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Journal of Research in Health Sciences

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## Original article

# Evaluation of an Oral Health Intervention among Mothers of Young Children: A Clustered Randomized Trial

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## ARTICLE INFORMATION

### Article history:

Received: 03 February 2015

Revised: 10 March 2015

Accepted: 23 June 2015

Available online: 27 June 2015

### Keywords:

Early Childhood Caries

Infants

Theory of Planned Behavior

Randomized Controlled Trial (RCT)

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## ABSTRACT

**Background:** Oral health education for the mothers of very young children is important in reducing the risk of early childhood caries. This study aimed to evaluate the impact of an oral health intervention among mothers of 1-2 years old children.

**Methods:** This cluster randomized controlled trial (2012) was conducted among ninety mothers of 1-2 year old children. The setting of study was 10 child day-care centers out of 18 in Hamadan, western Iran. Day-care centers were randomly allocated into two groups: an intervention group (5 day-care centers, 45 mothers) and a control group (5 day-care centers, 45 mothers). Intervention consisted of three sessions, a booklet, and mobile phone text-message reminders. The primary outcome was change in cleaning the children's teeth, while the secondary outcomes were changes in Theory of Planned Behavior (TPB) cognitions. Questionnaires at baseline, 10 days, and 3 months assessed intervention effects. Data were analyzed using SPSS v.16. T tests, chi-square, and logistic and linear generalized estimating equations (GEE) regression were used to test intervention impact.

**Results:** At 10-day assessment, mothers in intervention group reported a significant difference in knowledge ( $P=0.001$ ), attitude ( $P=0.004$ ), perceived behavioral control ( $P=0.008$ ), and cleaning of children's teeth ( $P=0.011$ ). Also, at 3-month assessment compared to control group, the mothers in intervention group significantly improved in scores of knowledge ( $P=0.001$ ), attitude ( $P=0.001$ ), perceived behavioral control ( $P=0.001$ ), and cleaning of children's teeth ( $P=0.001$ ). However, the effect sizes were small to medium and ranged from 0.1 to 0.4 for all cognitions except knowledge (effect size > 0.70). Generalized estimating equations (GEE) showed that score of attitude and perceived behavioral control of intervention group improved between the two post-test assessments.

**Conclusions:** A brief multicomponent theory-based intervention among mothers of 1-2 years old children was effective moderately in improving cognitions and self-reported cleaning children's teeth.

**Citation:** Makvandi Z, Karimi Shahanjarini A, Faradmal J, Bashirian S. Evaluation of an Oral Health Intervention among Mothers of Young Children: A Clustered Randomized Trial. *J Res Health Sci.* 2015; 15(2): 88-93.

## Introduction

Early childhood caries (ECC) is a serious public health problem. Because of high prevalence, ECC has been considered to be at epidemic proportions in the developing countries<sup>1</sup>. Untreated caries can affect the quality of life of children through eating troubles, sleeping difficulties, insufficient nutrition and improper growth and development<sup>2</sup>. Despite the importance of ECC, neither WHO, nor the Iranian Ministry of Health and Medical Education has published any data about the oral health status of young children<sup>3</sup>. This may be due to the low attendance rates for routine monitoring. In Tehran the ECC prevalence in 12-15, 16-19, and 20-25 month-old children was 3%, 9%, and 14%, respectively<sup>3</sup>. Tooth decay in infants and toddlers is often referred to as Baby Bottle Tooth Decay. Previous investigations have revealed correlation between ECC and sleeping with a bottle and bottle-feeding<sup>4, 5</sup>. Besides,

prolonged or on-demand breast-feeding is associated with an increased risk of ECC, especially after the age of 12 months<sup>6</sup>. To prevent the development of the ECC, the American Academy of Pediatric Dentistry recommends that infant's gums should be cleaned with a soft toothbrush and water. Despite this recommendation, once daily cleaning was reported for 19% of the 12- to 15-month-old children and 18% of the 16-to 23-month-old children<sup>7</sup>.

