

# Oral health related attitudes and behavior correlated with gender. An item-level analysis using the Hiroshima University Dental Behavior Inventory

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**Abstract.** Objective: To investigate inter-gender differences as they are reflected in the oral health related attitudes and behaviors. Material and method: This is a one time, transversal correlational study. 318 participants from Romania with no dental specific education took part in the research, well balanced between female (175 participants, 55.03%) and male (143 participants, 44.97%). The mean age of participants was 22.79±5.93 years, with mean age for females 23.26±6.36 years, and mean age for males 22.20±5.31 years. A Romanian translated and validated version of Hiroshima University Dental Behavior Inventory (HU-DBI) questionnaire was used to measure the respondents' behavior and attitudes regarding their oral health actions. Results: For 7 out of 12 scored items, female participants performed better than male participants. The chi-square test analysis revealed significant differences only for one of the 12 HUDBI's scored items – item 15 “I put off going to dentist until I have a toothache” where the ‘correct’ answer was recorded for N = 94 (53.71%) in females and N = 60 (41.96%) in males – p=0.037. The smallest difference in percentages between females and males was discovered for item 11 “I think I can clean my teeth well without using toothpaste” where the correct answer was recorded only by N = 36 (11.32%) of the entire population with the females scoring N = 19 (10.86%) and males N = 17 (11.89%) – p=0.773. The totality of women ‘correct’ respondents across all 12 items represented 148 (47% of 318) as compared to only 76 (24% male respondents). Conclusion: Our study revealed high differences at item level “correct” responses, mildly favoring women with respect to displaying better oral health attitudes and behavior, but without statistically or clinically relevant gender differences.

**Key Words:** gender, oral health attitudes and behavior, HU-DBI, Romania

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## Introduction

Oral hygiene and home practices, care seeking and injury control practices, are amongst the most important individual behaviors which affect oral, dental, and craniofacial health, and there is consistent empirical evidence that toothbrushing improves oral health (Gaare et al 1990; Damle et al 2014; D’Cruz & Aradhya 2013). In turn, the individual’s practices, including those regarding one’s oral health, are also vastly influenced by the socio-cultural background (Lee & Kiyak 1992; Kiyak 1993; Diehnelt et al 1990; Andersen & Davidson 1997; Aday & Forthofer 1992). Adequate information and instruction also has a significant effect on acquiring healthy behavior (Oliveira et al 2002). Moreover, empirical evidence was found that the oral health-related attitudes and behaviors are learned in family (Okada et al 2002; Okada et al 2008) as well as in school (Al-Sadhan 2003).

Amongst the plethora of studies that investigated the individuals’ behavior and attitudes, the vast majority of those studies that used self-reported instruments employed Makoto Kawamura’s Hiroshima University Dental Behavior Inventory (HU-DBI) (Kawamura 1988). With specific regard to the individual’s attitudes and behaviors investigated using HU-DBI, significant cultural influences were recorded as well as between various ethnic and cultural groups (Kawamura et al 2001; Kawamura et al 2002; Komabayashi et al 2005; Polychronopoulou & Kawamura 2005).

Whereas (culturally) sharing knowledge and information is useful to describe and make things known, the extent to which one is proficient in a certain behavior is a function of both practice and quality of learning, as a process. For instance, studies regarding the attitudes and behaviors investigated using HU-DBI showed that not only dentistry students perform better than

Table 1: Items of HU-DBI

Item code	Item content
it_1	I don't worry much about visiting the dentist
it_2	My gums tend to bleed when I brush my teeth (D)
it_3	I worry about the color of my teeth
it_4	I have noticed some white sticky deposits on my teeth (A)
it_5	I use a child sized toothbrush
it_6	I think that I cannot help having false teeth when I am old (D)
it_7	I am bothered by the color of my gums
it_8	I think my teeth are getting worse despite my daily brushing (D)
it_9	I brush each of my teeth carefully (A)
it_10	I have never been taught professionally how to brush (D)
it_11	I think I can clean my teeth well without using toothpaste (A)
it_12	I often check my teeth in a mirror after brushing (A)
it_13	I worry about having bad breath
it_14	It is impossible to prevent gum disease with tooth brushing alone (D)
it_15	I put off going to the dentist until I have tooth ache (D)
it_16	I have used a dye to see how clean my teeth are (A)
it_17	I use a toothbrush with hard bristles
it_18	I don't feel I have brushed well unless I brush with strong strokes
it_19	I feel I sometimes take too much time to brush my teeth (A)
it_20	I have had my dentist tell me that I brush very well

