Self-Efficacy Perspective on Oral Health among Turkish Pre-Adolescents

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Objective: To assess the association between toothbrushing and dietary self-efficacy and oral health status and behaviour related to it among Turkish pre-adolescents.

Materials and Methods: A cross-sectional study of Turkish school pre-adolescents aged 10 to 12 (n = 611) by oral health examinations (OHE) and self-administered health behaviour questionnaire (PHBQ). The PHBQ, including new Toothbrushing (TBSES), and modified Dietary Self-Efficacy (DSES), was designed to survey pre-adolescents' oral, dietary and general hygiene behaviour by psychosocial factors. An OHE based on World Health Organization criteria was implemented. The participation rate was 97% (n = 591), and 95% (n = 584) for PHBQ and OHE. Multiple linear regression analysis, descriptive statistics, factor and item analysis, Pearson correlation coefficient, chi-square test, and Student t-test were applied.

Results: Pre-adolescents, mostly with regular toothbrushing habits (69% at least once a day) and high levels of irregular dental visits (79%) had as their mean DMFS figure 3.77 ± 3.37. Principal component analysis for TBSES and DSES revealed that four factors met the Kaiser Criteria, accounting for 50.2% of total variance. Scales with good internal consistency and test-retest stability were associated with professionally (DMFS) and self-assessed dental health ($p < 0.05$). A similar tendency appeared between self-assessed gingival health and DSES ($p < 0.05$).

Conclusion: Self-efficacy beliefs were associated with oral health and related behaviour among pre-adolescents. Further research is needed for implementation of scales to enhance oral health.

Key words: pre-adolescents, oral health, self-efficacy, Turkey

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The theory of self-efficacy was developed within the social cognitive theory in which health is determined by interactions between behavioral, environmental and individual factors (Bandura, 1977). Perception of self-efficacy can be expected to play a crucial role at adoption, maintenance and persistence of behaviours because people engage in activities that they believe they can manage but avoid the ones that they perceive as more than they can cope with.

Perceived self-efficacy is defined as the confidence that people can perform or engage in the healthy behaviour accross different challenging situations (Prochaska et al, 1996). It develops in the course of life and is affected by parents and peers and transition from pre-adolescenthood to adulthood is regarded to imply a growth of self-efficacy (Bandura, 1986). This period of life is also crucial in adoption of health behaviours that are unlikely to change beyond adolescence (Kelder et al, 1994).

Research on self-efficacy beliefs in pre-adolescents and adolescents suggests that they are positively correlated with health-related dietary patterns (Cusatis and Shannon, 1996; Parcel et al,

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1995; Reynols et al, 1999). Based on these studies and similar performed on adult tooth-brushing and flossing behaviours (Kneckt et al, 1999; McGaul et al, 1985; Stewart et al, 1997), assessment of oral health behaviours among pre-adolescents by using self-efficacy theory may provide better understanding of their development.

The present study was designed to assess for the first time the association between tooth-brushing and dietary self-efficacy and oral health status and behaviour related to it, among Turkish pre-adolescents.

MATERIAL AND METHODS

A cross-sectional study was performed on Turkish school pre-adolescents aged 10-12 (n = 611) in Kadiköy (a managerial district of Istanbul) by oral health examinations and questionnaires, in spring 2004.

Self-administered health behaviour questionnaires for pre-adolescents (PHBQ) were reconstructed after they were tested by a pilot study that was carried out on a sample of fourth grade elementary school pre-adolescents (n = 63) in Istanbul, in 2003.

The PHBQ, with new Tooth-brushing Self-Efficacy Scale (TBSES) and modified Dietary Self-Efficacy Scale (DSES) (Reynolds, 1993), was designed to survey pre-adolescents' oral, dietary and general hygiene behaviors by psychosocial factors. Social Cognitive Theory (Bandura, 1997) guided the development process of both TBSES (eight items) and modified DSES (11 items), whose scores were calculated as the sum of a five-point Likert Scale (2 = completely sure to –2 = completely not sure). The sum scores for TBSES and DSES were coded as low, and high by taking the median as the cut offs (4 and 7, respectively) (Kneckt, 2000).

