**A feasiblity and acceptability study of an e-training intervention to facilitate health behaviour change conversations in dental care settings.**

Sophia Josepha, Jo Hartb, Anna Chisholmc, Sarah Robinsonb, Joanna Goldthorpea, Sarah Petersa

a School of Health Sciences, University of Manchester, Oxford Road, Manchester, England, M13 9PL

*sophia.joseph@outlook.co.uk**;* *Joanna.goldthorpe@manchester.ac.uk**, Sarah.Peters@manchester.ac.uk*

bSchool of Medical Sciences, University of Manchester, Oxford Road, Manchester, England, M13 9PL

*sarah.robinson-4@student.manchester.ac.uk**,* *Jo.Hart@manchester.ac.uk**,*

c Department of Psychological Sciences, University of Liverpool, Brownlow Hill, Liverpool, L69 7ZX

*Anna.Chisholm@liverpool.ac.uk*

Corresponding author: Sarah Peters, *Sarah.peters@manchester.ac.uk*

ABSTRACT

**Introduction**: Health behaviours result in oral health problems. Behaviour change techniques, informed by behaviour science, are rarely utilised by dental care professionals (DCPs) within routine care.

**Aim**: To develop a theory-informed intervention to support DCPs’ behaviour change conversations and evaluate its feasibility and acceptability.

**Intervention**: A behaviour change toolkit (*Toothpicks*) comprising 33 behaviour change techniques (BCTs) relevant to dentistry, delivered within an interactive online course.

**Design:** Development and mixed-methods evaluation of the intervention.

**Materials and methods:** Participants’ motivation to discuss behaviour change with patients was measured before and after training using a validated questionnaire. Acceptability was assessed through semi-structured interviews.

**Results:** DCPs’ (N=32) motivation increased significantly post-training. Participants found the trainingacceptable and reported subsequently implementing techniques into their practice. Potential barriers preventing implementation to clinical practice include perceived lack of opportunities to effect change within the constraints of the clinical context.

**Conclusions:** Acceptable theory-informed training that is acceptable and accessible can be developed that increases DCPs’ motivation to discuss behaviour change with patients. Further research is necessary to establish the longer-term impact of brief behaviour change training on DCPs clinical practice and patient health behaviours.

IN BRIEF

* Behaviour change techniques, derived from behaviour science theory, can help individuals improve smoking, alcohol use, diet and dental hygiene habits.
* Dentists report finding it challenging to initiate and support patients to make health behaviour changes and identify this as a training need.
* Dental care professional’s motivation to engage in behaviour change conversations increased following online training in behaviour change techniques. They found the training acceptable and reported examples of using it within their clinical practice.
* Theory-informed behaviour change training is feasible and acceptable but changes are needed to the clinical environment to ensure practitioners prioritise preventative conversations.

INTRODUCTION

Non-communicable diseases annually account for 68% of global deaths1. Known risk factors include smoking, diet and alcohol consumption, and research suggests 82% of these deaths could be avoided with appropriate changes in such lifestyle behaviours1. Health behaviours, such as dietary sugar (particularly sugary inter-meal snacks), alcohol and tobacco consumption are risk factors for highly prevalent oral diseases, including oral cancer2 and dental decay. 3 Other key oral health behaviours include regular attendance at the dentist, daily toothbrushing, increased exposure to fluoride and interdental cleaning.4 Behaviour change is therefore integral to a systematic, preventative approach to reducing the prevalence of these conditions.4,5

Many theories have been proposed to explain how and why behaviour change occurs, for example, the COM-B model, which recognises Capability, Opportunity and Motivation as interacting to produce a behaviour.6 This model has also been considered in relation to behaviours that impact upon oral health.7,8 Behaviour change techniques (BCTs) are the specific components of interventions that aim to modify behaviour, based on one or several overlapping theories. Taxonomies of such techniques are useful tools to ease intervention development, facilitate implementation and identify the mechanisms of action by providing standardised technique definitions.9,10 In addition, the Health Behaviour Change Competency framework describes the competencies required by clinicians when delivering behaviour change interventions to patients and clients.11 Evidence suggests that utilising psychological theories and behaviour change techniques, particularly goal setting, planning and monitoring behaviour, are effective in periodontal management12, though the literature remains limited in size and scope.13,14 Moreover, there has been even less focus on how to support health professionals to utilise behaviour science within routine care.

