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Title Page:

Which Behaviour Change Techniques may help Waterpipe smokers to quit? An expert consensus using a Modified Delphi Technique

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ABSTRACT

Introduction: Waterpipe smoking is addictive and harmful. The determinants of waterpipe smoking may differ from those of cigarette smoking; therefore, behavioural approaches to support quitting may also differ between these two tobacco products. While some evidence exists on effective behavioural change techniques (BCTs) to facilitate cigarette smoking cessation, there is little research on waterpipe smoking cessation.

Methods: Twenty-four experts were selected from the author lists of peer-reviewed, randomised controlled trials on waterpipe smoking cessation. They were invited to two rounds of a consensus development exercise using modified Delphi technique. Experts ranked 55 BCTs categorised further into those that promote; "awareness of harms of waterpipe smoking and advantages of quitting" (14), "preparation and planning to quit" (29) and "relapse prevention and sustaining an ex-smoker identity" (12) on their potential effectiveness. Kendall's W statistics was used to assess agreement.

Results: Fifteen experts responded in round 1 and 14 completed both rounds. A strong consensus was achieved for BCTs that help in "relapse prevention and sustaining ex-smoker identity" (w=0.7; p<0.001) and a moderate for those that promote "awareness of harms of waterpipe smoking and advantages of quitting" (w=0.6; p<0.001) and "preparation and planning to quit" (w=0.6; p<0.001). Providing information on the consequences of waterpipe smoking and its cessation, assessing readiness and ability to quit, and making people aware of the withdrawal symptoms, were the three highest-ranking BCTs.

Conclusion: Based on expert consensus, an inventory of BCTs ordered for their potential effectiveness can be useful for health professionals offering cessation support to waterpipe smokers.

Implications: Waterpipe smoking is addictive, harmful and gaining global popularity, particularly among youth. An expert consensus on behaviour change techniques, likely to be effective in supporting waterpipe smokers to quit, has practice and research implications. Smoking cessation advisors can use these techniques to counsel waterpipe smokers who wish to quit. Behavioural and public health scientists can also use these to develop and evaluate behavioural support interventions for this client group.

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INTRODUCTION

Waterpipe smoking, (also known as "hookah", "shisha", "arghile", and "hubble bubble") is a method of tobacco consumption originating from the Eastern Mediterranean Region (EMR), however, its popularity is now growing in selected areas worldwide despite multiple negative health effects associated with its use.[1] Studies have identified over 300 chemicals in waterpipe smoke, including nicotine, carbon monoxide, nitric oxide and heavy metals.[2] Furthermore, waterpipe smoking is associated with typical tobacco-related diseases including lung cancer (OR = 2.12; 95% CI 1.32-3.42) and respiratory illnesses (OR = 2.3; 95% CI 1.1-5.1).[3]

Waterpipe smoking prevalence varies across different countries and age groups. In the EMR, studies of school students found waterpipe smoking prevalence ranging between 9-25%, in university students 6-28% and in adults 4-15%.[4] A study in Pakistan found 53.6% of university students were ever waterpipe smokers and of these 61.1% were current smokers.[5] A survey of adolescents in all American states except Hawaii and Alaska found that between 2010 and 2013, the past-30 days prevalence of waterpipe smoking increased from 17% to 23%.[6]

A systematic review including 32 articles on waterpipe smoking dependence concluded that waterpipe smoking leads to nicotine dependence due to high levels of nicotine delivery, withdrawal symptoms after temporary abstinence, and reports of difficulty in quitting.[7] Estimates from another review suggest that between 79% and 98% of waterpipe users were confident that they could quit waterpipe any time, and that the interest in quitting ranges between 26-53% in the US and 21-64% in Middle Eastern countries.[8] This establishes the need for further support for waterpipe smokers who want to quit.

In a recent systematic review of interventions for waterpipe cessation,[9] only seven studies were identified as providing a behavioural intervention to assist waterpipe smokers to quit. These varied widely – both in their content and in their delivery. For example, studies used individual-level and group-level behavioural techniques focusing on the health effects of waterpipe use only[10-12] whereas others supplemented this with encouragement to set a quit date[13,14] teaching around stimulus control and contingency management strategies, and issues around social pressures to smoke waterpipe and building resilience.[15,16] Most of these studies were pilot in nature and only two showed statistically

significant increases in cessation rates in intervention groups compared to control groups. The need to develop behavioural interventions for waterpipe users is therefore of paramount importance.

