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Theory-based oral health education in adolescents

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SUMMARY

Objectives. The aims were to overview the previous use of psychological theories for oral health education in adolescents and to discuss current approaches which could enhance the effectiveness of behaviour modification in this age group. Material. The MEDLINE via OVID database was searched for relevant papers published during the last four decades. Results. Only a few studies using psychological models and theories in oral health education for adolescents could be found and these studies were carried out a few decades ago. It was shown that socially disadvantaged adolescents, i.e. those who have the greatest need for improvements in oral health, might benefit most from the theory-based behavioural interventions. However, evidence from these trials can not be directly used to base oral health education in contemporary adolescents. An important consideration is that psychological models and theories developed for adults may not apply as well to adolescents, who are at different stages of behavioural development and with different cognitive abilities. Conclusions. Understanding the adolescent profile in oral health education appears to be crucial for success. The theory-based approaches to health behaviour modification, already successfully applied in other fields of medicine, might be a good alternative to conventional oral health promotion in adolescents.

Key words: oral health education, adolescents, parenting, theory-based behavioural intervention.

INTRODUCTION

Recent theories of the social determinants of health emphasize the contribution of the life-course perspective to health inequalities, i.e. that exposure to advantages and disadvantages through life may accumulate longitudinally (1). It has also been proposed that there are socially-critical periods in human life, which may have particular importance in determining health status over the long-term, and early adolescence has been identified as the first period (2). It is believed that there is a link between health-related behaviours of adolescents and their subsequent health status as adults (3). Therefore, the timing of delivering the intervention is considered to be one of the key issues for success in health promotion (4). One of health promotion strategies is health education, which in order to achieve optimum health focuses on lifestyle, namely knowledge, attitudes and behaviour (5). It is known that relatively stable patterns of toothbrushing, physical activity, smoking, and dietary habits are established during adolescence (6;7). As unhealthy behaviours were shown to be difficult to change during the adult years, it is important to intervene during adolescence before they become entrenched (3).

On the other hand, puberty was reported to be the most difficult period for health education (8). In general, adolescents are not future-orientated and fail to see themselves as vulnerable to health problems (9-11). Moreover, it was reported that for adolescents healthy teeth are even less valuable than their general health (12).

Despite the number of studies done, it remains unclear which type of intervention is most effective for oral health promotion (13). Attempts to modify human behaviour should be based on the understanding of principles of social interaction, communication and developmental processes (14). However, the majority of researchers investigating changes in oral health-related behaviour only used different methods

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of the same educational approach based on the simple conveying of information regarding the etiology of oral disease and instructions in toothbrushing. It has been shown that improvement in knowledge does not necessarily result in more positive attitudes (15) and that the positive attitudes achieved do not always influence the behaviours of the individuals (16;17). In addition, even if changes in oral health behaviours occurred, they appeared to be less resistant to deterioration over time than health knowledge (18).

The effectiveness of changing oral health-related behaviour using simple instructional lectures was questioned a few decades ago (19). In 1978, Kegeles and co-authors (20) emphasized that one of the most important shortcomings of research on preventive health behaviour was that there were no attempts to derive hypotheses or explanations from theory. The importance of theory-based interventions in health education aiming to improve the chances of effectiveness has been repeatedly emphasized in the literature (21;22). It was stated that health behaviour theories suggest more effective methods for behaviour change and patient compliance, and provide a foundation for implementation, monitoring and evaluation of intervention (23;24).

Unfortunately, the full potential of the behavioural and social sciences to promote health-protective behaviours has not been fully realized (22). There is ample evidence in other fields of medicine of successful interventions for prevention or changing unhealthy behaviours in individuals of different age groups (25-29). However, a theory-based approach in oral health education has not been widely adopted. A systematic review of interventions in adults identified only four randomized controlled trials where attempts to improve adherence to oral hygiene instructions were based upon psychological models or theories (30). It was concluded that there was tentative evidence that psychological approaches to behaviour management can improve oral hygiene and oral hygiene-related behaviour. The need for greater use of theory in the development of interventions was emphasized (30).

The aims of present work are 1) to overview the previous use of psychological theories for oral health education in adolescents and 2) to discuss contemporary approaches which might be useful to enhance the effectiveness of behaviour modification in adolescents.