In the pilot study, TBSES, and DSES with additional statements to the modified original copy (Reynolds, 1993) were tested for validity and reliability: Cronbach coefficient measures for TBSES ($\alpha = 0.78$), DSES ($\alpha = 0.80$) were high. The correlations between test and retest measures of the scales were acceptable, respectively ($\alpha = 0.89$, $\alpha = 0.82$, $p < 0.05$) with normal distribution (One-Sample Kolmogorov-Smirnow test, $p > 0.05$). The scales were retested longitudinally to assess their stability after six months and the correlations between test and retest measures were acceptable, respectively, ($\alpha = 0.41$, $\alpha = 0.46$, $p < 0.05$).

Based on the results of the pilot study, the questionnaires were revised. Back translation from and to Turkish were conducted by two native speakers to ensure comparability with the original forms in English.

The revised questionnaires were distributed and replied in the classes. Oral health examinations based on World Health Organization criteria (WHO, 1998) were carried out in the classrooms by two calibrated examiners two weeks before the survey.

The participation rate was a total of 97% (n = 591), 95% (n = 584) for PHBQ, and clinical oral-examinations. Percentages of boys and girls were 51% and 49%.

Professionally- and self-assessed oral health outcomes were analysed for any possible correlations with TBSES and DSES: 1) the professional one (DMFS) was dichotomised into diseased (DMFS = 0) and nondiseased (DMFS > 0). 2) Self-assessed dental health (DHS) by pre-adolescents was recorded on a five-point Likert Scale ranging from –2 (very bad) to 2 (very good). For the analysis, DHS was dichotomised into: 'at least average', which included worse, bad or average and 'above average', which included others. Self-assessed gingival bleeding was re-recoded three categories: 'never', including never or rarely, 'sometimes', and 'usually' consisting the usually and always.

Multiple linear regression was performed to determine whether TBSES, and DSES are related with the following independent variables: 1) general health habits, oral and dietary health behaviors: sleeping time, and frequency of taking bath per week, time spent on TV/computer games on a day, between-meal habits; frequencies of pre-adolescent tooth-brushing and dental visit; consumption of sweets or fizzy drinks/week, daily dairy consumption and pocket money spent on sweets/week. 2) socio-economic factors: pocket money/week, having dinner with the family or not, number of siblings at home.

In addition to multiple linear regression analysis, descriptive statistics, factor, and item analysis, Pearson correlation coefficient, chi-square test and Student t-test were applied.

RESULTS

Mean DMFS score for all the pre-adolescents was 3.77 ± 3.37. Of all pre-adolescents, 17% had

Table 1 Factor analysis of Tooth-brushing Self-Efficacy Scale (TBSES) and Dietary Self-Efficacy Scale (DSES) by VARIMAX rotated-solution

	Component**			
	T	P	DH	C
TBSES: "How sure that (you can brush your teeth)..."				
1. even in a hurry...	.59	*	*	*
2. even tired at night	.64	*	*	*
3. even when have lots of homework to do for the next day	.61	*	*	.28
4. even when ill, at nights	.61	*	*	.39
5. even when ill, twice a day	.72	*	*	*
6. even when on holiday/weekend.....	.64	*	*	*
7. tooth-brushing is part of daily routines like.....	.59	*	*	*
8. can not sleep in case of not brushing teeth before	.65	*	*	*
DSES: "How sure that you can...."				
1. eat vegetables with other food at lunch	*	.42	.31	*
2. resist to buy sweets when.....	*	*	*	.73
3. resist to buy fizzy drinks when.....	*	*	*	.79
4. drink water/milk instead of fizzy drinks even when...	*	*	.53	.39
5. eat fruits instead of sweets when...	*	*	.55	*
6. eat vegetables with other food at dinner	*	.52	.45	*
7. eat fruits instead of sweets between meals	*	*	.73	*
8. eat vegetables instead of fast-food between meals	*	*	.66	.27
9. eat at least two vegetables/day	*	.81	*	*
10. eat at least two fruits/day	*	.76	*	*
11. drink at least two glasses of milk/day	*	.52	*	*

* loadings below 0.25.
** T: Tooth-brushing, P: Preference of fruits, and vegetables to unhealthy food, DH: Daily life habit, C: Control over external events.

DMFS = 0 and the half reported their dental health (DHS) above average, while 41% reported never and 33% sometimes bleeding during tooth-brushing. Regular tooth-brushing was reported by 69% (at least once a day) and irregular dental visits (less than once a year) by 79%.

Item-total correlations had adequate consistency across every item for the TBSES and DSES within a range; r = 0.46 to 0.55, r = 0.38 to 0.53, respectively. Principal component analysis for TBSES and DSES revealed that four factors met the Kaiser Criteria (eigenvalue greater than-one rule). It accounted for 50.2% of the total variance. Table 1 displays the VARIMAX Rotated-solution.

