A mixed methods investigation of an online intervention to facilitate student midwives’ engagement in effective conversations about weight-related behaviour change with pregnant women

# ABSTRACT

***Objective.*** (1) To identify whether an online training intervention could increase midwifery students’ knowledge of behaviour change techniques (BCTs) and intentions to use them in practice. (2) To identify students’ views and current experiences of talking to women about weight-related behaviour change.

***Design.*** Mixed methods study involving pre- and post-training assessments, and qualitative interviews with midwifery students.

***Setting.*** Online training course delivered at a University in the North of England, UK.

***Participants***. Midwifery students in the third year of their undergraduate degree during 2015-16.

***Intervention.*** Online training focused on equipping students with knowledge of theoretically-informed BCTs, and the skills to use them opportunistically in existing practice settings.

***Measurements***. Likelihood of discussing obesity with women was assessed via a 12-item, 7-point Likert scale assessing students’ attitudes, subjective norms, perceived behavioural control, and intentions. A 14-item checklist was used to assess BCT knowledge whereby students selected recognised BCTs (of 7 correct, 7 false). Students’ views and experiences of current practice was explored through in-depth, semi-structured one-on-one interviews with a member of the research team.

***Findings.*** Students’ subjective norms, perceived behavioural control, and knowledge of BCTs increased post-training but intention and attitudes did not. Interviews revealed three themes accounting for students experiences and views of behaviour change practice: (1) ‘How training fits with current encounters with maternal obesity in midwifery training’ (2) ‘TEnT PEGS prepares students for practice’, and (3) ‘Value of tailored training’.

***Key conclusions.*** Online BCT training can improve the midwifery students’ confidence, knowledge and beliefs that this is part of their role. They also reported finding the training helpful in better preparing them for this challenging element of their routine practice.

***Implications for practice.*** Online BCT training can be used to prepare undergraduate midwifery students for practice.

# HIGHLIGHTS

* Online training for student midwives increases their knowledge about behaviour change techniques, and their confidence and beliefs about having effective conversations about health behaviour.
* Training did not change participants’ intentions to have or attitudes towards effective conversations about health behaviour, but pre training levels of attitudes and intentions were already high.
* Online training for student midwives is feasible and acceptable. Interviews indicated that student midwives felt this session prepared them for the challenge of having these conversations in practice.

# KEYWORDS

* Lifestyle behaviour change
* Midwifery students
* Communication skills
* Qualitative
* Obesity

# INTRODUCTION

Obesity is an increasing public health concern due to the growing number of people affected. The prevalence of obesity among adults has increased year on year internationally, for example in the UK rising from 14.9% to 25.6% between 1993 and 2014 (Public Health England, 2016). Obesity causes substantial illness burden, increasing the risk of many cancers (Renehan et al, 2008) and disabling conditions such as osteoarthritis, asthma, chronic back pain, type II diabetes and cardiovascular disease (Guh et al., 2009). By 2030 it is estimated that a further 11million UK adults will be obese, contributing up to £2billion per year in health care costs required to treat the associated preventable diseases (Wang et al., 2011). Reducing obesity is therefore a public health priority for the UK government (Department of Health, 2011).

Pre-pregnancy maternal obesity is associated with increased risk of a range of structural fetal abnormalities (Stothard, et al, 2009) as well as pre-eclampsia, and obstetric outcomes such as induced labour, emergency caesarean delivery, stillbirth, post-partum haemorrhage, gestational hypertension and macrosomia (Bhattacharya et al., 2007). Maternal obesity also has ongoing risks for children. A meta-analysis showed that children born to women with pregravid obesity are three times more likely to be obese than those born to normal-weight mothers (Yu et al., 2013) and are less likely to breastfeed (Lyons et al., 2018). Compared to individuals without obese parents, adults with two obese parents are 2.5 times more likely to develop metabolic syndrome and three times more likely to suffer angina or myocardial infarction (Han et al., 2015). Sibling comparison studies in the offspring of bariatric surgery patients, which controls for some familial confounding variables (Smith et al., 2009; Kral et al., 2006), indicates these results are not solely products of shared lifestyle factors.

Even for normal weight or overweight women, excessive weight gain in pregnancy brings additional health risks. Although there are no evidence-based guidelines on recommended pregnancy weight gain in the UK (National Institute for Health and Care Excellence 2010), the US based guidelines (Subcommittee on Nutritional Status and Weight Gain During Pregnancy et al., 1990), and more recently updated gestational weight guidance (Institute of Medicine 2009), are frequently used to estimate optimum pregnancy weight gain.

Gestational weight gain (GWG) above American guidelines (Subcommittee on Nutritional Status and Weight Gain During Pregnancy et al., 1990; Institute of Medicine 2009) increases the risk of caesarean delivery and macrosomia (Asvanarunat, 2015: Goldstein et al 2017), offspring adiposity all the way into adulthood (Oken, et al, 2007; Oken, et al, 2010; Schack-Nielsen, et al, 2009), and post-partum weight retention (Siega-Riz et al., 2009). Excess GWG is often carried into future pregnancies (Greene, et al, 1988; Maddah & Nikooyeh, 2009; Gunderson, et al, 2009), exacerbating the problems associated with maternal obesity described above and exposing the mother and future children to increased risk of personal health problems.

There are important economic arguments why interventions are needed to manage weight needs of pregnant women. The costs of providing pregnancy and obstetric care are 23% higher for overweight women and 37% higher for obese women than for women with normal Body Mass Index (BMI, Morgan et al., 2014). In the UK, this is in the context of obesity contributing to annual costs to the overall economy of £27billion, including £6.1billion in National Health Service (NHS) costs (Public Health England, 2015). Interventions which assist overweight and obese women to achieve a normal BMI, therefore reducing healthcare use to that of normal-weight women are cost-effective at less than £1171.34 per person (Morgan et al., 2014).

