

Brief Motivational Interviewing Counseling to Improve Oral Hygiene Behavior Among Adolescent

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ABSTRACT

Aim: To analyze the effect of the brief motivational interviewing counselling approach on the knowledge, attitudes and tooth brushing practice of adolescents.

Method: This research is a quasi-experiment with a pre-test and post-test design with a control group design. The research sample was 80 adolescents aged 12 and 13 years. Respondents were divided into two groups, namely 40 intervention and control groups based on inclusion criteria. The intervention group was given the MI approach, and the control group was assigned conventional dental health education. The MI group also received follow-up over the phone. Both groups filled out knowledge and attitude questionnaires before being given treatment. Plaque index and tooth brushing practice examinations were performed at baseline and four weeks after intervention.

Results: The results showed an increase in the average score of oral health knowledge, attitude, tooth brushing practice in all groups. The plaque index showed a decrease in the average score in all groups. The test of both groups showed that brief MI counseling was more effective than conventional dental health education, oral health knowledge ($p < 0.001$), attitude ($p < 0.001$), tooth brushing practice ($p = 0.001$), plaque index ($p = 0.011$). Follow-up MI by telephone in adolescents is beneficial in the research during the covid-19 pandemic as a promotive and preventive effort to improve dental health behaviour. The MI method by telephone is very interesting for adolescents, easily accessible and time-efficient.

Conclusion : The MI counselling brief intervention can change dental and oral health behaviour through increasing knowledge, attitudes, tooth brushing practices and reducing the dental and oral hygiene index scores of adolescents. MI interventions need to be combined with other interventions to get more effective results for research sustainability.

Keywords: Motivational Interviewing, Oral Hygiene Behaviour, Adolescent

INTRODUCTION

The oral cavity is very influential on the health of the body, meaning that if a person experiences toothache, it can affect other body parts so that it will interfere with daily activities. Studies show that around 3.5 billion people around the world experience oral disease.¹ According to the World Health Organization, 60%-90% of school-age children experience dental caries. Adolescent oral health in Indonesia is a serious problem, especially those related to dental caries and gingivitis. Early adolescence has an age range of 12-15 years which is identified as a critical social period in human life that is very important in determining long-term health status, especially oral health.²

National data, according to RISKESDAS, 2018 reports that the age group 10-14 years has a caries prevalence of 57.6%.³ The guideline on adolescent oral health care states that adolescence has an increase in growth hormone during puberty which affects the composition of subgingival microbes. This is evidenced by research by Adiatman, M. et al., 2016, which states that the gingival status of adolescents, the gingival index of adolescents aged 12 years in Jakarta is 53%, has a score of two and 68% suffers from gingivitis.⁴ Oral health in Indonesia is an important thing that must be considered by health workers, namely dentists and dental therapists. Oral diseases such as dental caries and gingivitis can have a major impact on adolescents physically, psychologically and socially.⁵

The Indonesian government calls for Indonesia to be

caries-free by 2030.⁶ The health education approach with biopsychosocial and behavioural models is a comprehensive approach and has proven to be a promising prospect in creating sustainable behaviour change compared to conventional health education approaches.⁷ The conventional health education model aims to increase patient awareness of the severity of the problem of disease through providing information or advice on solutions and benefits of actions suggested by health professionals.⁸ The limitations of the conventional health education approach have been proven from several studies. Increasing knowledge rarely translates into a sustainable behaviour change because an extension worker positions himself as an expert who gives direct messages to encourage patients to follow their recommendations.^{9,10} This puts the patient in a position of acceptance, but passively.¹¹

Health behaviour intervention using motivational interviewing (MI) technique is a technique to generate intrinsic motivation in changing behaviour. MI was developed by William R. Miller and Stephen Rollnick (2013), Several MI studies in the health sector, such as drug abuse, eating disorders, weight loss, non-adherence to medication and reducing smoking behaviour, have been shown to be effective.¹² In addition, MI technique research is being adopted in several areas of dental health promotion. Harrison et al. reported that MI intervention had a positive impact on reducing dental caries severity in indigenous children in Quebec, Canada.¹³ The Systematic Review reported that MI could increase the frequency of

brushing teeth, limit the habit of consuming cariogenic foods, and increase self-efficacy in oral and dental health.¹⁴