Only 3-5% of those who attempt to quit smoking cigarettes on their own have a successful long term quit.[17] On the other hand, long term follow up of individuals receiving behavioural support from a smoking cessation councillor has been shown to be more effective than controls (RR 1.39, 95% CI 1.24 to 1.57).[18] However, even within the NHS stop smoking service there has been variability in success, some of which is thought to be due to the delivery and components of the behavioural intervention itself.[19] The use of behavioural change technique (BCT) taxonomy is an attempt to standardise behavioural interventions, allowing clear documentation of what components make up the intervention[19-22] and an assessment of the differential effectiveness of these components. These techniques are now commonly used within behavioural support for smoking cessation.[19,20]

The determinants of waterpipe smoking may differ from the determinants of conventional cigarette smoking. Two large reviews were carried out in 2013 and 2015[8,23] which found that waterpipe-specific determinants of use may include sharing the product in a social setting, the perception of reduced harm compared to cigarettes, and the perception that the fruit flavours which dominate waterpipe tobacco branding strategies imply that the product is healthy. The determinants shared with cigarettes include relaxation, enjoyment, availability, affordability, curiosity, hospitality, family attitudes, peer influence and addiction. Moreover, there are common myths specifically associated with waterpipe smoking and this includes the belief that the water that the smoke passes through purifies the smoke and this contributes to the perception that is it less harmful than cigarettes.[8,23]

Despite the common usage of waterpipe, evidence of negative health effects and the demonstration that determinants of waterpipe smoking differ from cigarette smoking, there is a paucity of research into developing and evaluating behavioural interventions to support waterpipe smoking cessation.

While a Cochrane review identified three randomised studies of waterpipe smoking cessation interventions these were considered to be of very low methodological quality as each study was at high risk of at least two of the following biases: performance bias (i.e. lack of blinding of participants), detection bias (i.e. lack of blinding of outcome), reporting bias (i.e. outcome measures not appropriately reported) and lack of biochemical verification of cessation measures.[24] Waterpipe smoking cessation rates were higher in intervention groups in all studies, with a statistically significant

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difference found in two of the three studies. This demonstrates that behavioural interventions are potentially beneficial to waterpipe users. The main conclusions of the Cochrane review called for the development of systematically designed behavioural interventions specific to waterpipe smoking.[12,13,16,24] Given the difference in determinants between waterpipe and cigarette smoking, developing and testing behavioural interventions specifically targeting waterpipe smokers with clearly documented components for identifying and replicating the active ingredients are in dire need.[25]

In the absence of empirical data, we aimed to seek expert consensus to develop an inventory of such techniques to provide a basis for design of behavioural interventions for waterpipe smoking cessation.

METHODS

Design

In 1980's the RAND Corporation developed 'Delphi technique' - currently the most widely used method for developing consensus among experts. In this method, the experts, first, respond to a list of procedures for a specified condition making independent ratings of appropriateness for each procedure. Next, the panel meets together as a group and formally discusses any disagreement.

We used a modified Delphi technique to develop a valid expert consensus.[26] The modifications made in the standard Delphi technique were: i) approach taken to administer the procedure i.e. individual (independent opinion) versus group approach (face-to-face consultation);[27] and the ranking of list items[28] by experts as opposed to the more popular rating exercise as Delphi was originally devised to handle opinions rather than objective facts. Both group and individual approach to Delphi procedure can be used for content ranking, although the generation of ideas individually eliminates the potential of 'group thinking' and minimises the introduction of bias in the ranking process.[29] Other methods of reaching consensus include, nominal group technique, RAND-UCLA Appropriateness Method and Consensus Development Conference.[30] However, these methods require experts to meet face-to-face.[30] Modified Delphi technique, on the other hand, is an efficient and inclusive approach to reach consensus among a group of international experts.[31]

In general, two or three Delphi rounds results in some convergence of individual judgements, while more than three rounds make little impact on the level of agreement and have adverse effect on the response rate.[27] Therefore, two Delphi rounds were chosen to retain a high response rate but still achieve valid consensus.[26] These were conducted in June and July 2015 via emails.[26]

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Ethics approval was granted by the research governance committee at the University of York.