Obesity can be reduced through lifestyle changes and adoption of healthy behaviours such as increased physical activity and reduced intake of calorific and fatty foods (Hill & Peters, 1998). Cochrane reviews have shown that healthcare professionals use diet and exercise behaviour interventions to support women to lose weight after pregnancy (Amorim et al, 2013), and prevent excessive weight gain in pregnant women (Muktabhant, et al, 2015), but not during pregnancy (Furber et al 2013). Pregnancy presents a series of ‘teachable moments’, events or circumstances, which create salient health concerns with links to health behaviours. Women are motivated to change behaviour for the benefit of their baby’s health, and benefits from regular presence of health care professionals (Phelan, 2010; Cohen, et al, 2011).

Health care professionals understand the importance of GWG and obesity and are motivated to address the issues in consultation, yet find it uncomfortable to discuss health-related behaviour change with patients (Chisholm et al, 2012a, Heslehurst et al., 2014). A meta-synthesis demonstrated that midwives report substantial problems in discussing lifestyle and behaviour, fearing offending women lest it damage the supportive relationship they were trying to build (Willcox et al., 2012), leading some to avoid the topic altogether (Heslehurst et al., 2013). It is also viewed as a relatively low priority compared to issues such as smoking cessation, with a ‘comparative lack of supporting resources’ for conversations about obesity (Heslehurst et al., 2014, p. 472). Other healthcare professionals supporting women during pregnancy and postnatal periods also find these discussions challenging and miss opportunities to initiate behaviour change talk (Talbot et al, 2018).

Other obstacles to engaging with women in weight-related conversations include a lack of confidence in how to approach such conversation effectively (Macleod et al., 2012). This is despite numerous clinical recommendations (WHO 2008; NICE, 2010), professional body recommendations (NMC 2009, 2015) and initiatives such as Making Every Contact Count [MECC] (NHS Yorkshire and Humber, 2012) advocating that midwives *explicitly* address behaviour change with women. MECC (PHE, 2016) is a Public Health England initiative. Education for midwives on communicating about obesity during childbearing is limited and there are no specific education strategies identified to enhance skills in effective communication with women about their weight, and also helping them to facilitate change. At the university where these authors are based, generic communication skills were taught, followed by face to face role plays acting out scenarios that typically may be encountered during antenatal care. Obesity and its challenges and opportunities for change were not included prior to this intervention being developed.

The Theory of Planned Behaviour (Azjen, 1991) may be a useful approach to understanding why midwives struggle in these conversations. The theory identifies three key predictors of intention, which in turn predict behaviour – in this case engaging in conversations about obesity-related behaviour: i) attitudes, such as the expectation of negative patient response; ii) social norms, such as the importance your peers or seniors see in this work; and iii) perceived behavioural control, i.e. believing you hold regarding the time, confidence and skills you have to do the job effectively. Heslehurst et al. (2014) identified that throughout the literature midwives consistently expressed the need for training to deliver these behaviour change conversations sensitively and effectively.

After finding similar challenges for medical professionals engaging in behaviour change conversations (Chisholm, et al, 2012a), a behaviour change communication toolkit was developed that comprises evidence-based behaviour change techniques (Michie et al 2011, Michie et al 2013). This toolkit labelled ‘TEnT PEGS’ (for full details see Chisholm et al 2013a) has been shown to be feasible and acceptable for medical students, and training in this approach increases their intention to discuss obesity-related behaviour change with patients (Chisholm et al, 2015). The focus of this study is to build upon this work to test if an adapted version of this training package would be similarly helpful for midwife students.

The aim of this study was therefore to evaluate an online TEnT PEGS training package for midwifery students. Specific research questions were:

1) Can an online teaching package effectively transfer knowledge about behaviour change techniques to midwifery students?

2) Can training in the TEnT PEGS toolkit increase student midwives’ intention to use helpful behaviour change techniques in conversations with women about obesity?

3) What are student midwives’ views about behaviour change talk in practice and their perceptions of this training?

METHODS

**Design**

This mixed-methods sequential design study comprised a repeated measures questionnaire and qualitative interviews. Mixed methods were most appropriate as we wanted to asses changes as a result of the training intervention but also explore in depth student midwives’ views. It was approved by a University Ethics committee (ref. 11259 [UREC committee 4]).

**Participants and procedure**

The sample was drawn from all third year midwifery students studying at a large University in the North of England during the academic year of 2015–16 (n=67).

All final year students registered on the undergraduate midwifery education programme were provided in advance with the participant information sheet about the study and invited to complete a paper version of the pre-training questionnaire during an introductory lecture-style teaching session. All students had access to the online TEnT PEGS training package which was delivered through Blackboard, an online learning environment used by students to submit work and access course materials. The training has been previously delivered within face-to-face sessions (Chisholm et al, 2015), and was adapted to midwifery practice and delivered as an e-learning package, in order to manage limits of curriculum space, availability of staff and student teaching time. Specific elements which had been adapted for midwifery trainees included the following: stating that the session is aimed towards both midwifery and medical trainees; reorienting module content descriptions to ‘childbearing women’ rather than ‘patients’; and inclusion of an explanation of the links between obesity and childbearing-related illnesses. All other aspects of the training including all interactive activities, information provided, and the TEnT PEGS toolkit itself remained unchanged.

As part of scheduled teaching, student midwives were given a month to complete the online TEnT PEGS training. A post-training questionnaire was embedded within a Blackboard training session and upon completion all students were invited to take part in a qualitative interview to explore their views about the teaching package in terms of its relevance and utility to midwifery practice. Completion of the training, though not the research questionnaires or qualitative interview, was part of their statutory professional attendance on the midwifery programme (Nursing & Midwifery Council, 2009) Student interviews were arranged to take place either in person on the University campus, or over the phone, according to their preference.

