

The Influence of a School-Based Online Educational Intervention on Oral Health Behaviors of Primary School Students during the Covid-19 Pandemic: Based on the Theory of Planned Behavior

Maryam Mohamadi ¹, * Raheleh Soltani ², Mahbobeh Khorsandi ³, Amir Almasi-Hashiani ⁴

¹ Students Research Committee, Arak University of Medical Sciences, Arak, Iran.

² Assistant Professor, Department of Health Education and Health Promotion, School of Health, Arak University of Medical Sciences, Arak, Iran.

³ Professor of Health Education and Health Promotion, School of Health, Arak University of Medical Medical Sciences, Arak, Iran.

⁴ Assistant Professor of Epidemiology Department of Epidemiology, Arak University of Medical Medical Sciences, Arak, Iran.

Abstract

Background: Dental caries are one of the children's most common chronic diseases. This study aims to examine the influence of school-based online education on oral hygiene behaviors during COVID-19.

Methods: This quasi-experimental study was conducted on 120 students in the 5th and 6th grades of primary school in Shazand, Iran, from February 2022 to April 2022. The participants were selected by cluster sampling method and divided into two groups; control (n=60) and experimental (n=60). The data collection instrument checked the participants' demographic information, constructions of the theory of planned behavior (TPB), and oral health behaviors before and after the intervention. The experimental group participated in four online educational sessions (each session was 1 hour) in SHAD software. Descriptive statistics, Chi-square test, and Analysis of Covariance (ANCOVA) were used to analyze the data via SPSS version 23.

Results: The mean \pm standard deviation (SD) of the students' age was 11.50 ± 0.50 . Before the intervention, there was no significant relationship between the oral hygiene behavior of the two groups and the TPB constructions ($p > 0.05$). A month after the intervention, the mean scores of the oral hygiene behavior, attitude, subjective norm, perceived behavioral control, and intention significantly increased in the experimental group ($p < 0.001$). After the intervention, both twice brushing a day and once a day flossing significantly increased in the experimental group; from 28.2 % to 73.3 % and from 50 % to 75 %, respectively ($p < 0.001$).

Conclusion: Rendering the results of this study, online educational intervention based on the theory of planned behavior promotes the oral health behaviors of primary school students.

Key Words: COVID-19, Dental caries, Educational intervention, Online education, School-based oral hygiene training, Theory of Planned Behavior.

* Please cite this article as: Mohamadi M, Soltani R, Khorsandi M, Almasi-Hashiani A. The Influence of a School-Based Online Educational Intervention on Oral Health Behaviors of Primary School Students during the Covid-19 Pandemic: Based on the Theory of Planned Behavior. Int J Pediatr 2023; 11 (09):18202-18211. DOI: [10.22038/ijp.2023.71854.5265](https://doi.org/10.22038/ijp.2023.71854.5265)

*Corresponding Author:

Raheleh Soltani, Assistant Professor, Department of Health Education and Health Promotion, School of Health, Arak University of Medical Sciences, Arak, Iran. Email: shadi8685@gmail.com

Received date: May.08,2023; Accepted date: Sep.28,2023

1- INTRODUCTION

COVID-19 is one of the important concerns and challenges of public health as an emerging disease. The spread of COVID-19 has negatively influenced the oral health of school students (1). Oral hygiene has been influenced by COVID-19 quarantine more than any other health service. Dental visits have faced limitations as risky methods that can transfer disease and infection. Following that, the intraoral examination of the patients, especially kids, has faced restrictions leading to periodontal complications (2). The COVID-19 pandemic has had negative psychological-social and behavioral effects on children and teenagers. This problem can affect general health and oral hygiene (3).

