BJPsych Open (2025)
11, e287, 1–9. doi: 10.1192/bjo.2025.10905

Co-creating a toothbrushing intervention for adults with severe mental illness

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Background

People with severe mental Illness (SMI) bear an excessive burden of periodontal disease, which can exacerbate their mental and physical multimorbidity. Therefore, improving and sustaining good oral hygiene is key.

Aims

To co-create a theory-driven oral hygiene intervention for people with SMI.

Method

A two-stage, eight-step method was followed drawing on the Behaviour Change Wheel. Stage 1, understanding the problem, involved evidence review and stakeholder consultations. Stage 2 focused on identifying theoretical barriers and facilitators through semi-structured interviews ($n = 20$) and co-designing the intervention content alongside people with SMI, carers, primary care, mental health and dental professionals and clinical leads. Interview data were analysed using framework analysis. Identified barriers and facilitators were mapped to the Capability, Opportunity, Motivation–Behaviour model and Theoretical Domain Framework. Intervention functions, policy categories and behaviour change techniques were identified and mapped accordingly.

Results

The target behaviour of twice-daily toothbrushing was addressed through understanding the consequences of improving oral health and brushing, forming a brushing habit, brushing instructions and demonstration with consideration of cognitive capacity and exploring the need for financial and social support. Recommendations for intervention delivery included integrating it into the SMI physical health checks, training and remunerating primary care and mental health professionals to deliver it as part of a personalised and integrated care approach to rebuilding broader lifestyle routines; and maintaining engagement through follow-up appointments.

Conclusions

This is the first study to co-create a theory-driven toothbrushing intervention for people with SMI, delivered by primary care and mental health professionals.

Keywords

Mental disorders; bipolar and related disorders; schizophrenia spectrum and other psychotic disorders; oral health; participatory research.

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People with severe mental illness (SMI) often have their lives shortened significantly by physical conditions such as diabetes and cardiovascular diseases,[1] but less attention has been paid to the stark inequalities in oral health that they experience. According to a recent systematic review with meta-analysis, people with SMI were four times more likely to have periodontal (gum) disease compared with the general population.[2] This excessive burden of periodontal disease borne by people with SMI is partially caused by the shared social determinants of health.[3] For example, social factors such as low socioeconomic position affect behavioural factors like tobacco and alcohol use, which are common risk factors for both periodontal disease and SMI. Additionally, there are complex bidirectional interactions among periodontal disease and SMI, and chronic inflammatory physical conditions such as type 2 diabetes, that tend to cluster in people with SMI. For example, periodontitis, especially in its advanced stages, can be a risk and prognostic factor for SMI and type 2 diabetes. It can induce or contribute to chronic systemic inflammation, a risk factor for both SMI and type 2 diabetes.[4] This means that maintaining good periodontal health is important for both the mental and physical health of people with SMI. Although oral hygiene self-care is key for the prevention and management of periodontal disease, a systematic review showed that only 39% of individuals with SMI cleaned their teeth twice a day compared with 75% reported in the general population.[5] Flossing and mouthwash use were also lower in this group of people. SMI is associated with negative and positive symptoms, as well as reduced motivation for self-care behaviours including oral hygiene. Furthermore, the side-effects of the first generation of antipsychotics include tremulous movements, which can impede oral hygiene. Evidence syntheses have highlighted the absence of effective interventions to improve oral hygiene among people with SMI.[6,7] This is due to the lack of consideration of co-creation and theory in the development, implementation and evaluation of such interventions.[3] While different theories exist to guide the development of behaviour change interventions, use of the Behaviour Change Wheel (BCW) seems to be on the rise. The BCW offers a systematic approach that draws on stakeholders' input (through co-creation), as well as on using 'integrative' behaviour change theoretical framework and process to develop 'multi-level' complex behaviour change interventions.[8]

Aim

To address the above evidence gap, we conducted the current study aimed at co-creating a theory-driven oral hygiene intervention for people with SMI using the BCW approach.

Method

Reporting is in line with the Consolidated Criteria for Reporting Qualitative Research (Appendix 1).[9]

