Section A: CPHE to complete	
Name:	Charles Abraham
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Guidance title:	Behaviour change
Committee:	Programme Development Group
Subject of expert testimony:	Behaviour change – identifying effective elements of behaviour change interventions
Evidence gaps or uncertainties:	[Please list the research questions or evidence uncertainties that the testimony should address]
What are the benefits and challenges in developing a taxonomy of behaviour change interventions?	
How can we identify the effective elements of behaviour change interventions?	
Section B: Expert to complete	
Summary testimony:	

Summary of Evidence Provided by Charles Abraham

Health behavior change (BC) interventions have been shown to be effective across domains and have the potential to be very cost effective compared to later treatment. However, effectiveness is variable and the key aim for reviewers is to identify what features of intervention enhances effectiveness for which group applied to which behavior patterns.

Ground breaking work in this field was reported by Albarracín et al. (2005) who identified 10 change techniques that could be (i) linked to underlying empirically-supported regulatory processes, and (2) reliably identified in intervention descriptions. The authors were able to identify change process and related techniques likely to enhance the effectiveness of HIV-preventive intervention among particular groups. They, noted, for example, that,

> *…. the most effective interventions contained educational information, attitudinal arguments, behavioral skills arguments, and behavioral skills training…. the least effective attempted to induce fear of HIV.*

A noteworthy finding was some change techniques are effective for particular groups and counter-productive for others. So, for example, providing normative feedback (e.g., using the two techniques of providing information on others' approval of behaviors and others' performance of behaviors) was effective for young target groups but use of such techniques was associated with reduced effectiveness among intervention older recipients.

Abraham & Michie (2008) built on Albarracín et al's (2005) work by identifying and defining a larger set of change techniques linked to empirically-supported change

processes which were found to be reliably identifiable in descriptions of interventions provided in papers from across a wide range of behavioural domains and from manuals of HIV-preventive interventions.

The impact of change techniques on intervention effectiveness may be moderated by a range of other intervention characteristics. As well as target group by technique interactions (as identified by Albarracín et al., 2005), the delivery format, the context and frequency of change technique use, the competence of those involved and other intervention characteristics can moderate effectiveness. A useful list of intervention characteristics was provided by Davidson et al. (2003). The "Syntheses of HIV Risk Reduction Research" (SHARP) intervention content classification system (Abraham et al., under review) was developed using insights from Albarracín et al's (2005) and Abraham & Michie (2008) and allows categorization of a range of intervention features which may moderate the effectiveness of change techniques on intervention effectiveness. The system has been found to be reliable and useful in identifying intervention features associated with effectiveness in interventions promoting safer sex.

Research has shown that the content of usual care is an important determinant of intervention effectiveness (de Bruin et al., 2010). Any intervention is more likely to be found to be effective when compared to a relatively poor, versus a relatively good, active control. Thus interpretation of effectiveness data in which active controls groups are used (like usual care) requires analyses of the characteristics, not only of interventions, but also of active controls. Without such analyses, an intervention deemed to be effective on the basis of a comparison with usual care may not be effective relative to higher quality usual care – and vice versa. Checking usual care comparisons for representativeness of common practice may mitigate this problem.

Two studies comparing the number of change techniques identifiable from paper and manual descriptions of the same intervention have reported significant and substantial differences indicating that the range of change techniques included in interventions is unrepresented in paper descriptions (Abraham & Michie, 2008). Consequently, descriptions provided in published papers may not provide comprehensive descriptions of manualised or delivered interventions. This is problematic because effectiveness (or ineffectiveness) may be linked to characteristics not reported in published papers. Analyzing manual descriptions may mitigate this problem.

More generally, reviewers using meta analytic techniques to identify moderators of effectiveness (e.g., target audience, change technique combinations, delivery formats etc) must strive to avoid the problem of combining distinct features in the same category; the so called "apples and pears" problem. When the moderator is not an objectively verifiable characteristic of the intervention (e.g., the intervention was delivered to young women) reviewers need to ensure that the coding category definitions used to analyse intervention descriptions are both reliable and valid. Standard practice have been established for reliability analyses (e.g., Kappa = .7, Abraham & Michie, 2008). Validity may be enhanced by ensuring that definitions are specific and based on previous empirical evidence. For example, since previous research has identified differences in the effects of providing descriptive (e.g., others do this) and subjective normative information (e.g., others approve of this) these should be distinguished rather than using a less well defined category such as "normative feedback". Less specific categories may capture quite distinct aspects of an intervention that have different or opposing effects. This principle applies to all categorization including delivery formats.

The relationship between intervention characteristics and effectiveness is likely to vary as a consequence of the fit between intervention characteristics and recipients/ users. For example, the effectiveness of if-then planning has been demonstrated among motivated intervention recipients. However, this technique is only likely to work if the plans generated are realistic and pertinent to the current barriers to enhancement of intentions. In some cases this content may be obvious and researcher-generated, if-then plans may be effective. In other cases, recipients may be able to generate their own plans using an online questionnaire but in other groups, face-to-face delivery using instruction, modeling and feedback may be necessary for the technique to have measurable effects on e.g., physical activity and diet (Luszczynska, 2007). Thus, as was highlighted in the NICE (2007) guidance, the pre-existing knowledge, motivation and skills of recipients is critical to choice of intervention content and delivery format. In particular, interventions are likely to be effective when viewed to be rewarding and realistic by recipient/ users. Paulussen et al. (1994) found that effectiveness was not an important criterion for the adoption of sex education interventions in Dutch schools, illustrating that unless the intervention is desirable and rewarding for adopters/users/recipients it is unlikely to be integrated into everyday practice – even if efficacy has been demonstrated.

Similarly, as intervention which is effective in one context may not be sustainable in another (Glasgow et al., 2002). So interventions found to be effective in trials may not have an impact when rolled into practice because they are not maintained or because they are “adapted” for use in practice leaving out critical components determining efficacy under trail conditions.

The importance of the match between recipients and intervention content and between context and intervention content implies that interventions are more likely to be effective when developed for specific recipients in particular contexts. This is the approach recommended by “Intervention Mapping” (Bartholomew et al., 2011). A key element of this approach is the co-creation of interventions which is also recommended by use of Patient-Practitioner-Involvement strategies by the National Institute of Health Research. Thus the way in which an intervention has been developed is likely to be an independent predicator of its effectiveness in context. Thirteen key aspects of intervention mapping and co-creation were identified in the evidence provided, using the HeLP intervention development process and trail design as an illustration (Wyatt et al., under review). i.e.,

1. Begin with a problem-solving approach to empirically-verified health needs,
2. Identify underlying regulatory and change processes.
3. Develop interventions in the context in which they will be used.
4. Develop products and interventions that can readily be used in everyday work/ leisure environments and are sustainable over time within available resources, with the active creative participation of those who will use, deliver and adopt the intervention.
5. Understand the reasons why adopters would select and employ products, including interventions, and “design-in” such usability features.
6. Assemble a multi-skilled team including users and those who will deliver the intervention.
7. Use intervention mapping procedures to map change techniques to be used in the intervention onto underlying change processes.
8. Pilot the intervention and seek to improve it in-context.
9. Conduct feasibility evaluations and re-design time.
10. Include process evaluations that track adherence, how the intervention is “used” and the change processes it affects – ideally qualitative and

quantitative data.

11. Design effectiveness trials to scale…
12. . ….using objective measures (linking outcomes to behaviours) with long-term follow up.
13. Develop detailed implementation manuals to ensure fidelity of replication.

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