Oral health promotion focusing on modifying the infant feeding practice and oral health care behaviors such as cleaning the infant's teeth is a valuable tool for improve the oral health status of children<sup>8, 9</sup>. Attempts to modify healthy behavior should be based on the underlying determinants of oral health behaviors. Theory guided interventions are more effective in achieving behavioral changes than are non-theory-based interventions<sup>10</sup>. However, a theory-based

approach in oral health education has not been widely adopted<sup>11</sup>. The most educational interventions for the prevention of dental problems are traditional, with a curative-restorative approach through paternalistic information giving by dental professionals<sup>11</sup>. On the other hand, only limited studies have assessed the effect of interventions on oral health behaviors of under three yr old children<sup>12-14</sup>. The well-known theory of planned behavior (TPB) has been used to explain health behaviors in over a thousand studies<sup>15</sup>. This theory has been significant predictor of oral health behaviors<sup>16, 17</sup>. TPB assumes that the proximal predictors of behavior are a person's intention to perform that behavior and perceived behavioral control (PBC). PBC refers to a person's perception of the ease or difficulty of performing a given behavior. Intention itself is proposed to be predicted by three determinates; attitude, PBC, and subjective norms. Accordingly, changes in behavior come after changes in intentions, whereas changes in intentions follow from changes in attitudes, subjective norms and PBC.

The aim of our study was to assess the extent to which the intervention changed the mothers' cognitive predictors as well as reported behavior of teeth cleaning of children aged 1-2 years.

## Methods

This study was a two-arm cluster randomized controlled trial (Registration code: IRCT2013031712456N1), with a 3-month follow-up, conducted in child day-care centers in Hamadan, Iran in 2012.

The research project was approved by the Ethics and Research Committee of Hamadan University of Medical Sciences (Number of the approval letter: d/p/16/35/9/2414). All participants gave written informed consent.

Participants were mothers of 1-2 years old children. Considering Rong et al' study<sup>12</sup>, the sample size was calculated to detect a difference of 18% brushing children's teeth between the intervention and control group, achieving 5% type I error (one- sided) and power of 80%. The final sample size required for this study was calculated to be 90. According to Hamadan's Behzisti Organization, there were 18 active child daycare centers in Hamadan City that had at least six 1-2 year- old children. We selected randomly ten out of these day-care centers based on Hamadan municipality areas. Then selected day- care centers in each of municipality areas were allocated to two groups of intervention (5 child daycare centers, 45 mothers) and control group (5 child daycare centers, 45 mothers). In each day-care center, eligible mothers of children 1-2 years old were selected randomly. Mothers were eligible for inclusion in the study if they i) were living with their child, ii) had a signed consent. The primary outcome was change in dental cleaning behavior, and the secondary outcome measures were changes in knowledge and cognitions of TPB. Variables were measured prior to receiving the intervention, at 10 days after intervention, and at 3 -months follow up. The questionnaires included attitude, perceived behavioral control, intention, knowledge, cleaning of children' teeth, and demographic questions. TPB cognitions (i.e., attitude, perceived behavioral control, and intention) were measured indirectly (i.e., belief-based) using a previous guideline<sup>18</sup>. Accordingly, based on salient beliefs identified through the literature review and the researchers' experiences, a 25- item questionnaire was developed. All

response options were on a five point Likert-type scale. Considering practical issues in designing the intervention, we did not aim to focus the change in subjective norms, so the measure of subjective norm was not assessed in this study.

**Attitude:** This measure consisted of four salient behavioral beliefs (Bb) of cleaning children's teeth such as "cleaning my child's teeth before sleep can help prevent tooth decay", multiplied with the four evaluations of behavioral outcome (Oe) items such as "preventing tooth decay in my child is an important issue". The following equation was used to calculate total attitude score. Total attitude score was obtained from mean of the following product:  $\Sigma (Bb \times Oe)$ .

**Perceived control:** This was measured based on four salient control beliefs (Cb) such as "I'm usually so tired that I can't clean my child's teeth before sleep" multiplied with the four control belief power (Cp) items such as "If I was so tired, it would make it more difficult for me to brush teeth of my child". The following equation was used to calculate of total PBC score. Total PBC score was obtained from mean of the following product:  $\Sigma (Cb \times Cp)$ .

**Behavioral intention:** Behavioral intention was measured using two items (e.g., "I intend to clean my child's teeth").

**Knowledge:** Ajzen considered knowledge as a foundation on which attitudes, subjective norms, and perceived behavioral control are built<sup>19</sup>. Hence, all mothers were asked to complete a questionnaire included seven items designed to evaluate their knowledge of the causes of dental caries and how to prevent it. A total knowledge score was formed for each respondent (ranging from 0 to 7).

**Cleaning of children's teeth:** The behavior was measured by asking mothers about oral cleaning for child (i.e. "did you clean your *child's teeth* in the last 24 hours?")