The Cronbach coefficients showed acceptable evidence of internal consistency, for TBSES (α = 0.81) and DSES (α = 0.79). Among TBSES's scores (n = 578), the percentage of high levels was 54%. DSES (n = 529) showed similar tendency (55%).

DHS and DMFS, negatively correlated with each other ($r_s = -0.155$, $p = 0.01$), showed positive correlations with TBSES ($r_s = 0.425$, $p = 0.01$; $r_s = 0.086$, $p = 0.05$). Among DSES values, similar trend was evident only for DHS ($r_s = 0.346$, $p = 0.01$).

Pre-adolescents with negative perception of DHS "at least average" tend to have significant lower levels of TBSES (0.8 ± 7.14), and DSES (3.4 ± 8.72) than those perceiving positively "above average" (6.0 ± 6.65), (8.7 ± 8.26), ($p = 0.00$). In a similar way, DMFS, with general mean 3.8 ± 3.37, was significantly different between pre-adolescents with high and low levels of TBSES (3.3 ± 2.93; 4.1 ± 3.63, $p = 0.03$).

Self-assessed gingival health, correlated with DMFS ($r_s = 0.106$, $p = 0.05$), was not associated with TBSES; tendency of reporting never having had bleeding, among pre-adolescents, with high level of

Table 2 Characteristics of behavioural and social factors among pre-adolescents, based on their association with the self-efficacy scales

	Response rate (n = 611) %	n	%
Tooth-brushing Frequency	96		
≤ 1/week		89	15.1
> 1/week but not daily		94	16.0
1/day		195	33.2
2/day		210	35.7
Daily dairy consumption	93		
None		171	30.1
1-2 servings		302	53.2
3-4 servings		95	16.7
Consumption of sweets during the last week	93		
6-7 days/week		72	12.6
3-5 days/week		180	31.5
1-2 days/week		253	44.3
None		66	11.6
Weekly pocket money spent on sweets	94		
None		195	33.8
> 1/2 pocket money		222	38.5
= 1/2 pocket money		123	21.3
< 1/2 pocket money		37	6.4
Hours of watching TV/day	92		
Never		58	10.3
< 1 hour		137	24.3
1-2 hours		207	36.7
> 2 hours		162	28.7
Frequency of taking shower during the last 7 days	88		
0 or 1		210	39.0
2 or more		328	61.0
School performance	88		
Below average		131	24.3
Average		108	20.0
Above average		300	55.7

* sum scores of 6 items on vegetable, fruit, and dairy consumption/week (never to more than once day; 0-5) categorized as "> adequate", and "≤ adequate", by taking the median (7) as cut off.

TBSES, was similar to that of those with low TBSES ($p = 0.053$). Dissimilarly, negative association was observed between levels of DSES and self-reported gingival health, ($p < 0.05$).

The behavioral and socio-economic factors, with certain characteristics (Table 2), explained TBSES and DSES by their different pattern of associations (Table 3). The frequencies of tooth-brushing and

Table 3 Tooth-brushing Self-Efficacy (TBSES) and Dietary Self-Efficacy (DSES) measures among pre-adolescents (n = 382, n = 354) explained by selected variables, by multiple linear regression analysis

Pre-adolescents' TBSES- and DSES-related behavioural, social factors	TBSES 1 (R^2 = 0.283)			DSES (R^2 = 0.212)		
	β	SE	p	β	SE	p
Tooth-brushing Frequency	5.739	0.704	**0.000**	3.111	0.941	**0.001**
Daily dairy consumption	2.207	0.473	**0.000**	2.497	0.617	**0.000**
School performance	1.189	0.396	**0.003**	1.440	0.518	**0.006**
Frequency of taking shower	2.586	0.658	**0.000**	2.411	0.944	**0.011**
Hours of watching TV	–0.796	0.338	***0.019***	*	*	0.261
Consumption of sweets during the last week	*	*	0.754	1.488	0.533	***0.006***
Consumption of fizzy drinks during the last week	*	*	0.563	0.969	0.453	***0.033***
Weekly pocket money spent on sweets	*	*	0.380	–1.626	0.499	***0.001***
constant	–12.019	1.683		–0.560	1.977	

Statistically significant p-values in bold for common variables.
Statistically significant p-values in italics for separate variables.

taking shower, daily dairy consumption, and school performance, were the relevant factors in common ($p < 0.05$).