Procedure

Step 1: Developing the list of BCTs

We used existing literature to develop the list of BCTs. This involved linking BCTs to determinants of waterpipe smoking from two reviews,[8,23] some of which include socialising, relaxation, enjoyment, perception to be less harmful than cigarettes, affordability, peer influence and addiction as well as the beliefs that fruit tobaccos are healthy, perception that they will not become addicted and normative acceptability. Two seminal papers were consulted for BCT taxonomy; one for smoking[20] and one for broader health related behaviours.[22] We used all smoking cessation BCTs and a selection from the general techniques list, which were deemed relevant to waterpipe smoking determinants. One of the authors (IK), a behaviour change expert, assessed the suitability of this list.

BCTs were divided into three broad categories: (a) "awareness of harms of waterpipe smoking and advantages of quitting" (14 BCTs), (b) "preparation and planning to quit" (29 BCTs) and (c) "relapse prevention and sustaining an ex-smoker identity" (12 BCTs).

Step 2: Participants

Participants included experts in waterpipe cessation interventions and behavioural scientists.

All participants that had published a peer-reviewed paper (any author position) on randomised controlled trials of behavioural interventions for waterpipe smoking cessation were invited to take part in this study. Cochrane reviews on waterpipe smoking cessation were consulted. Given its robust methodology, authors from studies included in the only Cochrane review (published in July 2015)[24] on interventions for waterpipe smoking cessation were contacted. In addition to the authors of the included studies, the authors of the Cochrane review were also asked to participate as well as a BCT expert working within our research team (IK).

Overall the experts invited to take part in this study varied in their experience across a diverse population of waterpipe smokers, including Egypt, Pakistan, Syria and the United States. We were not able to select experts outside these settings due to the very limited numbers of evaluations of waterpipe cessation interventions and hence the required expertise in the area. The experts themselves belonged to a diverse field of expertise including microbiology and immunology, community, environmental and occupational health, biostatistics, bioinformatics, nursing, tobacco

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studies, epidemiology, public health, social and behavioural sciences, psychology, pharmacology and cancer biology, health sciences, medical sciences, primary care, international health and development, and were from countries other than where the waterpipe studies were conducted.

In general, reliability of experts' consensus is low for numbers less than six and above 12 improvements in reliability of consensus is not substantial.[30,32]

Inclusion criteria of this Cochrane review included randomised, quasi-randomised and cluster randomised controlled trials among current (past-30 day) waterpipe users of any age and either gender. The review included both pharmacological and behavioural cessation interventions, however we only considered studies that included a behavioural component (regardless of whether a pharmacological component was also included in the intervention). The primary outcome measure of the review was abstinence from waterpipe smoking at six months or more from the start of the intervention; however we also included the review's one excluded study which met all the above criteria except for the length of follow up, which was three month abstinence.[23]

The key researcher (NO) did not take part in the modified Delphi technique in order to keep the process anonymous and independent. This prevented participants getting influenced by the opinion of one eminent and/or eloquent individual.[30] As an incentive, participants were told that their contribution will be acknowledged in any academic outputs of this work and a final inventory will be made available for general use.

Step 3: Delphi exercise first round

Participants were invited by email to take part and complete the Delphi exercise. The email included an excel sheet with a list of techniques that had been shown to be effective in changing other related behaviours (e.g. cigarette smoking) that was generated in step 1 and a letter of invitation.

Participants were requested to take part in the modified Delphi procedure and provided information on the process, composition, purpose and anticipated time for the consensus building exercise.

Participants were instructed to rank each technique within respective groups in order of importance, and were given this prompt - "To aid judgement of importance you may want to consider acceptability, deliverability and efficacy". The modified Delphi procedure used in this study differs from the more popular rating type Delphi which does not require ranking of items on a list. We sorted the items out

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into smaller groups to ease ranking. A single long list of items could have clouded the consensus process and would have made it practically very difficult for the experts to assign ranks from 1 to 56.[28] Participants were informed of the anonymity of the collated data, and that the second round will contain average scores by all experts for each technique which will then need to be ranked again by each expert.

Responses were entered into an Excel spreadsheet. Kendall's W was used to measure agreement between the experts.[28]

Step 4: Delphi exercise second round

Between round one and two, participants fed back that within the second category there were three constructs that were very similar to each other. The research team therefore decided that the scores from the three constructs should be averaged and the list reduced to 27 components. Following that participants were given the average, standard deviation and ranked score from all participants in round one. They were then asked to re-rank the BCTs with this in mind. It was explained to participants that there was no obligation to change ranking. Kendal's W was then recalculated for the second round. Following cut-offs were used to categorise Kendall's W; *0.1 = Very weak agreement; 0.3 = Weak agreement; 0.5 = Moderate agreement; 0.7 = Strong agreement; and 0.9 = Unusually strong agreement.*[28]

RESULTS

Step 1: Developing the list of BCTs

A total of 55 BCTs were extracted from the literature (web supplement 1), 30 specific for smoking cessation and 25 for other general health behaviours. Two of these were dropped from the second round due to a considerable overlap with others.