Note: Items marked with (D) are reversed scored (i.e., get points for expressed disagreement), and items marked with (A) are scored directly (i.e., receive points for expressed agreement). Only items marked (D) or (A) are scored.

students with education not related to dentistry (Baseer 2013), but they also perform better than those from related domains, such as medicine (Al Kawas et al 2010).

The aim of our research was to find how gender affects oral health attitudes and behavior and how our findings relate with other results in literature.

## Material and methods

A one time, transversal correlational study was employed during May-August 2016. Data collection was done using an on-line questionnaire hosted on Google Forms™. The link for the questionnaire was distributed using Facebook™ and word-of-mouth. Also pen and paper questionnaires were used. A sample of 318 individuals obtained by snowball sampling took part in the research. The participation was open and voluntary, with a minimum age of 18, chosen for legal reasons pertaining to the participants' informed consent. The participation resulted was well balanced, even if this was not the initial intent between female (175 participants, 55.03%) and male (143 participants, 44.97%). The mean age of participants was 22.79±5.93 years, with mean age for females 23.26±6.36 years, and mean age for males 22.20±5.31 years. The consent of participants was obtained for the study protocol and the questionnaire approved by the Ethical Committee of "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania.

A Romanian translated and validated version (Dumitrescu et al 2007; Truță & Milicescu 2015) of HU-DBI questionnaire (Kawamura 1988) was used to measure the respondents' behavior

and attitudes regarding their preventive oral health actions. HU-DBI is a self-reported questionnaire, which consists of 20 (see Table 1) dichotomous or binary items, with forced 'yes' or 'no' responses. Only 12 out of the 20 total items are scored, and half of these 12 are reversed. Items such as "I brush each of my teeth carefully" obtain one point for expressed agreement, whereas items such as "I put off going to the dentist until I have a tooth-ache" get one point for expressed disagreement. Thus, one can obtain a maximum score of 12 points and higher scores reflect better oral health attitudes and behavior. The data regarding the respondent's age, gender was gathered in the demographics section of the questionnaire.

The data processing was done using IBM's SPSS version 23. The first data cleaning consisted in removing the unengaged respondents and those with too many missing responses. A threshold of 5% missing responses was established and where it was possible, the respondents under this threshold were contacted to provide further clarification on their missing answer. A series of chi-square analysis for each item scored for the HU-DBI questionnaire was conducted with a significant threshold at  $p < 0.05$  level.

## Results

The item-level analysis showed that for 7 out 12 scored items, female participants performed better than male participants. With respect to both genders, items 12 ("I often check my teeth in the mirror after brushing"), 2 ("My gums tend to bleed when I brush my teeth"), 10 ("I have never been taught professionally

Table 2. Chi-square tests

Item	Number and percent of participant's correct responses				Chi-Square	
	Female	Male	Total	Diff	Value	p
	N(%)	N(%)	N(%)	N(%)		
it_12	151 (86.29%)	112 (78.32%)	263 (82.7%)	12.26%	3.489	0.062
it_15	94 (53.71%)	60 (41.96%)	154 (48.43%)	10.69%	4.355	0.037
it_10	107 (61.14%)	77 (53.85%)	184 (57.86%)	9.43%	1.718	0.19
it_9	91 (52%)	63 (44.06%)	154 (48.43%)	8.81%	1.988	0.158
it_6	81 (46.29%)	58 (40.56%)	139 (43.71%)	7.23%	1.049	0.306
it_8	83 (47.43%)	60 (41.96%)	143 (44.97%)	7.23%	0.952	0.329
it_2	110 (62.86%)	96 (67.13%)	206 (64.78%)	4.40%	0.631	0.427
it_14	97 (55.43%)	85 (59.44%)	182 (57.23%)	3.77%	0.517	0.472
it_4	34 (19.43%)	23 (16.08%)	57 (17.92%)	3.46%	0.598	0.439
it_16	9 (5.14%)	14 (9.79%)	23 (7.23%)	1.57%	2.533	0.111
it_19	16 (9.14%)	19 (13.29%)	35 (11.01%)	0.94%	1.38	0.24
it_11	19 (10.86%)	17 (11.89%)	36 (11.32%)	0.63%	0.083	0.773

how to brush”) received highest scores, whereas items 11 (“I think I can clean my teeth well without using tooth paste”), 19 (“I feel I sometimes take too much time to brush my teeth”), and 16 (“I have used a dye to see how clean my teeth are”), were scored the lowest.

