Original Article

Promoting positive attitudes to breastfeeding: the development and evaluation of a theory-based intervention with school children involving a cluster randomised controlled trial

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Abstract

The objective of this study was to design, implement and evaluate an intervention based on the theory of planned behaviour (TPB) to enhance young peoples' motivations to breastfeed/support a partner to breastfeed. Six semi-structured focus groups were first conducted with 48 13–14-year-olds from two schools in Northern Ireland. The salient beliefs elicited were subsequently used to design a TPB-based questionnaire that was then administered to 2021 13–14-year-old pupils (852 males; 1169 females) from 36 post-primary schools to identify the most important determinants of breastfeeding. The results were used to inform the design and implementation of an intervention package that was subsequently evaluated using a cluster randomised controlled trial involving 44 randomly selected schools across Northern Ireland. Questionnaires were administered to 18 intervention and 26 control schools at baseline and again at 1 and 6 months post-intervention to evaluate its effectiveness. Multi-level modelling was employed to analyse the data. The results revealed significant effects on women's intention to breastfeed, $\beta = 0.208$, $t(1275) = 2.715$, $P = 0.007$; attitudes, $\beta = 0.223$, $t(1275) = 4.655$, $P < 0.001$; moral attitudes, $\beta = 0.231$, $t(1275) = 4.211$, $P < 0.001$; subjective norm, $\beta = 0.118$, $t(1275) = 2.521$, $P = 0.012$; and knowledge, $\beta = 0.109$, d.f. (1275) = 7.843, $P < 0.001$. However, for men, the results revealed significant effects on only the construct of knowledge, $\beta = 0.104$, $t(541) = 4.345$, $P < 0.001$. The research has provided evidence to support the need for breastfeeding education in schools and has shown how a theoretical framework may be used to inform the design and evaluation of a health behaviour intervention.

Keywords: theory of planned behaviour, breastfeeding, health intervention.

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Introduction

Breastfeeding continues to be an important public health issue not only because of the recognised health benefits for both mother and child (see, e.g. Heinig & Dewey 1996, 1997) but also because it contributes to reducing health inequalities (DHSSPS 2012). For example, research has shown that breastfed children from low socio-economic groups have better health outcomes than formula-fed children from more affluent households (Forsyth 2004). As a result,

breastfeeding continues to be promoted internationally as the preferred method of infant feeding (World Health Organization/UNICEF 2003, 2013). Indeed, there is widespread support for the promotion of breastfeeding in numerous research and policy documents. However, breastfeeding initiation and continuation rates in the United Kingdom and many parts of Western Europe are low relative to other countries (Dyson *et al.* 2005). While UK figures have increased significantly in recent years with 81% reporting to have initiated breastfeeding in 2010, rates

in Northern Ireland remain comparatively low. For example, only 64% of women in Northern Ireland initiated breastfeeding during 2010 compared with 83% in England, 74% in Scotland and 71% in Wales (NHS Information Centre 2011). Moreover, these figures have remained relatively constant despite significant improvements in Northern Ireland prior to 2005 (Bolling 2006) with the result that bottle-feeding continues to be the norm (DHSSPS 2012).

Given the above, numerous interventions have been designed to promote the initiation and continuation of breastfeeding (see McMillan *et al.* 2009). A systematic review of the effectiveness of interventions was conducted by Fairbank *et al.* (2000) who concluded that three types of intervention appeared to be particularly successful. Specifically, health education initiatives and peer support programmes delivered during the antenatal period had some effect together with intervention packages and structural changes in hospital practices. While the findings of more recent interventions support these general conclusions (e.g. McInnes & Stone 2001; Kang *et al.* 2005), it is acknowledged that the limited effectiveness of some interventions may in part be explained by the absence of a theoretical framework. Moreover, while some studies have been informed by the significant influence of certain theoretical constructs (e.g. Noel-Weiss *et al.* 2006), many appear to ignore the research in which important predictors of breastfeeding initiation have been identified. This would seem to be important given the findings reported elsewhere (e.g. Sutton 2010), which suggest that psychological theories in particular have much to offer in terms of informing the design and delivery of health behaviour interventions.

One framework thought to be particularly effective in the context of health psychology is the theory of

planned behaviour (TPB; Ajzen 1985). This theory has been used extensively to predict and explain behaviour and is being used increasingly to provide a framework for developing behavioural change interventions (Hardeman *et al.* 2002). While few studies have used theory to inform the design, implementation and evaluation of breastfeeding interventions (McMillan *et al.* 2009), there is much research evidence to suggest that the TPB variables do have an important role to play in predicting breastfeeding behaviour. Indeed, the theory has been successfully applied to breastfeeding in a number of studies (e.g. Wambach 1997; Avery *et al.* 1998; Duckett *et al.* 1998; Dodgson *et al.* 2003; Rempel 2004; Giles *et al.* 2007; McMillan *et al.* 2008; Dyson *et al.* 2010), and support has been provided for the significant influence of all three components of the model. Perhaps more importantly, there is some evidence to suggest that some of the most salient beliefs surrounding breastfeeding may be used to differentiate between those intending to breastfeed and those who don't, which could provide useful information in terms of designing a breastfeeding intervention (McMillan *et al.* 2009).