Initiatives within the NHS such as the ‘All Our Health’ approach recognise the importance of preventing illness and improving patients’ health outcomes through behaviour change.15 The ‘Making Every Contact Count’, initiative, which advocates that all health care professionals, regardless of their speciality encourage patients to make healthy changes in their behaviour.16 Dental care professionals (DCPs) are ideally placed to encourage health behaviour changes, as they have the opportunity to access patients with varying levels of good health through regular check-up appointments. This affords opportunities to build relationships with patients and offer consistent support for health behaviour change. However, gaps in dentists’ knowledge, confidence and motivation to hold behaviour change conversations with patients have been identified.7,17,18,19 Consequently, opportunities to initiate conversations about health behaviours (sometimes referred to as ‘teachable moments’20) are often missed, resulting in evidence-based general health advice not being communicated during consultations18,19.

Research suggests DCPs, like other clinicians, perceive a lack of training, time constraints, remit uncertainties and concerns about damaging the clinician-patient relationship as barriers to initiating conversations about health behaviours.18,21 Interventions to increase DCPs’ motivation and capability to initiate behaviour change conversations with patients are therefore necessary. Such training interventions have previously been reported5,22, however, have not specifically drawn on behaviour change theory.  An intervention has been developed specifically to enable health practitioners to have effective behaviour change conversations around weight-management23, which was found to be feasible and acceptable by healthcare professionals in different clinical settings. 24,25 This has not yet been translated for a dental setting, where there are specific contextual, environmental and communication training needs.7,18 DCPs are ideally placed to offer behaviour change interventions to patients and there is a clear need to develop their skills and confidence in delivering evidence based techniques to help patients to engage in preventative health behaviours.

AIMS AND OBJECTIVES

To understand participants’ engagement with a behaviour-change conversation training intervention by: 1) Assessing change in participants’ motivation to initiate behaviour change conversations before and after receiving the intervention. 2) Exploring participants’ views on acceptability of the intervention and potential barriers to implementing learning within routine care.

METHODS

Ethical approval was granted from a University research ethics committee (ref 2017-0756-2391).

**Intervention development**

As smoking, diet and alcohol consumption are established risk factors relevant to dental practice4, effective BCTs for these specific behaviours were identified using taxonomies of behaviour change8,9,10, as well as those described in the behaviour change competency framework for medium level interventions11. A rapid review was conducted to identify which BCTs had support for changing oral health. The candidate BCTs were then discussed with a multi-disciplinary team of stakeholders (comprising health psychologists, dentists and health educators) to ascertain their feasibility for use in dental practice. A final consensus of 33 BCTs was reached following this validation exercise. To ease recall, these were organised around nine themes under the acronym *Toothpicks*, to assist the learner. These categories were: **T**alking style, **O**pinions and thoughts, **O**bjectives, **T**ailored plans, **H**elp from others, **P**ractice and record, **I**ncentive, **C**hange the environment, and **K**nowledge and **S**upport (see Table 1).

The results of this exercise were used to modify an existing, evidence-based behaviour change intervention developed within non-dental settings that has been found to be effective in changing key psychological determinants of health behaviour change.23,24,25 An online open access course26 was created which comprised sections on the rationale for discussing behaviour change with dental patients, principles and content of the *Toothpicks* toolkit, interactive tasks and clinical scenarios presented using video-clips that are relevant to dentistry. Each technique was supported with examples of patient cues to listen out for and ways of responding to these. The clinical scenarios and patient cues were derived from qualitative interviews with dental patients and dental care professionals18 and a series of stakeholder meetings during which time the content and formatting of the intervention were refined. The learning objectives for the course were to i) be able to describe the role of BCTs in helping patients to change health behaviours and ii) be able to describe and implement effective ways to support patients to adopt healthier behaviours.