**Pre- and post-training questionnaire**

A two-part questionnaire was used that had been previously validated in a similar health professional undergraduate teaching context (Chisholm et al. 2015). Section one comprises a 12-item, 7-point Likert scale assessing TPB constructs (item stems are in Table 1 – attitudes, subjective norms, perceived behavioural control, and intention regarding engaging in behaviour change discussions with obese women. Example items include ‘*For me, discussing ways to adopt healthier lifestyles with obese patients will be: worthless – valuable*” (attitude item); “*People who are important to me want me to discuss lifestyle change with obese patients*” (subjective norm item); “*For me, discussing lifestyle change with obese patients will be: difficult – easy*” (perceived behavioural control item); “*I want to discuss lifestyle change with obese patients in the future*” (intention item). Section two of the questionnaire assesses students’ knowledge about what BCTs are included within the TEnT PEGS framework to facilitate behaviour change with women. From 14 items (7 BCTs from TEnT PEGS; and 7 commonly used but often ineffective techniques e.g. scare tactics) participants were asked to identify which statements they thought were useful to use with women (yes/no). For full list of knowledge items, see Table 2.

Demographic data was not collected as part of the questionnaires.

**Post-training qualitative Interviews**

Semi-structured individual interviews were conducted to explore participants’ views of behaviour change conversations with pregnant women and their experience of the TEnT PEGS training package. Interviews were selected because they can provide rich accounts of personal experience and opinions (Britten, 1995). Interviews were semi-structured following a topic guide which covered overall impressions of the course, relevance, structure and delivery, what students felt they had learnt and how they had used, or would use, the training in practice (full topic guide available on request). Interviews were conducted face-to-face (n=3) or by telephone (n=5) with one of three researchers (SA, CL, ER). Interviewers combined open questions to facilitate participant-led discussion and allow unanticipated ideas to arise, with closed questions to probe and clarify details of the discussion. Interviews were digitally audio-recorded (apart from 1 recording which failed, comprehensive notes were written for this interview) and transcribed verbatim (removing any identifying information such as names and places).

**Analysis**

The questionnaire data were entered into SPSS (version 22), tested for normality, and individual missing data items were reassigned with the mean value of completed scores for that variable. Change between time 1 and 2 scores were then assessed using paired t-test for normally distributed data, and Wilcoxon Signed Ranks test for non-normally distributed data.

Interview data were explored via an inductive thematic analysis (Braun & Clarke, 2006). This process included familiarisation of the data (reading of transcripts, noting relevant/interesting data pertinent to the research objective), code generation (reflective note taking to identify relevant segments of data and highlighting emergent patterns), theme identification (grouping of patterns/codes to form broader themes and sub-themes), theme reviewing (iterative scrutiny of interview transcripts and emerging theme structure including assessment of theme boundaries, overlap, and ambiguities), and defining themes and sub-themes (development of titles/labels to accurately reflect the content). Three team members independently analysed the data before coming together as a wider group to discuss the resulting thematic structure and form consensus over ambiguous data.

RESULTS

Sixty-three of 67 registered students (94%) completed the training. Fifty-two (of 67 registered students, 78%) completed both the pre and post–training questionnaires. Of these, 20 students consented to take part in a qualitative interview, and eight were available to do so during the study period. See Figure 1 for details of recruitment to the study and completion of questionnaires.

**[Figure 1 about here]**

**Questionnaire findings**

Students were asked their beliefs about discussing weight-related behaviour change with women (within-group comparisons shown in Table 1). There was a significant increase in students’ subjective norm and perceived behavioural control scores following the training. No significant changes in students’ intention or attitude towards discussing weight-related behaviour change with women were observed.

Regarding knowledge of BCTs within the TEnT PEGS framework, students scored a median of 9 out of 14 (Range = 5-12) on the BCT checklist prior to training, and 13 out of 14 (Range = 7-14) following training. A Wilcoxon Signed Rank test indicated that this difference was statistically significant (*z* = -5.923, *p* < .001) with a large effect size (*r* = .70). Table 2 displays the change in percentage of correctly identified BCTs by students before and after completing the training.

**[Table 1 and 2 about here]**

**Interview findings**

Eight midwifery students completed an interview. All were female, four reported their ethnicity as British, 1 as Black African, and 3 were unknown. Mean age was 29 years old, S.D. = 8.7, Range = 20-40. Interview length ranged between 9 and 41 minutes, Mean = 22 minutes (S.D. = 13.5).

Findings from the interview analysis are organised into three themes: (1) ‘How training fits with current encounters with maternal obesity in midwifery training’ (2) ‘TEnT PEGS prepares students for practice’, and (3) ‘Value of tailored training’. Each theme is described in turn with illustrative quotes included (labelled with non-identifying codes, e.g. ‘ID 01’).

**Theme one: ‘How training fits with current encounters with maternal obesity in midwifery training’**

Despite being students, interviewees were already involved in engaging with and discussing weight and obesity with women they encountered on placements and described feeling particularly ‘nervous’ and ‘awkward’ in these encounters and felt that student midwives are ill-equippedto have these conversations. Although participants had not all yet discussed lifestyle change with obese women, many had and some were already anxious about having these conversations, anticipating them as being challenging. Participants perceived that the training package had provided them with some direction in an area that had worried them.

*“It just gives you alternative things to say and I always felt a bit nervous when talking to ladies” (ID 1)*

The main source of their anxiety was concern about how they would be perceived by women, as they didn’t want to seem ‘patronising’ or ‘insulting’. Obesity was acknowledged by participants to be a ‘sensitive’ area, and some felt that it was regarded as a ‘taboo’ subject.

Participants described having observed behaviour change conversations occur in clinical practice and in their own personal experiences (i.e. being maternity service users), which then shaped the way they felt about delivering the same content to other women. They recognised some of the techniques they had encountered as being ineffective at the time, even without an understanding of the TEnT PEGS training package. Additionally, exposure to counterproductive techniques within their clinical experience led to these students reporting awareness of situations when women are provided with sub-optimal lifestyle behaviour change support. For example, students recalled times when women were given ‘direct instruction’ or ‘general advice’, which are not supported by evidence or included within the TEnT PEGS behaviour change techniques framework.

*“I was told to lose weight, and made to cry at the hospital, cause it was just a case of ‘you’re fat’ you need to eat less and move more” (ID 7)*

*(note – this student had experience of being a maternity service user)*

Students reported observing a ‘lack of follow-up’ from other midwives working in practice, which limited learning about how to go on to deliver the content themselves. They also noted how the topic of managing women’s obesity was often deferred to others:

*“It’s never followed up on or they mention being referred to a dietician but I think it’s trying to pass it on a bit sometimes I feel.” (ID 1)*

Participants justified how appointment ‘time constraints’ left healthy lifestyle change as a neglected topic that was sometimes passed on (despite recognising at the same time, the unique position they were in to address these issues with women – Theme 1).

