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Ngala Healthy You, Healthy Baby: a personalised online program to support healthy weight in pregnancy and early life

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Abstract

Perinatal maternal obesity is common and has significant child and maternal health consequences. Online resources have the potential to engage young mothers to adopt healthier lifestyles during pregnancy and postpartum. Intercept interviews with 53 pregnant women at antenatal clinics and focus groups with 67 new mothers at mothers' groups and playgroups were conducted to determine preferred types and formats of online information and support. The expressed needs of women were matched to behaviour change theory to guide development of the Healthy You Healthy Baby website and Smartphone application. A mix of factual and practical online information, self-assessment, goal-setting and feedback in an interactive format is recommended to motivate and support women to achieve healthy lifestyles in the perinatal period. Referral to online resources by health professionals and quality assurance of content is important to increase the confidence of women to act on it.

Introduction

The childbearing years are a period of increased risk of unhealthy weight gain for many women (Nehring et al., 2011), with excess weight likely to persist into later years (Mamum et al., 2010). Around thirty percent of all Australian mothers will become overweight (20%) or obese (10%) during their first pregnancy (Brown et al., 2006). As well, there is a disturbing association between maternal adiposity, excess weight gain in pregnancy and increased childhood adiposity (Nehring et al., 2012). Over 20% of Australian children aged 2 to 3 years are overweight or obese with rates highest amongst children from lower socio-economic families (DoHA, 2008). Excessive weight gain in the first two years of life is associated with a two- to three-fold increase in the risk of overweight in puberty and later life (Baird et al., 2005), where the physical, social and economic health risks and costs are well defined (Access Economics, 2006).

Prevention of early childhood obesity has to date been implemented primarily through school (Doak et al., 2006) or preschool (Hesketh et al., 2010) interventions. Although these interventions are important, factors associated with obesity present themselves much earlier, including metabolic effects of maternal obesity in the gestational period (Lobstein, 2011) as well as maternal influences on early childhood diet and lifestyle (Spence et al., 2010). Mothers play a critical role in fostering the healthy lifestyle of their children; spending most time interacting with children at an early age, shaping children's diets and activity via role-modelling and controlling the home environment (Campbell et al., 2010). Thus mothers are critical agents of change for the prevention of their own and their children's overweight. The childbearing period represents a time when mothers and families may be more receptive to changing their lifestyles for the sake of their children (Olson, 2005), hence the importance of communication opportunities presented during pregnancy and early postpartum.

The Starting Childhood Obesity Prevention Earlier project was initiated with key government and non-government stakeholders to develop a sustainable cross-sector intervention in Western Australia (WA) to engage families in prevention of early childhood obesity. The project involved a literature review and a systematic process of consultations with stakeholders to identify and short-list promising approaches and to select a pilot project suitable in the WA context (Hearn and Miller 2013). Approximately 31,000 babies are born per year in WA, 41% to first-time mothers aged 18-35 years (Joyce and Hutchinson, 2012). Health information for pregnant women and first-time mothers traditionally has been provided through primary health care providers, educational pamphlets and perinatal classes (Gagnon et al., 2007), with additional support from family members and friends. However, service limitations and time pressures, as well as reduced size and dispersed living arrangements of modern families mean that first-time mothers may lack this support. In addition, today's young mothers are increasingly using online resources to retrieve health information (Lagan et al., 2011; Plantin and Daneback, 2009; Larsson, 2009). Hence stakeholders unanimously agreed to support development of an online resource for parents that is endorsed by primary care providers, well-publicised and focused on supporting healthy family lifestyles during the perinatal period (ante-natal to one year of age). Due to its existing state-wide profile with primary health care providers and new parents, the Ngala Early Parenting and Early Childhood support service was deemed the most appropriate online host for the resource.

This paper presents evidence to justify an online approach to communication, as well as developmental research to determine what type of information women would prefer online and in what form this is best communicated to engage their interest and to support behaviour change.

