Exploring the cultural appropriateness and usefulness of an mHealth program for optimal infant feeding in an urban Aboriginal and Torres Strait Islander Health Service: Growing healthy at Inala

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I, Annalie Houston declare that this thesis, is submitted in fulfilment of the requirements aware of Master of Health Services (Research), in the Faculty of Health at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution. This research is supported by the Australian Government Research Training Program.

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Terminology

Reflecting the cultural diversity and preference of descendants of the original inhabitants of the continent and surrounding islands now called Australia, the terminology “Aboriginal and Torres Strait Islander people” is acknowledged and is consistent with National Health and Medical Research Council (NHMRC) guidelines (NHMRC, 2007, Hayman et al., 2014). The term “Aboriginal” used alone is defined by the person referring to themselves identifying as “Aboriginal and not Torres Strait Islander”. Aboriginal, Aboriginal and Torres Strait Islander and Torres Strait Islander peoples are referred to in the thesis as distinct ethnic groups rather than racial groups. The term “Indigenous” is only used in the thesis to refer to peoples around the world who were the original inhabitants of their lands. The term “non-Indigenous” is used to refer to people who do not identify as either Aboriginal or Torres Strait Islander.

“mHealth”, or “mobile health” is the delivery of health information via mobile technologies such as mobile phones (Misha et al., 2011). The term "app" used throughout the thesis is a shortening of the term "software application". A mobile “app” is a computer program designed to run on a mobile device such as a Smartphone or tablet (SmartphoneAppsPedia, 2015). A Smartphone is a mobile phone with an advanced mobile operating system which combines features of a personal computer operating system with other features useful for mobile or handheld use. A tablet is a small portable computer that accepts input directly on to its screen rather than via a keyboard or mouse (SmartphoneAppsPedia, 2015).

Abbreviations

ABS	Australian Bureau of Statistics
AHW	Aboriginal Health Worker
AIHW	Australian Institute of Health and Welfare
ATSIHRAC	Aboriginal and Torres Strait Islander Health and Research Advisory Committee
BMI	Body Mass Index
COAG	Council of Australian Governments
CoE	Southern Qld Centre of Excellence in Aboriginal & Torres Strait Islander Primary Health Care
COM-B	Capability-Opportunity-Motivation
GPs	General Practitioners
HREC	Human Research Ethics Committee
iOS	Operating System for iPhone, iPads and iPod touch
NACCHO	National Aboriginal Community Controlled Health Organisation
NHMRC	National Health and Medical Research Council
NSW	New South Wales
PC	Personal Computer
PDA	Personal Digital Assistant
PICF	Participant Information and Consent Form
QLD	Queensland
RCT	Randomised Control Trial
RWG	Rapid Weight Gain
SES	Socioeconomic Status
SMS	Short Messaging Service
UNICEF	United Nations Children's Fund
vs.	Versus
WHO	World Health Organisation

Abstract

Background

Inappropriate infant feeding practices are associated with poor health and may contribute to excess weight gain. Aboriginal and Torres Strait Islander infants have lower rates of breastfeeding, higher rates of early introduction of solids and higher rates of childhood obesity compared to other Australians. There is a lack of evidence about effective and culturally relevant programs addressing infant feeding for Aboriginal and Torres Strait Islander families. The delivery of health promotion programs using mobile phones (mHealth) offers a promising new avenue for engaging Aboriginal and Torres Strait Islander families. The Growing healthy program is an app and website targeting healthy infant feeding practices for parents experiencing socioeconomic disadvantage. Growing healthy at Inala is an exploratory study of this program amongst Aboriginal and Torres Strait Islander families in an urban area.

Objective:

The aims of this study were to explore whether the Growing healthy app is a suitable approach to provide infant feeding support to parents of Aboriginal and Torres Strait Islander infants. Also, to explore the key factors that need to be considered in adapting such a program to ensure that it is culturally appropriate and engaging.

Methods:

This study was conducted at an urban Aboriginal and Torres Strait Islander primary health care service. Two participant groups were involved: parents of Aboriginal and Torres Strait Islander infants aged less than nine months; and clinical staff of the health service. A multiple method approach, with predominantly qualitative methods, was used and comprised of three components. Firstly, an informal discussion with parents was held to explore the appropriateness and acceptability of key messages provided in the program's

app. Secondly, parents used the program for at least six weeks, after which they participated in semi structured interviews. There were two rounds of interviews conducted with most parents, and interviews explored parent's experiences of using the program, and suggestions for improvement. The app analytic data provided insight into how the parents used the program and which messages they accessed. Finally, two group discussions with staff of the health care service were conducted to explore their perceptions of the program.

Results:

Two parents attended the informal discussion and ten parents used the program for at least six weeks and participated in semi-structured interviews. A total of nineteen staff members participated in group discussions with staff. The data suggested that the Growing healthy app has the potential to provide infant feeding support for parents of Aboriginal infants in an urban setting, as it was perceived to be a helpful, consistent, reassuring and an easily accessible source of information and support. Parents raised less concerns with the cultural appropriateness of the app than the staff. Most staff thought modifications were required for the app to be considered culturally appropriate and acceptable. The look and feel of the app were important factors for cultural considerations. Presenting information as stories or real-life experiences in the app were suggestions parents and staff made.