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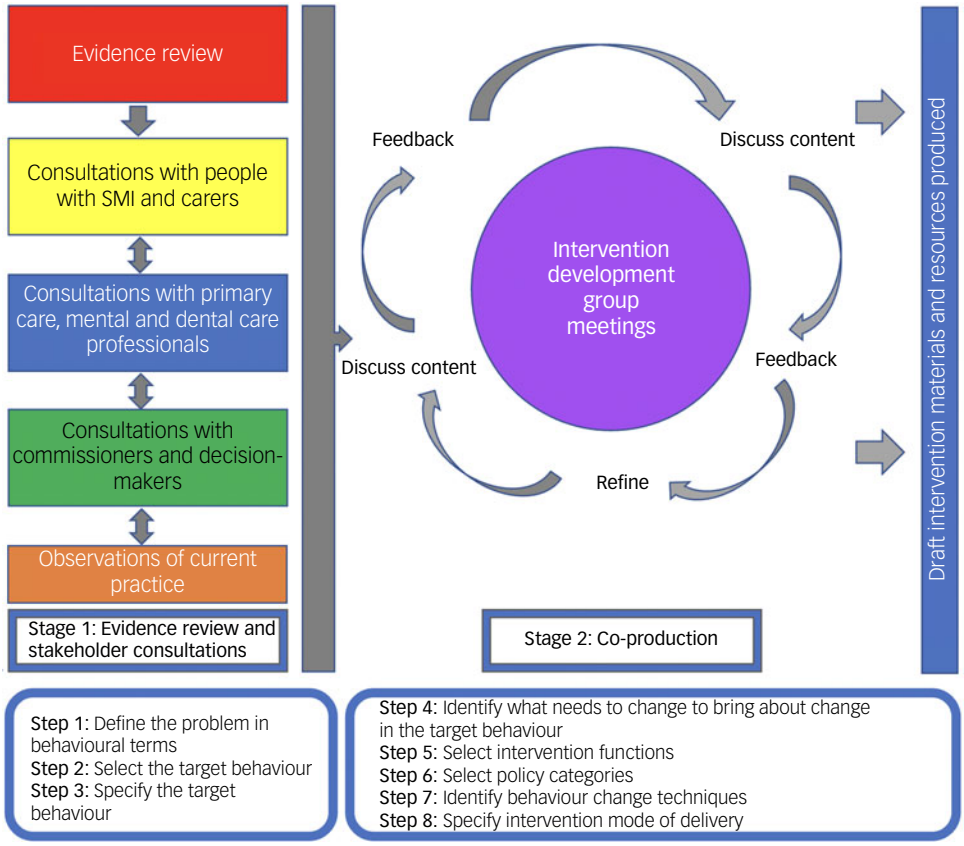


Fig. 1 Stages and steps involved in the co-creation of the Restart Smiling toothbrushing intervention for people with severe mental illness (SMI).

Study design and theoretical framework

We followed a process split into two stages over eight steps, drawing on the framework of Hawkins et al (2017) for the co-production and prototyping of public health interventions and the above-mentioned BCW theoretical framework (Fig. 1).[8,10] Stage 1 involved BCW steps 1–3 to define the problem in behavioural terms, and to select and specify the target behaviour. We completed this stage through conducting a critical review and stakeholder one-on-one and focus group engagements with people with SMI, carers, primary care, mental health and dental professionals, clinical and public leads, policymakers and commissioners.[3] Stage 2 involved BCW steps 4–8 to design and refine the intervention. In step 4, we identified what needs to change to bring about change in the target behaviour (identifying barriers and facilitators). We adopted a phenomenological approach to explore the subjective experience of toothbrushing, or supporting toothbrushing, in people with SMI and identify barriers and facilitators to improve and sustain this behaviour. We mapped identified barriers and facilitators to the Capability, Opportunity, Motivation–Behaviour (COM-B) model and the Theoretical Domain Framework (TDF). In steps 5 and 6, we selected relevant intervention functions and policy categories that can facilitate behaviour change. In step 7, we identified and mapped behaviour change techniques (BCTs) accordingly using BCT Taxonomy v1.[11] This helped identify potential strategies that could be used to facilitate change in the target behaviour. In step 8, we specified the intervention mode of delivery.

Ethical standards

We assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation, and with the Helsinki Declaration of 1975 as revised in 2013. All procedures involving human participants were approved by the NHS Research Ethics Committee (no. 21/WA/0058). Written informed consent was obtained from all participants in the qualitative study.

Participants and recruitment

The lead author (E.J.) recruited participants through sharing of flyers with relevant national and regional experts-by-experience groups, clinical networks and communities of practice and snowballing. The study was also promoted at the Right to Smile event and 'Mind Your Smile' national live X Chat (#MindYourSmile). Participants were recruited purposively. Eligible people with SMI were those aged 18–65 years and diagnosed with either bipolar disorder, schizophrenia/schizoaffective disorder or other psychotic disorders. Other participants were carers, primary care, mental health and dental professionals and clinical leads who provide care for people with SMI. All participants were required to speak English and not to be participants in other studies. Interested participants completed an online eligibility and sociodemographic questionnaire. Eligible participants were contacted by the lead author to schedule the semi-structured interview. All participants were given £20 for their participation in the present study.

