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The Determinants of Self-Rated Oral Health in Istanbul Adults

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1. Introduction

No studies have been published on a comprehensive appraisal of the full range of factors that may affect Turkish adults' perceptions of their oral health status, as measured by a single item. Understanding the local context of self-rated oral health (SROH) and its determinants within Turkish culture will be important to develop oral health policy and to design oral health promotion programs for adults. Oral diseases, primarily dental caries and periodontal diseases, are major public health problems in Turkey (Gökalp et al., 2010). Oral health care resources are primarily allocated to curative care without an underlying oral health policy. The government's oral health care budget and the existing oral health services are inadequate to meet increasing oral health needs and demands of the adult population (Kargul & Bakkal, 2010). Utilization of oral health care services is low, and the oral health visits are usually problem-oriented (Gökalp et al., 2010; Kargul & Bakkal, 2010).

In Turkey, most studies of adults have focused dominantly on biological, clinical and behavioral health risk factors of oral diseases (Akarslan et al., 2008; Gökalp et al., 2010; Namal et al., 2008; Oztürk et al., 2008; Unlüer et al., 2007). In the past decade, few studies using validated subjective oral health measures have been conducted to verify the impact of different oral disorders and prosthodontic treatments on oral health quality of life in Turkish patients groups (Arslan et al., 2009; Baran & Nalcaci, 2011; Caglayan et al., 2009; Geckili et al., 2011). To the best of your knowledge, there is one published study that investigated the relationships among oral health beliefs, oral health behaviors, socio-demographic factors and SROH (Peker & Bermek, 2011).

SROH is an assessment of the functional, psychological, and social impact of oral disease and disorder on overall well being (Locker & Gibson, 2005). Although different approaches are available for evaluating self-perceived oral health, single-item indicators have frequently been used because they represent a valid and simple measure for evaluating oral health-related outcomes and summarizing oral health status (Dolan et al., 1998; Locker & Gibson, 2005). Most studies have been conducted with samples of adults, and findings indicate this measure is fairly stable over time (Peek et al., 1999), and positively associated with clinical assessment of oral health status (Gilbert et al., 1998; Kim et al., 2010; Pattussi et al., 2010; Peek et al., 1999). Over the past two decades there has been growing interest in examining individuals' SROH (Atchison & Andersen, 2000; Gilbert et al., 1998; Locker et al., 2005,

2009), mostly in adult and elderly populations in different countries. A single-item global self-rating is a valid, reliable measure of oral health (Pinelli & de Castro Monteiro Loffredo, 2007) and a good predictor of the use of oral health services (Abelsen, 2008; Araújo et al., 2009; Camargo et al., 2009; Gilbert et al., 2003; Locker & Miller, 1994; Matos & Lima-Costa, 2006; Maupomé & et al., 2004; Okunseri et al., 2008b; Pavi et al., 2010; Petersen et al., 2000; Thomson et al., 2010; Woolfolk et al. 1999; Wu et al., 2011). Nowadays, SROH has been widely used in nationwide and community-based surveys in many countries (Baker, 2009; Borrell & Baquero, 2011; Finlayson et al., 2010; Kim et al., 2010; Martins et al., 2010; Matos & Lima-Costa, 2006; Pattussi et al., 2010; Okunseri et al., 2008a, 2008b; Sanders & Spencer, 2005; Wu et al., 2011) and in the first and second International Collaborative study of Oral Health Outcomes (Arnljot et al., 1985; Chen et al., 1997). In many studies, SROH have been used to assess the perceived need for dental care and dental treatment outcomes (Jones et al., 2001; Lundegren et al., 2011; Martins et al., 2009, 2010; Seremidi et al., 2009) and to estimate the effect of oral conditions on people's quality of life and well-being (Benyamini et al., 2004; Dahl et al., 2011; Jones et al., 2001; Kieffer & Hoogstraten, 2008; Locker et al., 2005; Locker, 2009; Locker & Miller, 1994; Martins, 2009; Ostberg & Hall-Lord, 2011).