**Demographic variables:** demographic questionnaire consisted of items regarding age and gender of children, parental educational level and occupational status.

To evaluate the content validity of questionnaire, an expert panel comprising of six experts in the areas of health education and promotion were consulted to review the preliminary scales. The panel was asked to review the items and comment on the necessity and clarity of the items. Scientific expertise was also used to evaluate the question stems, response formats, and order of the questions.

A test-retest analysis with a sample of mothers (n=30) not involved in the main study was conducted to determine the reliability of TPB variables. The interval between test and retest was 4 weeks. Pearson correlation was used to assess test-retest reliability. Overall, the test-retest indicated good reliability, yielding an average of correlation 0.90.

At follow-up, mothers of the intervention group received additional questions to obtain process data. They were asked to evaluate the program activities and overall feedback on the program. The process evaluation was performed to explore the aspects of implementation and help in the interpretation of the outcome results.

### Description of the intervention

In developing the intervention components, we applied the principles of motivational interview (MI). This approach is a promising technique in creating lasting change and improvement in health interventions<sup>11</sup>. Five general

principles of MI included: express empathy, develop discrepancy, roll with resistance, support self-efficacy, and avoid argumentation<sup>20</sup>.

Based on beliefs elicited from participants in baseline, the messages of intervention were generated to address the following determinants: knowledge, attitude, and perceived behavioral control. Table 1 shows the behavioral change techniques "BCT" used to modify each of cognitions. The messages of intervention reinforced positive beliefs and applied problem solving in relation to negative beliefs. This intervention consisted of three-day care-based sessions, booklet, and text messages reminder. Intervention components were provided in the same order and on the same schedule for all of 5 daycare centers of intervention group. The sessions were developed to provide learning objectives according to Bloom's taxonomy and held during one month.

**Table 1:** Intervention strategies to change in knowledge and TPB variables

Target variable	Behavior change technique	Procedures
Knowledge	Providing information about oral health	Session 1 and booklet: general information related to role of oral health in child's health, importance of primary teeth, factors influencing on ECC, discussion about ways of preventing ECC
Attitude	Provide information on consequences provide information about others' approval	Session 2: provide information and discussion to focus on what will happen if the mothers do or do not perform the cleaning of child's teeth. Discussion about ways of preventing ECC
Perceived behavioral control	Modeling arguments to bolster self-efficacy	Session 3 and booklet: discussion about how to overcome potential barriers of cleaning the children's teeth, mothers who were successful in cleaning their child's teeth asked to talk about their experiences
Intention	Self-monitoring goal setting	Booklet: mothers asked to complete a 1-week diary regard to cleaning of child's teeth. Mothers were encouraged to set goals in relation to cleaning their child's teeth.

The mothers received a 22- page booklet at the start of the second session. The booklet was developed using guideline on infant oral health care<sup>9, 21</sup> and the researchers' experiences specifically to target knowledge (i.e., importance of primary teeth and ways to prevent caries) and PBC (i.e., barriers/difficulties related to cleaning of children's teeth and solutions to overcome potential barriers to taking action in relation to cleaning of children's teeth) as well as encouraging action by establishing self-monitoring and goal setting. To establish self-monitoring and goal setting, at the end of booklet, mothers were asked to note the frequency of cleaning their child's teeth. The booklet was piloted amongst 5 mothers who were not involved in the main study. Parts found to be unclear or unhelpful were rewritten.

The intervention group of mothers received eight different motivational text messages (e.g., healthy smile, happy child with cleaning child's teeth) 45 days after the last session. Four working days, two text messages (one at 9 am and one at 7 pm) were sent daily to every mother's mobile phone. To increase the probability by which mothers would read the messages, the maximum number of characters in each message was 70. No intervention was applied in the control group.

### Analysis

Data were analyzed using SPSS v.16 (Chicago, IL, USA). To compare the results between the two groups (control vs. intervention at baseline and two post interventions) independent *t* tests and chi-square test were used for cognitions (i.e.; knowledge, attitude, PBC, and intention) and behavior (i.e.; cleaning of children's teeth), respectively. We applied paired *t* tests and McNemar tests to examine within

Each session lasted 45- 60 min conducted by the first author. The first two sessions were a combination of interactive *lecture and discussion*. We used principles of motivational interview included express empathy (e.g., "I understand that all of you face with competing life pressures"), develop discrepancy (e.g., "However, your child may suffer from caries due to poor oral health"), support self-efficacy (e.g., " you are responsible for choosing and carrying out personal change"), avoid argumentation (e.g., "Putting your child to bed with a bottle helps he/ she sleep better. Do you see any negative outcomes of doing this?"), and roll with resistance (e.g., Shifting mothers' perception during these two sessions. In the last session mothers discussed about how to overcome potential barriers of cleaning the children's teeth and mothers who were successful in cleaning their child's teeth, were asked to talk about their experiences.

groups (baseline vs. two post interventions) for cognitions and behavior, respectively.