Dental caries and periodontal problems are one of the most common diseases in the world (4-6). Dental caries affect about 60-90 % of school-aged children (7-9). In the study by Kamiab et al. (2021) in the urban area of Rafsanjan, Iran, the ratio of caries-free children was 4.1% among primary school students (10). Oral health can influence children's school performance and activities (11, 12). Oral health and dental caries are integral not only to general health but also to well-being and children's quality of life (13, 14). Oral health includes flossing, tooth brushing, and mouthwash, which can prevent dental caries (15, 16). Mechanical methods (flossing and brushing) are the most common ways suggested for controlling dental caries and good oral hygiene. Despite the necessity of oral health behaviors, it is not adequate in school-aged children (15-18). In a study by Babaei et al., only 28.3% of students flossed and brushed their teeth daily, and 26.6% had visited a dentist in the past 6 months (19). In a study by Peyman et al., 57.4% of children visited a dentist regularly (20). On the other hand, another study (2022) demonstrated that covid-19 pandemic had

a negative impact on the daily tooth brushing of children aged 0-18 years (21). The documents highlight the necessity of school-based educational intervention programs to improve oral health behaviors (17, 18, 20, 22). Furthermore, according to the WHO, schools are one of the most ideal and important settings for promoting oral and dental health, with a globally efficient influence over one billion children, along with their families and community members (23).

Theory-based educational interventions are necessary to improve student's behavior regarding oral and dental health (24, 25). One of the suggested theories about oral health is the theory of planned behavior (TPB). This theory can predict 16 to 35% of the behavioral variance of oral health behaviors (17). It includes four constructions; attitude, subjective norm, perceived behavioral control, and intention for behavior (26). This study aims to assess the influence of school-based educational intervention on the oral hygiene of primary school students based on TPB in the COVID-19 pandemic.

2- MATERIALS AND METHODS

2-1. Design and participants

This quasi-experimental study was conducted on 120 students in the 5th and 6th grades of primary school in Shazand, Iran, from February 2022 to April 2022. The participants were selected by cluster sampling method and were randomly divided into two groups; control (n=60) and experimental (n=60). The Consolidated Standards of Reporting Trials (CONSORT) were applied to this study (27).

2-1.1. Inclusion and exclusion criteria

The criteria for entrance to the study were the conscious consent of the parents, willingness to participate in the study, and not suffering from special mental and emotional diseases (concerning their

medical profiles). The exclusion criteria included not participating in the intervention or withdrawing for any reason and not completing the questionnaire after the intervention.

2-1.2. Sample size

The sample size was determined based on a similar study (8) reporting the mean \pm standard deviation of the oral health behaviors in the experimental and control group as 6.1 ± 1.6 and 4.4 ± 2 , respectively. Using Stata software, and considering 5 % alpha and 90% potential, the minimum needed sample was estimated as 25 participants in each group. Due to the high likability of withdrawal of some participants because of the school shutdown and COVID-19, 60 students were included in each group.

2-2. Measuring tools: validity and reliability

Data were collected using a self-report questionnaire. It takes almost 20 minutes to complete the questionnaire. The questionnaire comprised 3 parts. The first part included the demographic information; age, sex, number of members of the family, father and mother's job, the educational degree of the father and mother (secondary school and less, diploma, and higher), and the self-report economic status (good, average, weak)(28).

The second part included the TPB-based questions derived from the TPB guidelines and available literature (17, 25, 26) which addressed the student's perceived behavioral control, subjective norm, attitude, and intention toward oral and dental health. The responses to all items were assessed with a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

2-2.1. Validity and reliability

The content validity of the tools was confirmed by an expert panel of ten

academicians (two general dental public health, six health education and health promotion, and two health care providers).

The mean content validity ratio (CVR) and content validity index (CVI) were calculated to be 0.87 and 0.94 indicating a good internal consistency.

2-2.2. Pilot study

The reliability of the questionnaire was assessed by the test-retest method (two-week interval) in a pilot study among 25 participants and the attained data were not included in the final analysis. The test-retest reliability coefficient was 0.88 ($P=0.001$).

2-2.3. Student's attitude toward oral and dental health

Students' attitude was evaluated through 12 items, for example "Healthy teeth are important for growth and general health." The possible score range was 12–60, in which a higher score indicates a higher attitude towards oral and dental health. Cronbach's alpha reliability of this construct was determined to be 0.63.

2-2.4. Student's subjective norms towards oral and dental health

Subjective norms were measured through 9 items such as "my friends encourage me to brush my teeth every day," The possible score range was 9–45, with a Cronbach's alpha reliability of 0.68.

2-2.5. Student's perceived behavioral control towards oral and dental health

Perceived behavioral control (PBC) was measured through 6 items, like "It's easy for me to brush my teeth every day, if I want".

