



Editorial

Form of delivery as a key ‘active ingredient’ in behaviour change interventions

Background

The form of delivery (FoD) is a vital part of any behaviour change intervention and not merely a by-product of operationalising theory and behaviour change techniques (BCTs). Behaviour change interventions consist of three broad groups of interconnected components: (1) BCTs (i.e., the content of the intervention); (2) theory (i.e., the processes through which the intervention is believed to influence behaviour); and (3) the FoD (i.e., the way in which the intervention is delivered). Behaviour change science has made significant progress in specifying BCTs (Abraham & Michie, 2008; Michie *et al.*, 2013), and understanding the behaviour change processes (Hall & Fong, 2010; Rothman, Sheeran, & Wood, 2009; Strack & Deutsch, 2004; West, 2006), with healthy critical debates helping advance theoretical innovation and testing (Snihotta, Preseu, & Araújo-Soares, 2013). Some BCTs and associated theories specify some FoD elements. For instance, financial incentives and learning theory make several predictions about scheduling (Johnston, 2016). However, the majority of FoD elements and features are insufficiently specified to allow full operationalization and replication of an intervention (see Adams, Giles, McColl, & Snihotta, 2014 for the example of financial incentives).

The FoD has received comparatively little explicit attention in intervention development and implementation research. We suggest that the FoD is a crucial ‘active ingredient’ driving or undermining intervention effectiveness and can therefore serve a key function rather than just providing an inert vehicle which can be adapted (Hawe, Shiell, & Riley, 2004). In this editorial, we first examine the concept of FoD and then focus on why FoD is important when developing and testing behaviour change interventions. We use ‘form of delivery’, rather than ‘mode of delivery’, to refer to intervention delivery components. Although ‘mode of delivery’ is sometimes used to refer to a range of delivery elements, the same term is often used in a narrow sense referring merely to delivery format features of an intervention (e.g., face-to-face, group, Internet).

What is ‘form of delivery?’

There is currently no agreed definition of a behaviour change intervention’s FoD, unlike other intervention components such as BCTs (Michie & Johnston, 2013) and theory (Michie, West, Campbell, Brown, & Gainforth, 2014). The template for intervention description and replication (TIDieR) outlines a variety of delivery relevant features including what was provided, by whom, how, where, when, and for how much (Hoffmann *et al.*, 2014). In line with TIDieR, we suggest the following definition: The FoD

includes all features through which behaviour change intervention content is conveyed including: the provider, format, materials, setting, intensity, tailoring, and style. The purpose of this general definition is to aid the prospective development and designing of behaviour change interventions. More detailed definitions of FoD may be required for other purposes such as for service providers who are trying to decide whether an intervention is feasible to deliver in their context.

According to this definition, the FoD is multifaceted as any behaviour change intervention will consist of multiple FoD elements, and each BCT may have a different configuration of FoD elements and features. We use the term 'element' to refer to the broad FoD components as outlined in the definition (e.g., delivery format) and the term 'features' to refer to subcomponents of the FoD elements (e.g., delivery format includes the features mode of delivery, delivery method, delivery channel, and delivery route; see Table 1 for more detail and examples). Several lists containing FoD elements and features exist, but these also typically include BCT and theory components. A comprehensive and inclusive FoD framework to aide intervention development is currently lacking. Based on the structure from TiDiE and other existing lists containing FoD elements and features (Borek, Abraham, Smith, Greaves, & Tarrant, 2015; Davidson *et al.*, 2003; Hoddinott, Allan, Avenell, & Britten, 2010; Webb, Joseph, Yardley, & Michie, 2010), we propose a preliminary framework in line with the above definition (Table 1).

Why is the form of delivery important?

1. Form of delivery can be important for operationalization of several theories.

The FoD can be important for the translation of theoretical concepts into intervention components. For example, the distinction between abstract and concrete in the common-sense self-regulation model (Leventhal, Brissette, Leventhal, & Cameron, 2003) may be best achieved through a sensory delivery format using concrete models. Although women know that they are pregnant at the time of an ultrasound scan, the image and sound of the heartbeat of the unborn child helps those beliefs become concrete, making it suddenly feel 'real' which can have significant cognitive and emotional consequences (Langer, Ringler, & Reinold, 1988), and significant behavioural impact (Campbell *et al.*, 1982). The abstract/concrete distinction is also important in relation to smoking cessation. Cameron and Williams (2015) found that as images moved from cartoon (abstract), through medical representation in an X-ray to a photograph (concrete) form, the odds of perceived impact by participants increased dramatically (Cameron & Williams, 2015). Moreover, simple concrete representations have been successful in changing patients' understanding of their clinical problem and the nature of their treatment (Karamanidou, Weinman, & Horne, 2008) and in a recent intervention, demonstrations of a blocked artery using a model to illustrate restricted blood flow helped patients to achieve a concrete representation of their peripheral arterial disease (Cunningham, Swanson, O'Carroll, & Holdsworth, 2012). Several other theories such as learning theory also have clear implications for FoD operationalization (Johnston, 2016).