A systematic review shows that the MI technique is based on autonomous support and has potential for dental health.¹⁵ Adolescents psychologically have an increased sense of independence to encourage the emergence of autonomy motivation, are often resistant to regulating the reception of advice or suggestions, so that the health education delivered must be adapted to the characteristics of adolescents by acknowledging, respecting, and protecting the period of adolescent development.¹⁶ MI counselling is one of the appropriate methods to be applied and is still very limited in research in the teenage age group. This study aims to analyze effect of MI counselling on oral hygiene by measuring adolescents' knowledge, attitudes and tooth brushing practice.

MATERIALS & METHODS

This research is an experimental study (pretest and posttest control group design). Subjects in the intervention group were given a 15-20 minute MI counselling brief. Both groups were given leaflets as health education in their respective homes. Sampling was calculated based on sample estimates by Rigau-Gay et al.¹⁷, with $\alpha = 0.05$ and power = 0.80. The sample was divided into two groups, namely 40 adolescent students for the intervention and control groups. Purposive sampling was used to select students in this study with inclusion criteria aged 12-13 years, students who can communicate well, students who are not currently undergoing.

The study protocol (No. 348/XI/2020/Ethics Committees) had been approved by the Ethics Committee of the Faculty of Medical, Universitas Islam Sultan Agung Semarang. The instrument for measuring knowledge and attitudes used a questionnaire with a Cronbach Alpha score of 0.70 and 0.78. Knowledge has ten questions related to the technique, frequency, time and function of brushing teeth correctly. Attitude consists of 10 questions using a 5-point Likert scale (strongly agree to disagree strongly). Tooth brushing uses a video camera that shows only the mouth area without exposing the face to avoid facial recognition. Tooth brushing practice was evaluated and assessed using video by one examiner who was unaware of the subject group. Beginning validity tooth brushing practice was carried out on 15 respondents by researchers and experts. The Kappa coefficient shows good reliability results (K=0.785 and 0.873). The measurement result of the plaque score index by O'Leary showed a minimum of plaque surface that is 12 and a maximum of 112. The development of the score plaque calculation had not scored 10% or less.

The data was analyzed by using SPSS version 25. Data were analyzed for normality by using the Shapiro-Wilk test. The research data used a ratio scale. Data were analyzed for normality by using the Shapiro-Wilk test. The effectivity test on the paired group normal data used dependent sample test and for the unpaired group, it used the independent sample test. Linear regression analysis was used to determine which of the variables of parental education, gender, knowledge, attitudes and tooth brushing practice contributed to the plaque index. A p-value A 0.05 was considered statistically significant.

RESULTS

A total of 80 adolescents participated in this study. Among all, age 12 years was 21(52,5%) and 22(55%), 13 years of age were 19(47,5)% and 18(45%) in intervention and control group. Respondents were male and female, 20 (50%) in both groups. As presented in Table 1, no significant group difference was found in participants' socio-demographic backgrounds (p>0.05). The characteristic of the study participants showed in Table 1.

Table 1. Characteristics of Participant

Characteristic		Intervention	Control	p-value
		% (n)	%(n)	
Age	12 years old	52,5%(21)	55%(22)	0.825
	13 years old	47,5%(19)	45%(18)	
Gender	Male	50%(20)	50%(20)	1.000
	Female	50%(20)	50%(20)	
Mother's Education	Higher Education	50%(20)	30%(12)	0.069
	High School	50%(20)	70%(28)	
Father's Education	Higher Education	60%(24)	42,5%(17)	0.120
	High School	40%(16)	57,5(23)	

p-value were obtained through Chi-Square test

Table 2 shows the data normality test. Oral health knowledge was primarily abnormally distributed with a p-value <0.05. It can be concluded that the distributed data is not normal, then it will be continued with nonparametric tests. Attitude, Tooth brushing practice and plaque index with p-value>0.05, it can be concluded that the distributed data is normal, then it will be continued with parametric test.