While most interventions have focused on pregnant women, evidence is now accumulating to suggest that the school system has an important role to play in the context of health promotion, and breastfeeding initiation could be enhanced if young people (both male and female) were exposed to the idea that breastfeeding is normal, natural and beneficial (Health Promotion Agency 2006). Recently, these sentiments have been echoed in several policy documents. For example, the World Health Organization/UNICEF *Global Strategy for Infant and Young Child Feeding* (2003) recommends that education authorities should provide accurate information through schools and other educational channels. Also, the

Key messages

- School-based interventions can have some success in enhancing young peoples' motivations to breastfeed. However, further research is needed to see if the effects can be maintained across time.
- It is appropriate to target males as well as females but separate interventions may be required.
- The theory of planned behaviour can be used effectively to inform the design, implementation and evaluation of health behaviour interventions and has proved to be a useful tool in promoting positive attitudes to breastfeeding.

UNICEF UK Baby Friendly Initiative in their document *Towards National, Regional and Local Strategies for Breastfeeding* stressed that ‘access to impartial information is essential for informed decision making’ and emphasise the need for future parents to receive ‘accurate, unbiased information as part of their school education’ (Health Promotion Agency 2006). However, while some education programmes have been developed (Health Promotion Agency 2006), most attempts to provide breastfeeding education in schools have been rather fragmented and have lacked a coordinated and theoretical focus (Dykes & Griffiths 1998).

With this in mind, the overriding aim of this research programme was to design, implement and evaluate an intervention guided by the TPB to promote positive attitudes to breastfeeding and to enhance young peoples’ motivations to breastfeed and/or support a partner to breastfeed. When using the TPB in this context, it is recommended that one follows a series of steps (Sutton 2002, 2010; see also Fishbein & Middlestadt 1989). The objectives of this research programme have therefore been to (1) conduct an elicitation study to identify the factors influencing young peoples’ motivations to breastfeed; (2) construct a TPB-based questionnaire based on the beliefs elicited from the elicitation study; (3) administer the questionnaire to a representative sample of young people to identify the most important determinants of breastfeeding; (4) design a breastfeeding intervention aimed at increasing young people’s motivations to breastfeed/encourage their future partner to breastfeed; (5) test the breastfeeding intervention with a cohort of 13–14-year-old school children; and (6) evaluate the programme, exploring key changes in social cognition variables such as attitude, confidence and motivation to breastfeed. While the elements of this process have been reported elsewhere (cf. Giles *et al.* 2007, 2010, 2013), it is hoped that a description of the complete process required for a behavioural change programme of this nature, together with the additional focus on males, will not only provide further evidence to support the value of school-based interventions but more importantly will be of use to other researchers interested in using theory to inform the design and evaluation of health behaviour interventions.

Method

Consistent with the advice of Ajzen (2013), this programme of research was conducted in three phases: (1) an elicitation study involving a series of focus groups; (2) a TPB-based questionnaire survey; and (3) a behavioural change intervention designed to enhance young people’s intentions to breastfeed/support a partner to breastfeed based on a cluster randomised controlled trial (RCT).

Phase 1: elicitation study

Aim

The aim of this phase of the research process was to identify young peoples’ salient beliefs in relation to breastfeeding with a view to informing the design of a questionnaire that would subsequently assess the relative importance of the most significant determinants of this behaviour.

To achieve this aim, it was necessary to first identify the target behaviour and target population. The population and behaviour of interest were first defined according to the TACT (Target, Action, Context and Time) principle (Ajzen & Fishbein 1980). In light of the research evidence to suggest that interventions should be directed towards young adolescents (because this is an impressionable age during which they can be persuaded to think and act differently; Goulet *et al.* 2003; see also Greene *et al.* 2003), the practicalities of conducting research in educational settings (e.g. in terms of the restraints imposed by the national curriculum for examinations and assessment) and the cultural issues associated with research of this nature, early adolescence was deemed the most appropriate time to intervene.

Given that the views of others and in particular the father have been identified as having a significant influence on the infant feeding decisions of mothers (e.g. Khassawneh *et al.* 2006; Swanson & Power 2005; Tarrant & Kearney 2008), the focus here was on males as well as females. However, given the distal nature of the behaviour, a scenario was created for each gender. Specifically, females were asked to consider the possibility that they would have a baby at some time in the future and then indicate the extent to which it was

likely they would breastfeed. Males, however, were asked to indicate the extent to which they would encourage a partner to breastfeed.

Participants and procedure

Six semi-structured focus groups were conducted with 48,13–14-year-olds from two schools in Northern Ireland (Giles *et al.* 2007). Within each school, three groups of between six and eight people were selected: one group comprised only males, one group comprised only females and one group comprised both males and females. A series of nine questions was used to structure the focus group sessions (Francis *et al.* 2004; see Table 1). All focus groups were conducted by an experienced facilitator, were audio taped and transcribed verbatim.

Results

Data were analysed with a view to identifying the belief-based measures of attitude, subjective norm and perceived behavioural control and was conducted according to the guidelines of Francis *et al.* (2004). This involved organising the responses into themes (attitudinal beliefs, normative beliefs and control beliefs) and listing them in order of frequency.