At item-level, significant differences were identified between the female and male groups for item 15, and less significant for items 14, 19 and 11.

An ordered listing of the number and percentage of ‘correct’ answers for scored items ordered best to worst for both genders was obtained (see Table 2). While N=263 (82.70%) of the respondents (N=151 (86.29%) for female and N=112 (78.32%) for male) are checking their teeth in the mirror after brushing only N= 23 (7.23%) of the respondents (N=9 (5.14%) for female and N=14 (9.79%) for male) use dye to see how clean their teeth are. The largest difference in percentages between females and males was discovered for item 15: “I put off going to dentist until I have a toothache” where the ‘correct’ answer was recorded for 53.71% in females and 41.96% in males. The smallest difference in percentages between females and males was discovered for item 11: “I think I can clean my teeth well without using toothpaste (A)” where the correct answer was recorder only by 11.32% of the entire population with the females scoring 10.86% and males 11.89%.

The chi-square test analysis revealed significant differences between females and males only for one of the 12 HUDBI’s scored items – item 15, where we have recorded  $p=0.037$ . The smallest difference was recorder for item 11 with  $p=0.773$ . However, it is important to observe that in terms of the magnitude of the differences of female vs male correct respondents, the totality of women correct respondents across all 12 items represented 148 (47% of 318) as compared to only 76 (24% male respondents).

## Discussion

While HU-DBI is a global scored computed out of 12 items in the questionnaire, the item-level analysis may serve to identify those specific attitudes and behaviors which contribute the most in inducing differences at group levels in global scores amongst

the research groups. Identifying relevant differences at item-level can serve to direct or target specific education training or information sessions regarding the corresponding ‘vulnerable’ attitudes and behaviors.

We found that female participants were more conscientious than their male counterparts especially for attitudes and behaviors such as reasons for a dental appointment (it\_15), self-image/looks (it\_12) and interest for professional guidance for teeth brushing (it\_10).

Women scoring better than men at the items with higher number of correct responses while men scored (marginally) better at the items where the number of correct responses were lower is evidence that overall gender is a factor in oral health attitudes and behavior.

While other studies employed participants with specific dental education (dental students and dental hygienists), our study focused on a more general population – with various areas and level of education. Albeit not similar ‘to the teeth’ with results obtained in previous research, our study is largely consistent with findings in mainstream research literature. For instance, we found that women tend to exhibit higher levels of dental self-care than their male counterparts, regardless of their education background, which is consistent with results regarding female vs male differences from other research (Al Kawas et al 2010). Also, partial similarities regarding answers to item 2 (“My gums tend to bleed [...]”) were found in Levin & Shenkman’s 2004 study regarding oral health in Israeli adults.

While the number of participant (size of population) provides good confidence level in the analysis, the value for p computed for chi-square tests at item level were close to the chosen significant threshold  $p=0.05$  and therefore must be interpreted with caution.

Our study results are consistent with other findings in literature, revealing high differences at item level “correct” responses ranging from 82.70% to 7.23% (Baseer et al 2013; Dumitrescu et al 2007; Levin & Shenkman 2004).

Such high differences at item level correct responses should motivate expert trainers who can benefit from this evidence that shows that not all attributes associated with the study of oral

self-care-related attitudes and behaviors need the same levels of attention. Information and training materials targeting specific oral health attitudes and behavior that both genders scored low should produce positive effects for the entire population.

## Conclusions

Various attitudes and behaviors contribute in different proportions to the overall variability identified at the level of global scale scores. This is important because such attitudes and behaviors are subject to change, if proper training and education is applied.

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