The possible score range was 6–30, in which a higher score indicates higher PBC towards oral and dental health. Its Cronbach's alpha reliability was estimated as 0.72.

2-2.6. Student's intention toward oral and dental health

Students' intention was evaluated through 6 items, for example "I intend to brush my teeth every day for the next two weeks." The possible score range was 6–30 and a higher score indicates higher intention towards oral and dental health. Reliability was 0.70 determined by Cronbach's alpha.

2-2.7. Oral and dental health knowledge

The oral and dental health knowledge was measured through 13 multiple-choice items in which every correct answer was given a score of 1 and an incorrect answer was given a score of 0. The possible score range was from 0 to 13, a higher score indicating a higher knowledge. The test-retest reliability coefficient was 0.88.

2-2.8. Oral hygiene behaviors (OHB)

Part three was related to OHB and consisted of 9 items derived from the available literature (17, 25). The items included tooth brushing (1=never, 2=rarely, 3=a few times a week, 4=once a day, 5=twice daily or more), flossing (1=never, 2=rarely, 3=a few times a week, 4=once a day, 5=twice daily or more), use of mouth rinse (1=never, 2=rarely, 3=a few times a week, 4=once a day, 5=twice daily or more) the time of your last dental check-up, (5=within six months, 4=six months to one year ago, 3= one to two years ago, 2= more than two years ago, 1=never or do not remember), and healthy eating habits (5=always, 4=often, 3=sometimes, 2=rarely, 1=never). The possible score range was 9–45 and the higher score indicated the higher OHB. Its Cronbach's alpha reliability was estimated as 0.71.

2-3. Intervention

An oral and dental health educational intervention was delivered to the experimental group based on constructs of TPB and by the use of the students' social network (SHAD) software. It is an

educational application that has been used for the virtual training of students during the COVID-19 pandemic in Iran. The students of the experimental group participated in four online 60-minute sessions. The first session included knowledge toward oral health, the second session included the attitude and subjective norms, the third session included the perceived behavioral control, and the fourth session included the behavioral intention and practice toward oral health and dental health. The educational method included interactive lecture, group discussion, storytelling about oral health, educational videos of brushing and flossing skills, as well as animations and cartoons about tooth decay, game, etc. At the end of the study, a tooth brushing class was held to practically teach the correct ways of brushing the teeth.

The students brushed their teeth in the researchers' presence based on what they had learned. At the end of the study (after the data of the second stage (after the intervention) was collected, the educational package was given to the control group. Also, toothbrushes and dental floss were given to the participants (the experimental and control groups).

2-4. Data analysis

SPSS version 23 statistical software (SPSS, Inc., Chicago, IL, USA) was used to analyze the data. Descriptive statistics were performed to assess the means, standard deviations (SD), and frequencies for categorical variables. The Kolmogorov-Smirnov test was used for checking the normality of the data and the Chi-square test was used to compare categorical variables between two groups. Analysis of covariance (ANCOVA) was used to compare the constructs of TPB and oral health behavior scores between the two groups at baseline and after the intervention. For all tests, the significance level was considered at $\alpha=0.05$.

3-RESULTS

Conferring to **Table 1**, the mean \pm standard deviation of the student's age was 11.50 ± 0.50 ; and 50% (60/120) of the students were girls. About 50% (n=60) of the students were in 6th grade, and 100% (n=120) were from public schools.

The mean scores for TPB constructions and oral health behaviors in the experimental and control group before and after the intervention is presented in **Table 2**.

Before the intervention, there was no statistical difference between the two groups in the mean scores of knowledge, attitude, subjective norm, perceived behavioral control, intention, and oral health behaviors ($p>0.05$). Based on

results presented in **Table 2** the ANCOVA analysis indicated that a month after the intervention, there was a statistical difference between the two groups in terms of knowledge ($p<0.001$), attitude, subjective norm ($p<0.001$), perceived behavioral control ($p<0.001$), Intention ($p<0.001$), and oral health behaviors ($p<0.001$). A month after the educational intervention, all of the constructs of TPB and oral health behaviors increased significantly in the experimental group.

Based on the results in **Table 3**, after the intervention twice-daily tooth brushing raised from 28.2 % to 73.3 % and once a day flossing raised from 50 % to 75 % in the experimental group, showing a significant increase ($p<0.001$).