There are several reasons for investigating lay peoples' perceptions of their oral health. First, self-reported information has the advantage of being easier to gather in population-based samples compared to collecting data by clinical examinations. It also may be useful for estimating the resources needed to care for a specific population (Atchison & Gift, 1997; Jones et al., 2001; Pinelli & de Castro Monteiro Loffredo, 2007; Wu et al., 2011). SROH is used frequently in many national health surveys when clinical evaluations are too costly and has been shown to be a valid and useful summary indicator of overall oral health status (Locker & Miller, 1994). Secondly, it can be a useful tool for planning and monitoring health services and health promotion interventions. It also could provide benefits to health care providers in monitoring outcomes and evaluating treatments. (Locker, 1996). Thirdly, SROH is an assessment of the functional, psychological, and social impact of oral disease and disorder (Gilbert et al., 1998). Self-perceived oral health provides more information about how a certain disease affects an individual's life, rather than the objective measurements of this disease (Jones et al., 2001; Kim et al., 2010; Martins et al., 2009).

In Turkey, dental care for the adults needs to be improved and the identification of their self-perception of oral health could be the first step towards the development of oral health promotion programs aiming to increase awareness of oral health and to improve the oral health of Turkish adults (Gökalp et al., 2010; Kargul & Bakkal, 2010; Peker & Bermek, 2011). No studies have been published on a comprehensive appraisal of the full range of factors that may affect Turkish adults' perceptions of their oral health status, as measured by a single. Therefore, the aim of the study is to investigate the main factors associated with good SROH in Istanbul adults.

1.1 Conceptual framework

This study used a multidimensional model of oral health for measuring the association of tooth pain and dental problems with SROH (Locker, 1988) and an expanded version of the Andersen's Behavioral Model of Health Services Utilization (Andersen & Davidson, 1997; Baker, 2009).

A multidimensional model of oral health is comprised of five dimensions: namely - oral disease and tissue damage, oral pain and discomfort, oral functional limitation, oral disadvantage, and self-rated oral health (Gilbert et al., 1998; Locker, 1988). The Andersen's Behavioral Model consists of variables distributed into four levels: exogenous variables, primary determinants of oral health, health behaviors, and oral health outcomes. This model proposes that a person's characteristics, beliefs, and behaviors will predict one's perceptions of oral health (Andersen, 1995). These models as conceptual framework were used to assess differences in the multitude of factors influencing oral health and to explain population-based oral health behaviors and outcomes (Atchison & Gift, 1997; Baker, 2009; Gilbert, 2005; Martins et al., 2010, 2011).

In this study, these models were used to help develop the survey instrument and to guide data analysis, including the selection of variables for the logistic regression models. A set of independent individual-level variables were identified that may influence SROH: (1) exogenous variables (age, gender); (2) personal characteristics of primary determinants of oral health (predisposing socio-demographic and health beliefs factors - education, marital status, oral health locus of control (LOC) beliefs, perceived general health status; enabling characteristics - socio-economic status, having dental insurance; need factors - perceived dental treatment need, self-reported number of teeth, self-reported dental pain and dental problems, and (3) oral health behaviors (frequency of tooth brushing, dental attendance pattern, use of dental floss).

A number of studies showed that demographic and socio-economic variables such as gender, age, income and marital status have been associated with SROH (Borrell & Baquero, 2011; Finlayson et al., 2010; Kim et al., 2010; Okunseri et al., 2008a; Patussi et al., 2010; Ugarte et al., 2007; Wu et al., 2011).

Previous studies showed that individuals who perceive better oral health had a higher frequency of seeking preventive dental care (Araújo et al., 2009; Camargo et al., 2009; Gilbert et al., 2003; Matos&Lima-Costa, 2006; Okunseri et al., 2008b; Pavi et al., 2010; Thomson et al., 2010; Woolfolk et al. 1999; Wu et al., 2011). In addition, poor SROH was associated significantly with unfavorable oral health behaviors (Ekbäck et al., 2009; Kim et al., 2010; Locker et al., 2009; Okunseri et al., 2008b; Wu et al., 2011).

Associations between self-perceptions of general health status and SROH have been reported in several studies (Atchison & Gift, 1997; Benyamini et al., 2004; Okunseri et al., 2008a, b).

Psychosocial factors (e.g., self-esteem, mastery, personal control, life satisfaction, stress, sense of cohesion, depression, resilience, social support) were found to be related to SROH (Benyamini et al., 2004; Finlayson et al., 2010; Locker, 2009; Martins et al., 2011; Peker & Bermek, 2011; Sanders & Spencer, 2005; Wu et al., 2011).

SROH was also associated significantly with oral functional problems and concerns (Ekbäck et al., 2009; Gilbert et al., 1998; Kim et al., 2010; Locker et al., 2009; Ugarte et al., 2007).