DISCUSSION

Psychometric tools, developed to assess two health specific self-efficacy variables, namely Tooth-brushing and Dietary Self-Efficacy Scales, indicated high-level internal consistency, test-retest reliability and evidence for construct validity. Homogenous measurements of self-efficacy through these scales were supported by high α reliability coefficients.

Based on principal component analysis, the significant association between perception of self-efficacy and tooth-brushing was found by principal component, tailoring to one particular domain of oral health behavior; tooth-brushing; as present study was supposed to measure. The situations that specifically affected the different dimensions of oral health behavior, including tooth-brushing, by self-efficacy beliefs have been studied among adults by Stewart et al (1997), and Syrjala et al (1999). Similarly, dietary self-efficacy beliefs, encompassing a variety of aspects of healthy eating habits in the present study, have been also investigated from different perspectives. Reynolds et al (1999) measured children's dietary self-efficacy beliefs in terms of consuming fruit and vegetables during meals, asking for and preparing fruits and vegetables; whereas Parcel et al (1995) measured children's confidence in eating lower fat and sodium foods; revealing to one aspect of complex dietary behavior. Such single- and multi-faceted measures of health behavior by self-efficacy beliefs enable to monitor the adoption of positive health habits or effectiveness of preventive health regimes and to identify potentially troublesome situations in adoption or maintenance of health behavior (Bandura, 1997), and present results were in line with that.

Based on Social Cognitive Theory, personal success related to positive health behavior may increase the perception of self-efficacy (Bandura, 1977); the sensation of having a healthy mouth with reductions in dental treatment needs, pain and comfortability at chewing foods among pre-adolescents may lead to self-evaluation process and increased awareness on personal oral health status and confidence in performing positive oral health behaviour. That was evident in the present study by the association between self-assessed dental health and tooth-brushing self-efficacy. Similar relation with dietary self-efficacy beliefs may suggest that oral health behaviors and dietary habits share the same domain as health enhancing behaviour (Donovan et al, 1993; Ebin et al, 2001; Roysamb and Wiik, 1998). Self-assessed gingival health did not relate to tooth-brushing self-efficacy beliefs, and this is most probably due to the fact that periodontal diseases at these very young ages do not usually lead to pain and loss of teeth. There-

fore, children may not sense the association between performance on tooth-brushing and bleeding of gums. This is also evident with the findings indicating the weak relation between self-assessed periodontal health and clinical records. Similarly, early studies have shown that periodontal health status assessed by adolescents was only partially compatible with clinical records (Kallio et al, 1994; Ostberg et al, 2003; Taani and Alhaija, 2003). The association between dietary self-efficacy scale and self-assessed gingival health may be explained in terms of dietary self-efficacy scale's association with healthy nutrition (Parcel et al, 1995; Reynols et al, 1999). In addition to that, healthy nutrition is found out to be closely related with periodontal health (Petti et al, 2000; Rugg-Gunn, 1993). However, there has not been any previous research on relation between self-reported oral health and self-efficacy beliefs among pre-adolescents, and further research is needed.

Cognitive-behavioural approaches based on increasing self-efficacy levels of individuals were successful in adoption and maintenance of positive oral health (Stewart et al, 1991; Wolfe et al, 1997). Similarly, increased levels of dietary self-efficacy beliefs were related to positively to consumption of healthy food and negatively to choice for snacks (Brug et al, 1995; Cusatis and Shannon, 1996). Under the light of these studies and self-efficacy being accepted as an important component of skill-based health education in health promoting schools (WHO, 2001), it could take an important role in setting up effective preventive oral health interventions among pre-adolescents.

However, there is need for assessment of factors associated with self-efficacy beliefs in oral health for better understanding especially among pre-adolescents. The explanatory factors of the tooth-brushing and dietary self-efficacy, in the present study, have been studied in literature from the perspective of their relation to oral health and its behaviour (Holund, 1987; Dummer, 1990; Kuusela et al, 1997; Marshall et al, 2003; Petridou et al, 1996; Rise et al, 1991). However, all the relevant determinants have been previously separately studied and no holistic study addressing all of them has been reported.

Self-efficacy beliefs studied were associated with oral health and related behaviour among pre-adolescents. The scales applied seemed to have potential for implementation. Further research is, however, needed.

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