Step 2: Participants

Out of 26 eligible experts, 24 were invited (two were uncontactable) to take part in the consensus development exercise. 15 participated in the first round (62.5% response rate; nine males and six females) and out of these, 14 in the second (93.3% response rate; eight males and six females).

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Step 3 and 4: Delphi exercise first and second round

Results from rounds one and two are summarised in Table 2. At round two, a strong to moderate agreement emerged between participants in their ranking of BCTs for waterpipe smoking cessation. A strong consensus was achieved for BCTs that help in "relapse prevention and sustaining ex-smoker identity" (w=0.7; p<0.001) and a moderate for those that promote "awareness of harms of waterpipe smoking and advantages of quitting" (w=0.6; p<0.001) and "preparation and planning to quit" (w=0.6; p<0.001). Table 1 provides a list of BCTs within their three categories as ranked and ordered by the expert panel. In the first category (awareness of harms of waterpipe smoking and advantages of quitting) participants felt it was most important to give information on consequences of waterpipe smoking and cessation and to do this in a salient way as well as identifying reasons for wanting and not wanting to stop. In the second category (preparation and planning to quit) it was felt the most important component would be assessing readiness and ability to quit, assessing previous quit attempts and facilitating barrier identification and problem solving. In the final category (relapse prevention and sustaining ex-smoker identity), the highest-ranking BCTs were about assessing and providing information on withdrawal symptoms and facilitating relapse prevention.

DISCUSSION

The modified Delphi technique provides us with an inventory of BCTs in the order of their ranking which can be used by those who wish to develop behavioural intervention and/or use these techniques to offer cessation support to waterpipe smokers. The techniques that ranked high under each category were also consistent with what would be expected in a consensus development exercise for other addictive behaviours. Most would consider providing information on the consequences of continuing or changing an addictive behaviour, assessing clients' readiness and ability to change, and preparing them for withdrawal, as key to behaviour change.

There may be several reasons for the agreement among experts not being stronger for all three BCT categories. There was a large number of BCTs within each category – making it more difficult to reach consensus. Waterpipe smoking is also a complex and diverse behaviour that differs across the world, for example in the type of tobacco smoked (e.g. flavoured vs unflavoured), where it is smoked (e.g. cafes vs home), population demographics (e.g. elderly people vs young college students) and type of smokers (everyday vs infrequent). To illustrate this, an analysis of the Global Adult Tobacco Survey

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showed that the number of weekly waterpipe sessions ranged from 2.8 in Russia (where waterpipe is more popular among younger adults and flavoured waterpipe tobacco is predominantly used) to 17.2 in Egypt and 30.5 in India (where waterpipe is more popular among older adults and unflavoured waterpipe tobacco is predominantly used).[33] Determinants may vary across different waterpipe smoking denominations and this may be one of the reasons for not observing a stronger correlation; however, the higher ranking BCTs in each category are likely to be the same irrespective of the setting and culture of waterpipe smoking consumption.

A further limitation of this study is that there are only a small number of people who are experts in both behaviour change techniques as well as waterpipe smoking cessation. Participants were selected as they cover both these areas by having experience in behavioural change interventions for waterpipe smoking; however, they are not behavioural change experts. Behavioural change taxonomy is a relatively new field that has extensive use within the UK but in early stages within the US and other parts of the world. Participants understanding of behavioural change techniques might have affected how they rank some techniques.

BCTs themselves are also limited – mode of delivery and provider cannot be controlled by this process and the taxonomies that have been produced are not comprehensive[34] and it is possible that this process would mean important components are missing – although by including BCTs from the general list and not just the smoking cessation list we have made this less likely. Previous studies have also found that many of the BCTs are highly correlated with each other making it difficult to separate out effect size.[19] Furthermore, the consensus method we applied does not directly match work undertaken in the domain of cigarette smoking cessation. It is worth noting that cigarette smoking cessation programmes have been found to underreport BCT use.[35] That notwithstanding, three reviews do provide insights in to which BCTs are associated with successful interventions in this context. West et al investigated which BCTs used in group-based behavioral support by English stop-smoking services were associated with 4 week quit outcomes (Communicate group member identities; and placing a financial deposit which is lost if a stop-smoking buddy relapses);[36] Bartlett et al undertook a meta-analysis of which BCTs were associated with successful interventions for people with COPD (Facilitate action planning/develop treatment plan, Prompt self-recording, Advise on methods of weight control, and Advise on/facilitate use of social support);[37] and, Lorencatto et al