[TABLE 1 ABOUT HERE]

A printable summary document was made available showing brief descriptions of each technique (<http://www.tentpegs.info/toothpicks.html>). After completing the online training, participants received a certificate confirming they had completed one hour of verifiable continuing professional development (CPD) training.

**Study design**

A mixed methods approach was taken. A repeated-measures design assessed change following completion of an online education intervention using validated questionnaires of motivation and other known determinants of behaviour change. Qualitative interviews provided an in-depth understanding of the acceptability of the training and potential implementation issues27

**Methods and materials**

Qualified dentists, dental hygienists and dental nurses were eligible to participate. All dental practices and hospitals across two locations in the North of England were identified using online searches and contacted via email addresses provided on publicly available websites (N = 120).

The questionnaire comprised questions relating to the following: 1) participant demographics (age, gender, ethnicity and year of qualification), 2) eight questions that measured motivation towards initiating behaviour change conversations with patients, using a questionnaire previously validated in behaviour change education research with healthcare professionals24,25, based on the Theory of Planned Behaviour28, which has been shown to predict clinicians behaviour29.

The eight questions assessed key determinants of practitioner behaviour: perceived time availability, perceptions of the extent to which behaviour change is their role, confidence in having behaviour change conversations, beliefs about other professionals’ practice, ease of having behaviour change conversations, effectiveness of these conversations, deliberate planning of conversations and the extent to which they think about behaviour change during practice. Responses were recorded on a 7-point Likert scale (‘Strongly Disagree’ to ‘Strongly Agree’) and a total score created by averaging the items. Participants also reported the number of behaviour change conversations they have with patients. On receipt of a completed baseline questionnaire, participants were emailed a hyperlink to the online course, and a follow-up questionnaire with instructions to answer and return it one week following completion of the course.

A subsample of participants was interviewed to investigate the acceptability of the course and gain feedback on its usability and content. All participants were invited to take part in an interview but, due to resources, we were only able to interview the first six respondents. The final subsample included participants from different disciplines and levels of experience. Semi-structured interviews were used to allow flexibility to explore emerging ideas30,31 and conducted face-to-face or via telephone (according to participant choice) at time and location convenient for the participant. Interviews followed a topic guide, developed through review of the literature and covered 1) the relevance of the course content, 2) intentions and experiences implementing new techniques and 3) views of the format and structure of the course. Questions were open-ended using prompts and probes to clarify and follow-up responses. Interviews were digitally audio-recorded and transcribed verbatim, removing any identifying information at the point of transcription.

**Analysis of main outcome measures**

Motivation

Statistical analyses were conducted using SPSS (Version 23). As a repeated-measures design was used, independence of measures was assumed. The sampling distribution of the differences between before and after scores was found to be normal following inspection of the Q-Q plots. This was confirmed by a Kolmogorov-Smirnov test for normality, which indicated the difference between the data set was not significantly different from normal (p < .05). No outliers were identified in the data. A paired-sample t-test was used to compare participants’ mean score before and after completion of the *Toothpicks* course.

Acceptability

Interviews were analysed using inductive thematic analysis to generate exploratory findings, at semantic level through a realist perspective, reporting participants’ experiences, meanings and reality.32 Data were coded to their most basic levels, then combined to common themes or patterns, providing a rich narrative of the content. Identified themes and codes were reviewed alongside incoming data to allow adaptations to be made to the topic guide and emerging patterns further explored. One researcher (SJ) initially coded the data and developed emerging themes alongside discussions with the wider research team, which added to the trustworthiness of the analysis.31

RESULTS

Thirty-two DCPs were recruited from twelve dental practices and two dental hospitals comprising 78% dentists, 6% dental hygienists and 15% dental nurses. Half of the sample were female (53%) and most described themselves as White British (66%). The mean age was 31 years (range 23 to 56), and participants had been qualified for a mean of 8 years (range 1 to 31) (See Table 2). All completed baseline questionnaires were provided with the training, and all but ten participants returned a follow-up questionnaire (response rate = 68.75%). No significant differences were found between the baseline scores of participants who did and did not return the follow-up questionnaire, *t*(30) = -.64, *p* > .05.