2. Form of delivery may enhance or undermine BCT effectiveness.

Much of the recent health psychology research tested which BCTs are associated with effectiveness (Dombrowski *et al.*, 2012; Michie, Abraham, Wittington, McAteer, & Gupta, 2009). However, it might be equally important how a BCT is delivered. For example, Chapman and Armitage (2010) showed that a booster session can enhance the impact of an implementation intention intervention, suggesting that intensity is an important FoD

Table 1. Form of delivery elements of behaviour change interventions

Delivery elements	Examples
<i>Delivery features</i>	
Provider (Who delivers, facilitates, or is behind the intervention?) [TIDieR: WHO]*	
<i>Provider Characteristics</i>	Male; female; non-personal (e.g., institute, government, professional body, company)
<i>Professional background</i>	Nurse, GP, psychologist, dietician, lay member
<i>Professional experience</i>	15 years practicing nurse, Masters level psychology student, registered dietician for 8 years
<i>Number of providers</i>	2 nurses and 1 GP; 1 psychologist; 3 lay members
<i>Training in intervention facilitation</i>	2-hr training session; half day workshop; online training module
<i>Training in intervention delivery</i>	Communication skills training; group facilitation training, cognitive behavioural skills training
<i>Intervention relevant competence</i>	Certified health trainer, certificate in counselling
<i>Continuity</i>	Same provider; different providers for different topics; mix of same and different providers
Delivery Format (What are the methods of intervention administration) [TIDieR: HOW]*	
<i>Mode of delivery</i>	Face to face, remote, face to face and remote (e.g., Skype), environmental (e.g., prompts)
<i>Delivery method</i>	Individual, group, community, population
<i>Delivery channel</i>	Personal, self-help, mobile phone application (app), text message (SMS), telephone, email, CD-ROM, videoconferencing, podcast
<i>Delivery route</i>	Audio, text, picture, experiential
Materials (What were the physical or virtual materials that the intervention consisted of?) [TIDieR: WHAT]*	
<i>Participants' materials</i>	Leaflet, booklet, book, webpage, app, device (e.g., pedometer), certificate, money, voucher
<i>Providers' materials</i>	Session manual; pop-up reminders, self-monitoring sheets
<i>Intervention materials</i>	Eligibility forms, questionnaires, sign in forms
Setting (Where is the intervention being delivered?) [TIDieR: WHERE] *	
<i>Location</i>	Primary care, hospital, community venue, university, participants' home
<i>Venue</i>	Consultation room, lecture theatre, research laboratory
Intensity (What is the intensity with which the intervention is being delivered?) [TIDieR: WHEN and HOW MUCH]*	
<i>Duration of intervention</i>	1 hr, 1 month, 12 months
<i>Number of contacts</i>	1 contact; 26 contacts; 365 contacts
<i>Length of contacts</i>	1 min, 1 hr, 90 min
<i>Frequency</i>	Daily, weekly, monthly
<i>Spacing</i>	Constant, variable, frequent to less frequent
<i>BCT sequencing</i>	Fixed order, theoretical clusters, variable order
<i>Contact form</i>	Scheduled, random, proactive, reactive
Tailoring (Does the intervention delivery differ between participants?) [TIDieR: TAILORING]*	
<i>Intervention variation</i>	One size for all, Personalized, titrated or adapted
<i>Tailoring source</i>	Self-tailored, theory tailored, practitioner tailors
<i>Standardization</i>	Automated, semi-automated, personal

Continued

Table 1. (Continued)

Delivery elements	
Delivery features	Examples
Style (What was the overall style of the intervention?) [TIDieR: Not included]*	
Delivery style	Asset-based, patient-centred, authoritarian
Communication style	Patient led, practitioner led, narrative
Communication techniques	Listening, questioning, reflecting, pauses
Visual style	Logo, branding, colour scheme
Complexity	Reading level, layout, depth of information

*Mapping of the form of delivery elements to Hoffman *et al.*'s TIDieR checklist.

element for effectiveness. A self-regulation theory-based intervention to support weight loss maintenance found that an intervention identical in content was more effective when the mode of delivery was face to face compared with Internet delivery (Wing, Tate, Gorin, Raynor, & Fava, 2006). This might be due to the so-called therapist effect documented in clinical psychology, whereby marked variation in therapy effectiveness is explained by therapist variables, as opposed to the therapy content (Wiborg, Knoop, Wensing, & Bleijenberg, 2012). In face-to-face interventions, the ability to establish rapport, engage, empathize, and demonstrate good interview skills are well recognized as powerful determinants of outcome (Frankel & Sherman, 2014) and are related to the FoD element of intervention style. Although the FoD is crucial to inform the development of interventions, delivery elements are seldom studied in their own right. More evidence on the most effective FoD for BCTs is needed, especially for techniques that have accumulated a favourable evidence base.