2. Method

2.1 Data source and sample

This study used the household interview data which were collected during my PhD thesis. The survey was conducted by a market research company (Mayak) on a representative quota sample of 1200 Istanbul adults aged 18 years and over (response rate 88 %). This

cross-sectional survey was undertaken in November and December 2003. The present study sample was restricted to 979 adults who answered the question on the SROH. Data were collected through personal interviews and carried out in the participants' homes by eight trained professional interviewers. A detailed description of the sampling, design and procedures of the survey has been reported elsewhere (Peker&Bermek,2011). The Ethics Committee of the Faculty of Medicine, the University of Istanbul approved the study protocol.

2.2 Measures

The dependent and independent variables which were used in this study are summarized below.

2.2.1 Dependent variable

SROH was assessed by using a single item question "How would you rate your oral health?" with possible ordinal responses: excellent, very good, good, fair and poor (Dolan et al., 1998). The answers were later dichotomized for analysis purposes, with participants who rated their oral health as excellent, very good, or good categorized as good and those who rated their oral health as fair or poor categorized as bad.

2.2.2 Independent variables

Independent variables were examined across for domains: (1) exogenous variables (age, gender); (2) personal characteristics of primary determinants of oral health (predisposing socio-demographic and health beliefs factors - education, marital status, oral health LOC beliefs, perceived general health status; enabling characteristics - socio-economic status, having dental insurance; need factors - perceived dental treatment need, self-reported number of teeth, self-reported dental pain and dental problem, and (3) oral health behaviors (frequency of tooth brushing and dental attendance pattern).

Perceived dental treatment need was measured by the response to the question "Do you perceive any need for dental treatment at the moment?" The response was either yes or no.

A sum score of reported oral problems was computed from questions on broken tooth, position of teeth, swollen gums, bad breaths, and ulcers in the mouth, bleeding gums, colour of the teeth and gum abscess. This score was dichotomized as no reported oral problems vs. reported at least one oral problem. Self-reported number of teeth was based on response to the item "How many of your own teeth do you have?", which was dichotomized as less than 20 teeth vs. 20 or more teeth. Dental pain was assessed by asking whether the person had a toothache in the last 6 months. The response was either yes or no. Self-perceived health status was measured using a single-item self-rating of health (Benyamini et al., 2004; Borrell & Baquero, 2011; Okunseri et al., 2008b). Self-rated health (SRH) was based on responses to a single item ("How do you consider your health in general?"), which was dichotomized as Good (excellent/good/fair) vs. Bad (poor/very poor). The measure of self-reported oral health behaviors included two questions: tooth brushing frequency (\geq twice a day, \leq once a day); and dental attendance pattern (symptom-oriented / regular dental check-up at least once a year). Age was coded in three age categories: (18-30, 31-45, and 46 + years). Educational level was categorized into three groups according to years of completed schooling: primary (0-5 years), secondary (6-11 years), and higher (more than 11

years). Socio-economic status (SES) was measured by using the VERI Socio-Economic Status Index (Tüzün, 2000). It is a social stratification model developed by the Veri Research Company in Turkey, made up of an equal-weight combination of values based on average educational level and working status of the household members, life facilitating property ownership, area of residence and house ownership. SES was categorized into three groups according to VERI Socio-Economic Status Index score: low (4-9), middle (11-14), and high (15-20). Marital status was recorded as married and not married (never married, separated, widowed or divorced). Health insurance status was coded as uninsured and insured. The Multidimensional Oral Health LOC Scale, a validated measure using 26 items assessed on a 4-point scale ranging 'strongly disagree' to 'strongly agree' was used to measure beliefs about adults' control over oral health (Peker & Bermek, 2011). This scale consists of four subscales, namely the Internal, External-Dentist, External-Chance, and External-Socialization agents. These subscales indicate the degree to which a person believes that his/her oral health outcomes are controlled by himself/herself, by chance, by the dentist's recommendation and advice, by the dentist's preventive dental care, or by socialization agents (e.g., family member, friends, colleagues, relatives etc.). Subscale scores are calculated by adding the scores of all the items within a particular subscale, and dividing the sum by the number of items. Higher scores reflect stronger endorsement of the subscales. Cronbach's alpha of the scale in this sample was 0.71.