[TABLE 2 ABOUT HERE]

**Motivation**

A paired-sample t-test indicated a statistically significant increase in motivation from before (*M* = 4.87, *SD* = 0.97) to after training (*M* = 5.80, *SD* = 0.68) (mean difference= 0.93, 95% CI 1.26 – 0.59), *t*(21) = -5.79, *p* < .001, representing a large effect size, *d*= 1.11). Individual questionnaire items revealed significant differences (*p* < .05) before and after training for 6/8 items (confidence, beliefs about others practice, ease of having conversations, effectiveness of conversations, deliberate planning of conversations and thinking of conversations). No significant changes pre-post training were identified in participants’ beliefs about having time to have conversations with patients to help them make lifestyle changes or their perception as to the whether or not this was their role.

**Acceptability**

Six interviews were conducted with five dentists and one dental nurse. These were the first participants recruited to the training study. Interviews lasted an approximately 20 minutes. Findings were organised within two overarching themes (i. views and experiences of the course, and ii. implementation barriers). These, alongside the 5 sub-themes are described in turn, and illustrative quotes presented alongside.

1. Views and experiences of the course

Participants described their experiences of completing the course and gave opinions on its content, its accessibility and the techniques included. They made some suggestions for improvements that fell into three sub-themes.

*Course content*

Participants identified smoking, diet and alcohol consumption as behaviours relevant to their clinical practice. They reported having previously felt uncomfortable and ill-equipped when discussing all these types of health behaviour with patients and described having frequently avoided such conversations or left patients to initiate discussions. They noted that alcohol use is a particularly difficult topic to initiate and suggested additional material about substance use would also be valuable.

“*I wouldn’t really talk to someone about their alcohol consumption unless like it was an obvious massive problem and they felt it was a massive problem for their life and wanted me to help them, like they asked for help*” Participant 107

The content was perceived to be clinically relevant and pitched at a suitable level of difficulty. Participants valued that the training explicitly drew upon established science – a body of research they were unfamiliar with and felt were hitherto unlikely to access. They recommended including an additional scenario of a common presentation they found particularly challenging (discussions with parents of children at risk of dental decay).

Health behaviour change techniques were perceived to be a novel area of training. Although participants reported having had training in communication, only one had received any training in behaviour change communication and this was reported to have been of poor quality and having lacked depth or grounding in evidence or theory.

“*Very basic stuff at Uni. I can’t think that I’ve done anything CPD on it* [health behaviour change]*. Obviously, they talk about smoking and you know, how that leads to cancer and all those kinds of things. Not specifically how we change that behaviour.”* Participant 105

*Accessibility*

Participants reported that the online format of the course made it accessible to busy clinicians. They liked that the module was interactive and included material in a range of formats (e.g. videos, diagrams) and reported finding it easy to navigate. They found it useful to be able complete the course at their own pace and revisit it at any time to refresh learning and clarify uncertainties.

“*I think the nice thing with this is, the fact that its online and accessible at any time, you know, it’s not too time consuming, you know, its straight to the point with specific practical examples and so from that point of view it makes it, you know, it makes it very accessible to a lot of people without having to commit too much time to it.*” Participant 117

*Techniques*

Participants reported finding training in specific techniques informative and motivating. They described limited previous attempts at trying to address patient’s health behaviour however were able to relate the techniques learnt to their own practice: They perceived that the training affirmed some approaches that they had attempted previously (e.g. building rapport) and helped them to understand why some techniques they had previously tried had not been successful (e.g. using scare tactics).

“*It is refreshing; it is correct that if you just preach to a patient they won’t change*”Participant 111

Some participants described practicing BCTs they had learnt during the course subsequently within their clinical practice. They fed-back that these were successful clinical encounters.