Data collection

To complete steps 4–8, the lead author conducted 20 one-on-one semi-structured interviews using Microsoft Teams (Microsoft Office, version 16.63 for Mac iOS) between July 2022 and June 2023. Two topic guides (one for people with SMI and the other for

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carers, professionals and clinical leads) were informed by stage 1 and structured following the COM-B and TDF domains (Appendices 2 and 3). Four experts (a person with SMI, a carer and general practitioner, a psychologist and mental health nurse, and a dentist) were invited to comment via email on the questions, the structure of the interview guides, missing discussion topics and any other comments. Interviews lasted between 39 and 99 min and were audio-recorded and transcribed verbatim by a trusted transcribing service. Field notes were taken by the lead author to help contextualise and interpret findings. Data collection stopped when saturation was reached. To refine the content of the intervention and mode of delivery, E.J. collected feedback from stakeholders. This included patient and public involvement activities and two stakeholder engagement workshops. Identified toothbrushing barriers and facilitators, intervention functions, policy categories and BCTs were presented, and feedback was obtained using the Acceptability, Practicability, Effectiveness, Affordability, Side-effects and Equity (APEASE) criteria.[12]

Research team

Our multidisciplinary team have expertise across public health, psychology, special care dentistry, general practice, psychiatry and SMI carer experience. E.J. is a female clinical academic and specialist in dental public health with a PhD and an interest in co-creating complex interventions to tackle mental, physical and oral multimorbidity in people with SMI. E.S. is a female psychologist with a PhD and an interest in the development and evaluation of complex interventions for chronic illness. E.H. is a female specialist in special care dentistry with a PhD and an interest in facilitating access to dental care in people with mental ill health. F.F. is a female consultant in dental public health with an interest in tackling oral health inequalities experienced by vulnerable groups. M.B.A.A. is a male early career researcher with an interest in developing public health interventions. C.A.C.-G. is a female general practitioner with a PhD and an interest in the primary care management of people with mental, physical and oral multimorbidity. S.B. is a female carer for a person living with SMI. K.B. is a male psychiatrist with a PhD and an interest in mental, physical and oral multimorbidity in people with SMI.

Data analyses

Sociodemographic data were summarised using descriptive statistics. We analysed interview data using framework analysis as described by Ritchie et al.[13] We thereafter coded data using the constructs of the COM-B model and TDF, and refined the content of the intervention and mode of delivery based on stakeholders' feedback. First, an inductive and iterative thematic approach was used to understand participants' responses and perspectives. Steps started with data familiarisation and development of an initial coding framework (E.J.), which was discussed and refined by the wider research team. The framework was then applied to the whole data-set. E.J. undertook complete coding of transcripts using Microsoft Excel spreadsheet (Microsoft Office, version 16.89 for Mac iOS), and developed and triangulated themes across different participant groups. To ensure reliability, transcriptions were independently coded by E.S., E.H., F.F. and M.B.A.A. Consensus on themes and interpretation was reached through wider team discussions. Two participants provided input on the themes and interpretation of findings for additional validation. Second, E.J. coded data using the constructs of the COM-B model and TDF. Codes were reviewed by E.S., and any discrepancies in coding were discussed by E.J. and E.S. until consensus was reached. Third, by meeting as a co-production team we refined the content of the intervention, including training for professionals and content received by people with SMI based on stakeholder feedback. We used the APEASE criteria to guide decisions about the intervention content and mode of delivery.[12] Throughout data analyses, we kept an audit trail and engaged in ongoing reflexivity.

Table 1 Participants' sociodemographic characteristics

	Participants with SMI ($n = 10$)	Other participants ($n = 10$)
Age (years), mean (range)	47.4 (33–61)	42.2 (24–62)
Gender		
Male	3	2
Female	7	8
Ethnicity		
White British	6	5
Non-White British	4	5
Education level		
Up to secondary school completed	2	0
College/vocational training	6	2
University graduate/postgraduate	2	8
Employment		
Employed (including self-employed)	8	10
Unemployed	2	0
Type of SMI		
Bipolar disorder	3	–
Schizophrenia/schizoaffective disorder	2	–
Other psychotic disorders[a]	5	–
Role[bcd]		
Person with SMI	10	–
Carer	–	2
Primary care/mental health professional and/or clinical lead	–	4
Dental professional and/or clinical lead	–	4

SMI, severe mental illness.
a. Two participants also had major depressive disorder.
b. Professional background included occupational therapist, clinical psychologist, general practitioner, peer support worker, dentist, specialist in special care dentistry, special care dental nurse and oral health educator.
c. Clinical leadership background included clinical lead for adult mental health in an integrated care board, and head and assistant head of dental services.
d. Two participants (one with SMI and a carer) were peer support workers and provided their perspectives from both roles.

Results

Twenty participants took part in the semi-structured interviews. Their sociodemographic characteristics are summarised in Table 1.