2.3 Data analysis

The data were analyzed by using SPSS version 11.5 for Windows (SPSS, Inc, Chicago, IL, USA). A combination of descriptive, bivariate and multivariate statistical methods was used for this analysis. Chi square test was used for categorical variables, and the independent sample t-test was used for continuous variables. Finally, a binary logistic regression analysis with stepwise backward elimination (likelihood ratio) was applied to determine the relationship between the dependent variable and independent variables. The variables that had shown statistical significance at the 5% level in the bivariate analysis with at least one of the outcomes studied were entered into the model for logistic regression analysis. Estimates of model fit (Omnibus test) and odds ratios (ORs) with their corresponding 95 percent confidence intervals (CIs) were computed. In all statistical analyses, the significance level was set to $p < 0.05$. Age, education, and oral health LOC beliefs scores were entered as continuous variables in the model. Nagelkerke R² was used to describe the proportion of the total variance explained by the multivariate models.

3. Results

The sample consisted of 492 men and 487 women and the mean (SD) age was 36.52 (13.58) years; 68% had formal school education equal to or less than 8 years, 57% had a moderate SES, 57% were married, and 40 % had no health insurance. Overall, 65% of the study sample reported having bad oral health, while 71% rated general health as good. 18% reported having had regular dental checkups, 35% brushed twice a day or more. 29% of adults reported having dental pain during the past six months, 36% had dental problems, and 27% reported no need for dental treatment. 67% reported that they had less than 20 teeth.

Internal consistency reliability, as measured by Cronbach's alpha, was 0.71 for the Multidimensional Oral Health LOC Scale, and 0.82 for the Internal subscale, 0.79 for the

External/Dentist subscale, 0.71 for the External/Chance subscale, and 0.72 for the External/Socialization agents subscale. The mean item subscale scores were 3.49 (SD=0.43, range = 1.82 - 4) for Internal, 2.77 (SD =0.57, range = 1-4) for External /Dentist, 1.97 (SD =0.57, range = 0.86 - 4) for External / Chance, and 2.70 (SD = 0.79, range = 0.50 - 4) for External/Socialization agents

Independent variables		Bad SROH n (%)	Good SROH n (%)	P value
Gender	Female	297 (46.8)	190 (55.1)	0.014
	Male	337 (53.2)	155 (44.9)	
Age	18-30 years	328 (51.7)	72 (20.9)	<0.001
	31-45 years	210 (33.1)	131 (38)	
	46 + years	96 (15.1)	142 (41.2)	
Education	Primary or less	418 (65.9)	244 (70.7)	0.022
	Secondary	153 (24.1)	58 (16.8)	
	Higher	63 (9.9)	43 (12.5)	
Dental attendance	Regular	97 (15.3)	79 (22.9)	0.003
	Symptoms-oriented	537 (84.7)	266 (77.1)	
Toothbrushing	≥ twice a day	208 (33.7)	127 (38.5)	0.143
	≤ once a day	409 (66.3)	203 (61.5)	

Table 1. Exogenous and behavioral characteristics of the studied sample according to SROH (n=979)

The frequencies of the independent variables were assessed in this study in relation to SROH are shown in Table 1 and Table 2. Health insurance (P<0.001), gender (P=0.014), age (P<0.001), education (P=0.022), marital status (P<0.001), dental attendance pattern (P=0.003), Internal (P<0.001), Dentist (P<0.001), and Chance (P=0.006) oral health LOC beliefs, the self-reported number of teeth (P<0.001), dental pain (P<0.001), and SRH (P= 0.003) were significantly associated with the SROH. SROH was not associated with SES (P=0.287), the frequency of tooth brushing (P=0.143), having dental problems (P=0.227), perceived need for dental treatment (P=0.160), and Socialization agents LOC beliefs (P=0.602). Stepwise binary logistic regression analyses were performed to examine the association the independent variables with good SROH. In the final model, only four variables were found to be associated with good SROH. This model indicated a good fit (Ombinus test: chi-square = 445.200, p<0.0001) and with correct classification of 76.8 percent of the adults. The final model explained 52.4 % of the variance in good SROH (Nagelkerke's R2 = 0.524). As seen in Table 3, having good SROH was associated significantly with increasing age (P<0.001; odds ratio [OR]=2.03; 95% confidence interval [CI]= 1.64 -2.53) regular dental attendance (P=0.013; odds ratio [OR]=0.75; 95% confidence interval [CI]= 0.59 -0.94), higher Dentist LOC beliefs (P<0.001; odds ratio [OR]=2.05, 95% confidence interval [CI]= 1.52-2.76), and lower Chance LOC beliefs (P=0.001; odds ratio [OR]=0.62, 95% confidence interval [CI]= 0.47-0.83).

