frequently.^{23,34} Self-esteem, a component of behavioural capital, contributed to caries among Turkish pre-adolescents. The WHO suggested self-esteem to be an initiative of oral health-promoting schools toward adoption of positive health behaviours and enhancement of the oral health status of school children.¹⁴ This approach may be essential in reducing the gap in oral health inequalities among children and adolescents, because development of self-esteem is positively related to better family related characteristics such as socio-economic status³⁵ and to positive maternal influence such as in rearing attitudes.³⁶ The present findings are further evidence for the facts that having an increased number of siblings

Table 1. Dental health measures of Turkish (n=459) and Finnish (n=155) pre-adolescents along with health and behavioural capital measures and with family-related characteristics.

	Pre-adolescents		
	Turkish	Finnish	P
Health capital^a			
Height (cm)	X=142.7 (±9.3)	X=150.7 (±9.9)	0.001
Weight (kg)	X=37.7 (±8.8)	X=41.9 (±9.2)	0.001
Behavioural capital^b			
Tooth-brushing self-efficacy ^c			0.479
Low	54%	51%	
High	46%	49%	
Self-esteem ^c			0.538
Low	59%	57%	
High	41%	43%	
Family-related characteristics^b			
Number of children in family			0.466
1 or 2	64%	65%	
More than two	36%	35%	
Family type			0.001
Single	6%	23%	
Two-parent	94%	77%	
Time spend with mother on a school day			0.001
2 hours or less	12%	17%	
>2 but < 4 hours	21%	31%	
4-6 hours	33%	42%	
>6 hours	34%	10%	

Statistical evaluation: a: by student t-test, b: by chi-square test, differences by nationality c: coded as low and high by taking the medians as the cut offs.

and negative maternal influence (less time spent with mother) contribute to lower levels of self-esteem among Turkish pre-adolescents.

Eventhoughthesemeasurements of body height and weight by self-reports may be considered as possibly biased, parent-reported body measurements for adolescents have been shown to be reliable and valid.³⁷ As the aim concerned the association between health capital (body height-weight) and DMFT, separately for Turkish and Finnish pre-adolescents, the genetic or other factors that may lead to differences on health capital measures between these countries was out of concern. In both countries, oral health data were collected by use of standardized recording criteria that are also practical and reliable under field

conditions.²⁰ Since there is no national dental data bank in Turkey, the use of standardized diagnostic criteria facilitates other comparisons, as found earlier between two countries with differing oral health care systems, respectively similar to those in Turkey and Finland.³⁸ The family-related characteristics used in the present study are also used in cross-sectional studies utilizing the life-course approach,²⁵ generating hypotheses on different pathways to explain the associations.³⁹ Life-course factors can be measured by reliable self-reports among pre-adolescents, because children are already sufficiently aware of these factors in the beginning of pre-adolescence.⁴⁰

The limitation of this study is its cross sectional nature. There seems to be need for the follow-up

Table 2. Association of DMFT with selected parameters by means of logistic regression analysis,^a among Turkish (n=459) and Finnish (n=155) pre-adolescents.

	Turkish pre-adolescents			Finnish pre-adolescents		
	Adjusted OR	95% CI	P	Adjusted OR	95% CI	P
Health capital^b						
Height (cm)	1.02	1.01-1.13	0.003	1.10	1.02-1.18	0.009
Weight (kg)	1.03	0.99-1.08	0.144	0.98	0.85-0.96	0.002
Behavioural capital^c						
Tooth-brushing self-efficacy						
Low	1			1		
High	1.44	0.83-2.50	0.197	1.28	0.60-3.11	0.460
Self-esteem						
Low	1			1		
High	2.37	1.36-4.10	0.002	1.56	0.69-3.52	0.280
Family-related characteristics^c						
Number of children in family	0.59	0.42-0.85	0.001	0.82	0.51-1.31	0.400
Family type						
Single	1			1		
Two-parent	1.45	0.45-4.63	0.532	3.01	1.16-7.84	0.024
Time spend with mother on a school day	1.18	0.59-1.05	0.100	0.60	1.02-1.18	0.027
Gender						
Girl	1			1		
Boy	0.48	0.27-0.86	0.013	1.69	0.75-3.82	0.200
Age	0.75	0.49-1.12	0.159	0.73	0.44-1.20	0.220

a: Outcome: dentally healthy:DMFT=0 vs. dentally diseased:DMFT>0
 Statistical evaluation: b: by student t-test, c: by chi-square test, differences by nationality;
 Adjusted OR: by age and gender

studies considering the association of dental caries experience with health- and behavioural capital among pre-adolescents starting from childhood to identify and improve their well-being. Furthermore, the present study speaks for a limited number of participants and there is need for further research with larger sample size.

CONCLUSIONS

The dental health of pre-adolescents is interrelated with health- and behavioral capital in different pathways under the influence of social and economic factors experienced in family life. This interrelation functions in populations both with and without a wide range of socio-economic inequalities, such as are represented by Turkey and Finland. Specifically, in Turkey, with no prevention-oriented oral health care system and with social deprivation, the cooperation of pediatricians and dentists is necessary in assessment of general and dental health in a holistic context throughout the life-course, to enhance the well-being of pre-adolescents. Regardless of the complexity of the issue, interventions to promote pre-adolescent dental health through the life-course approach are warranted.

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