Target behaviour

In stage 1 (steps 1–3), the oral hygiene behaviour to be changed was identified and specified jointly by stakeholders. Oral hygiene practices include toothbrushing and the use of other aids for cleaning teeth, such as dental floss and mouthwash.[14] The target behaviour that was selected and specified by stakeholders was brushing the teeth and gum line at least twice daily (last thing at night or before bedtime and on at least one other occasion) for 2 min with a manual or electric toothbrush and appropriate fluoride toothpaste.

What needs to change to bring about change in toothbrushing

In stage 2 (step 4), the following 6 themes were identified for what needs to change to improve and sustain brushing among people with SMI. The links between these themes and COM-B and TDF theoretical constructs are mapped in Table 2.

https://doi.org/10.1192/bjo.2025.10905 Published online by Cambridge University Press

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Table 2 Matrix of the links between what needs to happen for brushing to occur, COM-B and TDF domains, interventions functions, policy categories and examples of identified behaviour change techniques (BCTs)

COM-B domains	TDF domains	What needs to happen for brushing to occur	Examples of evidence to support the need for change	Intervention functions	Policy categories	BCTs
Psychological capability	Knowledge	To understand the benefits of improving oral health and brushing	'If there was more information about the relationship between mouth bacteria and brain health, mental health … that would be really motivating because people might not particularly care about their teeth, but no one wants to feel bad'. Female participant with SMI (P320) 'Good physical health and the self-care elements all tie in to oral health.' Male mental health professional (P279)	Education	Communications and marketing	5.1. Information about health consequences
	Memory, attention and decision processes	To associate brushing with other daily habits	'I've heard that if you want to make new habits you have to attach them to existing habits. I suppose if I got into the habit of doing it straight away, so … you get up, go to the toilet and then clean my teeth so that I'm twinning it with the first visit to the loo, then that might help'. Female participant with SMI (P320)	Enablement	Communications and marketing	7.1. Prompts/cues
		To create a reminder	'Things like visual reminders, might be useful … maybe suggesting put your toothbrush and toothpaste downstairs by the kettle'. Female participant with SMI (P282)	Environmental restructuring Enablement	Environmental/social planning	7.1. Prompts/cues 12.5. Adding objects to the environment
	Behavioural regulation	To incorporate brushing into daily routines	'Encourage people to build it in as a habit … You don't think about it too much … the things that you don't need to think about too much don't require the effort of having to motivate yourself. You're on auto pilot so trying to train that would be helpful'. Female participant with SMI (P320)	Enablement	Communications and marketing	8.3. Habit formation
Physical capability	Skills	To receive evidence-based advice on brushing	'So support there, that would be really good, especially for people who are not sure and would like a bit more advice … How do I use these brushes'. Female participant with SMI (P315)	Training Modelling	Communications and marketing Service provision	4.1. Instruction on how to perform the behaviour 6.1. Demonstration of behaviour
		To discuss brushing equipment	'I like the electric toothbrush because it has a smaller head, so it can get into places … So it's much more flexible as to where it can reach'. Male participant with SMI (P304) 'It is nice to have the manual, because you take more control, you do take more control and it's lighter, like physically, it's lighter.' Female participant with SMI (P314) 'It's the same with toothpaste … so with patients who have sensory concerns, with severe mental health, there might be flavour or bubble concerns'. Female dental professional (P333)	Environmental restructuring	Environmental/social planning	12.5. Adding objects to the environment
Social opportunity	Social influence	To discuss social reasons for improving oral health and brushing	'If we go out we are conscious that people are going to think that we look scruffy, we look unclean … because also there is a degree of stigma attached to not taking care of your teeth … you don't want to be that person with bad breath … we don't perceive it to be socially acceptable to say, I feel so crap today, I haven't even brushed my teeth'. Female participant with SMI (P308)	Persuasion	Communications and marketing	5.3. Information about social and environmental consequences
		To ask for practical support if needed	'My wife is very good and we're both have our electric toothbrushes, and she makes sure the heads are changed … I don't clean my teeth often enough, my wife shouts at me'. Male participant with SMI (P280)	Environmental restructuring	Environmental/social planning	3.2. Social support (practical)

(Continued)

Physical opportunity	Environmental context and resources	To overcome financial barriers to brushing	'If I really didn't care about finance, I would have changed the head quicker, like more often … it's not a huge difference, if I was getting better toothpaste, or just the cheapest one'. Female participant with SMI (P314)	Enablement	Fiscal measures	12.5. Adding objects to the environment
Reflective motivation	Beliefs about consequences	To believe in the benefits of brushing	'He wants to improve his brushing … so that he can improve his general feel, aesthetic wise … also his confidence and his mental well-being … it saves a lot of anxiety and concern, and phobias and other concerns with mental health and oral health moving forward'. Female dental professional (P333)	Persuasion	Communications and marketing	5.6. Information about emotional consequences
	Social/professional role and identity	To discuss self-identity reasons for improving oral health and brushing	'[In] my religious values and moral values, you have to look after yourself, you have to brush your teeth for example.' Female participant with SMI (P315)	Persuasion	Communications and marketing	13.4. Valued self-identity
Automatic motivation	Emotion	To discuss the effect of brushing on lifting mood and feeling good	'I'll give my teeth a good brush and sometimes, that works to lift that grey cloud, that lowness, sometimes it helps to just wash it all away.' Female participant with SMI (P321)	Persuasion	Communications and marketing	5.6. Information about emotional consequences

SMI, severe mental illness; COM-B, Capability,Opportunity, Motivation–Behaviour model; TDF, Theoretical Domain Framework.