Table 2. Data Normality Test

Variable	p-value	
	Intervention	Control
Oral health knowledge pre-test	0.000	0.005
Oral health knowledge post-test	0.000	0.020
Attitude pre-test	0.148*	0.272*
Attitude post-test	0.056*	0.100*
Tooth brushing practice pre-test	0.102*	0.100*
Tooth brushing practice post-test	0.118*	0.156*
Plaque index pre-test	0.083*	0.604*
Plaque index post-test	0.065*	0.071*

Shapiro-wilk *p-value > 0.05

Table 3. Oral Health Knowledge, Attitude, TBP, Plaque index in Intervention Group Respondents

Variable	Mean+SD		Delta	p-value
	Pre-test	Post-test		
Oral health knowledge	7.23+1.000	9.03+0.974	9.03	<0.001
Attitude	44.42+2.659	47.28+1.724	2.98	<0.001
TBP	11.40+2.530	19.38+2.569	7.98	<0.001
Plaque index	71.43+14.430	23.73+7.906	47.70	<0.001

p-value were obtained through Wilcoxon, Paired sample test

Table 3 shows that students in the intervention group with a p-value <0.05. The mean scores and their standard variations of the main study variables were as follows: Oral health Knowledge = 9.03+0.974, Attitude = 47.28+1.724, Tooth Brushing Practice = 19.38+2.569 and Plaque Indeks = 23.73+7.906, meaning that motivational interviewing counselling is effective in improving oral hygiene behaviour in adolescents.

Table 4 shows that students in the control group with a p-value <0.05, The mean scores and their standard variations of the main study variables were as follows: Oral health Knowledge = 7.75+1.193, Attitude = 44.28+2.660, Tooth Brushing Practice = 17.00+3.297 and Plaque Indeks = 53.20+16.069, meaning that the conventional health education is effective in improving oral hygiene behaviour adolescent.

Table 4. Oral health Knowledge, Attitude, TBP, Plaque indeks In Control Group Respondents

Variable	Mean+SD		Delta	p-value
	Pre-test	Post-test		
Oral health knowledge	6.03+1.423	7.75+1.193	1.73	<0.001
Attitude	41.50+2.491	44.28+2.660	2.78	<0.001
TBP	11.20+3.639	17.00+3.297	5.80	<0.001
Plaque index	89.73+4.139	53.20+16.069	36.52	<0.001

p-value were obtained through Wilcoxon, Paired sample test

Table 5. the test result of the effectiveness of unpaired data show the p-value between the intervention and control groups were p-value < 0.05, meaning the motivational interviewing counselling was more effective in improving oral health knowledge, attitude, correct teeth were brushing practice and lowering plaque index scores compared to conventional health methods.

Table 5. Differences of Oral health Knowledge, Attitude, TBP, Plaque indeks of two groups

Groups	N	Mean	SD	p-value
Oral health knowledge				
Intervention	40	9.03	1.258	<0.001**
Control	40	7.75		
Attitude				
Intervention	40	47.28	1.724	<0.001**
Control	40	44.28	2.660	
TBP				
Intervention	40	19.38	2.569	0.001*
Control	40	17.00	3.297	
Plaque index				
Intervention	40	36.68	3.954	0.011*
Control	40	34.15		

p-value were obtained through Man Whitney, Independent sample Test (**p<0.01 : *p<0.05)

The linear regression analysis was performed to explain the variables affecting the plaque score index among adolescents. According to table 6, Model 4 diperoleh pengaruh terbesar adalah variable jenis kelamin. Variable from oral health knowledge, Mother Education, and gender can define 22,6% of the variance of plaque index among adolescents.