**Theme two: ‘TEnT PEGS prepares trainees for practice’**

The content of the TEnT PEGS training was well received. It was viewed as being relevant to routine practice and something participants could envisage using. These students felt that exposure to the TEnT PEGS content improved their confidence and made them feel less ill-equipped to manage obesity with women in practice.

The midwifery students found the online learning package to be ‘valuable’ and they believed it gave them ‘effective’ tools to use in practice. They specifically described how it gave them ideas about how they could initiate obesity-related conversations and what to say to women to support them in changing associated behaviours.

*“It was better than I expected because it gave you like certain things that you shouldn’t be saying to people. Things to encourage and it made me think about it differently” (ID 4)*

The participants commented on the ‘choice of phrasing’ that TEnT PEGS offered them, and that the package revolved around ‘encouragement’ as opposed to other counterproductive techniques they may have previously witnessed. Many also agreed that the package was ‘relevant’, although there was some deliberation about the specialism of this package being specifically for midwifery.

*“Some of them [video clips] obviously because of midwifery like they weren’t relevant particularly... I didn’t really feel like I learnt much from them” (ID 10)*

It was apparent to students that TEnT PEGS was designed for a wider range of health professionals. For example students disliked that scenarios included the term ‘patients’ as this is not a term commonly used in the field of midwifery. Students suggested instead to develop ‘specialist alternative’ versions of the TEnT PEGS package. They nevertheless still felt that TEnT PEGS would be useful for other healthcare professionals, and applied to multiple lifestyle behaviours wider than obesity.

*“I think that would be like, doctors, nurses and midwives, all sorts of people could use it, it’s quite a simple way of breaking it down.” (ID 7)*

*“I think you should definitely use that structure for like erm, smoking cessation and things like that as well.” (ID 19)*

Here these student midwives saw the value of the package, and recognised it as suitable for not only an extension of services for pregnant women such as “antenatal clinics” (ID 1), but also across all healthcare divisions. This moves away from the tendency to pass on responsibility to another branch of healthcare, and suggests instead a new standardised way of responding to lifestyle behaviour challenges so that patients can be supported at any stage or in any situation linked to lifestyle. The student midwives noted that they could see themselves using these behaviour change techniques in practice and that it was ‘generalisable’ and could be used on multiple behaviours like drinking and smoking.

**Theme three: ‘Value of online delivery of training’**

Students liked the ‘interactive’ elements to the package (e.g. video clips), and wanted more of this interactivity, even extending to a face-to-face delivery option. Students did report that the main benefit of the online delivered package was the ability to work through it at your own pace.

*“But I think that this way (online) you could go at your own pace, and take longer on the bits that you want to.” (ID 4)*

Students believed it was valuable to have time to work on elements of the training that they wanted to. As previous themes have suggested, student midwives have not had much experience in this area of lifestyle change communication, and having their own time to complete the online learning package meant that they could take their time and maximise their understanding. However, this led to a desire for further steps to consolidate this acquired knowledge, especially as it was novel.

*“It would have been good if we’d of had a bit more information in the lecture and then it was maybe followed up by the TEnT PEGS. Or maybe TEnT PEGS then followed up by a lecture.” (ID 6)*

There was consensus amongst participants that face-to-face content such as a lecture, workshop, or discussion group would be a valuable addition to their education and would help them to embed the knowledge further. In particular, Students suggested holding sessions in whichfeedback could be available of their own skills and performance for example, via role plays or assessment.

*“And then it would be interesting to see what you, like the people who are designing it or the people that are specialists thought as well, so you could compare whether you were along the right lines, what you could do to improve it.” (ID 14)*

As the TEnT PEGS strategies were deemed novel and largely unfamiliar to participants, they wanted to make sure they were taking on board the best information to use in practice. They wanted more ‘examples’ and a ‘repetition’ of the information, either through lecture content or by receiving feedback. Participants liked examples provided through video clips of health professionals, but also wanted to see examples from service users.

*“If there was an example of like a person who had like a patient not just a health care professional, if they could like say what had helped them or which parts of it had worked for them ... a testimonial of someone who’s like changed from it, or thought it was good.” (ID 19)*

DISCUSSION

**Key findings, interpretation and implications**

This study evaluates a novel approach to supporting student midwives to have obesity management discussions with women. Following training, student midwives are more likely to believe that (a) behaviour change discussions with women form an expected part of their clinical role, and (b) they are able and confident to hold these discussions. Both the questionnaire and interview findings support this increase in subjective norm and perceived behavioural control (PBC) beliefs. The findings do not however, support that students’ attitudes towards having these conversations become more positive following training, nor that students have greater intention to hold behaviour change conversations with women in practice. As other previous work has not been carried out in this area, further work is required to investigate how these findings might translate to students’ practice behaviours, for example identifying the extent to which confidence (or PBC) medicates actual behaviour (initiation of obesity discussions or implementations of BCTs) in practice.

Findings indicate that the TEnT PEGS training will increase student midwives’ knowledge of behaviour change techniques. For all technique categories (Tailored plans, Environment, Thoughts, Perform and practice, Emotions, Goals, and Social support), there was an increase in the percentage of those student midwives’ identifying techniques correctly. Students were also more likely to reject unhelpful techniques following training. This relates to previous work where health professionals commonly use alternative and arguably less helpful techniques such as scare tactics, or information giving alone (Britt et al 2004; Epling et al 2011).

Following training, student midwives reported that they valued the TEnT PEGS training package, seeing it as an asset to their communication training particularly in sensitive or challenging situations such as obese mothers. Interview findings revealed that even at this stage of their training they are struggling with the concept and experience of having these conversations with women and that they appreciated this structured training approach which draws directly upon existing theory- and evidence-bases in behaviour change science.