Table-1: Demographic characteristics of the participants in the control (n=60) and Experimental (n=60) groups

Variables	Category	Group	
		N (%) Experimental	N (%) Control
gender	Male	30(25)	30(25)
	Female	30(25)	30(25)
Grade	The fifth	30(25)	30(25)
	The sixth	30(25)	30(25)
Father's occupation	Employed	14(23.3)	17(28.3)
	unemployed	34(56.7)	32(53.3)
	Manual worker	12(20)	11(18.3)
Mother's occupation	Employed	2(3.3)	7(11/7)
	Unemployed	58(96.7)	53(88.3)
Father's education	Primary	4(6.7)	7(11.7)
	Middle school	20(33.3)	9(15)
	Diploma	24(40)	24(40)
	College university	10(16.7)	20(33.3)
Maternal education	Primary	7(11.7)	8(13.3)
	Middle school	11(18.3)	12(20)
	Diploma	24(40)	24(40)
	College university	16(26.7)	16(26.7)
Economic Status	Low	9(15)	6(10)
	Medium	31(51.7)	30(50)
	High	20(33.3)	24(40)

Table-2: Comparing the means and standard deviations of TPB structures and the oral health behaviors in the experimental and control groups before and after the intervention

TPB constructs	Groups	Before	After	F(df)	ES**	* p Value
		Mean (S.D)	Mean (S.D)			
Knowledge	Experimental	6.6 (2.1)	10.1 (2.1)	220(1)	0.4	<0.001
	Control	6.3 (1.91)	7.2 (1.8)			
Attitude	Experimental	54.8 (2.6)	57.5 (1.7)	131(1)	0.5	<0.001
	Control	53.7 (3.5)	54.1 (3.3)			
Subjective norm	Experimental	41.4 (2.4)	43 (1.7)	66(1)	0.3	<0.001
	Control	36.4 (4.3)	36.9 (3.9)			
Perceived behavioral control	Experimental	24.1 (3.7)	27.8 (2)	146(1)	0.5	<0.001
	Control	22.7 (4.6)	22.9 (4.5)			
Intention	Experimental	23.3 (3.9)	28.8 (1.5)	186(1)	0.6	<0.001
	Control	23.4 (4.1)	23.9 (3.9)			
oral health behaviors	Experimental	27.1 (3.8)	33.4 (3.8)	230(1)	0.6	<0.001
	Control	26.9 (4.7)	28 (4.5)			

*=Analysis of covariance (ANCOVA) test was used,**=Effect size

Table-3: Comparing the participant’s tooth brushing, and flossing in the experimental and control groups before and after intervention

Variables	Category	Before N (%)		After N (%)	
		Experimental	Control	Experimental	Control
Tooth brushing	Never/ Irregular	1(1.7)	4(6.7)	0(0)	3(5)
	A few times a week	13(21.7)	21(35)	3(5)	20(33.3)
	Once a day	29(48.3)	22(36.7)	13(21.7)	22(36.7)
	Twice or more a day	28(17.3)	13(21.7)	44(73.3)	15(25)
	* p Value	0.15		0.001	
Flossing	Never/ Irregular	8(13.3)	17(28.3)	6(10)	11(18.3)
	A few times a week	22(36.7)	22(36.7)	9(15)	27(45)
	Once a day	21(35.0)	10(16.7)	28(46.7)	9(15)
	Twice or more a day	9(15)	11(18.3)	17(28.3)	13(21.7)
	*P Value	0.06		0.001	

*chi-square test was used, N (%) = Number (%)

4- DISCUSSION

The present study aimed to determine the influence of a school-based online educational intervention on oral hygiene behaviors of primary school students based on the theory of planned behavior during the COVID-19 pandemic. According to the

results of this study, after the intervention, the attitude, subjective norm, perceived behavioral control, and intention toward oral and dental health significantly increased in the experimental group. These findings confirm the findings of several previous studies conducted based on the theory of planned behavior (25, 29). The

findings are also consistent with those of Scheerman et al. and Shojaei et al., in this field (30, 31). It can be concluded that compared to systematic training, the training based on the theory of planned behavior has had more influence on improving knowledge and the other constructs of the theory.