Table 6. Four multiple linear regression models of plaque index

	Independent Variable	B	p-value	R ²
I	OHK	2.553	0.099	0.233
	Attitude	-0.347	0.674	
	TBP	0.145	0.772	
	Mother's Education (1=High School, 2=Higher Education)	4.403	0.082	
	Father's Education(1=High School, 2=Higher Education)	0.135	0.961	
	Gender(1=Male, 2=female)	5.061	0.081	
II	OHK	2.537	0.089	0.233
	Attitude	-0.344	0.671	
	TBP	0.152	0.749	
	Mother's Education(1=High School, 2=Higher Education)	4.379	0.074	
	Gender(1=Male, 2=female)	5.010	0.060	
III	OHK	2.623	0.070	0.231
	Attitude	-0.374	0.638	
	Mother's Education(1=High School, 2=Higher Education)	4.414	0.067	
	Gender	5.092	0.052*	
IV	OHK	2.311	0.068	0.226
	Mother's Education(1=High School, 2=Higher Education)	4.482	0.060	
	Gender(1=Male, 2=female)	4.690	0.054*	

OHK= Oral Health Knowledge, TBP=Tooth Brushing Practice

DISCUSSION

The results of the research analysis showed that adolescents experienced an increase in knowledge of attitudes, TBP and decreased plaque index scores after one month of observation after MI intervention. The value of adolescent knowledge has increased due to the intervention provided in the form of MI counselling for 15-20 minutes with the substance of correct brushing techniques, dental health problems that are often experienced by adolescents and healthy diet foods for dental health assisted by learning media such as videos, leaflets. And props (phantom). Batliner et al. (2014) in their research showed that MI could improve oral health behaviour through increased knowledge.¹⁸

Counselling is also carried out by telephone contact three times a week after the MI intervention face to face, which aims to maintain communication between respondents and counsellors to strengthen commitment and provide support to adolescents for behavioural changes that have been chosen. Study protocols in group formation in dental health conducted online proved that MI is very effective and efficient to be applied to adolescents.¹⁹ Follow-up carried out individually will make the involvement of the counsellor relationship more intense in seeking changes in dental health behaviour so that it is expected to produce sustainable behaviour changes.

The assessment of the stages of behaviour change refers to the stage of change theory (transtheoretical theory) through scenario exercises consisting of 5 stages of evolution, namely pre-contemplation, contemplation, planning, action and maintenance. In each stage chosen by adolescent students, the counsellor will support every

decision that has been selected by providing motivational support.

Miller and Rollnick (2014) are the originators of the motivational interviewing theory, which says that an effective counselling process depends on how a counsellor masters psychological concepts. MI is a directive method aimed at eliciting the client's intrinsic motivation in changing behaviour.²⁰ The success of our research results can be caused by several reasons. Firstly, counsellors in the counselling process are dental therapists who have received training from psychologists on mastering MI principles that must be learned, including express empathy, develop discrepancy, roll with resistance and support self-efficacy. Secondly, the counsellor approach to adolescent students in the counselling process through the skills of open-ended questions, affirmations, reflections and summaries (OARS).

The results showed that a video-assisted Tooth Brushing Practice after the MI counselling intervention on how to brush teeth on 16 surfaces using the bass technique, modifying the bass and roll were identified as the proper toothbrushing technique because adolescents had better dental and oral hygiene status as evidenced by a decrease in score. Index plaque, especially the whole gingival area. Brief MI counselling can help develop dental health promotions to increase the effectiveness of TBP in the future. The TBP video is shown in figure 1.