Literature

New Mothers and Media Use: The Potential Impact of Online Information on Maternal Healthy Lifestyle

In 2011, 92% of Australian households had home internet access (Neilson, 2012). Whilst age and socio-economic differences between mothers who have access to information and support on the internet have been reported (Wen et al., 2011), most recent studies report diminishing class differences in website use for parenting information (Plantin and Danebak, 2009). Also, mobile wireless Internet is the fastest growing online technology, with Australian women of prime child-bearing age amongst the highest users (ABS, 2011). The use of Smartphone applications is increasing rapidly (Mackay, 2012), thus the influence of information and communication technologies is unlikely to diminish in the future.

Key benefits of online health information communication with new mothers include the ability to reach out to a wider audience, without an increase in service costs (Plantin and Daneback, 2009), as well as the opportunity for health promotion initiatives to engage with individuals wherever and whenever needed. In addition to static website information, online environments also provide important social support when women are isolated, time poor and needing reassurance (McDaniel et al., 2011). Young women turn online and seek participation in electronic support groups for information and support to navigate and deal with their new responsibilities during and post pregnancy (Cowie et al., 2011; McDaniel et al., 2011). Mothers are encouraged by 24-hour availability of information and access to a large number of people so that diverse advice may be gained (Madge and O'Connor, 2006) and selected to suit them. Research has shown that new mothers find it useful to have their own thoughts, feelings, parenting issues, and lifestyle affirmed as normal by experienced mothers (Dunham et al., 1989), yet there are conflicting claims about the effect of the internet and other electronic media on mothers. Some claim that the internet can empower women through online information exchange (Madge and O'Connor, 2006), while others claim it

merely builds on consumerism and negatively influences mothers' feelings of stress, competency and adjustment to parenting in general (Di Maggio et al., 2001). Even so, despite the high percentage of new mothers using the internet on a day-to-day basis, prior to the HYHB project little research had been conducted to identify the type and form of online communication women need to help improve their lifestyles for better health.

The Communicative Value of Online Behavioural Interventions

Although there were few rigorous evaluations of online healthy lifestyle support interventions with perinatal women, literature on the effects of internet-based interventions on physical activity and dietary behaviour in wider populations of women is growing, with systematic reviews (Webb et al., 2010; Kroeze et al., 2006; Neville et al., 2009) suggesting promising effects when self-assessment, goal-setting and tailored advice are used, and online mobile methods of communication, such as Smartphone applications and SMS, are employed. Tailoring is a multi-step and multi-dimensional process that involves assessing individual characteristics, creating individual messages, and then delivering these messages using a variety of appropriate strategies and channels. Tailoring based on multiple criteria is most effective, especially when incorporating self-identification characteristics and aspects of behaviour change theory (Lustria et al., 2009). Tailoring also allows the inclusion of interactive personalised components such as self-assessment and goal-setting that can enhance the user's experience and support their achievement of behavioural goals. Comparing print and online tailored health information to change lifestyle behaviours, Noar et al. (2011) concluded that online approaches may lead to longer lasting behaviour changes. Lustria et al. (2009) found in a systematic review of 30 studies that the most common variables for tailoring online content were existing health behaviours or risk factors and users' stages of behavioural change.

The Stages of Change model, originally developed with regards to smoking cessation (Prochaska and DiClemente, 1983) and further developed into the Transtheoretical Model of Health Behaviour Change (Prochaska and Velicer, 1997), has shown to be of value in a wide range of other situations including recent online applications (Levesque et al., 2012). At its heart, the Stages of Change model has five steps: (1) Precontemplation, the 'ignorance is bliss' stage; (2) Contemplation, a state of awareness and sometimes of concern; (3) Preparation, where a person feels that action is necessary and may be 'testing the waters'; (4) Action, where a plan

to address the situation is followed over some time, usually months; and (5) Maintenance, a decision to continue in the new behaviours indefinitely; and optionally (6) Relapse, to normalise the sense of ‘falling off the wagon’ (and getting on again). Attractive, non-threatening information provision, willingly accessed by the user, is needed in online programs to impact upon all aspects of the Stages of Change progression (Webb et al. 2010; Levesque et al., 2012).