Exploring the health, social and emotional consequences of improving oral health and brushing

Participants stressed the importance of understanding and discussing the health, social and emotional consequences of having good oral health and maintaining good oral hygiene (Table 2). This would motivate people with SMI to prioritise their oral health and improve their brushing regimen. They highlighted that information and discussion should focus on the importance of oral health to the physical and mental health of people with SMI, and the strong links between their mouth, mind and body.

Valued self-identity

In addition to simply understanding the benefits of good oral health, several participants explained that the condition of their oral health represented a deeper self-identity (Table 2). It was suggested that discussion could explore the link between good oral hygiene, healthy teeth and mouth, fresh breath and social interaction, emotions and self-identity.

Forming a brushing habit

Participants emphasised the need to support people with SMI to form a brushing habit that is incorporated into their daily morning and evening routines (Table 2). People with SMI stated that they often find the evening brushing routine more challenging, when they usually feel tired and might not remember to brush their teeth. This is partly related to the side-effects of their psychotropic medications. Participants suggested problem-solving with the person with SMI and their prescriber – for example, the possibility of amending the evening medication time to 30–60 min before bedtime. This would help people with SMI carry out their evening self-care routine (including brushing) and avoid evening/night binge eating, which is a major side-effect of psychotropic medications:

> 'If it [medication] doesn't have to be taken at eight o'clock and you have a little bit of food or you have a sandwich or something, and you take your tablet at 10 … brush your teeth … then go to bed yeah. That could be an idea'. Female participant with SMI (P315)

Participants also mentioned the use of a reminder and/or associating the new brushing habit with an existing habit to help with remembering (Table 2). They noted that different people prefer different types of reminders (e.g. visual reminders or setting phone alarms).

Receiving instructions and demonstration on brushing and considering cognitive capacity

Participants identified the need to receive evidence-based instructions and demonstration on brushing frequency, duration, technique and coverage (Table 2). Instructions should be simple and concise and supported by accessible resources, particularly demonstration videos:

> 'She doesn't really read a lot, so maybe a video format would be the best.' Female carer (P309)

The above should be supported with a discussion to aid the selection of the type of toothbrush (manual or electric) considering the level of cognitive concentration required, manual dexterity and sensory issues, personal preference, reach (size of head), pressure sensitiveness and other characteristics and practicalities (such as the need to remember to recharge the electric toothbrush) (Table 2). Most participants with SMI preferred the electric toothbrush

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Table 3 Identified behaviour change techniques (BCTs) according to BCT Taxonomy v1[a]

1. Goals and planning	**6. Comparison of behaviour**	**10. Reward and threat**
1.1. Goal-setting (behaviour)	6.1. Demonstration of behaviour	10.3. Non-specific reward
1.2. Problem-solving		10.6. Non-specific incentive
1.4. Action-planning		10.7. Self-incentive
1.5. Review behaviour goal(s)		
2. Feedback and monitoring	**7. Association**	**11. Regulation**
2.1. Monitoring of behaviour by others without feedback	7.1. Prompts/cues	11.1. Pharmacological support
2.2. Feedback on behaviour		11.2. Reduce negative emotion
2.3. Self-monitoring of behaviour		11.3. Conserving mental resources
3. Social support	**8. Repetition and substitution**	**12. Antecedents**
3.1. Social support (unspecified)	8.3. Habit formation	12.1. Restructuring the physical environment
3.2. Social support (practical)	8.7. Graded tasks	12.2. Restructuring the social environment
3.3. Social support (emotional)		12.5. Adding objects to the environment
4. Shaping knowledge	**9. Comparison of outcomes**	**13. Identity**
4.1. Instruction on how to perform the behaviour	9.1. Credible resource	13.1. Identification of self as role model
4.4. Behaviour experiment	9.2. Pros and cons	13.4. Valued self-identity
5. Natural consequences	9.3. Comparative imagining of future outcomes	13.5. Identity associated with changed behaviour
5.1. Information about health consequences		**15. Self-belief**
5.3. Information about social and environmental consequences		15.3. Focus on past success
5.6. Information about emotional consequences		15.4. Self-talk

a. BCTs shaded were selected based on stakeholders' feedback as key behavioural strategies to improve and sustain brushing among people with severe mental illness.

because of the low level of cognitive concentration required, and considered it a 'trusted companion' with which to clean their teeth.