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augmented an existing Cochrane review and investigated which BCTs were associated with 4 week quit outcomes in pregnancy (provide information on the consequences of smoking and smoking cessation; facilitate barrier identification and problem solving; facilitate action planning/identify relapse triggers; facilitate goal setting; facilitate goal setting; assess current readiness and ability to quit; offer/direct toward appropriate written materials; provide information on withdrawal symptoms; assess past history of quit attempts; prompt commitment from the client there and then).[38] Providing information on the consequences of waterpipe smoking and its cessation, assessing readiness and ability to quit, and making people aware of the withdrawal symptoms, were the three highest-ranking BCTs in our Delphi exercise. Each of these find related support in at least one review, and, notwithstanding the establish differences in determinants between cigarette and waterpipe use, are broadly in line with the cigarette smoking cessation literature.

Finally, socialising has been shown to be an important determinant of waterpipe smoking.[8,23] It would be difficult to address a social determinant within an individual-based behavioural intervention for waterpipe smoking cessation but this would need to be targeted through other approaches. Despite these limitations, as discussed above, we have been able to include a substantive proportion of a limited number of experts from research groups in various settings worldwide.

Behavioural interventions are one of many strategies to control waterpipe smoking. Other measures to limit its demand, include health warnings, smoke-free spaces and taxation.[39] However, for those who are addicted to waterpipe smoking, supporting them to stop is still an important aspect of tobacco control.

This is the first attempt to develop a consensus among experts in the field of what BCTs they believe will be effective in waterpipe smoking cessation. With waterpipe smoking being a diverse behaviour and there being an absence of evidence, we need to take the best possible approach to further waterpipe smoking cessation interventions. This process gives a starting point for future interventions to be developed and for an evidence base to be established. For those developing behavioural interventions for waterpipe cessations, we suggest that these findings be contextualised to local needs of the target population, for example by conducting focus groups to develop behavioural interventions for specific sub-groups. When conducting further studies there is also a need for researchers to describe components of their interventions,[21,25] which will allow assessment of what

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components are effective in waterpipe smoking and allow reproduction of the behavioural interventions.

CONCLUSION

This is the first expert panel consensus on the potentially effective BCTs for waterpipe smoking cessation. Given the lack of current evidence this gives a starting point for those health professionals that offer cessation support to waterpipe smokers and to researchers who wish to develop behavioural interventions in future. Waterpipe that research and behavioural taxonomy are both emerging fields. This study brings the two together for the first time and allows us to attempt to be evidence-based in our design and offer of behavioural interventions to target waterpipe smoking.

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Table 1: Ranking of 53 Behaviour Change Techniques (BCTs) within three categories

	Round 1 average score (SD)	Round 1 ranking	Round 2 average score (SD)	Round 2 ranking
Awareness of harms of waterpipe smoking and advantages of quitting				
Provide information on consequences of waterpipe smoking and consequences of waterpipe cessation	2.6 (2.3)	1	1.7 (1.3)	1
Identify reasons for wanting and not wanting to stop smoking waterpipe	4.3 (3.1)	2	2.9 (1.8)	2
Salience of consequences	6.1 (4.2)	4	4.4 (2.2)	3
Information about social and environmental consequences	6.0 (2.8)	3	5.3 (3.1)	4
Incompatible beliefs	6.3 (2.9)	5	5.8 (2.6)	5
Pros and cons	7.3 (2.2)	6	6.9 (2.3)	6
Measure carbon monoxide (CO)	7.7 (4.5)	8	7.5 (3.1)	7
Comparative imagining of future outcomes	7.3 (3.9)	7	7.7 (2.5)	8
Assess current and past smoking behaviour	8.1 (4.6)	9	8.5 (3.8)	9
Provide normative information about others' behaviour and experience	8.3 (3.6)	10	8.9 (3.5)	10
Re-attribution	9.7 (2.9)	11	10.8 (1.5)	11
Information about emotional consequences	9.8 (3.5)	12	11.4 (2.3)	12
Anticipated regret	10.5 (2.6)	13	11.6 (2.7)	13
Credible source	11.0 (4.1)	14	11.8 (3.1)	14
Preparation and planning to quit				
Assess current readiness and ability to quit	3.9 (4.9)	1	2.2 (3.1)	1
Assess past history of quit attempts	8.0 (8.9)	3	5.6 (4.2)	2
Facilitate barrier identification and problem solving	8.9 (5.3)	4	5.6 (3.2)	2
Facilitate action planning/develop treatment plan	7.5 (5.5)	2	5.7 (5.3)	4
Advice on environmental restructuring	11.2 (8.9)	5	6.8 (4.0)	5
Boost motivation and self-efficacy	11.6 (6.1)	7	7.4 (2.9)	6
Facilitate goal setting	11.3 (7.1)	6	8.9 (7.0)	7
Restructuring the social environment	13.1 (9.1)	10	10.1 (5.3)	8
Avoidance/reducing exposure to cues for the behaviour	11.7 (7.8)	8	10.2 (6.9)	9
Action planning	11.8 (4.9)	9	10.9 (3.5)	10
Advice on changing routine	14.8 (9.0)	12	13.1 (5.6)	11
Behaviour substitution	15.0 (7.8)	13	13.7 (5.7)	12
Summarise information/confirm client	16.0 (6.5)	14	13.9 (6.5)	13