Methods

Theoretical Framework

The aim of the HYHB project was to provide information and motivational messages to improve the attitude, knowledge, confidence and behaviours of pregnant women and new mothers with regards to healthy lifestyle to prevent overweight and obesity in themselves and their children. The intervention is based on Stages of Change (Prochaska and DiClemente, 1983; Prochaska and Velicer, 1997), Social Cognitive Theory (Bandura, 1977), and motivational models (Miller and Rollnick, 1991). The key assumptions are: i) individuals go through a multi-stage behaviour change process which may be started, exited and re-entered at any stage (Prochaska and DiClemente, 1983; Prochaska and Velicer, 1997); ii) behavioural change is motivated by feelings of self-confidence, which are enhanced when individuals have the necessary skills to make lifestyle changes (Bandura, 1977; Miller and Rollnick, 1991); iii) an individual, their environment and behaviour continuously interact and influence each other (Bandura, 1977), therefore individual, social, economic and environmental barriers and supports need to be identified and addressed to achieve behaviour change; iv) ongoing support can enhance the acquisition of skills and self-confidence needed to sustain behavioural change; and v) motivation and goal-setting elicited directly from individuals is conducive to successful behavioural change (Miller and Rollnick, 1991).

Developmental research

Aside from empirical evidence from the literature on the use and effectiveness of online technologies in influencing healthy lifestyle behaviours, information was also sought from pregnant women and new mothers to guide development of the HYHB resources. Semi-structured intercept interviews with pregnant women and focus groups with postpartum women were conducted to explore their online technology use and their opinions on what online healthy lifestyle information is most needed, in what form, and how best it should be presented and promoted to be effective.

The intercept interviews were conducted with 53 pregnant women attending one large metropolitan and one small rural public antenatal clinic in Western Australia. Pregnant women presenting at the clinics and able to communicate in English were informed of the interviews by the midwife and posters and leaflets left in the waiting room. Trained research assistants attended the metropolitan clinic over a two-week period and the weekly rural clinic once to invite participation, obtain consent and interview eligible and interested women. Focus group participants were recruited with informed consent from WA community health new mothers' groups and playgroups. Overall, nine focus groups were conducted with 67 postpartum women attending groups in lower socioeconomic areas of metropolitan and rural WA. The interviews and focus groups were audiotaped, transcribed verbatim, and then analysed for key themes related to online resource use, desired format and content needs. Ethics approval was obtained from Edith Cowan University and relevant health service ethics committees.

Results

Participants

Almost all women approached agreed to participate. Of the pregnant women interviewed (P), all were aged between 18 and 40 years, 53% were pregnant with their first child and 83% spoke English as their first language. The mothers' group and play group women (PG) were of similar age, 70% had one or two pre-school children and 40% were judged overweight or obese by the facilitator.

Internet use

Consistent with national data (Neilson, 2012), most pregnant women and mothers interviewed at antenatal clinics, mothers' groups and playgroups had access to the internet and used it frequently to search for information about pregnancy and early childhood, especially with their first child. Smartphone owners noted the convenience of immediate information searches and ability to download relevant apps. Women accessed many sites on pregnancy and parenting and could list favourites, but they were not particularly loyal to any site because none provided all the information needed. In fact, some women complained of difficulty searching through too much information, whilst others often checked and compared information from several sites, seeking consensus or confirmation of their own beliefs.

You can't find all the information on one website you need to try 2, 3 or 4. The information may or may not be correct so you need to find the right one for you. (P)

There's too much information; like one site could be right, this site could be wrong and you don't know what to believe (PG).

Search engines such as Google were considered to be the quickest source of answers to immediate questions.

Internet's probably the easiest, there's so much on there to find. First port of call for anything really. Just Google (P).

However, search results often included international websites with limited local relevance or commercial sites with mixed credibility. Trust was highest in Government or university websites, but commercial sites and forums were also accessed for ideas and promotions.