In relation to attitude, most young people had quite positive attitudes to breastfeeding and some were motivated to consider it in the future (Giles *et al.* 2007). Particular attention was focused on the normal and natural aspects of breastfeeding and also on the issue of embarrassment. Social support also appeared to have a significant influence on one's motivation to breastfeed/support a partner to breastfeed. In other words, young people seemed more likely to consider it as an option if their parents, partners and friends were in support of the behaviour. In terms of control beliefs, respondents again made reference to the importance of a strong social support network and the issue of embarrassment, but also acknowledged that the mother's health following child birth, pain and tiredness would also be limiting factors. Knowledge of breastfeeding was also somewhat limited. While the majority seemed aware that breast and bottled milk are not the same and breastfeeding can enhance the

Table 1. Questions informing focus group study

Focus group interview schedule
<p>Introduction:</p> <p>The topic of our discussion today is breastfeeding. We would like you to imagine that you will have a baby at some time in the future and then consider the likelihood that you will breastfeed or encourage a partner to breastfeed and to explore with each other the pros and cons of engaging in this behaviour. So: Do you think you would consider breastfeeding or encourage a partner to breastfeed if you do ever have a baby?</p> <p>To elicit attitudinal beliefs:</p> <p>What do you consider are the possible advantages of breastfeeding?</p> <p>What do you consider are the possible disadvantages of breastfeeding?</p> <p>Is there anything else that you would associate with breastfeeding?</p> <p>To elicit normative beliefs:</p> <p>Are there any groups or people that would approve of you breastfeeding/encouraging a partner to breastfeed?</p> <p>Are there any groups or people that would disapprove of you breastfeeding/encouraging a partner to breastfeed?</p> <p>Are there any other groups or people that come to mind when you think about breastfeeding/encouraging a partner to breastfeed?</p> <p>To elicit control beliefs:</p> <p>What factors do you think might encourage you to breastfeed?</p> <p>What factors do you think might prevent you from breastfeeding?</p> <p>Are there any other factors that come to mind when you think about breastfeeding or encouraging a partner to breastfeed?</p> <p>To elicit additional information:</p> <p>Do you know if you were breastfed yourselves as children?</p> <p>Have you ever seen anyone breastfeeding a child? If so, who was this person and where did you see it happen?</p> <p>What do you think about women breastfeeding in public places?</p> <p>What do you think about bottle-feeding? What are the advantages/disadvantages of bottle-feeding? How does this compare with breastfeeding?</p> <p>Would anyone like to add anything else?</p>

bonding process, most seemed unaware of the health benefits to both mother and child.

Each set of beliefs elicited was converted into a statement for use in the questionnaire survey; the results of which are displayed in Table 2. Two members of the research team were involved in this process to increase the validity of the analysis.

Phase 2: questionnaire survey

Aim

The aim of this phase of the research process was to administer a TPB-based questionnaire based on the

Table 2. Salient beliefs elicited about breastfeeding

Attitudinal beliefs
Bonding with one's baby
Providing health benefits for one's baby
A convenient method of infant feeding
Regaining one's figure
Helping to prevent breast cancer
Saving money
A natural method of infant feeding
A time-consuming method of infant feeding
A feeling of embarrassment
Limiting social activity
Excluding the involvement of other people
An uncomfortable and painful method of infant feeding
Normative beliefs
My mum
My family
My partner
My close friends
The medical profession (doctors and nurses)
Control beliefs
The support of others
Having more knowledge about infant feeding
The intolerance of others to breastfeeding in public places
The embarrassment
The physical problems
The lack of public breastfeeding facilities
Having to do all the feeding myself
The tiredness I think I would experience/my partner would experience
The change in the shape of my breasts/my partner's breasts

beliefs elicited from the elicitation study to a representative sample of young people to identify the most important determinants of breastfeeding, which, in turn, could be used to design a behavioural intervention that would promote this behaviour.

Participants and procedure

The questionnaire was first piloted on 121 13–14-year-old school children (60 males; 61 females), with a view to identifying issues regarding content, layout and the operationalisation of variables (Giles *et al.* 2007). It was then administered to 2021 13–14-year-old pupils (852 males; 1169 females) from 36 post-primary schools in Northern Ireland. These schools had been selected at random from a list of all post-primary schools in Northern Ireland that had been sorted by a number of key stratification variables (e.g. secondary vs. grammar, co-educational vs. single sex) (Giles *et al.*

2010). The information elicited from the focus groups was used to inform the design of the questionnaire that was again administered by a member of the research team in the context of the school environment. However, because the aim of this research programme was to predict and explain behaviour with a view to informing the design of a behavioural intervention, both direct and belief-based measures of the various constructs were assessed (see Ajzen 2013).

The questionnaire

In terms of layout, the questionnaire comprised five sections related to (1) demographics; (2) previous experience; (3) acceptance of breastfeeding; (4) the prediction and explanation of breastfeeding using direct and belief-based measures of the TPB constructs; and (5) knowledge (see Table 3; see also Giles *et al.* 2010).

Results

Results were analysed using correlation and regression (SPSS version 17, SPSS, Chicago, IL, USA). In terms of prediction, the model was able to account for 73% of the variance in intention for females [$F(9, 1154) = 339.08, P < 0.001$] and 71% of the variance for males [$F(9, 824) = 227.82, P < 0.001$]. Of particular interest was the finding that for both males and females, the TPB constructs, notably attitudes to breastfeeding (F: $\beta = 0.34$; M: $\beta = 0.35$), subjective norm (F: $\beta = 0.36$; M: $\beta = 0.35$) and self-efficacy (F: $\beta = 0.19$; M: $\beta = 0.19$) together with the variables 'having been breastfed as a child' (F: $\beta = 0.14$; M: $\beta = 0.11$) and 'knowledge' (F: $\beta = 0.35$; M: $\beta = 0.25$) contributed significantly to the prediction of intention. These findings, together with the associated mean scores (which all left room for improvement), served to identify the variables to target for the intervention. Further analysis of the underlying beliefs highlighted the significant influence of one's significant others. Indeed, the importance attributed to the influence of one's mother (F: $\beta = 0.38$, M: $\beta = 0.18$, $P < 0.001$), medical professionals (F: $\beta = 0.14$, M: $\beta = 0.21$, $P < 0.001$), one's partner for females ($\beta = 0.12$, $P < 0.001$) and family and friends (F:

Table 3. Questionnaire items

Construct	Number of items	Sample items
Intention	3	I intend (will try/have decided) to breastfeed if I ever have a baby: extremely likely (7)/extremely unlikely (1); strongly agree (7)/strongly disagree (1). (Cronbach's $\alpha = 0.92$ females/0.80 males).
Attitude	3	Direct 'feeling-based' attitude*: Breastfeeding a baby would be: extremely pleasant; positive; enjoyable (7)/extremely unpleasant; negative; unenjoyable (1) (Cronbach's $\alpha = 0.92$ females/0.94 males).
	3	Direct 'moral-based' attitude: Breastfeeding a baby would be: extremely good; wise; right (7)/extremely bad; foolish; wrong (1) (Cronbach's $\alpha = 0.91$ females/0.90 males).
	12	Indirect 'belief-based' attitude: Twelve outcome evaluations (see Table 2), e.g. 'a feeling of embarrassment': extremely bad (−3) to extremely good (+3) multiplied by the corresponding behavioural belief, e.g. 'my breastfeeding my baby would cause me to feel embarrassed': extremely likely (7) to extremely unlikely (1).
Subjective norm	3	Direct subjective norm: Most people who are important to me think I should (would approve/would want me to) breastfeed if I ever have a baby: extremely likely (7) to extremely unlikely (1). (Cronbach's $\alpha = 0.83$ females/0.77 males).
	5	Indirect subjective norm: Five normative beliefs (see Table 2), e.g. 'my mum thinks I should breastfeed': extremely unlikely (−3) to extremely likely (+3) multiplied by the corresponding motivation to comply, e.g. 'generally speaking I want to do what my mum thinks I should do: extremely likely (7) to extremely unlikely (1).
Perceived behavioural control	3	Direct perceived behavioural control*: Whether or not I breastfeed if I ever have a baby is entirely up to me: strongly agree (7) to strongly disagree (1); How much personal control do you feel you have over breastfeeding a baby?: complete control (7) to no control (1); How much do you feel that breastfeeding is beyond your control?: not at all (1) to very much (7). (Cronbach's $\alpha = 0.46$ females/0.37 males).
	9	Indirect perceived behavioural control: Nine control beliefs (see Table 2), e.g. 'having the support of others would encourage me to breastfeed': extremely likely (7) to extremely unlikely (1).
Self-efficacy	3	Direct self-efficacy: I believe I have the ability/am capable/am confident that I will be able to breastfeed if I ever have a baby: definitely do (7) to do not (1)/capable (7) to not at all (1)/confident (7) to not at all (1). (Cronbach's $\alpha = 0.77$ females/0.68 males).
Knowledge	14	Babies who are bottle-fed have more illnesses than babies who are breastfed; small breasts will not produce enough milk; women who breastfeed should avoid certain foods: yes/no/don't know.
Demographics and previous exposure to breastfeeding	18	Were you breastfed as a child?: yes/no/don't know; Have you ever seen a mother breastfeeding? yes/no. If yes, who was this person? relative/friend/other. Breastfeeding is socially acceptable; I would be embarrassed by the sight of a mother breastfeeding: strongly agree (5) to strongly disagree (1).

Note: *At a direct level, two versions of attitude were employed on the basis that there is some evidence to suggest a distinction should be made between the affective and cognitive component of an attitude (see, e.g. Breckler & Wiggins 1989). †Consistent with some previous research, separate measures of perceived behavioural control and self-efficacy were employed (see Armitage & Conner 2001).

$\beta = 0.11$, $P < 0.05$; M: $\beta = 0.13$, $P < 0.001$) not only corroborated previous research, which has reported that the mother or infant's father (Robinson *et al.* 1993; Hoddinott & Pill 1999; Swanson & Power 2005), family members and friends (Dix 1991; Fitzpatrick *et al.* 1994; Stewart-Knox *et al.* 2003), and partners (Giugliani *et al.* 1994) are all influential but implied a need to provide information about other's approval and the support and encouragement they can provide

in the design of the intervention. Findings also highlighted the need to emphasise the natural aspect of breastfeeding (F: $\beta = 0.38$, M: $\beta = 0.37$, $P < 0.001$), the convenience (F: $\beta = 0.18$, M: $\beta = 0.13$, $P < 0.001$), and the bonding process (F: $\beta = 0.10$, $P < 0.01$; M: $\beta = 0.10$, $P < 0.05$) and to provide information about the potential health benefits for both mother and child (F: $\beta = 0.09$, $P < 0.01$). The potential for embarrassment was also highlighted as a possible focus for the inter-

vention (F: $\beta = 0.15$, $P < 0.001$), as was the need to enhance knowledge (F: $\beta = 0.35$, M: $\beta = 0.31$, $P < 0.001$).

Overall, the results not only supported the usefulness of the TPB as a tool for predicting young people's motivations to breastfeed but also served to identify possible targets for an intervention. Specifically, findings highlighted the constructs of attitude, subjective norm and self-efficacy. Moreover, the significance attributed to having been breastfed as a child highlighted the importance of experience and/or exposure and strengthened the need for an intervention that promotes attitude change by exposing both boys and girls to breastfeeding role models and focuses on the normal, natural and beneficial aspects of breastfeeding, in addition to enhancing knowledge.

Phase 3: behavioural change intervention

Aim

The aim of this phase of the research process was to design, implement and evaluate an intervention guided by the TPB to enhance young people's motivations to breastfeed and/or support a partner to breastfeed.