METHODS

The MEDLINE via OVID database was searched for papers published from 1967 to present. The following keywords and phrases were used: "health education", "public health dentistry", "health promotion", "healthy people programs", "(behavior or behaviour) therapy", "(behavior or behaviour) modification", "(behavior or behaviour) change", "(behavior or behaviour) control", "(behavior or behaviour) intervention", "lifestyle modification", "oral hygiene", "toothbrushing", "dental plaque", "health knowledge, attitudes, practice", "motivation", "dental devices, home care".

The search was limited to publications in English. The relevant publications were identified after having reviewed the abstracts. In search of further relevant studies, the reference lists of all included studies were examined.

Inclusion criteria:

- studies targeting at adolescents (12-18-year old);
- studies aiming to modify oral health related lifestyle (knowledge, attitudes or oral hygiene behaviour) and using interventions based on psychological models or theories;
- studies with pre- to post-test design (randomized controlled trials and quasi-experimental studies);
- controlled studies, i.e. studies either with a negative (no intervention) control group or with a positive (alternative intervention) control group.

RESULTS

Only three adolescent studies out of 31 based their interventions on psychological models or theories related to human behaviour.

The study by Albino et al. (31) evaluated changes in the oral health behaviour of adolescents, who received preventive dental treatment along with a comprehensive 3-year instructional and motivational program. Part of the program was based on the Belief Consistency model according to Rokeach's approach to behaviour change (31). Following this model, individuals were made aware of inconsistencies within their value – attitude systems. Significant differences among the groups were observed only after the implementation of the Belief Consistency program, i.e. students who had participated in the program activities compared to the students who did not had significantly better oral hygiene status.

The second study comprised of the above-mentioned Belief Consistency model and the Behaviour Rehearsal approach, focusing on teaching individuals to give themselves subvocal instructions on behaviour (32). Both models were compared to the conventional instruction group and controls. Some significant differences were revealed when both in-

tervention groups were compared to the control group. The Belief Consistency approach related to improvements in plaque scores over longer period of time than did the Behaviour Rehearsal model (12 weeks and 1 week, respectively).

An important finding can be revealed in the study by Sogaard et al., where the principles of Social Learning theory in oral health education were applied (33). Social learning theory focuses on the learning that occurs within a social context. It considers that people learn from one another, including observational learning, imitation, and modeling (34). The differences in improvement in gingival health among the groups (traditional program, comprehensive program and reference group) were not statistically significant. However, a clear effect of the comprehensive program based on the principles of Social Learning theory emerged when differences were adjusted for the socio-economic status. This adjustment showed that children from a lower socio-economic class benefited more from theory-based interventions while their counterparts with a high socio-economic background were able to take advantage of the traditional program (33).

DISCUSSION

Although reviewed studies showed benefit of interventions based on theories as compared to controls or conventional instructions, they had some methodological deficiencies, which make them at least less conclusive. The allocation of participants to groups in the study by Albino et al. (31) was not consistently at random, i.e. 10 schools were randomly assigned to one group, but students in the other 23 schools were assigned alternately from class rosters to other two groups. Seemingly, the randomization was still achieved as baseline levels of plaque scores were similar in all three groups. Another limitation of this study relates to how interventions and control were employed. In order to give a definite answer if theory based approach is more successful than conventional instructions, one should have an intervention group where only health education and no other activities are initiated. However, in this study all participants, including controls, were exposed to professional dental care. Consequently, the absence of an adequate intervention group and the absence of a negative control group lead to difficulties to make a clear distinction between the impact of educational program and the effect of preventive dental care.

The lack of clarity and precision in the report should also be mentioned. Although the authors stated that examinations for plaque and gingivitis were conducted every six months, it is unclear how long this was after the cessation of the Belief Consistency program. As intervention outcomes are usually difficult to sustain, it is important to know if the positive changes were still retained after a longer period of time.

The second study (32) was a true experiment where randomization of groups was secured. Participants in each of the schools were randomly assigned either to one of the three experimental groups or to the control group. The control group was a negative one, i.e. received no intervention. Consequently, due to a better study design this study can support us with stronger evidence than the study by Albino et al. (31). The strength of this study was that it used different objective measures: clinical plaque, clinical gingivitis assessments and photographic plaque measurements. However, the limitation of the photographic method was that it did not include the assessment of posterior teeth, the plaque scores of which are usually higher than the ones of anterior teeth (35). Another possible limitation is that the examiners were not blinded regarding baseline and post-test measures, thus a possibility of examiner bias occurred. Some support for this may be derived from the study findings, i.e. all clinical scores taken by the examiners were lower on the post-test, while this trend was not observed for the photographic plaque measures. In the present context, the photographic assessment seems to be a subject to less examiner bias than clinical measures as the time of measurement can be masked for examiner.