Participants noted the prescribing of high-concentration fluoride toothpaste for people with SMI, which requires system-level liaison with prescribers. They also mentioned the need to explore the use of flavourless and/or foamless fluoride toothpaste should the person with SMI have sensory issues:

> 'I know they recommend like higher fluoride toothpaste, don't they? For people on prescription, but I've only been offered that once … if you do have severe mental illness, you're more likely to be neglecting your teeth, so that seems to meet … the criteria that you're at risk'. Female participant with SMI (P282)

Exploring the need for financial and practical social support

Participants mentioned that financial and social support, particularly practical social support, might be needed (Table 2). The latter might include reminding people with SMI to brush their teeth, buying them brushing equipment, changing their manual toothbrush or the head of their electric toothbrush. Such social support could be requested from a family member, carer and/or other people they identify from their social network.

Further strategies for 'bad days'

Participants also identified the following strategies to help with sustaining brushing on 'bad days' (when their mood is very low and they lack energy or motivation):

(a) Identify reasons for maintaining brushing during bad days, such as knowing how quickly oral health can deteriorate if they don't brush.
(b) Include brushing in the maintenance plan they create for bad days, which includes the simple tasks they could do for themselves on a bad day to help them feel better.
(c) Ask a family member or carer to include brushing in their support on bad days.

> 'If you could get an understanding of how quickly your oral health can decline if you don't brush them … maybe for me that might help that extra tiny bit of motivation of me thinking this is a really bad day, but these are my teeth'. Female participant with SMI (P308)

> 'I mean for sure it helps when, for example, my kid is here and I see that it's important for him to keep hygiene.' Female participant with SMI (P314)

Intervention functions, policy categories and BCTs

In steps 5–7, 6 out of 9 intervention functions and 4 out of 7 policy categories, described in the BCW guide, were identified as relevant based on the findings of the semi-structured interviews, and are mapped in Table 2. With respect to BCTs, 36 out of 93 BCTs in BCT Taxonomy v1 were identified from interview data (Table 3). Ten BCTs were selected based on stakeholders' feedback as key behavioural strategies to improve and sustain brushing among people with SMI (Table 3).

Intervention mode of delivery

In step 8, the following four key recommendations on intervention mode of delivery were specified.

Integrating the brushing intervention into SMI physical health checks

Participants suggested that a brief oral hygiene assessment and brushing support are best provided as part of SMI annual physical health checks and follow-up care:

> 'I think it would sit really well as part of the annual physical health check if the nurse did talk to you about it … went over brushing technique, and those sorts of things'. Male participant with SMI (P304)

> 'We want people to smoke less, we want people to be healthy, and the mouth is part of health, so why not assess their oral hygiene at that physical health check? … I mean if they're already providing these other interventions there's no reason why oral hygiene can't be included there as well'. Female dental professional (P331)

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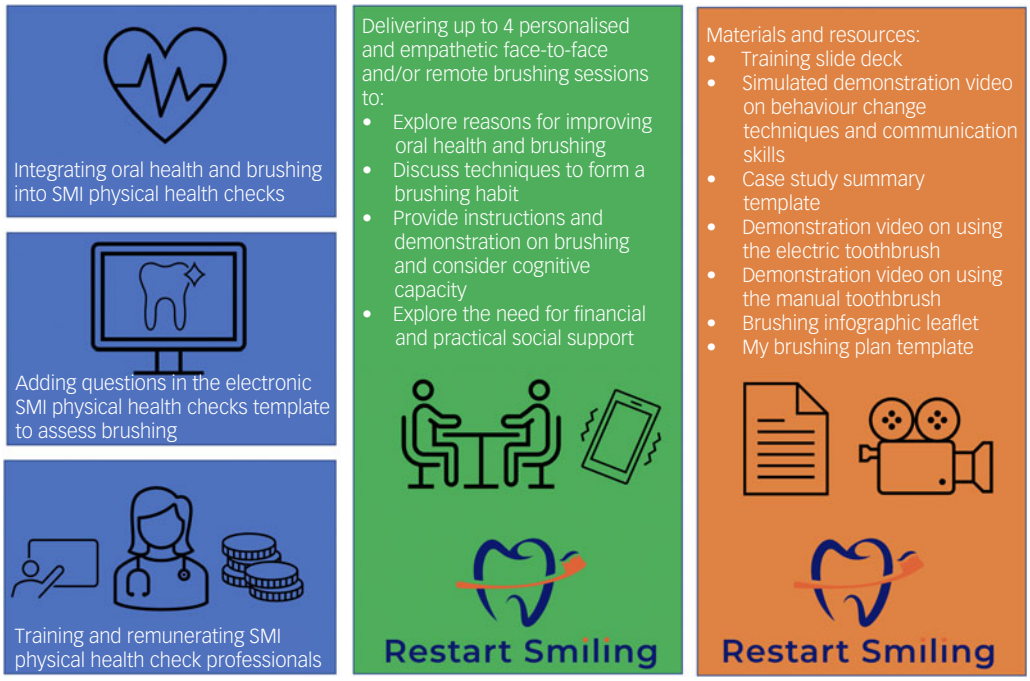


Fig. 2 The Restart Smiling toothbrushing intervention components. SMI, severe mental illness.