Independent variables		Bad SROH n (%)	Good SROH n (%)	P value
SES	Low	154 (24.3)	96 (27.8)	0.287
	Moderate	371 (58.5)	184 (53.3)	
	High	109 (17.2)	65 (18.8)	
Health Insurance	No	280 (44.2)	109 (31.6)	<0.001
	Yes	354 (55.8)	236 (68.4)	
SRH	Bad	537 (84.7)	266 (77.1)	0.003
	Good	97 (15.3)	79 (22.9)	
Marital status	Married	315 (49.7)	241 (69.9)	<0.001
	Non -married	319 (50.3)	104 (30.1)	
Dental pain	Yes	486 (76.7)	206 (59.7)	<0.001
	No	148 (23.3)	139 (40.3)	
Self-reported number of teeth	0-19	316 (49.8)	341 (98.8)	<0.001
	20-32	318 (50.2)	4 (1.2)	
Self-reported dental problems	No	416 (65.6)	213 (61.7)	0.227
	Yes	218 (34.4)	132 (38.3)	
Perceived dental treatment need	No	177 (27.9)	82 (23.8)	0.160
	Yes	457 (72.1)	263 (76.2)	
Internal LOC beliefs (Mean ± SD)		3.44 (0.42)	3.57 (0.42)	<0.001
Dentist LOC beliefs (Mean ± SD)		2.67 (0.54)	2.93 (0.60)	<0.001
Chance LOC beliefs (Mean ± SD)		2.01 (0.54)	1.90 (0.60)	0.006
Socialization agents LOC beliefs (Mean ± SD)		2.71 (0.77)	2.68 (0.83)	0.602

SD, standard deviation

Table 2. Predisposing, enabling and need characteristics of the studied sample according to SROH (n=979)

Independent variables	OR (95 % CI)	P-value
Age (years)	2.03 (1.64-2.53)	<0.001
Dental attendance (0= regular, 1= symptoms-oriented)	0.75 (0.59-0.94)	0.013
Dentist LOC Beliefs (range=1-4)	2.05 (1.52-2.76)	<0.001
Chance LOC Beliefs(range=0.86-4)	0.62 (0.47-0.83)	0.001

CI, confidence interval; OR, odds ratio

Table 3. Stepwise binary logistic regression for the association between good SROH and the independent variables

4. Discussion

This study is one of the first to examine a global rating of oral health among Istanbul adults aged 18 years and over using a representative quota sample. SROH is subjective patient-centered measure of oral health which involve the individual in the decision making process and assessment of their oral health (Locker, 1988; Pinelli & Loffredo, 2007). Thus, the subjective evaluation of oral health conditions of adults affected by cultural beliefs and socio-demographic and behavioral factors is more important for designing effective oral health programs and services (Andersen & Davidson, 2007; Butani et al., 2008; Gilbert et al., 1998; Kaplan & Baron-Epel, 2003; Kim et al., 2010; Matthias et al., 1995; Pattussi et al., 2010). The focus of this study analysis centers around the relation of a comprehensive set of exogenous variables, personal characteristics of primary determinants of oral health (predisposing socio-demographic and health beliefs factors, enabling characteristics, need factors) and oral health behavioral characteristics.

Bivariate analysis showed that being female, having regular dental attendance, having health insurance, bad SRH, older age, being married, and having lower natural teeth were strongly associated with good SROH.

In contrast to previous studies (Gift et al., 1998; Kim et al., 2010; Okunseri et al., 2008b; Reisine & Bailit, 1980), we found that older adults were more likely to rate their oral health better than younger adults. Consistent with previous studies (Pattussi et al., 2010; Reisine & Bailit, 1980), we found that males tended to rate their oral health worse than females. There are some variations in the referents which were used for the SROH according to socio-demographic characteristics, with age being the main source of variation (Locker et al., 2009). Age and sex differences in perceived oral health could be attributed to differences in oral health related expectations (Ekbäck et al., 2009; Carr et al., 2001).