It should be emphasized, that out of three reviewed papers the study by Sogaard et al. (33) was the only one where differences in socio-economic status were taken into account. The results suggest that effect of the same educational program might be different in adolescents with different socio-economic backgrounds. Nevertheless, this study also has a few methodological limitations. Firstly, there is no description if randomization of study participants was done. Secondly, the control group was not selected randomly as only schools which had not accepted the educational program were chosen as controls. A sign of non-randomness is that baseline differences among the groups were present. The authors considered the problem of baseline differences, for which they adjusted in their statistical analyses. However, the benefit of statistical adjustment can not be equal to the study design where true randomization is achieved.

A common limitation of all three aforementioned studies relates to the use of categorical measurements, which can be criticized as being too robust. Oral hygiene status is continuous (interval) condition, i.e.

one can find a very clean mouth with no plaque on any tooth to a condition where all teeth are completely covered by plaque. Consequently, one should consider that a few categories can not indicate the true variation among individuals in oral hygiene status. Moreover, it has been reported that categorization of an interval scale variable leads to information loss (36). Therefore, the choice of categorical measurements for oral hygiene assessments in the aforementioned studies might have two negative implications: inaccuracy and measurement error. The photographic method, i.e. an interval scale measurement of plaque used in the second study has a clear advantage over the categorical measurements employed in the other two studies. Moreover, photographic estimations of plaque were shown to be sensitive to record even small changes in oral hygiene (32;36). Another important advantage of the latter method is that it enables researchers to perform a completely blind scoring (32).

To sum up the findings of these three theory-based studies, one can conclude that there is a likelihood that behavioural interventions based on psychological models and theories are more effective in changing oral health behaviour in adolescents than conventional instructions. None of these three studies met the criteria of a true randomized double blinded controlled trial, which could be considered as definite evidence. Moreover, in these studies the follow-up periods were short (3-12 weeks). A longer follow-up is an important requirement as it was emphasized that in order to be of clinical benefit, changes in oral hygiene behaviour would need to be maintained over years rather than months (30).

An important consideration is the time when the reviewed studies were carried out. All three studies were conducted a few decades ago. Therefore, the results of these trials can not be extrapolated to a different generation such as present adolescents. Moreover, the research in the field of social theories has been ongoing, i.e. most psychological models and theories are more developed now and more adapted to the needs of the present generation.

The profile of adolescent audience

Understanding the profile of an audience to be targeted is of key importance and should be the first step in the planning of health promotion. Some possible clues for the success of behaviour modification in adolescents can be identified in the scientific literature. Given that teenagers do not value highly their health in general and teeth are felt to be important mostly in terms of their contribution to image (12), motivation based only on health knowledge in this audience can not be expected to be effective. It is generally agreed that health-oriented fear messages neither motivate nor alter behaviour for any length of time (8;37). During adolescence, the motives for oral health behaviour tend to shift from cognitive to emotional (38). Appearance of the teeth, fresh breath and even "kissability" as a means for successful social interaction are of great concern among adolescents (39;40). Consequently, the emphasis of health education in this segment of population should be placed on the social consequences rather than on the health consequences of oral health-related behaviour (37).

It has been suggested that the strong theoretical base would enhance the effect of oral health behaviour interventions (12) and there is a need for diverse educational approaches for individuals at different stages of behavioural development and with different cognitive abilities (15;37). Therefore, models and theories that have been developed for adults might not apply as well to adolescents. Psychological models and theories for adults work better at explaining and predicting behaviour that is reasoned or deliberated (41). Adolescents' health-risk behaviour is characterized as irrational, impulsive, having a significant affective component, and often is a reaction to risk-conductive circumstances rather than a pre-planned event (41). Based on this knowledge, it can be hypothesized that psychological models and theories targeting certain age groups, e.g. adolescents, might be more powerful in changing their oral health-related behaviours than those developed for adults.