Although the questionnaire findings did not identify a significant increase in student midwives’ attitudes or intentions towards having behaviour change conversations with obese women following the training, they did express in interviews that the training strengthened their beliefs around how important and valuable these discussions are. Further research is needed to identify how the training might change attitudes or intentions toward obesity discussions in a more representative sample of students.

This study supports previous literature that suggests midwives find lifestyle change communication challenging (Furber et al 2011; Olander et al 2011, Singleton and Furber, 2013; Heslehurst et al., 2013). TEnT PEGS training is a specific tool for student and qualified midwives to help them support women throughout their pregnancy, and encourage these women to make positive behaviour changes. This research also builds upon literature which emphasises the importance of capitalising upon ‘teachable moments’ such as pregnancy (Phelan, 2010). Participants recognised that pregnancy is an ideal time to address lifestyle behaviours such as physical inactivity, healthy eating, and obesity management. The TEnT PEGS training offers an approach to this, which is based upon latest understanding of how best to support people to make change to their behaviour. Midwifery students would like this to be further embedded within their education programme by providing additional opportunity for feedback or discussion of the skills taught. Further research could identify how best these components could be added to the online module and the extent to which this may influence training outcomes and midwife intentions and practice behaviour.

**Strengths and limitations**

Strengths of the study included the multi-disciplinary approach, including researchers in the fields of health psychology, midwifery, and medicine. Hesse-Biber (2016) points out that in order to study complex health care issues, interdisciplinary research teams are key in considering the varying factors. There was also frequent discussion among the researchers, which enabled a greater and deeper level of analysis. A further strength of the study is the demographic variability of student midwives in terms of their age, ethnicity and mothers in the group. This provided the data with a good spread of personal opinions, and some opportunities to discuss personal experiences with maternity health services. Finally, the mixed methods design offers benefit of including breadth in the data through a larger sample size alongside the depth of individual detailed accounts, maximising the strengths of each method (Ozawa & Pongpirul, 2013). Qualitative data explores a phenomenon whereas quantitative data confirms research questions on said phenomena (Lakshman et al, 2000).

There are a few potential limitations. Firstly the potential for bias in the findings. It is likely that students who do not see the relevance of the TEnT PEGS package, or held more negative attitudes towards behaviour change and communication training are less likely to engage with the training and associated research (Salmon et al, 2007). To some extent this was overcome by embedding the training within the curriculum and establishing a timetabled training slot – and 94% of registered students completing the online package. It is possible however that these were also students who already had greatest skills and knowledge in the area, hence greater benefits may be achieved by targeting and accessing the entire cohort, which would be possible if the training and assessment was mandatory. The uptake of the interview was more problematic as only eight of the 20 recruited participants (of 67 registered students; 12%) took part in an interview and it is likely the full range of views about the training experience were not captured.

This was a within-subject design and change in students’ knowledge and skills may be due to some other feature of their training (e.g. experience). The maximum period between questionnaires was four weeks, so it is unlikely significant changes would be expected in this period, however a randomised controlled trial would help to draw firmer conclusions around efficacy of the intervention. The complexity of conducting research in educational settings (due to timetabling constraints due to clinical placements, contamination due to shared resources between students and staff, ethics of withholding good training practice) limits the quality of research in the field (Chisholm et al, 2012b; Chisholm et al, 2013b; Fillingham et al, 2013; Todres et al 2007).

CONCLUSION

This study supports a need for health psychology informed communication training for midwifery students and indicates that an online learning tool like TEnT PEGS is a plausible and valuable way for midwifery students to learn how to deliver successful lifestyle change communication.

REFERENCES

Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211. [http://dx.doi:10.1016/0749-5978(91)90020-t](http://dx.doi:10.1016/0749-5978%2891%2990020-t)

Amorim Adegboye, A. R., & Linne, Y. M., 2013. Diet or exercise, or both, for weight reduction in women after childbirth. Cochrane Database of Systematic Reviews. http://dx.doi:10.1002/14651858.cd005627.pub3

Asvanarunat, E., 2015. Outcomes of gestational weight gain outside the institute of medicine guidelines. Journal of the Medical Association of Thailand, 97(11), 1119–25. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/25675675

Bhattacharya, S., Campbell, D. M., Liston, W. A., Centre, D. B., Bhattacharya, S., & Aberdeen Maternity Hospital., 2007. Effect of Body Mass Index on pregnancy outcomes in nulliparous women delivering singleton babies. BMC Public Health, 7(1), 1. http://dx.doi:10.1186/1471-2458-7-168

Braun, V. & Clarke, V., 2006. Using thematic analysis in psychology. Qualitative Research in Psychology, 3, 77–101. http://dx.doi.org/10.1191/1478088706qp063oa

Britt, E., Hudson, S.M. & Blampied, N.M.,2004. Motivational interviewing in health settings: a review. Patient Education and Counselling, 53(2),147-55. [http://dx.doi.org/10.1016/S0738-3991(03)00141-1](http://dx.doi.org/10.1016/S0738-3991%2803%2900141-1)

Britten, N., 1995. Qualitative interviews in medical research. British Medical Journal, 311, 251–253. https://doi.org/10.1136/bmj.311.6999.251

Chisholm, A., Hart, J., Lam, V., & Peters, S., 2012a. Current challenges of behavior change talk for medical professionals and students. Patient Education and Counseling, 87(3), 389–394. http://dx.doi.org/10.1016/j.pec.2011.12.001

Chisholm, A., Hart, J., Mann, K. & Peters, S., 2013a. Development of a behaviour change communication tool for medical students: The ‘Tent Pegs’ booklet. Patient Education and Counselling, 94(1):50-60. http://dx.doi.org/doi:10.1016/j.pec.2013.09.007

Chisholm, A., Hart, J., Mann, K., Perry, M., Duthrie, H., Rezvani, L., & Peters, S., 2015. Investigating the feasibility and acceptability of health psychology informed obesity training for medical students. Psychology, Health & Medicine, 21(3), 368-376. http://dx.doi.org/10.1080/13548506.2015.1062523

Chisholm, A., Mann, K., Peters, S., & Hart, J., 2013b. Are medical educators following General Medical Council guidelines on obesity education: if not why not? BMC Medical Education, 13, 53 – 72. http://dx.doi.org/10.1186/1472-6920-13-53