decisions				
Prompt self-recording	14.6 (6.5)	11	14.2 (6.1)	14
Set graded tasks	16.2 (6.9)	15	15.4 (6.2)	15
Prompt commitment from the client there and then	17.3 (7.0)	17	15.9 (5.9)	16
Mental rehearsal of successful performance	17.7 (7.6)	18	16.8 (5.4)	17
Verbal persuasion about capability	16.8 (7.5)	16	16.9 (5.4)	18
Distraction	18.1 (7.2)	19	17.7 (5.7)	19
Give options for additional and later support	18.5 (7.9)	20	19.4 (5.7)	20
Explain the importance of abrupt cessation	20.2 (7.4)	21	19.6 (3.8)	21
Material incentive (behaviour)	21.6 (10.3)	25	20.4 (8.6)	22
Self-talk	20.5 (6.2)	22	20.7 (3.3)	23
Advise on conserving mental resources	21.5 (6.6)	23	20.9 (3.5)	24
Valued self-identity	21.6 (6.3)	24	22.7 (4.0)	25
Self-incentive	24.1 (6.8)	27	22.9 (6.6)	26
Behavioural contract	22.7 (6.7)	26	23.3 (4.0)	27
Relapse prevention and sustaining an ex-smoker identity				
Provide information on withdrawal symptoms	2.4 (1.7)	1	2.1 (1.8)	1
Assess withdrawal symptoms	3.3 (2.4)	2	3.4 (2.4)	2
Facilitate relapse prevention and coping	3.6 (1.5)	3	3.4 (1.3)	2
Prompt review of goals	5.2 (2.8)	4	4.3 (1.9)	4
Provide feedback on current behaviour	5.2 (2.8)	4	4.6 (2.6)	5
Advice on/facilitate use of social support	5.9 (2.6)	6	6.0 (2.0)	6
Framing/reframing	7.7 (2.4)	7	7.6 (1.8)	7
Provide rewards contingent on successfully stopping smoking	8.3 (2.8)	9	8.4 (2.4)	8
Strengthen ex-smoker identity	7.9 (2.2)	8	8.5 (1.2)	9
Identification of self as role model	8.4 (3.6)	10	8.7 (3.2)	10
Provide rewards contingent on effort or progress	9.6 (1.8)	11	10.1 (1.7)	11
Self-reward	10.5 (2.2)	12	10.9 (2.0)	12

Table 2: Correlation between participants' responses of ranking of Behaviour Change Techniques (BCTs) for each category

	Kendall's W	Level of agreement	p values
Round 1 (n=15)			
Awareness of harms of waterpipe smoking and advantages of quitting	0.3	weak	<0.05
Preparation and planning to quit	0.3	weak	<0.05
Relapse prevention and sustaining an ex-smoker identity	0.5	moderate	<0.05
Round 2 (n=14)			
Waterpipe smoking - awareness of harms and advantages of quitting	0.6	moderate	<0.05
Preparation and planning to quit	0.6	moderate	<0.05
Relapse prevention and sustaining an ex-smoker identity	0.7	strong	<0.05

0.1 Very weak agreement; 0.3 Weak agreement; 0.5 Moderate agreement; 0.7 Strong agreement; 0.9 Unusually strong agreement[28]

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