Cluster design and randomisation

As the intervention was to be delivered to groups of school children, rather than individuals, a cluster RCT design was used. The main consideration of a cluster design is that the outcome for each participant cannot be assumed to be independent as participants within a cluster are likely to have similar outcomes (Medical Research Council 2002). The individuals within a cluster may interact with and influence each other (Wears 2002), and it is easy to see where this could be the case in classes of school children. Subversion bias was avoided by allocating clusters carefully and independently (Puffer *et al.* 2003). The database was sent to the York Clinical Trials Unit that carried out independent allocation of the schools to either a control group or an intervention group. Due to time and financial constraints, the proportion allocated to the intervention condition was 0.4 using minimisation software MINIM (Evans *et al.* 2010).

Baseline characteristics used in the minimisation strategy were education and library board area, type of school (secondary or grammar) and gender of school (mixed sex, single sex girl, single sex boy). The aim of minimisation was to balance the groups with respect to baseline factors and also to increase statistical power as stratifying factors are strong predictors of outcome (Medical Research Council 2002; Torgerson & Torgerson 2007). Allocation of schools to the groups occurred after all schools were recruited to the study, and teachers and pupils were not blinded to allocation. Ethical approval was obtained from the university's research ethical committee. Initial consent for the study was elicited from the head teacher of each participating school as the 'gate-keeper' of the cluster. Written consent was obtained from parents, pupils and teachers involved in the study.

Sample size and power calculation

It was acknowledged that increasing the number of clusters offers more increase in power than increasing the number of individuals. Therefore, a decision was taken to contact all post-primary schools in Northern Ireland requesting them to take part in the study. It was initially hoped to achieve a sample of 30 schools, which would consist of approximately 750 pupils across the two conditions. A meta-analysis by Lipsey & Wilson (1993) stated that most educational interventions generate an effect size of 0.3, while a meta-analysis of educational interventions by Torgerson *et al.* (2003) indicated an effect size of 0.88, with the lower confidence interval at 0.5. Looking at a cluster trial of sex education in schools, the authors also reported an intra-class correlation (ICC) of 0.05. Based on an ICC of 0.05, minimum detectable effect size (MDES) was estimated for males and females separately prior to data collection using Bloom *et al.*'s (2007) method. The MDES is the smallest effect that the study design is able to detect at 80% power ($P < 0.05$, two tailed), while assuming that the proportion allocation to the intervention was 0.4, the number of female schools was 42, the number of male schools was 32 and the number of pupils within each school/cluster was 25.

For females, the MDES was 0.252 and for males it was 0.289, both of which are below the lower confidence limit of 0.5 for effect sizes reported in Torgerson *et al.*'s (2003) meta-analytic review. This indicates that the design of the study was satisfactory.

Recruitment

All 228 post-primary schools in Northern Ireland were contacted by letter to inform them about the study objectives and to invite them to take part. Fifty schools initially agreed to participate, a response rate of 22%. Schools that agreed to participate were entered into a database containing information for sampling purposes such as geographical location, management type and gender composition. One year 10 class from each school in the intervention and the control conditions was sampled at random. Four schools subsequently withdrew due to time constraints and related issues. Attrition bias was therefore 8%, leaving the total number of participating schools as 46, 18 in the intervention group and 28 in the control group (see Fig. 1). Schools allocated to the intervention group received one 35-min educational session delivered by a member of the research team, as part of the year 10 home economics education curriculum. Control schools continued to receive the standard home economics curriculum without the additional input.

Design and content of the intervention

The intervention was initially developed by the Health Promotion Agency (Northern Ireland) having been informed by existing resources and pilot projects, consultations with health promotion and educational practitioners, and had already undergone some preliminary testing in schools (Health Promotion Agency 2008). However, adaptations were made to make it more relevant to the aims of this study and in particular to target those variables identified as significant predictors of breastfeeding intention following the attitude survey (Giles *et al.* 2007). For example, given the importance attributed to the role of one's significant others, information was provided

on the ways in which fathers, family and the wider social circle can be involved in breastfeeding and numerous visual images were used to highlight this. Further, given the importance attributed to attitude, information was provided on the potential consequences of breastfeeding in terms of the health benefits to both mother and child. The resulting intervention comprised two 35-min classroom sessions and relied primarily on persuasive communications delivered on PowerPoint slides (Giles *et al.* 2013; see also Abraham & Michie 2008). The materials were designed to be interactive wherever possible to engage young people and encourage discussion, and used cartoons and pictures. The sessions also included a video promoting breastfeeding, a couple of short quizzes and two radio advertisements designed for the general public that promoted the benefits of breastfeeding.

Pre-testing the intervention

The educational intervention was piloted in six schools to ensure that it was acceptable to teachers and pupils and could be implemented by a member of the research team in a reasonably standardised way across different school types (e.g. secondary and grammar). A few changes were made following the pilot study and before commencement of the full intervention phase of the research. For example, given teachers' concerns regarding time constraints and the overcrowded home economics curriculum, it was agreed to deliver the intervention in a single classroom slot of 60–80 min.

Evaluating the intervention

Two versions of the questionnaire (one for males and one for females) comprising the direct measures of the TPB were administered at baseline and again at 1 and 6 months post-intervention to evaluate the intervention. As such, the primary outcome measure was 'intention to breastfeed/support a partner to breastfeed'. Secondary outcome measures included both affective and instrumental measures of attitude, subjective norm, knowledge, perceived

Fig. 1. Flow of schools in cluster randomised controlled trial. TPB, theory of planned behaviour.

control and self-efficacy. At baseline, schools in the intervention were given an introduction and explanation of the project before they were asked to complete the questionnaire. The intervention was then delivered. Teachers were present during the intervention after which their views were sought on the usefulness, suitability and effectiveness of the educa-

tional materials via a structured questionnaire. The visit to each control school included an introduction and explanation of the project to the teacher and pupils and administration of the baseline questionnaire. All pupils completed questionnaires again in year 10, approximately 4 weeks and 6 months after the intervention was delivered.