“*I think the things about listen to what the patients are saying and reflect back to them, like so if they say something about like staining then you use that as a way to talk about the problem. I have been trying to do that a little bit more and make it more personal to everyone rather than having a set routine.”*Participant 101

The BCTs included in the toolkit were all reported to be acceptable, however some were favoured over others, based on their congruence with existing practices. ‘Creating action plans’ was reported to be a potentially particularly useful BCT and one that had been unfamiliar. They described the ‘*Toothpicks’* BCT toolkit summary as a useful tool and some had printed this out and referred back to it during their clinical practice. A suggestion was made to add printable objective sheets that could be used within consultations to facilitate developing patients’ tailored action plans.

1. Implementation barriers

Despite the acceptability and perceived usefulness of the course, participants two sets of barriers that could potentially prevent them from implementing the learnt techniques within their clinical practice.

*Capability and responsibility*

Participants described behaviour change conversations as difficult to initiate and were uncertain about acquiring sufficient skill through such brief training. There were varied views about the responsibility of DCPs to target health behaviour change. Some perceived that their responsibility was limited to *informing* patients of the dangers of lifestyle behaviours and that their practice should not extend to initiating or maintaining behaviour changes. Others saw behaviour change as increasingly central to their clinical practice and to prevent oral disease.

“*I think it’s definitely our role to be doing it, and I think from a medical legal point of view it’s becoming increasingly significant so you know, at the end of the day we have a responsibility to inform our patients.*” Participant 117

*Opportunity and motivation*

Time constraints were voiced as a key limitation to having opportunities to use and practice new behaviour change techniques during routine care. Whilst they acknowledged these techniques might save time in the longer term, they feared that financial consequences of extending consultations to discuss and monitor patient health behaviours would de-incentivise and erode their motivation to have these conversations.

“*Yeah I mean the main issue is just time, to sort of speak to patients so I think, you know for example the monitoring bit would be a much more sort of involved process*.” Participant 117

# DISCUSSION

This is the first study to report the development of a theory-informed behaviour change intervention to support DCPs’ behaviour change conversations with patients. It was acceptable and accessible to participants and, following training, DCPs’ motivation to discuss behaviour change with patients increased. The intervention addresses a gap in the current training opportunities for DCPs, and qualitative interviews suggest teaching health professionals in behaviour change techniques meets this training need. Participants found the training useful to their clinical practice and had begun to implement the techniques they had learnt. The findings therefore extend the current body of evidence that supports the utility of behaviour science in equipping health professionals with communication competencies in initiating and facilitating lifestyle changes to reduce disease.4,11

No significant differences were identified in participants’ beliefs about their role and time availability for behaviour change conversations before and after the intervention, and the results of the qualitative analysis identified these as persistent barriers to initiating behaviour change conversations and implementing learnt techniques. These barriers can be understood within the COM-B model6, an established framework for understanding the Capabilities, Opportunities and Motivations that lead to health behaviour change. For DCPs this included reduced opportunity caused by time constraints and uncertainties around capability and responsibility. Time has been identified as one of the biggest barriers preventing health care professionals in other specialities from initiating behaviour change conversations with patients17,18 and research suggests these clinicians report a lack of time for activities they do not prioritise21. DCPs who hold negative attitudes towards, or do not feel responsible for behaviour change conversations may place less value on their importance, set less time aside for them and be less likely to implement learnt techniques. Refinements to the training are needed to ensure it also addresses dentists’ attitudes to behaviour change conversations and beliefs about relevance to their clinical practice. Moreover, the increasing focus on preventative practice in dental care within current reforms31 will require funding to ensure this aspect of practice is valued and incentivised within the NHS Dental Contract. This is key as motivation alone is insufficient to create behaviour change (e.g. 32) - other structural limiting factors (such as environmental structures and policy barriers) still operate to limit adopting behaviour change within practice.7 Elsewhere, initiatives to encourage health professionals to capitalise on teachable opportunities in routine care shows that system-level support is key to successful implementation of training within healthcare practice.33