Istanbul adults with lower education level were more likely to report good SROH. It is known that the use of specific referents for the self-assessment health may vary by education (Krause & Jay, 1994). This finding was inconsistent with previous studies suggesting that less educated adults were more likely to rate their oral health as fair / poor (Atchison & Gift, 1997; Finlayson et al., 2010; Gift et al., 1998; Matthias et al., 1995). This discrepancy can be explained by the fact that Turkish adults with lower education level have lower levels of health literacy (Ozdemir et al., 2010). Recent studies suggest that health literacy is associated with educational attainment in self-rated health and in regular dental attendance pattern among older adults (Bennett et al., 2009). In addition, oral health literacy-related outcomes are risk indicators for poor self-reported oral health among rural-dwelling Indigenous Australians (Parker & Jamieson, 2010).

We found that adults who were married were more likely to report good SROH. Similar finding has been reported in a recent study conducted in Somali adults (Okunseri et al., 2008a).

Associations between SROH and socio-economic position markers (e.g., education, occupation, household income, household wealth, subjective social status and childhood socio-economic position) have been reported in several studies (Borrell & Baquero, 2011; Finlayson et al., 2010; Locker, 2009; Pattussi et al., 2010; Wu et al., 2011). In contrast, in the present study, SES (measured by the VERI Socio-Economic Status Index) is not associated with SROH. This discrepancy may be due to using composite SES index instead of well-accepted indicators of SES.

Consistent with previous studies (Abelsen, 2008; Araújo et al., 2009; Camargo et al., 2009; Gilbert et al., 2003; Locker & Miller, 1994; Matos & Lima-Costa, 2006; Maupomé et al., 2004; Okunseri et al., 2008b; Pavi et al., 2010; Petersen et al., 2000; Thomson et al., 2010; Woolfolk et al., 1999; Wu et al., 2011), we found that good SROH was strongly associated with regular dental attendance. It is known that an important part of maintaining good oral health is the use of appropriate dental services (Petersen & Yamamoto, 2005).

A recent qualitative study showed that adults rating their oral health as “excellent” were more likely to refer to health behaviors such as brushing and flossing twice a day and regular preventive dental visits (Locker et al., 2009). In previous studies, tooth brushing frequency was found to be related to SROH among both Korean adults aged 45-64 years (Kim et al., 2010) and Hmong adults living in the United States (Okunseri et al., 2008b). In contrast, in the present study and other ones (Martins et al., 2011), the frequency of tooth brushing is not associated with self-perception.

Dental insurance is associated with SROH consistent with previous studies (Coulter et al., 2004; Okunseri et al., 2008b). In our country, the national health insurance system was introduced in 2008 and covers oral health care. Recent study showed that if enrollees’ out-of-pocket costs were increased for dental care, there was a decreasing likelihood of their reporting excellent oral health (Coulter et al., 2004).

We found that dental pain was associated with poor SROH consistent with previous studies (Atchison & Gift, 1997; Locker et al., 2010; Martins et al., 2010). We found that SROH was not associated with perceived treatment need and having oral problems. However, these results were different from previous studies and reported that the perceived need was greater among individuals who perceived that their oral health was poor/very poor (Kim et al., 2009; Martins, 2009, 2010; Matos & Lima-Costa, 2006). SROH was associated with self-reported oral functional or psychological limitations (Atchison & Gift, 1997; Gift et al., 1998; Kim et al., 2009; Martins et al., 2009, 2010, 2011; Ojofeitimi et al., 2007; Seremidi et al., 2009). Adults who rated their oral health as “poor” were more likely to report having a current oral problem and perceived treatment needs (Locker et al., 2009). Self-perceived need for treatment was usually measured by asking people about the existence of any dental problems or by using constructed variables that combined the need for treatment with the existence of signs and symptoms of diseases, because functional and psychological impacts of the oral disease seem to be as important, if not more, as the clinical indicators while estimating the dental needs (Seremidi et al., 2009). In this study, self-perceived need for treatment was measured by asking whether or not the respondent had a need for dental treatment. Oral functional limitation related to oral health problems was not measured.