To assess the within-subject change of cognitions from the first post- test (10-day) to the second one (3-month), logistic and linear GEE regression models were designed for dichotomous outcome (i.e., cleaning of child's teeth) and continuous outcomes (i.e., cognitions), respectively. The models were adjusted for the corresponding baseline measure for each outcome to obtain adjusted mean differences to assess the effect of the intervention on continuous outcomes and adjusted *odds ratio* to assess the effect of the intervention on dichotomous outcome. The 95% confidence interval around the adjusted mean differences, adjusted *odds ratio*, and the corresponding *P* value were computed. In order to quantify the effect of intervention on cognitions, effect size statistics were calculated using pooled deviations<sup>22</sup>.

## Results

### Description of the trial sample

Of the 45 mothers assigned to the intervention group, 43 (95.5%) completed the 10- day assessment, and 40 (88.9%) completed the 3-month assessment. All of the 45 mothers allocated to the control group completed the 10-day assessment, and 41 (91%) completed the 3-month assessment. Reasons of lost to follow up were, changing day-care center, absence at more than one session or filling out questionnaires inaccurately. Table 2 indicates the distributions of the two groups of mothers in terms of their demographic characteristic.

Baseline characteristics were similar between groups ( $P>0.05$ ). Means and standard deviations for each variable at

baseline, 10 days and 3 – month follow up are shown in Table 3. At baseline, the level of knowledge of mothers was relatively high and mothers generally intended to clean their child’s teeth. This was accompanied by evaluations of the behavior as moderately positive and within their control. However, cleaning of children's teeth was generally low. At baseline, the majority of participants in the intervention (76%) and control group (71%) reported that did not clean their children's teeth.

**Intervention impact on cognitions**

At baseline, there was no difference between the control and intervention groups regarding the score of knowledge ( $P=0.928$ ), attitude ( $P=0.491$ ), PBC ( $P=0.964$ ), and intention ( $P=0.380$ ) (Table 3). Separate paired t-test in intervention group revealed statistically significant improvements in knowledge ( $P=0.001$ ), attitude ( $P=0.001$ ), PBC ( $P=0.001$ ), and intention ( $P=0.001$ ) from baseline to both 10- day and 3-month assessment.

Results of independent-samples t-test showed that at a 10-day assessment the intervention group significantly improved in scores on oral health knowledge ( $P=0.001$ ), attitude ( $P=0.004$ ), PBC ( $P=0.008$ ). However, there was no

significant differences in intention between two groups ( $P=0.703$ ) (Table 3). At 3-month assessment, compared to control group, the mothers in intervention group significantly improved in scores of knowledge ( $P=0.001$ ), attitude ( $P=0.001$ ), PBC ( $P=0.001$ ). Calculation of the effect size showed that the interventions’ effects on increasing knowledge score was 0.65 (i.e., large). The effect sizes were small to medium and ranged from 0.1 to 0.4 for all cognitions except knowledge (effect size=0.75).

**Table 2:** Demographic characteristic and baseline data

Variables	Control	Intervention	P value
Age (yr), Mean (SD)	32.31 (3.89)	33.84 (4.74)	0.097
Age of child (m), Mean (SD)	20.09 (2.94)	19.71 (3.75)	0.597
Educational level, n (%)			0.421
Primary and secondary school	5 (11.1)	0 (0.0)	
High school and diploma	1 (2.2)	7 (15.6)	
More than diploma	39 (86.7)	38 (84.4)	
Occupational status, n (%)			0.779
Homemaker	8 (17.8)	7 (15.6)	
Employed	37 (82.2)	38 (84.4)	
Sex of child, n (%)			0.508
Boy	28 (62.2)	31 (68.9)	
Girl	17 (37.8)	14 (31.1)	