This study showed that students' oral health behaviors and tooth brushing increased in the experimental group, as (27.1 vs. 33.4) and (28.2 % vs. 73.3 %) respectively. This finding conforms to some studies that reported the positive influence of educational intervention on oral health behaviors (4, 25, 30). A study by Halavani et al. showed that children's tooth brushing increased from 83 % to 91% after oral health education (32). This result is in agreement with a theory-based intervention through an online social media platform by Scheerman et al., in 2020, which aimed to promote oral health among Iranian adolescents (31). Tooth brushing is one of the most essential aspects of oral health self-care in children that is advised to be repeated twice a day for oral health and to prevent oral caries in students (8). Good education about oral hygiene in childhood is one of the most important approaches for improving oral hygiene. In the present study, the students' knowledge of oral health increased significantly, after the educational intervention. This finding confirms the results of a previous study by Hashemi et al. and Aboubakr et al. (33, 34). Another study by Aboubakr et al. also reported the significant effects of a school-based online educational intervention during the COVID-19 pandemic in Saudi Arabia on increasing the oral health knowledge of school students (34).

This study revealed that the experimental group had a better attitude toward oral health behaviors than the control group after the intervention. This finding approves the results of several previous

studies (35, 36). Peyman et al. (20), for example, reported the positive influence of an educational intervention based on the TPB on improving positive attitudes regarding oral health behaviors. This finding is also in line with those of the study by Shojaei et al. which showed that primary school children's attitude score toward oral health improved from 21.5 to 28.9 after being trained by an oral health educational program based on the theory of planned behavior (30). One of the potential factors to improve health is the attitude toward oral and dental health (37).

In the present study, the students' perceived behavioral control in oral health significantly increased in the experimental group as compared to the control group. This finding conforms to the studies by Dumitrescu et al. (35) and Shojaei et al. (30) indicating the positive influence of the theory-based intervention on the perceived behavioral control of the participants regarding oral and dental health.

4-1. Strengths and limitations

The current study, to the authors' knowledge, is the first in using the "SHAD" social network application to deliver a school-based and theory-based online educational intervention program to promote good oral hygiene behaviors during the COVID-19 pandemic. This study has some limitations. It implemented a self-report questionnaire that was prone to recall biases. Also, there was no clinical examination for the outcome variables. Moreover, Due to the lockdown of COVID-19 and school closures, face-to-face training was not possible. Nonetheless, using a plan for online education can be considered among the strengths of the study, since the students learned about oral and dental health during the quarantine and school closures.

5- CONCLUSION

It can be confirmed that the intervention based on TPB theory has been

weighty in improving and maintaining oral healthcare in students. The study revealed a significant improvement in oral and dental health behaviors, including brushing and dental flossing among the students. Therefore, the theory of planned behavior can be used as a good theoretical framework to design and perform oral and dental health interventions. Interventions based on educational models have shown more efficiency and influence regarding their aims to train society and change behaviors.

6- ETHICAL CONSIDERATIONS

The Ethical Committee of Arak University of Medical Science, Iran, approved the study protocol (ID number-IR.ARAKMU.REC.1400.314). The purpose of the study was explained to the students and their parents, and then written consent was obtained from the parents who volunteered to enter the study.

7- CONFLICTS OF INTEREST

None.