Chisholm, A., Hart, J., Mann, K. V., Harkness, E., & Peters, S., 2012b. Preparing medical students to facilitate lifestyle changes with obese patients: A systematic review of the literature. Academic Medicine, 87(7), 1 -12. http://dx.doi.org/10.1097/ACM.0b013e3182580648

Cohen, D. J., Clark, E. C., Lawson, P. J., Casucci, B. A., & Flocke, S. A., 2011. Identifying teachable moments for health behavior counseling in primary care. Patient Education and Counseling, 85(2), e8–e15. http://dx.doi.org/10.1016/j.pec.2010.11.009

Department of Health, 2011. Healthy lives, healthy people | A call to action on obesity in England. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/213720/dh\_130487.pdf

Epling, J.W., Morley, C.P., Ploutz-Snyder, R., 2011. Family physician attitudes in managing obesity: a cross-sectional survey study. BMC Research Notes, Nov 1;4:473 http://dx.doi.org/10.1186/1756-0500-4-473

Fillingham, A., Peters, S., Chisholm, A., & Hart, J., 2013. Early training in tackling patient obesity: A systematic review of nurse education. Nurse Education Today. 34(3):396-404. http://dx.doi.org/10.1016/j.nedt.2013.06.020

Furber, C.M., McGowan, L., 2011. A qualitative study of the experiences of women who are obese and pregnant in the UK. Midwifery. 27, 437-444 http://dx.doi.org/0.1016/j.midw.2010.04.001

Furber. C., McGowan, L, Lavender T Quenby S. Bower P Kontopantelis E., 2013. Antenatal interventions for reducing weight in obese women for improving pregnancy outcome. Cochrane Review: Pregnancy and Childbirth Group. <http://dx.doi.org/10.1002/14651858.CD009334.pub2>

Goldstein RF, Abell SK, Ranasinha S, Misso M, Boyle JA, Black MH, Li N, Hu G, Corrado F, Rode L, Kim YJ, Haugen M, Song WO, Kim MH, Bogaerts A, Devlieger R, Chung JH, Teede HJ. 2017 Association of Gestational Weight Gain With Maternal and Infant Outcomes. A Systematic Review and Meta-analysis. JAMA. 2017;317(21):2207–2225. doi:10.1001/jama.2017.3635

Greene, G., Smiciklas-Wright, H., Scholl, T., & Karp, R., 1988. Postpartum weight change: How much of the weight gained in pregnancy will be lost after delivery? Obstetrics & Gynecology, 71(5), 701–707. http://dx.doi.org/10.1016/0091-2182(89)90040-2

Guh, D. P., Zhang, W., Bansback, N., Amarsi, Z., Birmingham, C. L., & Anis, A. H., 2009. The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis. BMC Public Health, 9(1), 88. http://dx.doi.org/10.1186/1471-2458-9-88

Gunderson, E. P., Abrams, B., & Selvin, S., 2009. Childbearing and obesity in women: Weight before, during, and after pregnancy. Obstetrics and Gynecology Clinics of North America, 36(2), 317–332. http://dx.doi.org/10.1016/j.ogc.2009.04.001

Han, T. S., Hart, C. L., Haig, C., Logue, J., Upton, M. N., Watt, G. C. M., & Lean, M. E. J., 2015. Contributions of maternal and paternal adiposity and smoking to adult offspring adiposity and cardiovascular risk: The Midspan family study. BMJ Open, 5(11), e007682. http://dx.doi.org/10.1136/bmjopen-2015-007682

Heslehurst, N., Russell, S., McCormack, S., Sedgewick, G., Bell, R., & Rankin, J., 2013. Midwives perspectives of their training and education requirements in maternal obesity: A qualitative study. Midwifery, 29(7), 736–744. http://dx.doi.org/10.1016/j.midw.2012.07.007

Heslehurst, N., Crowe, L., Robalino, S., Sniehotta, F.F., McColl, E., Rankin, J., 2014. Interventions to change maternity healthcare professionals’ behaviours to promote weight-related support for obese pregnant women: a systematic review. Implementation Science, 9, 97. http://dx.doi.org/10.1186/s13012-014-0097-9

Hesse-Biber, S., 2016. Doing interdisciplinary mixed methods health care research: working the boundaries, tensions, and synergistic potential of team-based research. Qualitative Health Research, 26(5), 649 – 658.

http://dx.doi.org/10.1177/1049732316634304

Hill, J. O., & Peters, J. C., 1998. Environmental contributions to the obesity epidemic. Science, 280(5368), 1371–1374. <http://dx.doi.org/10.1126/science.280.5368.1371>

Institute of Medicine 2009 Weight gain during pregnancy: reexamining the guidelines. National Academies Press: Washington DC

Kral, J. G., Biron, S., Simard, S., Hould, Fs., Lebel, S., Marceau, S., & Marceau, P., 2006. Large maternal weight loss from obesity surgery prevents transmission of obesity to children who were followed for 2 to 18 years. Pediatrics, 118(6), e1644–e1649. http://dx.doi.org/10.1542/peds.2006-1379

Lakshman, M., Sinha, L., Biswas, M., Charles, M., & Arora, N., 2000. Quantitative vs qualitative research methods. The Indian Journal of Pediatrics, 67(5), 369 – 377. <http://dx.doi.org/10.1007/BF02820690>

Lyons S, Currie S, Peters S, Lavender T, Smith D.,2018.The association between psychological factors and breastfeeding behaviour in women with a body mass index (bmi) ≥30kg/m2: A systematic review. Obesity Reviews (in press)

Macleod, M., Gregor, A., Barnett, C., Magee, E., Thompson, J., & Anderson, A. S., 2012. Provision of weight management advice for obese women during pregnancy: A survey of current practice and midwives’ views on future approaches. Maternal & Child Nutrition, 9(4), 467–472. http://dx.doi.org/10.1111/j.1740-8709.2011.00396.x