Figure 1. Tooth Brushing Practice Video

The Ministry of Health, Indonesia, suggests brushing teeth in approximately 2 minutes.²¹ Research by Rahardjo et al. (2015) reported that the length of time for brushing teeth was 57.29 seconds.²² TBP is a basic skill to achieve sustainable oral hygiene habits.²³ Previous studies reported that MI could provide information, motivation and skills through proper brushing of teeth.²⁴

The analysis of the difference test between MI and conventional health education shows that the MI counselling brief is more effective than traditional health education. The MI method assumes that the health provider's position is someone in preparing clients for change by overcoming ambivalence about behavioural decisions.²⁵ MI is described as a method of changing behaviour by reflecting on and respecting the client's autonomy so that the client actively interprets his own needs and evaluates his behaviour. MI's potential outperforms conventional health education, as several studies reported that the effectiveness of MI can control periodontal infection in patients with non-surgical periodontal therapy, reduce caries early childhood caries

(ECC) in preschool children, increase self-efficacy, and increase tooth brushing frequency.^{27,28,9}

The results of regression analysis showed that after controlling for oral health education, attitude, TBP, mother's education, father's education and gender. The biggest influence is the gender variable. This is in line with the findings of previous studies that more women are found to have good oral hygiene because 87% of women brush their teeth twice a day, while about 67% of men do it and often forget to brush their teeth at night.²⁹ A systematic review also reported a higher frequency of brushing and flossing in women than in men.³⁰ Therefore, the plaque index score of women is lower than that of men. Someone who receives information through MI counselling will raise awareness that changes to the perceived oral hygiene will be of value to himself. MI's client-centered approach provides self-willed compliance.

Model 4 of the regression analysis shows that Oral Health Knowledge, mother's education and gender accounted for 22.6% of the plaque index. Oral health knowledge and mother's education have no significant relationship to plaque index scores. The study identified that there might be other contributing factors such as the process and flow rate of saliva, dietary habits and specific social roles. Previous studies have reported that increased plaque index scores can cause dental caries caused by food consumption frequency such as sweet ice tea, sweet-flavoured milk, bubble drinks/milk tea, and chocolate bars.³¹ Teenagers like the intake of sweet foods, so the behavioural factors of food consumption can cause an increase in the plaque index score. According to behavioural science theory, behaviour is a unique thing, namely the stages of change model (SCM)³² argues that behaviour change is a gradual process; understanding. Understanding the steps of a person's behaviour change helps strengthen the counselling process. The theory explains that there is no absolute and predictable change. The results of the analysis of the linear regression test are not meaningful in this study because there are stages of increasing or decreasing the compliance of a teenager who can change in making changes in dental health behaviour at a specific time. However, this is normal. The process of the rising and falling stages of making changes is a process that is experienced at every step by individuals until they reach the final stage. This process is in line with the theory, which states that a person's readiness to make changes is divided into five stages, namely: pre-contemplation, contemplation, planning, action and maintenance. Brief motivational interviewing counselling implemented for adolescents aims to understand motivation as a process or condition of readiness to change so that the goal of treatment is to facilitate building readiness to go through stages of change.

Previous studies reported that MI interventions in dental health were mostly carried out on parents, caregivers, preschool children, patients with periodontal disease.^{33,34,35,36,37} The lack of MI intervention research in adolescents. This study proves that MI is effectively implemented for adolescents. Adolescents psychologically have an increased sense of independence. They are often resistant to receiving advice, so that health education delivered to adolescents must be adapted to the

characteristics of adolescents by acknowledging, respecting and protecting in their development period. MI has positive potential in changing dental health behaviour.

This study has several limitations. The role of adolescent behaviour, including their knowledge, attitude and motivation towards their children, is not assessed. Measurement of the part of parents only looks at the educational background of parents. However, the sense of independence of adolescents to choose the freedom of care for themselves has been proven that adolescents who are advised by respecting their autonomy will be more obedient to make changes to dental health behaviour for themselves. Despite some limitations, this study has many strengths. The validity and reliability of data collection were carried out with good results. To ensure the quality of the research, counsellors were also given prior training by a psychologist, and video surveillance of TBP footage revealed the actual situation of teenagers' habits in how to brush their teeth in daily life.