3. Form of delivery can influence intervention engagement, adherence, and fidelity.

Interventions are only effective if people engage with them, including uptake, adoption, and use of intervention content. Additionally, a health service might only be willing to implement an intervention that is delivered in a manner seen as acceptable to service commissioners, staff, and patients. The FoD may also be important in the context of health inequalities if it disproportionately affects those from deprived backgrounds (e.g., some mHealth interventions may exclude those who cannot afford a mobile phone), thereby increasing intervention generated inequalities (White, Adams, & Heywood, 2009). If the FoD prevents engagement, then this will often impact on effectiveness. Burke *et al.* (2012) found that adherence to dietary self-monitoring was higher in a group that received a PDA compared to paper-based delivery (Burke *et al.*, 2012), suggesting that the materials offered as part of BCTs can influence engagement. Post-partum weight management interventions often struggle to engage women in group sessions, even when offering sessions multiple times per week and at various times of day (Ostbye *et al.*, 2009), suggesting that an alternative remote-based mode of delivery may be more feasible and successful during the busy period of new parenthood.

4. Form of delivery can determine how users understand intervention content.

Health outcomes are dependent on a range of different types of literacy: verbal literacy (Dewalt, Berkman, Sheridan, Lohr, & Pignone, 2004), health literacy (Easton, Entwistle, & Williams, 2010), visual literacy (Avgerinou & Ericson, 1997), and e-literacy (Brandtweiner, Donat, & Kerschbaum, 2010), and the FoD element materials and style should take this

into consideration. A simple FoD feature such as the reading level and specificity of information presented within intervention materials can have an impact on comprehension and recall of intervention content (Bradshaw, Ley, & Kinsey, 1975). Moreover, there is evidence to suggest that Western societies are becoming increasingly visually based (Gozzi, 1999) to the degree that concerns about 'visual literacy' alongside verbal and written literacy are being raised. Images are likely to aide intervention understanding and acceptability, especially to young people.

5. Form of delivery influences effectiveness, beyond the BCT.

The effectiveness of a behaviour change intervention might be driven by the FoD rather than the interventions' BCT content. For example, variability in the FoD features of intensity, such as the frequency and duration of intervention delivery, might influence effectiveness through exposure effects (e.g., participants being exposed to intervention content more frequently and/or for longer), engagement effects (e.g., participants might establish a better routine with weekly as opposed to monthly meetings), or sequencing effects (e.g., participants receive intervention components at a more suitable time in the change process). If we attribute the effectiveness of behaviour change interventions entirely to BCTs and theory, then we risk failing to identify important FoD elements, which may be key active ingredients that drive effectiveness. This might be the reason why some interventions, although initially successful, have been found to be less successful when the FoD has been changed (Williams, Michie, Dale, Stallard, & French, 2015). Changing the FoD of effective behaviour change interventions to deliver these more simply at lower costs has been referred to as 'health psychology homoeopathy' (O'Carroll, 2014).

6. Form of delivery may be crucial for implementation and sustainability.

FoD might be important for long-term effects of behaviour change interventions and determine future intervention scalability beyond the initial research study. If the aim of an intervention is widespread implementation once effectiveness is established, then it needs to be designed from the outset with a sustainable FoD (Loudon *et al.*, 2015). Although intervention studies may have different primary aims such as advancing theoretical understanding or establishing effectiveness under ideal conditions, many of the interventions we develop in health psychology are intended for widespread implementation in 'the real world'. Selecting an appropriate FoD might increase the chances for our intervention to have a population impact.

Towards a framework of form of delivery

In this editorial, we propose an initial definition of FoD, a framework in line with the definition (Table 1) and underline the importance of FoD in the design and testing of behaviour change interventions. However, this clearly requires further work. For instance, selecting mobile phone as the delivery channel leads to a multitude of additional features that will require decisions (cf. Danaher, Brendryen, Seeley, Tyler, & Woolley, 2015), which may all impact on intervention effectiveness.

Although interventions invariably use a FoD these are often not approached in an evidence- or theory-based manner. FoD can provide opportunities and choices for intervention operationalization, which drives intervention effectiveness. An important distinction is made in intervention mapping between a change method and a practical application with parameters of effectiveness (Kok *et al.*, 2015). More work is needed to theorize and explore how to systematically integrate BCTs and the various FoD elements and features within the intervention development process. Finding the best FoD requires

an in-depth understanding of users and their context, and the complex interactions these will have with the intervention components (Yardley, Morrison, Bradbury, & Muller, 2015). Different methodologies including mixed method approaches will play an important part in establishing and improving how BCTs and FoD are integrated most sensitively and appropriately (Yardley & Bishop, 2015). Often, the intervention development process will benefit from the expertise of other disciplines such as marketing, design, and information technologists as well as codesign with end-users to arrive at the most suitable and effective FoD.

Conclusion

Health Psychology has largely ignored the systematic study of FoD as an 'active ingredient' of behaviour change interventions. We think the time has come to change this.

Conflict of interest

All authors declare no conflict of interest.

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