Parenting and adolescent health behaviour

Family is one of the most important social support networks in health education activities (42). In early childhood, parents and other family members are reported to be a significant source of health beliefs and habits. Later in adolescence and young adulthood, parents and other family members act as reinforcing agents of certain health-related behaviours (14;39). Moreover, a child is dependent on parental willingness and ability to purchase certain materials (fluoride dentifrices and toothbrushes) or supply appropriate food etc. (14;42). Therefore, health care for children can not be designed without an essential link to parents (43).

One can argue that in adolescence the influence of the family wanes while peer influence increases (44). Indeed, the needs of children change as they get older and consequently parenting roles change. Although the responsibility for oral health shifts from parents to adolescents (45), the social support and involvement of parents is still very important (39;46). In addition, by adolescence, teens usually have a fairly

good understanding of how their parents will react to their certain behaviours (47). Simons-Morton et al. (48) found that although deviant peers were a risk factor, authoritative parents were a protective factor in the risky behaviours of adolescents such as smoking and drinking. This means, that adolescents seem to be mature enough to make their own, independent decisions and yet not completely beyond the influence of their parents (18).

The involvement of parents in oral health education for children and adolescents is not a new issue in dental research. However, their role has been rather passive, with parents being simply informed about the etiology and prevention of dental disease or serving as reward-givers for children in order to enhance their compliance (18;49;50). Unsurprisingly, these studies showed no significant improvement in the child – parent intervention groups or the contribution of parents was only one part of the complex motivational program, therefore, it was difficult to evaluate their influence on children's achievements (31).

The importance of giving information to parents regarding oral health should not be underestimated. Recent research showed that lack of knowledge was an obstacle for parents in promoting children's oral health (51). A different and more comprehensive approach would be the application of parenting principles to modify adolescent oral health-related behaviour.

"Parenting programs" aim to improve parenting skills in order to enhance parent/adolescent communication and to involve adolescents in family activities rather than just focus on a particular health issue (4). Two dimensions – demandingness (the extent to which parents demand mature behaviour, supervise activities, discipline transgressions) and responsiveness (the extent to which parents are attuned to their children's physical, social, and emotional needs and support their growing autonomy) – define parenting style. Parents who are both highly demanding and highly responsive are considered authoritative (47).

Research shows that parenting style has an important role in forming health behaviours among adolescents. For example, authoritative parenting was associated with decreased soft drink consumption (52), decreased drug and alcohol use (53), increased academic success (54), high self-esteem and an internal locus of control (55). Similarly, adolescents who had strong coherence with their family were more regular toothbrushers than their counterparts (56).

The challenge in oral health education is to achieve sustainability in behavioural changes. It has been shown that repetition and reinforcement are crucial for the maintenance of newly-acquired behaviour in adolescents, e.g. regular toothbrushing should be reinforced. To this end, the natural environment should provide sufficient opportunities to "trap" the modified behaviour into the system of natural reinforcers (57). It has been suggested that one of the best ways to increase these opportunities is the involvement of people from the individual's everyday life to assist in monitoring and reinforcement of healthy behaviours (58). In this context, the active involvement of parents into health education programs seems to be a promising way to maintain desirable dental health behaviour in adolescents over the long-term.

A cross-over beneficial effect of health education can also be expected due to mutual links within the family, i.e. parents influence children and children influence their parents (42). It has been reported that children transmitted information effectively to their family, thus changing knowledge and attitudes of their family members (59;60). Therefore, it is possible that additional community benefit can be gained from dental health education, other than those directly relating to the recipient (59).

It is important to engage parents and facilitate authoritative parenting, as it has been reported that success in school-based programs is limited without parental involvement (61;62). However, consideration has to be given to find effective ways of reaching parents of adolescents and educating them about parenting practices. Some difficulties should be anticipated. First, effective parental education to improve adolescent behaviour has proven to be complicated and difficult to implement (47). Second, attempts to obtain support from parents during clinical studies revealed their low level of involvement (63;64).

CONCLUSIONS

Adolescence should be considered a difficult though critical period of human life for health education. The main challenge for future research is not only to find effective ways to change individual behaviour, but also to be able to achieve sustained improvements. Understanding the adolescent profile in oral health education appears to be crucial for success. The theory-based approaches to health behaviour modification, already successfully applied in other fields of medicine, might be a good alternative to conventional oral health promotion in adolescents. It is likely that socially disadvantaged adolescents, i.e. those who have the greatest need for improvements in oral health, might benefit most from the theory-based behavioural interventions.

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