Training and remunerating primary care and mental health professionals

Most participants indicated that physical health-checking professionals in primary care and mental health services should be trained and remunerated to provide a brief brushing assessment and support for people with SMI. Participants also highlighted the advantages of using these professionals over dental professionals to deliver brushing support. This is because the former have regular contacts and established rapport with people with SMI and are best placed to support brushing as part of an integrated care approach to rebuild broader lifestyle routines, after addressing pressing mental and physical health needs:

> 'You're seeing them regularly, so they might help you write a plan … and then they check in on you a week later, or whatever, so you've got that kind of contact, you don't have like contact with dentists … it's for those people that see you regularly to have those conversations'. Female participant with SMI (P282)

Using a personalised and trauma-informed approach

Participants explained that brushing support should be person-centred and trauma-informed. This starts with asking people with SMI whether they would like to improve their brushing. Next, it points out what support is available for improving their brushing, then it focuses on finding what works for them to improve their brushing and supports decision-making in a non-judgemental approach, emphasising that they are not alone:

> 'Every patient is their own, we can't treat that patient group all the same way, because it doesn't work the same way for everyone else. So we have to be respectful of their thoughts and needs as well.' Female dental professional (P333)

> 'I think when these conversations do happen it has to be like in a very sensitive way with like a cultural understanding.' Female carer (P309)

The role of peer support workers was highlighted in relation to delivering such trauma-informed brushing support:

> 'You don't need a dentist to say those things to you … Sometimes it's a small little bit of information … [from] peer support or expert by experience … then everything feels less judgemental. It needs to come from something more collaborative'. Female participant with SMI (P314)

Maintaining engagement

Maintaining engagement through offering follow-up support appointments (in person or via the telephone) was considered highly important by participants:

> 'They'll have a series of appointments with the nurse to work on oral hygiene. And, they'll build up rapport with the patient, show them how to brush their teeth, give them tips and hints as how to do it better, and that's over a series of appointments.' Female dental professional (P331)

Further recommendations

Some participants outlined that brushing support should be culturally and linguistically tailored to cater for the needs of people with SMI from diverse ethnic backgrounds, and for those whose English is not their first language. Furthermore, there should be special considerations when supporting brushing in in-patient settings, such as providing supervised brushing. The intervention could be delivered through up to four support sessions face-to-face (for the initial session) and/or remote (for the follow-ups):

> 'I think the points with my mum that would be the most helpful is probably having other Bengali women holding that discussion. So, she'll be more inclined to take it in and also there wouldn't be that language barrier.' Female carer (P309)

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> 'For the ones that are in-patients, hopefully they are being supervised with the toothbrushing, so they're not going to do random things with it.' Female dental professional (P318)

The components of the brushing intervention (named Restart Smiling), including materials and training resources, are summarised in Fig. 2 and the logic model is presented in Supplementary Table 1.

Discussion

This is the first study to co-create an oral hygiene intervention for people with SMI using the BCW process. Our study identified new behaviour change strategies that could address the limitations of previous studies in terms of forming and sustaining a new toothbrushing habit.[18–32] For example, our findings highlight the unique challenges of integrating brushing into the evening routine. The study also identified a facilitator to rebuild the evening routine in a way that avoids or minimises the side-effects of psychotropic medications on brushing and on weight management at night. Furthermore, our findings identified strategies that could be used to support sustaining brushing on bad days in the longer term. Our study also highlights that brushing support should ideally be provided as part of integrated physical care by non-dental professionals who, compared with their dental counterparts, have regular contacts and established rapport with people with SMI. They also have better capability to support the formation of a toothbrushing habit as part of their assistance in building back the broader daily lifestyle routines. Such support may include social prescribing, which involves referral to non-medical services, to help people with SMI identify their social needs (such as housing and employment), apply for support (including financial support that could help with the cost of brushing equipment) and develop 'well-being' action plans to promote, establish or re-establish integration and support in their communities.[33]

The use of BCW in the development of oral health interventions is quite new. Two recent studies aimed to develop oral hygiene interventions for people with learning disabilities and for Punjabi immigrant adults.[15,16] However, in the study by Mac Giolla Phadraig et al, the BCW process was neither fully utilised nor well reported.[16] The study of Kaur et al applied the BCW process retrospectively on qualitative data collected from five Punjabi immigrant participants, indicating major limitations with methodology rigour and participatory principles of the BCW process.[15] Furthermore, the study of Mishu et al identified barriers and facilitators to oral hygiene in people with SMI and mapped them against the COM-B model and TDF domains.[17] Nonetheless, the authors did not link these to relevant intervention functions or policy categories, nor did they identify appropriate BCTs or design the oral hygiene intervention.

