



Original article

Motivational Interviewing to Promote Oral Health in Adolescents



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ABSTRACT

Purpose: Motivational interviewing (MI) is a counseling strategy to help people change their behaviors. This single-blinded randomized controlled trial evaluated the effectiveness of MI in improving adolescents' oral health.

Methods: Fifteen secondary schools were randomly assigned to three groups: (I) prevailing health education, (II) MI, and (III) MI coupled with interactive dental caries risk assessment (MI + RA). Adolescents ($n = 512$) with unfavorable oral health behaviors (infrequent toothbrushing and/or frequent snacking) were recruited; 161, 163, and 188 in groups I–III, respectively. Participants in the three groups received their respective interventions. At baseline and after 6 and 12 months, participants completed a questionnaire on their oral health self-efficacy and behaviors. Their oral hygiene (dental plaque score) and dental caries (number of decayed surfaces/teeth status) were recorded.

Results: Compared with group I, subjects in groups II and III were more likely to reduce their snacking frequency (odds ratios [95% confidence intervals {CIs}]: 7.12 [1.80–28.16] and 11.17 [2.90–42.98], respectively) and increase their toothbrushing frequency (odds ratios [95% CIs]: 5.26 [2.28–12.16] and 11.45 [4.99–26.26], respectively) after 12 months. Taking group I as a reference, groups II and III had lower number of new carious teeth $\Delta D_{ICDAS II 1-6MFT}$ (β [95% CI]: $-.24$ [$-.44$ to $-.04$] and $-.31$ [$-.51$ to $-.11$], respectively).

Conclusions: MI was more effective than prevailing health education strategy in eliciting positive changes in adolescents' oral health behaviors and preventing dental caries.

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IMPLICATIONS AND CONTRIBUTION

This study demonstrates the effectiveness of motivational interviewing in changing adolescents' dietary and oral hygiene behaviors and has direct implication for oral health. Since healthy diet and personal hygiene are essential for combating systemic diseases/conditions (e.g., obesity, diabetes, and infectious disease), the intervention also contributes to advancing adolescents' general health.

Dental caries (tooth decay) is a highly prevalent oral disease affecting a large proportion of the population globally [1]. Significant dental caries activity appears at the time of adolescence [2] and involves 60%–90% of school-aged children [3].

Conflicts of Interest: The authors have no conflicts of interests to disclose. This trial registration number is HKUCTR-1852.

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Dental caries exerts profound impacts on adolescents' physical, psychological, and social well-beings [4]. The treatment of dental caries poses a heavy financial burden for both individuals and society [5].

Dental caries is preventable if one adopts healthy self-care behaviors [1]. Early adolescence is a socially critical period [6], during which health behaviors would become perpetuated lifestyle habits [7]. This stage creates a unique opportunity for delivering oral health interventions to positively alter unfavorable behaviors. The prevailing health education (PE) has a clear

focus on knowledge dissemination and advice giving. This often leads to significant improvement in people's oral health knowledge which, however, seldom translates into sustained changes in their behaviors [8,9]. Adolescents are not future orientated and do not regard themselves as vulnerable to health problems [10–12]. Thus, alerting them to the consequences of unhealthy behaviors has little impact on their health behaviors [13,14]. In addition, with their increasing demand for autonomy [15], overt persuasion or direct advice giving to pressure for change often results in resistance, since they feel their own thoughts, feelings, or decisions are interfered [16]. The insufficiency of PE for adolescents has also been reported in a review, which showed a lack of sustained changes in oral health behaviors, despite some improvement in knowledge [9].

To address the limitation of PE, motivational interviewing (MI) has been developed for changing people's behaviors [17]. As a person-centered counseling strategy, MI elicits clients' intrinsic motivation, enhances their commitment, and explores their own solutions toward change [18]. A systematic review indicated that MI yielded a moderate effect size (from .25 to .57) within a wide range of behavioral problems, such as substance abuse, diet disorder, and exercise problems [19]. MI has also shown its potential in dental context, such as in improving periodontal treatment outcomes of adult patients and preventing early childhood caries [20]. However, dental MI studies conducted in adolescents are scarce, with only some early trials targeting smoking, poor compliance to dental appointment, and periodontal maintenance during orthodontic treatment [20]. There is no reported study on the effectiveness of MI in eliciting adolescents' behavior change associated with preventing dental caries.