Randomisation check

SPSS multiple analysis of variance, with treatment condition (intervention vs. control) as the independent variable and baseline TPB measures as the dependent variables, was used to check that randomisation was successful. There were no significant differences between the intervention conditions at baseline in either females [$F(7, 695) = 0.805, P = 0.583$] or males [$F(7, 381) = 0.533, P = 0.810$]. Randomisation was therefore deemed successful.

Data analysis using multi-level modelling (MLM)

The current data are regarded as hierarchical in that multiple levels exist. More specifically, level 1 units represent repeated measures of total scores of the TPB constructs; level 2 units represent the cases that are, in turn, nested in the level 3 units of the schools. Therefore, to evaluate the intervention while accounting for the clustered nature of the data, MLM was conducted on both the female and the male subsamples separately. These analyses were conducted separately given that the questions varied slightly by sex. For example, females were asked to consider the possibility that they would have a baby at some time in the future and then indicate the extent to which it was likely they would breastfeed. Males, however, were asked to indicate the extent to which they would encourage a partner to breastfeed. Therefore, we also expected the answers/attitudes to vary by sex given the female answers related directly to their own behaviour, whereas the male responses related to the behaviour of another (i.e. encouraging breastfeeding).

Given the nested structure of the data, MLM was implemented over single-level methods such as repeated measures analysis of variance. Indeed, if single-level methods had been implemented, the data would have been either aggregated or disaggregated. For example, in aggregating the data, we would have conducted analyses using mean scores from higher level units. In disaggregating the data, we would have conducted analyses on the level 1 units while disregarding differences between higher level units. These are two common mistakes often seen when analysing

hierarchical data that have the potential of producing untrustworthy, sometimes misleading results. In addition, doing so would have precluded us from analysing cross-level interaction effects (Snijders & Bosker 2012).

To assess whether the analyses needed to truly account for the clustered nature of the data, ICCs were calculated for each of the TPB constructs using the intercept only model. ICCs signify the similarity between single micro-level units within a given single macro-level unit (Snijders & Bosker 2012). ICCs for the female subsample were 0.120 for intention, 0.079 for feeling-based attitudes, 0.081 for moral-based attitudes, 0.060 for self-efficacy, 0.017 for perceived control, 0.090 for subjective norm and 0.170 for knowledge. By comparison, the ICCs for the male subsample were 0.191 for intention, 0.092 for feeling-based attitudes, 0.113 for moral-based attitudes, 0.070 for self-efficacy, 0.005 for perceived control, 0.090 for subjective norm and 0.165 for knowledge. Thus, the analysis needed to take account of the clustered nature of the data. Admittedly, a number of the ICCs are on the high side indicating that the between-group variance is relatively large compared with the within-group variance. Importantly, however, Hodges & Hedberg (2007) noted that ICCs of this magnitude are not uncommon in educational research. Indeed, they reported that on average ICCs in educational research generally fall within 0.10 and 0.25. All of our ICCs are within this range.

MLM was implemented using HLM6 software (Raudenbush *et al.* 2004). The MLM comprised three levels that assessed the effects of treatment condition (control vs. intervention), school type (secondary vs. grammar) and time (baseline, 1-month follow-up and 6-month follow-up) on the TPB constructs of intention to breastfeed, feeling-based attitudes towards breastfeeding, moral-based attitudes towards breastfeeding, perceived control over breastfeeding, self-efficacy regarding breastfeeding, subjective norm and knowledge about breastfeeding. The extent of missing data at the pupil level was small (<5%); thus, it was highly likely that the missing data were missing completely at random (MCAR). Therefore, listwise deletion was implemented, and the analyses were

restricted to only cases with complete data across all three time points. Therefore, the effective school sample in the females subsample comprised 17 intervention and 25 control schools (42 schools in total). The effective school sample in the male subsample comprised 13 intervention and 19 control schools (32 schools in total).

The primary aim was to assess the effects of the intervention. To do so, we included a cross-level interaction between intervention and time within the models. Secondary analyses assessed whether the effectiveness of the intervention differed between secondary and grammar schools. In doing so, we assessed school type (grammar vs. secondary), as well as the two-way interaction between school type and treatment (intervention vs. control).

Results

Note that the results pertaining to the female subsample have been reported in detail in a previous study (cf. Giles *et al.* 2013), and thus for comparative purposes, the results for both males and females will only be summarised herein.

A power analysis conducted on both samples separately concluded that each had power in excess of 0.90 to detect moderate effect sizes ($\delta = 0.40$) in level 1 slopes between treatment and comparison schools and were therefore of sufficient size for the analyses.

In assessing the effects of the intervention across the constructs of the TBP, the results revealed significant effects on females' intention to breastfeed, $\beta = 0.208$, $t(1275) = 2.715$, $P = 0.007$; attitudes, $\beta = 0.223$, $t(1275) = 4.655$, $P < 0.001$; moral attitude, $\beta = 0.231$, $t(1275) = 4.211$, $P < 0.001$; subjective norm, $\beta = 0.118$, $t(1275) = 2.521$, $P = 0.012$; and knowledge, $\beta = 0.109$, d.f. (1275) = 7.843, $P < 0.001$. However, in assessing the effects of the intervention across the constructs of the TBP in the males subsample, the results revealed significant effects on only the construct of knowledge, $\beta = 0.104$, $t(541) = 4.345$, $P < 0.001$.