CONCLUSION

Dental health education is a valuable effort in the promotion of dental health and has an affordable price. The quality of good oral and dental health will determine the health status of adolescents in the future. This study has proven that the approach using the brief motivational interviewing counselling method has a positive impact on oral hygiene behaviour by increasing knowledge, attitudes, tooth brushing practices, and reducing adolescents' dental and oral hygiene index scores. MI interventions need to be combined with other interventions and strengthen the theory of the psychological impact of MI to get more effective results for the sake of research sustainability.

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REFERENCES

1. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2017. *The Lancet* (2017).
2. Sousa, Z. A. A. de, Silva, J. G. da & Ferreira, M. de A. Knowledge and practices of teenagers about health: implications for the lifestyle and self care. *Escola Anna Nery - Revista de Enfermagem* (2014) doi:10.5935/1414-8145.20140057.
3. Minister of Health of Republic Indonesia. Results of Basic Health Research (Riskesmas) 2018. Health Research and Development Agency, Ministry of Health, Republic of Indonesia (2018).
4. Adiatman, M. et al. Dental and Periodontal Status of 5 and 12 year old Children in Jakarta and it's Satellite Cities. *Journal of Dentistry Indonesia* (2016) doi:10.14693/jdi.v23i1.982.
5. Bastos, R. S. et al. Dental caries related to quality of life in two Brazilian adolescent groups: A cross-sectional randomised study. *International Dental Journal* 62, 137–143 (2012).
6. Sakti. National Action Plan for Oral Health Services 2015-2019. 8 (2016)
7. N.B., S., R., K. & S., K. Effect of dental health education on the knowledge and attitude among expectant mothers: A questionnaire study. *Journal of Pharmacy and Bioallied Sciences* (2019).
8. Setiawati, F. et al. Effectiveness of dental health education intervention using the 16-surface tooth brushing program among 7–9-year-old schoolchildren in Indonesia. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada* (2020) doi:10.1590/pboci.2020.144.
9. Harrison, R. Motivational interviewing (MI) compared to conventional education (CE) has potential to improving oral health behaviors. *Journal of Evidence-Based Dental Practice* 14, 124–126 (2014).
10. Vani Kapoor, Anil Gupta, V. A. Behavioral changes after motivational interviewing versus traditional dental health education in parents of children with high caries risk: Results of a 1-year study. *Journal of Indian Society of Pedodontics and Preventive Dentistry* 37, 192–197 (2019).
11. Gao, X., Lo, E. C. M., McGrath, C. & Ho, S. M. Y. Innovative interventions to promote positive dental health behaviors and prevent dental caries in preschool children: Study protocol for a randomized controlled trial. *Trials* (2013) doi:10.1186/1745-6215-14-118.
12. Borrelli, B., Tooley, E. M. & Scott-Sheldon, L. A. J. Motivational interviewing for parent-child health interventions: A systematic review and meta-analysis. *Pediatric Dentistry* 37, 254–265 (2015).
13. Harrison, R. L., Veronneau, J. & Leroux, B. Effectiveness of maternal counseling in reducing caries in cree children. *Journal of Dental Research* (2012) doi:10.1177/0022034512459758.
14. I, Aryane, M.M., Emídio, A., Silva, R. & I, Andrela, M.C. Educational interventions in health services and oral health : systematic review. 1–14 (2018).
15. Kay, E. J., Vascott, D., Hocking, A. & Nield, H. Motivational interviewing in general dental practice: A review of the evidence. *British Dental Journal* 221, 785–791 (2016).
16. Frost, H. et al. Effectiveness of Motivational Interviewing on adult behaviour change in health and social care settings: A systematic review of reviews. *PLoS ONE* vol. 13 (2018).
17. Rigau-Gay, M. M., Claver-Garrido, E., Benet, M., Lusilla-Palacios, P. & Ustrell-Torrent, J. M. Effectiveness of motivational interviewing to improve oral hygiene in orthodontic patients: A randomized controlled trial. *Journal of Health Psychology* (2018) doi:10.1177/1359105318793719.
18. Batliner, T. et al. Motivational interviewing with American Indian mothers to prevent early childhood caries: Study design and methodology of a randomized control trial. *Trials* (2014) doi:10.1186/1745-6215-15-125.
19. Gao, X., Lo, E. C. M., McGrath, C. & Ho, S. M. Y. Face-to-face individual counseling and online group motivational interviewing in improving oral health: Study protocol for a randomized controlled trial. *Trials* 16, 1–7 (2015).
20. Miller, W. R. & Rollnick, S. *Motivational Interviewing, Third Edition: Helping People Change*. (2013).
21. Minister of Health of Republic Indonesia. Main Results of Basic Health Research 2018. Ministry of Health of the Republic of Indonesia (2018).
22. MoHR., I. Regulation of the Minister of Health of Republic Indonesia Number 89 Year 2015 about Oral Health Effort. Jakarta, Indonesia: Director General Legislation Ministry of Law and Human Rights Republic Indonesia; 2016. p. 148-50. (2018).
23. Thavarajah, R., Kumar, M., Mohandoss, A. A. & Vernon, L. T. Drilling Deeper into Toothbrushing Skills: is Proactive Interference an Under-Recognized Factor in Oral Hygiene Behavior Change? *Current Oral Health Reports* 2, 123–128 (2015).
24. Wu, L. et al. Motivational Interviewing to Promote Oral Health in Adolescents. *Journal of Adolescent Health* 61, 378–384 (2017).
25. Gillam, D. G. & Yusuf, H. Brief Motivational Interviewing in dental practice. *Dentistry Journal* 7, 1–9 (2019).
26. Cascaes, A. M., Bielemann, R. M., Clark, V. L. & Barros, A. J. D. Effectiveness of motivational interviewing at improving