Content and format needs

Women wanted factual information, tools for self-assessment, as well as tips and ideas on how to put healthy lifestyle recommendations into practice. In particular, during pregnancy they wanted facts and positive advice about healthy gestational weight gain and what foods and exercises were safe.

What sort of activity you are allowed to do and what stages of pregnancy. Everyone tells you what you can't do but not what you can (P).

How much you are meant to gain for your BMI and age – I found all of this out later. With my first one I put on 24 kg – with this one I've been a lot more aware and conscious of what I'm eating (P).

Some mothers emphasised their need for quick, short answers to immediate concerns that were not considered worthy of the time or cost of visiting health professionals.

Cos so many women say "oh, I heard you can do this, I heard you can do that" so a little question thing would be good so you can type in a question and get a response quite quickly (P).

Just quick responses to general questions, especially because I don't have any family over here so I don't really have anyone to ask so something like that would be good for me (PG).

Existing online information was often general and not detailed enough to meet the needs of individuals. Question and answer formats providing basic factual information with links to further reading were suggested. Interactive online formats were preferred although concise, easy to read static information illustrated with icons, graphics and videos was also acceptable.

Some women wanted individual tools to assess their current nutrition, fitness and weight, with practical ways to improve if needed. Self-assessment quizzes were considered particularly engaging, especially if they followed up with relevant advice and ideas to support change. Non-invasive follow-up alerts by email or SMS were welcomed. Women said they focused more on their child than themselves during this period, and would respond more to parent-focussed lifestyle information if it also related to the developmental stage of their pregnancy and child. Women liked the support provided by some websites that included regular communication via email or app alerts linked to developmental stage of the child.

I really love that monthly age appropriate idea, it's great, yeah and if it came to your inbox and you just kept it there for when you have time to read it. It's not a piece of paper that's floating around and has time to get lost (PG).

Sometimes women were simply seeking reassurance about the normality of their situation or new ideas to act on information they already know.

You know what you should be eating but it's just how to do it differently for more variety rather than just vegetables on a plate (P).

Makes it easier to look after yourself if you have good and quick recipe ideas, which recipe is high in what vitamins, minerals like iron and vit B etc... (P).

Forums and blogs were existing options for online support, but the reliability of information and time commitment were deterrents.

It's the same as when you're in a mother group, there are some things that are similar in your situation and advice, or things they've tried that you can take on board, and there's some things that you know have no relevance (PG).

I don't know if I like the forums – I think they can be a bit bitchy and opinionated. I can get on for a couple minutes at a time but to sit there for over an hour is just not possible (PG).

Given trust issues and search time constraints, most respondents welcomed online information that was in one place and preferably recommended by their health care provider.

If there was somewhere that had all the information you were looking for you can save that to your favourites or whatever and you can always go straight back to it rather than having to search again all the time (PG).

Discussion and recommendations

These results, viewed in the context of theories of behaviour change, provide clear direction for the type and form of online information and support needed to engage pregnant women and new mothers to improve their diet and physical activity levels. Theory suggests that individuals go through a multi-stage behaviour change process which includes growing awareness of an issue, assessment of personal risks and benefits, identification of options and goals, trying new behaviours, and retaining them if rewards outweigh the costs (Prochaska and DiClemente, 1983). Also, because individuals, their environment and behaviour

continuously interact and influence each other, barriers and supports need to be identified and addressed to achieve behaviour change (Bandura, 1977). Pregnant women and new mothers in this research identified a range of information and communication needs to support efforts to improve their healthy lifestyles. Whilst the stage of behavioural change of the women themselves was not assessed, their expressed needs are consistent with the types and forms of information and communication that would assist through the continuum of behaviour change (Table 1).

Table 1. Implications of behaviour change theory and mother’s needs for the type and form of online information and support provided by the Healthy You Healthy Baby resource.