**Table 3:** Pre and post intervention (10-day and 3-month assessment) in intervention and control groups

Outcome variables		Baseline		After 10-day assessment			After 3-month assessment		
		Mean (SD)	P value <sup>a</sup>	Mean (SD)	P value <sup>a</sup>	P value <sup>b</sup>	Mean (SD)	P value <sup>a</sup>	P value <sup>b</sup>
Knowledge	Control	4.82 (1.21)	0.928	5.00 (0.89)	0.001	0.118	5.17(0.80)	0.001	0.011
	Intervention	4.80 (1.12)		6.32 (0.61)			6.68(0.47)		
Attitude	Control	80.39 (17.21)	0.491	83.49 (14.19)	0.004	0.070	82.80(13.40)	0.001	0.118
	Intervention	77.65 (18.40)		91.17 (8.15)			95.00(4.80)		
Perceived behavioral control	Control	58.58 (29.36)	0.964	61.88 (29.20)	0.008	0.345	59.17(28.27)	0.001	0.901
	Intervention	58.29 (30.09)		76.90 (19.60)			83.35(15.70)		
Intention	Control	4.27 (0.93)	0.380	4.49 (0.77)	0.703	0.060	4.44(0.80)	0.053	0.070
	Intervention	4.09 (0.97)		4.55 (0.67)			4.72(0.45)		

<sup>a</sup> P value between groups (control-intervention)

<sup>b</sup> P value within groups (before-after)

**Intervention impact on behavior**

At baseline, there was no difference between the control and intervention groups regarding the score of mothers’

behavior (0.635) (Table 4). *McNemar's test result revealed statistically significant improvements in mothers' behavior from baseline to 10- day assessment ( $P=0.001$ ) and 3- month assessment ( $P=0.001$ ) (Table 4).*

**Table 4:** Pre and post intervention (10-day and 3-month assessment) in intervention and control groups

Outcome variable		Baseline		After 10-day assessment			After 3-month assessment		
		n (%)	P value <sup>a</sup>	n (%)	P value <sup>a</sup>	P value <sup>b</sup>	n (%)	P value <sup>a</sup>	P value <sup>b</sup>
Cleaning of children' teeth: Yes	Control	13 (29.0)	0.635	15 (36.6)	0.011	0.453	19 (46.3)	0.001	0.116
	Intervention	11 (24.0)		26 (65.0)			35 (87.5)		

<sup>a</sup> P value between groups (control-intervention)

<sup>b</sup> P value within groups (before-after)

Compared to control group, the mothers in intervention group reported significant improvement in cleaning of children’s teeth at 10-day assessment ( $P=0.011$ ) and 3-month assessment ( $P=0.001$ ) (Table 4).

Despite significant difference between two groups at both of post- tests, behavior of mothers in intervention group did not improve between the two post-test assessments (adjusted OR 2.18,  $P=0.280$ ) (Table 5).

**GEE model 10 days- 3 month assessment**

Over the period from 10-day to 3-month assessment, in comparison with participants in the control condition, participants of intervention group had more favorable attitudes toward cleaning teeth of their child (adjusted mean difference equal to 4.05,  $P=0.010$ ) and higher PBC scores (adjusted mean difference equal to 9.15,  $P=0.030$ ). However, knowledge (adjusted mean difference equal to 0.17,  $P=0.210$ ) and intention (adjusted mean difference equal to 0.22,  $P=0.051$ ) of mothers in intervention group didn't improve between the two post-test assessments (Table 5).

**Table 5:** Generalized estimation equation (GEE) model for 10-day and 3-month assessment adjusted by the baseline value

Outcome variables	Estimate	95% CI	P value
Adjusted mean difference			
Knowledge	0.17	-0.150, 0.460	0.216
Attitude	4.05	1.070, 7.940	0.011
Perceived behavioral control	9.15	3.051, 15.264	0.003
Intention	0.22	-0.001, 0.449	0.051
Adjusted odds ratio			
Cleaning of children' teeth	2.18	0.523, 9.126	0.284

### Participant's feedback about intervention

About 80% (n=32) of mothers in intervention group attended sessions completely (i.e., three sessions). According to mothers' report, intervention was useful and relevant for their condition (85%). Sixty-five percent of participants indicated that the intervention encouraged them to follow the recommended oral health behavior. Participants indicated that booklet provided interesting and practical information about overcoming barriers associated with cleaning their children's teeth. Majority of mothers reported that the most useful intervention strategy included the discussions.

### Discussion

Numerous sources have mentioned the role of mothers as facilitators of oral health in early childhood<sup>7, 14</sup>. Hence, insufficient education of mothers at an early stage could have an adverse effect on child's dental health. To our knowledge, this is one of the very few Iranian studies investigating the effect of intervention on oral health of under two year old children.