Existing research exploring the impact of interventions to prevent oral health problems are more commonly delivered by specialists (e.g. health psychologists or educators) outside routine dental care (e.g. 34). Although interventions have been developed to support these conversations in other healthcare specialties24,25, none have been designed and evaluated specifically for DCPs and initial findings are encouraging. Nevertheless, limitations of this first study should be considered. There was no control group in the quantitative evaluation, and the sample size was small, hence the findings may *overestimate* DCPs motivation to take up training. Rates of attrition were relatively high (around a third of participants did not complete the follow up questionnaire), suggesting a sampling bias risk that participants who completed the study were more interested in the topic. Whilst there were no statistical differences in motivation at baseline between participants who did and did not complete the follow-up questionnaire these limitations may have resulted in an artificially inflated baseline and effect size. Further research into those who decline training may reveal additional barriers to uptake of training (and subsequent implementation), which is important as negative attitudes towards behaviour and social sciences have been shown to develop early within clinical training perpetuated through a hidden curriciculum.35 This will be important future work to understand the acceptability of this approach to training more fully. Finally, whilst participants reported changes to their clinical practice and an increased perception in the effectiveness of these conversations following training, a fully powered randomised trial is needed in order to establish cost-effectiveness and clinical effectiveness in changing dental professionals’ skills, clinical practice and, in turn, patient health behaviours and outcomes. Nevertheless, the findings suggest that communication techniques drawing upon behaviour science are acceptable to trainees, can be feasibly delivered within this training intervention, and have potential to extend current training intiatives5 to support dental professionals maximise ‘teachable opportunities’20 within routine care and help patients make health behaviours to avoid preventable oral diseases. The training intervention is available online so is accessible, replicable and needs few resources, therefore has the potential to make an impact on public health if delivered at scale.

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DECLARATIONS OF INTEREST

None.

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Table 1. Behaviour change techniques within the *Toothpicks* framework

|  |  |
| --- | --- |
| **Domain**  | **Behaviour change techniques** |
| **T**alking style*Communication skills to reduce resistance and tailor conversations to individuals* | * Building rapport
* Use active listening skills
* Reflect and empathise
* Summarise and agree decisions
 |
| **O**pinions and thoughts*Discuss how the patient thinks about the problematic behaviour* | * Assess current and past health behaviours
* Assess motivation, listen for ‘readiness to change’ cues
* Reframe behaviour change as gain rather than loss
* Provide information on health consequences
* Generate pros and cons of behaviour change/no change
 |
| **O**bjectives*Set and review clear behavioural targets* | * Set specific goals
* Graded tasks
* Prompt rewards
 |
| **T**ailored plans*Work with the patient to create individualised actions* | * Action planning
* Coping planning
* Behavioural contracts
 |
| **H**elp from others*Identify how others may influence behaviour change* | * Social support
* Social comparison and approval
 |
| **P**ractice and record*Encourage patients to rehearse monitor behaviours*  | * Monitoring
* Rehearsal
* Feedback (including biofeedback)
 |
| **I**ncentivise*Identify motivations and reward to reinforce changes that align with these* | * Affirm and support patient
* Praise, and boost self-efficacy
 |
| **C**hanges in the environment*Identify changes patients can make to surroundings that make healthier choices easier*  | * Restructuring environment
* Identify and avoid triggers
 |
| **K**nowledge and **S**upport*Provide resources patients can use to access continued support* | * Direct toward credible additional sources of information and support
 |

Table 2. Demographics of participants

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Dentists**n=25 (78%) | **Hygienists**n=2 (6%) | **Nurses**n=5 (16%) | Total N=32 |
| **Age (mean)** | 31.72 | 32 | 29.80 | 31.44 |
| **Sex**female | 10 (40%) | 2 (100%) | 5 (100%) | 17 (53%) |
| **Ethnicity**White-BritishAfro-Caribbean AsianMixed-British | 14 (56%)1 (4%)7 (28%)3 (12%) | 2 (100%)000 | 2 (100%)000 | 21 (66%)1 (3%)7 (22%)3 (9%) |