In assessing treatment effect size, the treatment accounted for a substantial proportion of the variance between schools in knowledge (49.06%), attitudes (23.47%), moral attitudes (19.42%), intentions to

breastfeed (14.85%) and subjective norms (6.68%) in the female sample, and knowledge (37.3%) in the male sample.

In assessing if the intervention might differ between school type (secondary or grammar), we assessed school type, and a two-way interaction between school type and treatment (intervention vs. control). In the female sample, the intervention was found to be equally effective in secondary and grammar schools on increasing intention to breastfeed, attitudes, moral attitudes and subjective norms. However, there was a significantly greater increase in knowledge, $\beta = 0.050$, $t(1273) = 4.900$, $P < 0.001$ in secondary schools compared with grammar schools over time (irrespective of whether the school was an intervention or control school). In the male sample, the intervention was found to be equally effective in secondary and grammar schools in increasing male students' knowledge. Moreover, treatment had significant effects on male students' knowledge in that a significantly greater increase over time in knowledge levels occurred in intervention schools compared with control schools (regardless of whether they were secondary or grammar schools), $\beta = 0.106$, $t(539) = 2.277$, $P = 0.023$.

Discussion

This study has provided evidence to suggest that school-based interventions may have some success in enhancing young peoples' motivations to breastfeed. Indeed, as a result of the intervention, females were significantly more likely to report an intention to breastfeed. This finding would seem to be particularly important given that a woman's stated intention to breastfeed is one of the strongest predictors of breastfeeding initiation and duration (Meedya *et al.* 2010), and prenatal intentions to never initiate or to stop breastfeeding early have been identified as risk factors for all breastfeeding outcomes (DiGirolamo *et al.* 2005). In a longitudinal study of 300 Australian women, Blyth *et al.* (2004) reported that mothers who expressed an intention to breastfeed for 12 months were nearly two and a half times more likely to be breastfeeding at 4 months post-partum compared with those who expressed an initial intention of less

than 6 months (see also Forster *et al.* 2006). The findings reported here are all the more encouraging given the research evidence to suggest that somewhere between 50% and 90% of women make their infant feeding decisions prior to pregnancy (see, e.g. DiGirolamo *et al.* 2005).

This intervention was also successful in terms of promoting positive attitudes in females. This finding would appear to be important in light of the research evidence to suggest that attitude is another significant predictor of breastfeeding (see, e.g. Wambach 1997; Avery *et al.* 1998; Duckett *et al.* 1998; Rempel 2004; Giles *et al.* 2007; McMillan *et al.* 2008). Finding that both moral and feeling-based attitudes were enhanced as a result of the intervention is also encouraging in light of the importance attached to the underlying beliefs at different stages of the research process. Specifically, both the elicitation study and the questionnaire survey suggested that both affective (e.g. a feeling of embarrassment) and instrumental beliefs (e.g. a natural method of infant feeding) are involved in the decision-making process. Finding therefore that females were not only significantly more likely to believe that it is the 'right' thing to do but also that it would make them feel 'good' would suggest that the intervention had successfully overcome some of the negative perceptions (e.g. embarrassment) found to be significantly associated with breastfeeding in previous research (see, e.g. Stewart-Knox *et al.* 2003). These findings would appear to be particularly significant given more recent research evidence to suggest that many UK women have neutral or ambivalent feelings about breastfeeding and support for breastfeeding in public continues to be low (Kavanagh *et al.* 2012; Wilkins *et al.* 2012).

Social support has also been identified as having a significant influence on a woman's intention to breastfeed (Meedya *et al.* 2010). For example, Britton *et al.* (2007) in a review of 34 randomised or quasi-RCT in 14 countries concluded that professional support can influence breastfeeding duration. Moreover, Swanson & Power (2005) report that women who breastfeed often feel more social pressure than those who choose to bottle-feed and note that a mother's immediate support network (e.g. father, maternal

grandmother, friends and health care professionals) can have a significant influence on breastfeeding behaviour. Further, Arora *et al.* (2000) found that the perceived negative attitudes of the father towards breastfeeding influenced mothers' decisions to formula feed. Moreover, interventions with fathers have been found to increase breastfeeding initiation rates leading to calls for males to be more explicitly involved in the process (Earle 2000).

Finding that knowledge increased significantly over time is also important given the research evidence to show that mothers who breastfeed are not only more knowledgeable about the potential health benefits than those who choose to bottle-feed (Shaker *et al.* 2004; see also Susin *et al.* 1999), but increasing parents' knowledge can increase the chances of exclusive breastfeeding (Susin *et al.* 1999). This would seem to be particularly important in the context of males given that fathers have been identified as having a significant influence on the infant feeding decisions of mothers. Rempel (2004), e.g. reported that men's beliefs, including the positive benefits breastfeeding may have for the infant, predicted the strength of their partner's breastfeeding intentions and called for early health education efforts that include males as well as females.

However, perhaps surprisingly, the intervention described here did not significantly impact on the other measured variables for males. Several explanations seem likely. For example, it could be that the intervention did not target sufficiently those aspects that are of most importance and relevance to boys. While the intervention did focus on issues identified as important in previous research and did address the issues identified as significant in the elicitation study, e.g. embarrassment, and did attempt to identify a role for the father in terms of the support they can provide, the specific ways in which mothers might be supported were not addressed. Rempel & Rempel (2011) e.g. describe the type of support that fathers can provide in terms of completing household tasks, providing emotional support and encouragement and helping with childcare. This would seem to be significant in light of previous research that suggests that fathers do require more information (Sheriff & Hall 2011).