Maddah, M., & Nikooyeh, B., 2009. Weight retention from early pregnancy to three years postpartum: A study in Iranian women. Midwifery, 25(6), 731–737. http://dx.doi.org/10.1016/j.midw.2008.01.004

Michie, S., Ashford, S., Sniehotta, F., Dombrowski, S., Bishop, A., & French, D., 2011. A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: The CALO-RE taxonomy. Psychological Health, 26, 1 – 20. http://dx.doi.org/ 10.1080/08870446.2010.540664

Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., & Wood, C., 2013. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. Annals of Behavioral Medicine, 46, 81 – 95. http://dx.doi.org/ 10.1007/s12160-013-9486-6

Morgan, K. L., Rahman, M. A., Macey, S., Atkinson, M. D., Hill, R. A., Khanom, A., Brophy, S. T., 2014. Obesity in pregnancy: A retrospective prevalence-based study on health service utilisation and costs on the NHS. BMJ Open, 4(2), e003983–e003983. http://dx.doi.org/10.1136/bmjopen-2013-003983

Muktabhant, B., Lawrie, T. A., Lumbiganon, P., & Laopaiboon, M., 2015. Diet or exercise, or both, for preventing excessive weight gain in pregnancy. Cochrane Database of Systematic Reviews. http://dx.doi.org/10.1002/14651858.cd007145.pub3

NICE, 2010. Weight management before, during and after pregnancy. Retrieved March 4, 2016, from https://www.nice.org.uk/guidance/ph27/chapter/3-Considerations

NHS Yorkshire and Humber, 2012. Making every contact count. Retrieved August, 2016, from http://www.makingeverycontactcount.co.uk/

Nursing and Midwifery Council, 2009. Standards for pre-registration midwifery education. Nursing & Midwifery Council: London. Retrieved November 5, 2015, from http://www.nmc.org.uk/globalassets/sitedocuments/standards/nmc-standards-for-preregistration-midwifery-education.pdf

Nursing and Midwifery Council, 2015, The Code Professional Standards of Practice and behaviour for Nurses and Midwives. Nursing & Midwifery Council: London. Retrieved November 5, 2015, from http://www.nmc.org.uk/standards/code/read-the-code-online/

Oken, E., Rifas-Shiman, S. L., Field, A. E., Frazier, L. A., & Gillman, M. W., 2010. Maternal gestational weight gain and offspring weight in adolescence, 112(5), 999-1006. http://dx.doi.org/10.1097/AOG.0b013e31818a5d50

Oken, E., Taveras, E. M., Kleinman, K. P., Rich-Edwards, J. W., & Gillman, M. W., 2007. Gestational weight gain and child adiposity at age 3 years. American Journal of Obstetrics and Gynecology, 196(4), 322.e1–322.e8. http://dx.doi.org/10.1016/j.ajog.2006.11.027

Olander, E. K., Atkinson, L., Edmunds, J. K., & French, D. P., 2011. The views of pre- and post-natal women and health professionals regarding gestational weight gain: An exploratory study. Sexual & Reproductive Healthcare, 2(1), 43–48. http://dx.doi.org/10.1016/j.srhc.2010.10.004

Ozawa, S. & Pongpirul, K., 2013. 10 Best resources on ... mixed methods research in health systems. Health Policy and Planning, 29(3), 323 – 327. http://dx.doi.org/10.1093/heapol/czt019

Phelan, S., 2010. Pregnancy: A “teachable moment” for weight control and obesity prevention. American Journal of Obstetrics and Gynecology, 202(2), 135.e1–135.e8. http://dx.doi.org/10.1016/j.ajog.2009.06.008

Public Health England, 2015. Making the case for tackling obesity – why invest? Retrieved August 2016 from https://www.noo.org.uk/NOO\_about\_obesity/economics

Public Health England, 2016. UK and Ireland prevalence and trends: Public health England obesity knowledge and intelligence team. Retrieved March 25, 2016, from <https://www.noo.org.uk/NOO_about_obesity/adult_obesity/UK_prevalence_and_trends>

Public Health England, 2016. Making Every Contact Count: A Consensus statement. https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/515949/Making\_Every\_Contact\_Count\_Consensus\_Statement.pdf

Renehan, A. G., Tyson, M., Egger, M., Heller, R. F., & Zwahlen, M., 2008. Body-mass index and incidence of cancer: A systematic review and meta-analysis of prospective observational studies. The Lancet, 371(9612), 569–578. http://dx.doi.org/10.1016/s0140-6736(08)60269-x

Salmon, P., Peters, S., Rogers, A., Gask, L., Clifford R., Iredale, W., Dowrick, C., Morriss, R., 2007. Peering through the barriers in GPs’ explanations for declining to participate in research: the role of professional autonomy and the economy of time. Family Practice 24, 269-275. https://doi.org/10.1093/fampra/cmm015

Schack-Nielsen, L., Michaelsen, K. F., Gamborg, M., Mortensen, E. L., & Sørensen, T. I. A., 2009. Gestational weight gain in relation to offspring body mass index and obesity from infancy through adulthood. International Journal of Obesity, 34(1), 67–74. http://dx.doi.org/10.1038/ijo.2009.206

Siega-Riz, A., Viswanathan, M., Moos, M., Deierlein, A., Mumford, S., Knaack, J., Lohr, K., 2009. A systematic review of outcomes of maternal weight gain according to the institute of medicine recommendations: Birthweight, fetal growth, and postpartum weight retention. American Journal of Obstetrics and Gynecology., 201(4):339.e1-14. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/19788965

Singleton, G., Furber, C., 2013. The experiences of midwives when caring for obese women in labour: A qualitative study. Midwifery 30(1),103-111. http://dx.doi.org/ 10.1016/j.midw.2013.02.008

Smith, J., Cianflone, K., Biron, S., Hould, F. S., Lebel, S., Marceau, S., … Marceau, P., 2009. Effects of maternal surgical weight loss in mothers on intergenerational transmission of obesity. The Journal of Clinical Endocrinology & Metabolism, 94(11), 4275–4283. http://dx.doi.org/10.1210/jc.2009-0709

Stothard, K. J., Tennant, P. W. G., Bell, R., & Rankin, J., 2009. Maternal overweight and obesity and the risk of congenital anomalies. JAMA, 301(6), 636. http://dx.doi.org/10.1001/jama.2009.113

Subcommittee on Nutritional Status and Weight Gain During Pregnancy, Subcommittee on Dietary Intake and Nutrient Supplements During Pregnancy, Committee on Nutritional Status During Pregnancy and Lactation, Institute of Medicine, National Academy of Sciences, Committee on Nutritional Status During Pregnancy, & Food and Nutrition Board, 1990. Nutrition during pregnancy: Part I, weight gain: Part II, nutrient supplements (3rd ed.). Washington, D.C.: National Academies Press.