We found an inverse association between SROH and the number of self-reported natural teeth. This finding is inconsistent with previous studies showing that having higher natural teeth is strongly associated with good SROH (Jones et al., 2001; Okunseri et al., 2008 a,b; Ugarte et al., 2007). This may be explained by the fact the adults assessed their oral health positively when they could chew everything and were free from a long history of pain and other problems associated with the natural dentition (Kim et al., 2010; Locker et al., 2005; Matos & Lima-Costa, 2006; Martins et al., 2010, 2009). The decision to use the numbers of self-reported natural teeth as subjective oral health outcome in this study was made for a number of reasons. In this study, the association was further analyzed by creating two categories of remaining teeth (1-19 and 20-32 teeth), because these criteria for the number of teeth are widely used in research from several different age groups and in different

countries (Axelsson & Helgadóttir, 1995; Pitiphat et al, 2002; Ueno et al., 2010; Unell et al., 1997). Studies show that the number of natural teeth estimated by questionnaires is in good agreement with clinical examinations (Pitiphat et al, 2002; Unell et al., 1997) and patients' reported number of remaining teeth provide reasonably valid data on the actual number of teeth within a population group (Ueno et al., 2010). Furthermore, self-reported data would be used for measuring oral health conditions in populations at lower cost, less resource involvement and within shorter timeframes (Jones et al., 2001). Due to the limited budget and the deadline for the completion of the study, performing a clinical examination was not feasible in this study.

We found an inverse relationship between SROH and SRH. Although many studies suggest that the individuals who reported good/excellent oral health are more likely to report good/excellent general health (Atchison & Gift, 1997; Benyamini et al., 2004; Okunseri et al., 2008a,b), we found an inverse relationship between SROH and SRH. This result is consistent with previous studies suggesting that there is a deficit in perceptions of oral health relative to general health at all stages of adulthood and spanning the socio-economic spectrum (Sanders & Slade, 2006). Oral health and general health appear to be mostly unrelated in healthy population, because oral health and general health have different determinants (Kieffer & Hoogstraten, 2008).

In addition to material and behavioral factors, psychosocial factors may mediate the link between individual socio-economic status and health (Finlayson et al., 2010, Locker, 2009; Poortinga et al, 2008). Thus, many studies have examined the association between psychosocial factors (e.g.self-esteem, life satisfaction, stress, self-confidence, self-liking, self-competence, perfectionism, sense of cohesion, depression, resilience, social support) and oral health in adults (Benyamini et al., 2004; Finlayson et al., 2010; Locker, 2009; Martins et al., 2011; Wu et al., 2011). There are a few studies that have examined the relationship between personal control and SROH (Finlayson et al., 2010, Sanders & Spencer, 2005). In this study, the Multidimensional Oral Health LOC Scale was used to measure beliefs about adults' control over oral health (Peker & Bermek., 2011). The relationship between the SROH and LOC beliefs has been investigated only in a few studies (Kent et al., 1984; Peker & Bermek, 2011). Consistent with these studies, we also found that adults with high Dentist LOC and low Chance LOC were more likely to report good SROH. The findings of a recent study in Istanbul adults (Peker& Bermek, 2011) support the results of prior studies that health beliefs may mediate the link between individual socio-economic status and health (Broadbent et al., 2006; Butani et al., 2008, , Kiyak,1993; Poortinga et al., 2008). It is known that oral health beliefs influence adult's oral health behavior and self-ratings of oral health (Broadbent et al., 2006; Butani et al., 2008, , Kiyak,1993). Numerous studies showed that LOC beliefs were strongly associated with general and oral health behaviors (Bailey et al., 1981; Borkowska et al., 1998; Grotz et al., 2011; Mangelsdorff & Brush, 1978; Norman et al., 1998; Peker & Bermek, 2011, Steptoe & Wardle, 2001). Individuals who have strong beliefs in Internal control and in the control of Powerful others and weak beliefs in Chance control are likely to develop advantageous health behavior (Grotz et al., 2011; Norman et al., 1998; Peker & Bermek, 2011, , Steptoe & Wardle, 2001). An understanding of the role of oral health beliefs on self-ratings oral health may be useful in the design of oral health promotion programs and it provides clear guidance to assist oral health professionals to promote favorable oral health behaviors in their patients (Butani et al., 2008; Gilbert et al., 1998; Holt et al.,2003; Lee et al., 1993; Nakazono et al., 1997; Peker & Bermek, 2011).

The results of multivariate analyses showed that good SROH was strongly associated with regular dental attendance, older age, a higher Dentist LOC beliefs and a lower Chance LOC beliefs. The final model explained 52.4 % of the variance in good SROH (Nagelkerke's $R^2 = 0.524$). Two components of the Multidimensional Oral Health LOC Scale were predictors of good SROH among Istanbul adults. This is in contrast to a previous study that suggests that oral health beliefs represent a distinct dimension which may not be critical to a study of perceived oral health (Atchison & Gif, 1997).