- oral health: A systematic review. *Revista de Saude Publica* 48, 142–153 (2014).
27. Wu, L. et al. Motivational Interviewing to Promote Oral Health in Adolescents. *Journal of Adolescent Health* 61, 378–384 (2017).
 28. Randall, C. L. On Motivational Interviewing for Oral Health Promotion: State of the Field and Future Directions. *JDR Clinical and Translational Research* 376–377 (2018) doi:10.1177/2380084418796462.
 29. Nordström, A. & Birkhed, D. Attitudes and behavioural factors relating to toothbrushing and the use of fluoride toothpaste among caries-active Swedish adolescents—a questionnaire study. *Acta Odontologica Scandinavica* 75, 483–487 (2017).
 30. Calderon, S. J. & Mallory, C. A Systematic Review of Oral Health Behavior Research in American Adolescents. *Journal of School Nursing* (2014) doi:10.1177/1059840514544034.
 31. Utami, U. et al. Food consumption frequency and dental caries status among adolescents in Jakarta. *Journal of International Dental and Medical Research* (2020).
 32. Shaffer, J. A. Stages-of-Change Model. in *Encyclopedia of Behavioral Medicine* (2020). doi:10.1007/978-3-030-39903-0_1180.
 33. Naidu, R., Nunn, J. & Irwin, J. D. The effect of motivational interviewing on oral healthcare knowledge, attitudes and behaviour of parents and caregivers of preschool children: An exploratory cluster randomised controlled study. *BMC Oral Health* (2015) doi:10.1186/s12903-015-0068-9.
 34. Faustino-Silva, D. D. et al. Motivational interviewing effects on caries prevention in children differ by income: A randomized cluster trial. *Community Dentistry and Oral Epidemiology* 47, 477–484 (2019).
 35. Henshaw, M. M. et al. Randomized Trial of Motivational Interviewing to Prevent Early Childhood Caries in Public Housing. *JDR Clinical and Translational Research* 3, 353–365 (2018).
 36. Blue, C. M. et al. Using motivational interviewing to reduce parental risk related behaviors for early childhood caries: A pilot study. *BMC Oral Health* 20, 1–8 (2020).
 37. Woelber, J. P. et al. Training of Dental Professionals in Motivational Interviewing can Heighten Interdental Cleaning Self-Efficacy in Periodontal Patients. *Frontiers in Psychology* 7, 1–9 (2016).