Talbot H, Strong E, Peters S, Smith DM., 2018. Behaviour change opportunities at mother and baby checks in primary care: a qualitative investigation of the experiences of general practitioners British Journal of General Practice (in press)

Todres M., Stephenson A., Jones R., 2007. Medical education research remains the poor relation. BMJ. 2007 Aug 18; 335(7615): 333–335. https://doi.org/10.1136/bmj.39253.544688.94

Wang, Y. C., McPherson, K., Marsh, T., Gortmaker, S. L., & Brown, M., 2011. Health and economic burden of the projected obesity trends in the USA and the UK. The Lancet, 378(9793), 815-825. http://dx.doi.org/10.1016/S0140-6736(11)60814-3

Willcox, J. C., Campbell, K. J., van der Pligt, P., Hoban, E., Pidd, D., & Wilkinson, S., 2012. Excess gestational weight gain: An exploration of midwives’ views and practice. BMC Pregnancy and Childbirth, 12(1), 102. http://dx.doi.org/10.1186/1471-2393-12-102

World Health Organization (WHO), 2008. 2008–2013 action plan for the global strategy for the prevention and control of noncommunicable diseases. WHO; 2008.

Yu, Z., Han, S., Zhu, J., Sun, X., Ji, C., & Guo, X., 2013. Pre-Pregnancy body mass index in relation to infant birth weight and offspring overweight/obesity: A systematic review and Meta-Analysis. PLoS ONE, 8(4), e61627. http://dx.doi.org/10.1371/journal.pone.0061627

**Figure 1.** Recruitment of participants and completion of quantitative and qualitative data

67 3rd year midwifery students

4 non-attenders

63 Time 1 Questionnaires (6% dropout)

20 consented to interview (68% dropout)

52 Time 2 Questionnaires (17% dropout)

8 interviews completed (60% dropout)

**Table 1:** Comparisons between TPB scores pre and post training

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Item** | **Construct** | **Time 1****Median (range)** | **Time 2****Median (range)** | ***Z*** | ***p*** | ***r*** |
| I intend to… | Intention | 6 (1-7)  | 7 (2-7) | -1.842 | .065 | .255 |
| I expect to… | Intention | 7 (1-7) | 6 (5-7) |
| I want to… | Intention | 6 (1-7) | 6 (4-7) |
|  |  |  |  |  |  |  |
| Bad-Good | Attitudes | 7 (4-7) | 6 (3-7) | -1.468 | .142 | .204 |
| Worthless-Valuable | Attitudes | 7 (4-7) | 6 (4-7) |
| Unpleasant-Pleasant | Attitudes | 4 (1-7) | 4 (2-7) |
|  |  |  |  |  |  |  |
| People think I should… | Subjective norm | 5 (1-7) | 6 (4-7) | -4.103 | < .001 | \*.569 |
| It is expected of me… | Subjective norm | 6 (1-7) | 7 (4-7) |
| People want me to… | Subjective norm | 4 (1-7) | 6 (4-7) |
|  |  |  |  |  |  |  |
| I am confident… | PBC | 5 (1-7) | 6 (3-7) | -3.991 | < .001 | \*.553 |
| I will have control… | PBC | 5 (1-7) | 6 (2-7) |
| Difficult-Easy | PBC | 3 (1-7) | 3 (1-6) |

***Notes.*** *Each item used the core phrasing ‘discuss lifestyle change with obese patients’ within it. Full questionnaire available on request form the authors. PBC = Perceived behavioural control. Inferential statistics indicate within group comparisons conducted on combined construct scores. \* = indicates large effect size (Cohen, 1988).*

**Table 2:** *Percentage of identified behaviour change techniques at time 1 and time 2*

|  |  |  |  |
| --- | --- | --- | --- |
| **Checklist statement** | **BCT included within TEnT PEGS (y/n)** | **Percent correct at time 1** | **Percent correct at time 2** |
| Tell them that their health will continue to deteriorate with such low physical activity levels | Scare tactic/warning (N) | 84.13 | 92.31 |
| Ask them how they might feel about their weight in 10 years’ time | Imagery (Y) | 20.63 | 57.69 |
| Ask them to keep a food diary for 2 weeks | Monitoring (Y) | 71.43 | 82.69 |
| Inform them of the likely consequences of their unhealthy behaviours   | Inform consequences (N) | 38.10 | 80.77 |
| Encourage them to believe in themselves through using positive comments  | Self-talk (Y) | 92.06 | 100 |
| Ask them to think about things that might prevent them from changing  | Relapse prevention (Y) | 73.02 | 90.38 |
| Describe the associations between obesity and cardiovascular diseases  | Generic information (N) | 71.43 | 86.54 |
| Discuss specific feasible steps to achieving changes in their diet  | Goals (Y) | 93.65 | 96.15 |
| Tell them they need to increase their activity levels  | Direct instruction (N) | 71.43 | 94.23 |
| Discuss how they might avoid places where sticking to a healthy diet is particularly difficult  | Change environment (Y) | 28.57 | 88.46 |
| Highlight how important it is to reduce their fat intake  | Emphasise importance of change (N) | 61.90 | 82.69 |
| Prompt them to use other people in their lives for support  | Social support (Y) | 92.06 | 96.15 |
| Provide them with national weekly recommendations for physical activity levels  | Information giving (N) | 69.84 | 82.69 |
| Explain they key reasons why obesity causes health problems | Provide reasons to change (N) | 14.29 | 63.46 |