4.1 Limitations of the study and implications for future research

There are several limitations to this study that should be considered in the interpretation of the results. This study did not include clinical measures and examinations by dentists, and therefore the results pertain only to the associations found between self-reports of oral health. Thus, future studies are needed to evaluate the relationships between the clinical measures and self-reported oral health measures in adult population. Future study is needed to assess the validity and reproducibility of self-reported oral health (Pinelli & de Castro Monteiro Loffredo, 2007). Data were collected via self-report questionnaires, which might have introduced a “social desirability” bias. The cross-sectional design did not explain causation and changes over time in SROH. However, it does suggest future research questions on the development of the model of SROH in adults. Longitudinal studies would increase the knowledge on determinants of SROH further. Due to the cross-sectional nature of the data, the time sequence between some covariates and oral health was not well defined. There may be unmeasured factors such as cultural attitudes toward oral health and dental care, oral health outcomes, clinical status, psychological factors, and institutional barriers that could contribute to the differences in SROH among populations. We used the composite SES index to measure the socio-economic status of respondents. Some studies of SES and health have suggested that income is the best SES predictor of the SRH and SROH (Locker, 2009; Nummela et al., Sanders et al., 2006, von dem Knesebeck et al., 2003). Thus, future studies are needed to examine the association between income and SROH.

Further qualitative studies are needed to investigate the referents and meanings that underlie SROH and to examine the relationship between SROH and SRH among adults.

To measure the clinical, functional and psychosocial outcomes of oral disorders, future studies should be focused on the relation of SROH to the clinical measures and comprehensive subjective oral health measures. In addition, future studies using a combined measure of perceived need of any dental care may provide more detailed information about the relationship among SROH, self-perceived need for treatment and oral functional limitation (Seremidi et al., 2009).

5. Conclusions

This study is one of the first to examine a global rating of oral health among Istanbul adults aged 18 years and over using a representative quota sample. Almost half of the study sample rated their oral health as bad. Older age, regular dental visit, a higher Dentist LOC beliefs and a lower Chance LOC beliefs are significantly associated with good SROH. Oral health programs and services should not only target treatments for dental disease, but should also include component that determine the subjective evaluation of oral health conditions of adults affected by cultural health beliefs, socio-demographic and behavioral

factors. There is no oral health policy emphasizing prevention-oriented dental care and regular dental visit in Turkey. The results of this study could provide helpful information for oral health professionals to develop national oral health policy. Taking into account the oral health LOC beliefs that reinforce a good SROH may help the oral health professionals and dental health educators to develop health promotion programs. Age – specific oral health education and promotion programs is a good starting point for increasing oral health awareness and knowledge about the associations between oral and general health as well as improving regular dental attendance of Istanbul adults.

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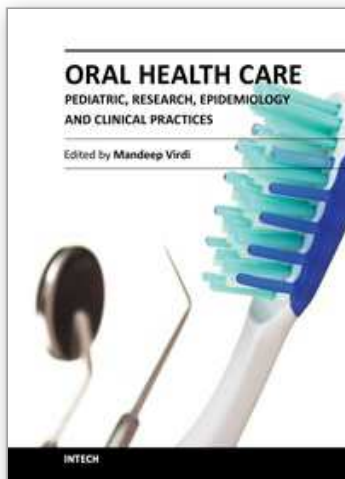
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Oral health care in pediatric dentistry deals with complete oral health, including preventive aspects for children right from their conception to adolescence, encompassing all the spheres of dentistry including various specialties. It also includes planning a preventive program at individual and community levels. The current research interests in oral health care include studies regarding the role of stem cells, tissue culture, and other ground-breaking technologies available to the scientific community in addition to traditional fields such as anatomy, physiology, and pharmaceuticals etc of the oral cavity. Public health and epidemiology in oral health care is about the monitoring of the general oral health of a community, general afflictions they are suffering from, and an overall approach for care and correction of the same. The oral health care-giver undertakes evaluation of conditions affecting individuals for infections, developmental anomalies, habits, etc. and provides corrective action in clinical conditions. The present work is a compendium of articles by internationally renowned and reputed specialists about the current developments in various fields of oral health care.

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