Alternatively, it could be that the idea of encouraging a partner to breastfeed is simply too distal to be of any real significance for boys. However, given the wealth of research evidence to suggest that experience and/or exposure to breastfeeding can have a positive impact and the attitudes of the father have been identified as having a significant influence on a mother's decision to breastfeed, it would seem feasible to suggest that a greater emphasis on women breastfeeding in the presence of men would help to modify and alleviate any negative concerns. Henderson *et al.* (2011) e.g. provided evidence to suggest that males without direct experience of breastfeeding believed it would involve excessive public exposure and would attract unwanted males' attention. As such, breastfeeding was perceived as natural but problematic, whereas formula feeding was considered as convenient and safe. Although it might not be feasible to introduce breastfeeding mothers to the school curriculum (e.g. La Leche League Leaders), these findings do suggest that a separate intervention may be required for males that exposes them more directly to the art of breastfeeding and focuses more explicitly on their role and the support they can provide (see Rempel & Rempel 2011).

Limitations

The differential impact of the intervention on males and females does call into question the mode of delivery. Given the often reported gender differences in learning and communication styles (see, e.g. Grossman & Grossman 1994), it could be that the traditional mode of delivery employed in the present context suited females more than males. Unfortunately, while the TPB does provide a useful framework for informing the design of the intervention and the outcome measures and the behavioural taxonomy provided by Abraham & Michie (2008) is useful in terms of helping to describe how constructs/beliefs will be changed by the content of the intervention, there is insufficient research evidence to suggest which framework and/or method of delivery works best (Ogden 2012). In other words, the theory helps to identify which beliefs should be targeted during the

intervention but does not suggest how these might be changed. The approach employed here was broadly based on persuasive communication. However, given the lack of available research evidence, we have no way of telling whether the impact of our intervention would have been greater if we had employed an alternative framework. Hardeman *et al.* (2005) present a causal modelling approach in which they have identified a range of techniques to support behavioural change including persuasive messages, goal setting, self-monitoring and reinforcement. Sutton (2002) suggests that 'guided-mastery experience' or 'the elaboration likelihood model' (Petty & Cacioppo 1986) might also provide useful frameworks, but the research here is still in its infancy. Also in terms of methods, the intervention employed here was based primarily on PowerPoint slides. Other studies have used a range of methods including leaflets, videos, lectures and discussions. While the nature of the intervention will to some extent determine which method is most appropriate, there is currently little evidence to guide the decision-making process.

It is also important to note there is always the potential for socially desirable responding in that the adolescents in the current study could have answered questions in the way they think is acceptable to the researchers. Further, the time allotted to deliver the intervention (i.e. 60–80 min) was quite short as was the follow-up period of 6 months. As such, we have no way of telling whether the benefits reported for females will be maintained across time and perhaps more importantly whether the changes observed will impact on actual behaviour. Ideally, the intervention would have been delivered in several sessions across consecutive weeks but this was not feasible given current educational priorities. Moreover, a longer term follow-up was not possible given the age of the sample and the perceived disruption that may have been caused once pupils had embarked on their General Certificate of Secondary Education programmes of study. However, it is certainly the case that a longer term follow-up in subsequent years would be beneficial.

On a final note, the Consolidated Standards of Reporting Trials (CONSORT) guidelines state that the statistical analysis in RCTs should incorporate the

'intention-to-treat' (ITT) principle in order to reduce the possibility of producing biased results due to participant non-compliance or missing data due to study dropout (Moher *et al.* 2001). As already noted, four of the schools agreeing to take part in the study subsequently refused after the allocations had been made. Because these schools provided no baseline or end-point data, it was not possible to include these schools in an ITT analysis. There was no dropout among schools that provided baseline data but some attrition at the pupil level. Only those pupils who provided complete data at all three time points were included in the multi-level analysis. The authors acknowledge this as a potential weakness in the analysis. However, to reiterate our earlier point, the level of missing data at the pupil level was <5%; therefore, it is highly likely that the data are not only missing at random (MAR) but also potentially MCAR. Listwise deletion of cases without complete data across all three time points would have a minimal biasing effect on the results if the data were MAR and no biasing effect if the data were MCAR. Furthermore, it is likely that missing responses after baseline were due to routine absences from school on the days of data collection and so the reason for missingness can be attributable to factors unrelated to the nature of the study.

Conclusion

In spite of the limitations, this study has a number of key strengths. Few studies to date have developed and tested breastfeeding interventions based on a sound theoretical framework. The TPB has proved to be a useful framework on which to base the intervention, and as such, the findings reported here support the use of the TPB as a tool to help design other health behaviour interventions. Further, despite the call by many authors for breastfeeding education in schools, little research had been carried out to date to address this gap. The study was large scale, and although limited to one country, few studies internationally have included both males and females in their intervention. It also included pupils from schools of different management types from different geographical locations across the social divide and as such, the

findings can be generalised to other school populations at least within the United Kingdom. However, further research is needed to replicate this study in other age groups and in other countries, and it would be particularly useful to see if the benefits for females were maintained across time.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Contributions

MG and CM were responsible for the conception of the research idea. MG, SM, CM, BS-K and JM contributed to the study design and management of the research process. CA was responsible for the analysis and interpretation of data. All authors were involved in drafting the paper, critically reviewing the manuscript and approving the final version submitted for publication.

Note on the intervention

The intervention package was distributed by the Health Promotion Agency to post-primary schools throughout Northern Ireland after data collection had been completed.

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