8- REFERENCES

1. Knorst JK, Brondani B, Tomazoni F, Vargas AW, Costa MD, da Silva Godois L, Mendes FM, Ardenghi DM, Ardenghi TM. COVID-19 pandemic reduces the negative perception of oral health-related quality of life in adolescents. *Quality of Life Research*. 2021; 30:1685-91.
2. Achmad H, Hasbi HS. Gingival Health and Oral Hygiene Measures among Junior High School Children during the Covid-19 Pandemic: A Systematic Review. *Annals of the Romanian Society for Cell Biology*. 2021:4783-99.
3. Brondani B, Knorst JK, Tomazoni F, Costa MD, Vargas AW, Noronha TG, Mendes FM, Ardenghi TM. Effect of the COVID-19 pandemic on behavioral and psychosocial factors related to oral health in adolescents: A cohort study. *International journal of pediatric dentistry*. 2021; 31(4):539-46.
4. Mohammadi Zeidi I, Yekaninejad M, Akaberi A. Effectiveness of motivational interviewing (MI) of oral self-care behaviors among high school students in Qazvin. *Journal of North Khorasan University of Medical Sciences*. 2013; 5(1):127-37.
5. Falahinia N, Razeghi S, Shamshiri AR, Firoozi M, Mohebbi SZ. The effectiveness of motivational interviewing on the oral health of leukemic children and oral health care knowledge, attitude and practice of their mothers: a hospital-based intervention. *BMC Pediatrics*. 2023; 23(1):261.
6. Nejadi Sadeghi E, Loeloe MS, Rabiei SMR, Bakhshesh L. Factors Affecting Oral Health Self-Care Behaviors in Seventh Grade Students in Behbahan City: An Application of the Health Belief Model. *International Journal of Pediatrics*. 2022; 10(4):15835-41.
7. Jafari A, Makvand Gholipour M, Khoramiyan Tousi S. The effect of a health promotion program on permanent dental health in elementary students. *Iranian Journal of Pediatric Dentistry*. 2019; 14(2):79-88.
8. Soltani R, Sharifirad G, Mahaki B, Ali Eslami A. The Effect of Oral Health Educational Intervention Program among Mothers of Children aged 1-6, Based on the Theory of Planned Behavior. *Journal of dentistry (Shiraz, Iran)*. 2020; 21(4):292-9.
9. Karami K, Shakerinejad G, Kabiry B. Effect of education based on health belief model on students' oral health behavior change. *J Ilam Univ Med Sci*. 2014; 21(7):134-41.
10. Kamiab N, Kamalabadi YM, Fathollahi MS. DMFT of the First Permanent Molars, dmft and Related Factors among All First-Grade Primary

School Students in Rafsanjan Urban Area. *Journal of Dentistry*. 2021; 22(2):109.

11. Shamsaei F, Ashtarani E, Meschi M, Ashtarani F. The Effect of Oral Health Education through Role Playing on Health Behavior of Educable Mentally Disabled Male Students in Hamadan. *JOURNAL OF NURSING EDUCATION (JNE)*, [online]. 2018; 7(1):27.

12. Beigi MR, Gholami M, Jafari A. Integration of Oral Health Interventions in the Health Promoting Schools Program in Iran: A Multi-Stakeholder Feasibility Assessment. *Frontiers in Dentistry*. 2021.

13. Soltani R, Ali Eslami A, Mahaki B, Alipoor M, Sharifirad G. Do Maternal Oral Health-Related Self-Efficacy and Knowledge Influence Oral Hygiene Behavior of their Children? *International Journal of Pediatrics*. 2016; 4(7):2035-42.

14. Guarnizo-Herreño CC, Wehby GL. Children's dental health, school performance, and psychosocial well-being. *The Journal of pediatrics*. 2012; 161(6):1153-9.

15. Yavari M, Morowatisharifabad M, Haghi M, Rezaeipandari H, Hatamzadeh N, Azad E. Study of knowledge, Attitude, Practice and Oral Health Status among High School Students in Yazd. *Tolooebehdasht*. 2016; 14(6):261-75.

16. Liu X, Xu J, Li S, Wang X, Liu J, Li X. The prevalence of gingivitis and related risk factors in schoolchildren aged 6-12 years old. *BMC oral health*. 2022; 22(1):623.

17. Soltani R, Barzegar M, Ghaffarifar S. Determinants of oral health-related quality of life and its affecting factors in preschool children: Cross-sectional study. *Journal of Oral Health and Oral Epidemiology*. 2023; 12(1):32-7.

18. Karamemedovic E, Bajric E, Virtanen JI. Oral Health Behaviour of Nine-Year-Old Children and Their Parents in

Sarajevo. *International journal of environmental research and public health*. 2021; 18(6).

19. Babaei N, Belyad S, Moradi A. Evaluation of Oral Hygiene and Related Oral Health Behaviors among Students Studying Science in Meshgin City. *Journal of Health*. 2019; 10(1):118-28.

20. Peyman N, Samiee Roudi K. The Effect of Education Based on the Theory of Planned Behavior on Caries Prevention of Permanent Teeth in Fifth Grade Students in Khaf City. *Journal of Mashhad Dental School*. 2015; 39(2):123-36.