This study suggested that an oral health education program based on TPB delivered in day-care centers might be effective in improve the cleaning of children's teeth and related cognitions. Following the intervention, changes in TPB cognitions were related to changes in intention and to changes in self-reported cleaning children's teeth as predicted by the TPB. In other words, according to TPB suggestion, mothers who increased their intention respectively increased their corresponding cognitions related to clean the children's teeth. Moreover, mothers who increased their intention to clean their children's teeth, respectively, increased their behavior. This adds support to the TPB as a model of changing behavior.

It seems that communication based on motivation interview with mothers, targeting cognitions by booklet, and being supported by mobile phone text-message reminders fostered behavioral change. However, despite the promising results, the effect sizes amounted at best to 0.4 for TPB cognitions. These results reflect small changes according to Cohen<sup>22</sup>. The weak effect observed might be explained, partly, by the fact that cognition levels were moderate to high prior to the intervention, so a ceiling effect may have precluded significant effects and partly by short lasting intervention. The behavioral change is a time consuming process that unfolds over time. Regular contact with mothers of infants to change dental health education had a greater effect on dental caries in the infants compared with children whose mothers received less frequent information<sup>23</sup>.

Consistent with the present results, improvements with respect to oral health and related cognitions have been reported in some of previous TPB based interventions<sup>24, 25</sup>. In presence of factors such as competing life pressure, influence of important others, having an incorrect belief about role of primary teeth, lack of consistent supportive<sup>17, 26</sup>, it is likely that mothers fail to optimize the benefits of cleaning their children's teeth. Therefore, it seems that addressing these factors using a multicomponent intervention would be more effective than a single component one. In order to combat the mentioned barriers and improve the effectiveness of intervention, we applied BCT through a multicomponent intervention such as provide information about behavior-

health link, provide opportunities for social comparison, modeling, self-monitoring, and goal setting<sup>27</sup>.

In our study, a considerable amount of the intervention was delivered via the booklet. This strategy provided each mother with an opportunity to inspect and consider the messages of intervention in private and at a time suitable to her. Moreover, other family members had the opportunity to examine the information. Using booklet as an interesting and practical tool can help provide interventions with a limited personal contact with participants. Health care system of Iran offers widespread children's vaccinations and according to 2010 IrMIDHS<sup>28</sup> about 97% of Iranian children under the age of two receive vaccination coverage. Therefore, the TPB based oral health educational interventions could be provided synchronized with the vaccination visits of children aged less than two years.

Through the process evaluation, majority of mothers described the discussions as the most useful intervention strategy. Using interactive methods during the discussions would facilitate sharing the mothers' experiences and minimize health literacy barriers in education. Consistently, a one-time hands-on training was effective in improving parental cognitions with respect to their child's oral health in African immigrants<sup>25</sup>.

The results of our study confirm findings from other studies applied motivational interview in children's oral health issue. Children of 6-18 month old whose mothers received motivational interview exhibited significantly less new caries<sup>29</sup>. However, in their systematic review on the effectiveness of motivational interviewing at improving oral health, Cascaes et al.<sup>11</sup> stated that the evidence of the effect of MI on improving oral health outcomes is mixed and there is need to further and better-designed investigations to assess fully the impact of MI on oral health.

Another noteworthy finding of this study was that score of attitude, PBC, and intention of intervention group improved between the two post-test assessments. This result could be explained by this fact that through processing of cognitions, successful behavior change might positively affect attitude, PBC and intention of mothers to clean their child's teeth. Moreover, from 10-day assessment to 3-month assessment, there was still room for improvement in these cognitions. Considering two above explanations, it seems that motivational text messages (i.e., reminder) and processing of cognitions led to improve in these cognitions.

There are several limitations of the present study. First, the finding of study might be affected by self-report bias. Secondly, the intervention mainly focused on mothers and did not include other family members. Differences in beliefs and practices of family members regard what is good for a child may create tension among family members. However, the booklet offered opportunity to other family members to examine the information.

### Conclusions

A brief multicomponent TPB intervention among mothers of 1-2 years old children may be effective in improve the cleaning of children's teeth and related cognitions. This adds support to the TPB as a model of changing behavior in oral health area.

## Acknowledgments

This study was supported by Vice-Chancellor of Research and Technology of Hamadan University of Medical Sciences, Contractor No. 9112154545.

## Conflict of interest statement

The authors have no conflict of interests to declare.

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