To facilitate the dental counseling process, an interactive dental caries risk assessment (RA) program Cariogram may be useful [21]. Enhanced with artificial intelligence, Cariogram displays one's caries risk profile via a pie diagram [22]. The whole risk is quantified and broken down into various aspects, including diet and oral hygiene. This RA program has been shown to be valid in adolescents [23]. It is assumed that this program, if introduced at appropriate time points, can facilitate MI in several ways, such as assisting client's self-reflection of his/her status quo, finding meaningful direction, exploring possible health gains through various behavioral changes, considering alternative and interim solutions, making informed decisions, and setting realistic goals [21]. Whether this interactive RA program can actually facilitate the MI process and maximize its potential has not been tested empirically.

This randomized controlled trial (RCT) aimed to evaluate the effectiveness of three intervention schemes, namely PE, MI, and MI + RA in enhancing adolescents' oral health self-efficacy, changing their oral health behaviors (snacking and toothbrushing), and preventing dental caries.

Methods

Sample size calculation and participant recruitment

This study was approved by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (reference no: UW 11-301). A sample size calculation was performed by using the software G*Power, version 3.1.9.2 (Franz Faul, Uni Kiel, Germany). The primary outcome of this RCT is dental caries increment. The mean and standard deviation of decayed, missing, and filled surfaces increment in schoolchildren

in a year was reported as 7.72 and 6.1 [24]. An intervention is considered clinically significant if it leads to a 30% reduction (i.e., to 5.404) of the caries increment [24]. A sample size of 110 subjects per group was estimated to yield a power of .80 and a statistical significance level of .05. Allowing for a 25% attrition rate, 147 subjects needed to be recruited into each group.

Fifteen secondary schools were recruited from the three main districts in Hong Kong. Schools in each district were randomly assigned to three intervention groups (I) PE, (II) MI, and (III) MI + RA. The randomization through drawing lots was completed by a research assistant not involved in the delivery of intervention, data acquisition, and outcome assessment. Allocation concealment was ensured by sealed and opaque envelopes.

To be eligible to join this study, one must (1) be a full-time student enrolled in a participating school; (2) be 12 or 13 years old; (3) not have any major systemic disease; (4) have unfavorable oral health behavior, defined as "toothbrushing less often than twice a day" AND/OR "snacking three times or more a day"; and (5) be able to communicate in Cantonese or Mandarin. Child's assent and parental written consent were obtained.

Interventions

At baseline, participants in group I received a 30-minute oral health talk delivered to the whole school by an experienced dental hygienist. Each participant received three pamphlets, namely "Cleaning teeth properly—You can do it," "How to use dental floss," and "Healthy diet, healthy teeth" (http://www.toothclub.gov.hk/en/en_index.html). Each participant in group II joined a one-on-one face-to-face MI session, which lasted 15–30 minutes. The MI approaches were followed, including the four spirits (evocation, compassion, acceptance, and collaboration), four processes (engaging, focusing, eliciting, and planning), and four skills (open questions, affirmation, reflection, and summary) [18]. In group III, the interactive RA program Cariogram was incorporated at different stages of MI as appropriate to facilitate the counseling process. The RA program was not used at the beginning of the counseling to avoid falling into direct information and advice giving. All MI sessions were audio-recorded and periodically reviewed. To facilitate the start of behavioral change, maintain the change and avoid relapse, five telephone calls were made in both MI groups at 2 weeks, 1 month, 2 months, 4 months, and 6 months after the initial counseling [25].

All interventions were delivered by two dental hygienists who were coached by an expert panel composed of a health psychologist, a behavior scientist, and a member of Motivational Interviewing Network for Trainers. Training sessions included lectures, discussions, demonstrations, and role-plays. Around 15% of audio records were randomly selected, and the fidelity of MI intervention was rated by using the Motivational Interviewing Treatment Integrity (MITI) Coding Manual 4.1 (Moyers TB, Manuel JK, Ernst D, unpublished, 2014). The MITI has two components, namely global scores and behavior counts. The global scores consist of a "relational" score and a "technical" score; the former measures "partnership" and "empathy," whereas the latter measures "cultivating change talk" and "softening sustain talk." Both global scores range from 1 to 5, with a higher score indicating a higher MI adherence. The behavior counts can be converted into two indicators, proportion of complex reflection (% CR) and reflection question ratio (R:Q). A % CR of 50% or above and an R:Q of 2 or above are considered as "good," whereas a % CR of 40% or above and an R:Q of 1 or above are considered as "fair."

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