21. Gotler M, Oren L, Spierer S, Yarom N, Ashkenazi M. The impact of COVID-19 lockdown on maintenance of children's dental health: A questionnaire-based survey. *Journal of the American Dental Association (1939)*. 2022; 153(5):440-9.

22. Garcés-Elías MC, Beltrán JA, Del Castillo-López CE, Agudelo-Suárez AA, León-Manco RA. Peruvian children toothbrushing during the COVID-19 pandemic. *F1000Research*. 2022; 11:760.

23. World Health Organization. WHO expert consultation on public health intervention against early childhood caries: Available at: <http://apps.who.int/iris/bitstream/10665/255627/1/WHO-NMH-PND-17.1-eng.pdf>

24. Petersen PE, Peng B, Tai B, Bian Z, Fan M. Effect of a school-based oral health education programme in Wuhan City, People's Republic of China. *International dental journal*. 2004; 54(1):33-41.

25. Pakpour AH, Gholami M, Gellert P, Yekaninejad MS, Dombrowski SU, Webb TL. The Effects of Two Planning Interventions on the Oral Health Behavior of Iranian Adolescents: A Cluster Randomized Controlled Trial. *Annals of behavioral medicine: a publication of the Society of Behavioral Medicine*. 2016; 50(3):409-18.

26. Ajzen I. The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*. 2020; 2(4):314-24.
27. Begg C, Cho M, Eastwood S, Horton R, Moher D, Olkin I, Pitkin R, Rennie D, Schulz KF, Simel D, Stroup DF. Improving the quality of reporting of randomized controlled trials: the CONSORT statement. *Jama*. 1996; 276(8):637-9.
28. Präg P. Subjective socio-economic status predicts self-rated health irrespective of objective family socio-economic background. *Scandinavian journal of public health*. 2020; 48(7):707-14.
29. Buunk-Werkhoven YA, Dijkstra A, van der Schans CP. Determinants of oral hygiene behavior: a study based on the theory of planned behavior. *Community dentistry and oral epidemiology*. 2011; 39(3):250-9.
30. Shojaei M, Peyman N, Ghavami V. The Effect of Peer Education Based on the Theory of Planned Behavior on the Improvement of Behaviors Related to Oral Health in Primary School Students in Rural Areas of Torbat-e Jam. *Military Caring Sciences*. 2022; 8(4):399-410.
31. Scheerman JFM, Hamilton K, Sharif MO, Lindmark U, Pakpour AH. A theory-based intervention delivered by an online social media platform to promote oral health among Iranian adolescents: a cluster randomized controlled trial. *Psychology & health*. 2020; 35(4):449-66.
32. Halawany HS, Al Badr A, Al Sadhan S, Al Balkhi M, Al-Maflehi N, Abraham NB, Jacob V, Al Sherif G. Effectiveness of oral health education intervention among female primary school children in Riyadh, Saudi Arabia. *The Saudi dental journal*. 2018; 30(3):190-6.
33. Hashemi ZS, Khorsandi M, Shamsi M, Moradzadeh R. Effect combined learning on oral health self-efficacy and self-care behaviors of students: a randomized controlled trial. *BMC oral health*. 2021; 21(1):342.
34. ABOUBAKR R, TOUNSI A. Impact of School-based Online Oral Health Education Programme during COVID-19 Pandemic: An Interventional Study in Riyadh, Saudi Arabia. *Journal of Clinical & Diagnostic Research*. 2022; 16(2).
35. Dumitrescu AL, Wagle M, Dogaru BC, Manolescu B. Modeling the theory of planned behavior for intention to improve oral health behaviors: the impact of attitudes, knowledge, and current behavior. *Journal of oral science*. 2011; 53(3):369-77.
36. Asgari I, Ahmady AE, Broder H, Eslamipour F, Wilson-Genderson M. Assessing the oral health-related quality of life in Iranian adolescents: validity of the Persian version of the Child Oral Health Impact Profile (COHIP). *Oral health & preventive dentistry*. 2013; 11(2):147-54.
37. Soltani R, Eslami AA, Akhlaghi N, Sharifirad G, Alipoor M, Mahaki B. Toothbrushing frequency among 4-6-year-old Iranian children and associated maternal attitude and sociobehavioral factors. *Dental research journal*. 2017; 14(1):50-6.