Stage of awareness, motivation, action to change	Type and form of communication relevant and acceptable to mothers	Implications for HYHB
<i>Pre-contemplation/unaware</i> Need issue raised with them.	Focus on child’s health rather than own, need information that links these. Information from trusted sources like GP, midwife. Monitored blog or forum.	Tailoring to stage of gestation, child development. Referral by health professional to quality website, app, monitored blog, forum.
<i>Contemplative</i> Beginning to see the need to change lifestyle for healthier pregnancy or prevention of excess weight gain in pregnancy.	Self-assessment may trigger preparation for change. Need general information that shows the benefits of change and easy options.	Brief factual website information. Personal quiz website or app. Suggestions of easy actions tailored to quiz response.
<i>Preparing</i> Prepared to give change a try and making plans.	Need to know benchmarks for safe weight gain, exercise, food. Quick answers to specific questions, recipes, information on local activities to give focus for action.	Goal setting on website or app. Question/answer format with links to detailed information. Tips, recipes, local activities.
<i>Action/Trying</i>	Need short-term rewards, validation	Revisit goals, quizzes for

Trying different behaviour. Open to receiving help and support.	of experiences.	feedback and monitoring. Emails tailored to gestational stage. Tips, recipes, local activities. Monitored blog, forum.
Maintaining Former behaviour no longer desirable but need to prevent relapse through coping strategies	Advice to address day to day issues that challenge healthy lifestyle.	Emails tailored to gestational stage. Tips, recipes, local activities. Monitored blog, forum.
Relapse/Termination/Advocacy Relapse may occur but new behaviour preferred. Advocate to other women.	Affirmation of achievements. Sharing with other women.	Emails tailored to gestational stage. Tips, recipes, local activities. Monitored blog, forum.

Motivation is critical to initiating and maintaining behaviour change. Given the child-centric focus of mothers, linking maternal and child health and tailoring information to the developmental stage of their child increases its personal relevance, particularly in the pre-contemplation and contemplation phases, and increases the likelihood that it will be read, cognitively processed, and acted on. Likewise, women trust advice from health professionals, and in this research indicated high likelihood to follow up online resources recommended by their GP or midwife. Brief general information is both informative and confirming in the contemplative stages but more specific facts tailored to individual needs are likely to be needed in the preparation stage. Mothers said they liked self-assessment quizzes, which in turn encourage individual goal setting for lifestyle change (Brown et al., 2012). Self-confidence to make changes is enhanced when individuals have the necessary skills, and women showed high interest in menus, recipes and other tips either downloadable online or through blogs and chat groups. Finally, women wanted regular emails, blogs and chat groups which would provide ongoing support for the acquisition of skills and self-confidence needed to sustain behaviour change. Whilst SMS messaging has been used as an alert in other health

promotion programs (Fjeldsoe et al., 2009; Fjeldsoe et al., 2011), mothers in HYHB focus groups resented the intrusion of non-urgent messages (especially when breast-feeding or napping) and recommended email or Facebook messages that could be read and acted on at a convenient time.

The HYHB online materials were developed considering this analysis of women's preferences related to behaviour change theory, as well as the resources available to the project. General information on maternal healthy diet, physical activity and weight is available under the 'Pregnancy' and 'Being a Parent' sections at <http://www.ngala.com.au/You-and-Your-Family>. Facts and tips are provided along with links to more detailed quality assured information and local resources. Lifestyle self-assessment quizzes and feedback are available online or via Smartphone application. Users can register to receive emails with lifestyle information and tips tailored to the developmental stage of their pregnancy or child. Additional support is available through a monitored Ngala Facebook page. Health professionals provide links to the resources to parents at antenatal and postnatal visits.

Conclusions

This research with pregnant women and new mothers confirmed that women are seeking online advice during their childbearing years. Their expressed online content needs were for factual information about safe foods, exercise and weight as well tips and ideas to support healthy lifestyle change. An interactive format was preferred, including question and answer and self-assessment with tailored feedback. This mix of information and interactive support is consistent with theory showing the need for motivation, factual and practical information, goal setting, and feedback at different stages of behaviour change. Referral by health professionals and quality assurance of online material is important to increase the confidence of women to act on it. Whilst the HYHB materials are designed to address theoretical

concepts and expressed needs, evaluation of implementation is now needed to guide future use.

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