Strengths and limitations

One of the main strengths of the present study is the use of the BCW, which is highly participatory and heavily grounded in behaviour change theory. Compared with the above-mentioned studies that aimed to develop oral hygiene interventions for people with SMI, the BCW approach allowed us to co-create systematically a brushing intervention with multi-level components targeting personal capabilities and motivational aspects, as well as wider healthcare system and socioeconomic determinants. The transferability of the current findings is supported by the thick description of methods, participants' characteristics and contexts, as well as by maintaining an audit trail and a reflexive journal and undertaking purposive sampling. Participants' experiences covered a wide range of settings, including primary care, in- and out-patient secondary mental health services, social care and the voluntary, community and social enterprise sector. They had diverse oral hygiene self-care practices.

Despite the above strengths, our study is not without limitations. One of the limitations of using the BCW is that it is resource-intensive due to involving a wide range of stakeholders and intervention complexity. Another limitation is related to the need to tailor the present toothbrushing intervention to people with SMI in secure psychiatric settings. A further potential limitation for transferability is that the findings may be less applicable to people with SMI and healthcare systems outside of the UK, where routine physical health checks and follow-up care are not commonly offered.

Implications and next steps

In terms of policy and practice implications, our study informed NHS England national guidance (2024) on improving the physical health for people living with SMI, which included for the first time oral health within the comprehensive SMI physical health checks and cited Restart Smiling within training resources.[34] SMI physical health checks are provided in primary care and secondary mental health services in England.[34] We summarised, in Fig. 2 and Supplementary Table 1, the inputs needed to embed toothbrushing support in the SMI physical health checks practice, namely, (a) adding questions to assess brushing into the electronic SMI physical health checks template and (b) training and remunerating primary care and mental health professionals who deliver SMI physical health checks for supporting brushing. These inputs are in line with the Right to Smile consensus statement, and with recommendations for better physical health checks and integrated care for people with SMI.[35–37] The next steps include prototyping and evaluating the Restart Smiling intervention.

In conclusion, we have co-created a complex theory-driven oral hygiene intervention for people with SMI integrated into physical health checks underpinned by systems thinking and using the BCW in real-world settings.

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First received 17 Jun 2025, final revision 1 Sep 2025, accepted 14 Oct 2025

Supplementary material

The supplementary material is available online at https://doi.org/10.1192/bjo.2025.10905

Data availability

The anonymised data that support the findings of this study are available from the corresponding author, E.J., upon reasonable request.

Acknowledgements

The authors thank all participants and stakeholders who took part and supported Restart Smiling development in stages 1 and 2. Special thanks to Professor Elizabeth Barley for her support on the interview topic guides. Some of the symbols used in the manuscript's figures were downloaded from www.flaticon.com.

https://doi.org/10.1192/bjo.2025.10905 Published online by Cambridge University Press

Author contributions

Conceptualisation of the study, study design and data acquisition: E.J.; data analysis and interpretation: E.J., E.S., E.H., F.F., M.B.A.A., S.B. and K.B.; writing of the manuscript: E.J.; critical revision of the manuscript: E.J., E.S., E.H., F.F., M.B.A.A., S.B., C.A.C.-G. and K.B. All authors gave their final approval and agree to be accountable for all aspects of the work.

Funding

This study was partly funded by the QMUL Clinical Lecturer Small Grant Scheme and National Institute for Health and Care Research (NIHR) Academic Clinical Lecturer Award. C.A.C.-G. is part-funded by NIHR Applied Research Collaboration West Midlands (no. NIHR200165). The views expressed are those of the authors and not necessarily those of the funders.

Declaration of interest

The authors declare no conflicts of interest with respect to the research, authorship and/or publication of this article. The views expressed are those of the author(s) and not necessarily those of NIHR or the Department of Health and Social Care. K.B. is a member of the *British Journal of Psychiatry Open* editorial board and did not take part in the review or decision-making process of this paper.

Transparency declaration

The authors confirm that this manuscript is an honest, accurate and transparent account of the study reported, that no important aspects of the study have been omitted and that any discrepancies from the study protocol have been explained.

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https://doi.org/10.1192/bjo.2025.10905 Published online by Cambridge University Press