Conclusions:

The findings suggest that the Growing healthy app may be a suitable mode for providing infant feeding support to Aboriginal and Torres Strait Islander families if key cultural insights are considered to maximise engagement and potential impact. While there were differing opinions of the staff and parents about key cultural insights, the parents implied that they accepted the app as it was promoted by a trusted health care practitioner through a trusted health care service.

Chapter 1: Introduction

Health promotion in Aboriginal and Torres Strait Islander communities is an important consideration within the “Closing the Gap” strategy to reduce the disparity between health outcomes in Aboriginal and non-Indigenous members of the population (Department of Health and Ageing, 2013b, Commonwealth of Australia, 2017). Health promotion for Aboriginal and Torres Strait Islander populations needs to take into account differences in culture; diversity of cultural beliefs and traditions within communities; languages and dialects; socio-economic circumstances; geographic location and the consequences of colonisation (Wise et al., 2012).

Considering the large number of Aboriginal and Torres Strait Islander communities across Australia (Horton, 1996), a key challenge is designing health promotion programs that are culturally appropriate for Aboriginal and Torres Strait Islander people within communities (Hearn and Wise, 2004). Central to achieving this is a holistic approach to health, recognising the needs and knowledge held in Aboriginal and Torres Strait Islander communities, and recognising of the importance community involvement in developing and implementing health promotion programs (Wise et al., 2012). Therefore, development of culturally appropriate programs or adaptation of mainstream programs to meet the needs of Aboriginal and Torres Strait Islander people is essential to improve outcomes (Demaio et al., 2012). Health promotion programs are more likely to build stronger communities when community people become involved in making decisions about the suitability of program resources (Wijlaars et al., 2011). This emphasises the need to explore the acceptance and appropriateness of a mainstream health promotion programs prior to implementation in an Aboriginal and Torres Strait Islander community.

This research explored whether an mHealth (mobile health) promotion program developed for the general population (Growing healthy) is appropriate to provide infant feeding support to Aboriginal and Torres Strait Islander families in an urban setting in southern Queensland. mHealth is becoming a more popular

method for health promotion programs, however little research has been conducted exploring whether it is a useful approach to provide infant feeding support for Aboriginal and Torres Strait Islander families. It is essential that programs developed for the general population are assessed for their cultural appropriateness for Aboriginal and Torres Strait Islander peoples prior to implementation. The research reported in this thesis provides some insight into culturally appropriateness and suitability of one mHealth promotion program, targeting infant feeding in a group of Aboriginal and Torres Strait Islander families.

1.1 The Growing healthy program

The Growing healthy program (Denney-Wilson et al., 2015) is an mHealth mobile application, short messaging service (SMS) and website providing parents with evidence based advice about infant feeding in the first nine months of life. The program is intended to complement routine care provided by primary health care practitioners and is tailored to the needs of families experiencing socioeconomic disadvantage. The Growing healthy program provides information and strategies to parents, advice and tips consistent with the National Health and Medical Research Council's (NHMRC's) Guidelines for Infant Feeding (NHMRC, 2012). The program aimed to:

- Promote breastfeeding
- If breastfeeding is not possible, promote best practice formula feeding
- Delay the introduction of solids to around six months of age but not before four months
- Promote healthy first foods and appropriate transition to family foods
- Promote healthy infant feeding practices
- Optimise infant dietary exposure to fruits and vegetables

- Improve infant diet quality at nine months of age (Denney-Wilson et al., 2015).

The Capability-Opportunity-Motivation (COM-B) theoretical framework and the behaviour change wheel model (Michie et al., 2014), were used to guide the development of the program. The Growing healthy program was also informed by: (1) two systematic reviews of the literature (Russell et al., 2016b, Laws et al., 2014); (2) qualitative interviews with mothers experiencing socioeconomic disadvantage (Russell et al., 2016a); and (3) questionnaires and interviews with maternal and child health nurses and nurses in general practice (Laws et al., 2015). An investigation of apps and websites concluded that there were no apps available to consumers that provided evidence based infant feeding advice and support for families that were a credible and reliable source of information (Taki et al., 2015).The findings from these studies suggested that one option for supporting infant feeding was the development of an app with evidence based information and resources to support feeding behaviours that promote healthy growth.

The Growing healthy program was delivered via an app for Smartphones, or SMS and website for those without Smartphones. During this thesis, the term the Growing healthy app relates to the participant receiving the Growing healthy program via a mobile phone (whether they have a Smartphone or not). The Growing healthy program provides parents with a ‘one-stop shop’ for infant feeding information (Denney-Wilson et al., 2015).

The app push notifications received on Smartphones allow the Growing healthy app to notify the parent of new messages even when they are not actively using the application. The app push notification appeared in the notification centre or on the lock screen on Smartphone devices. For parents with a mobile phone without Smartphone features (therefore without the Growing healthy app loaded onto their phone), messages were delivered via SMS and email with a link to the website for further information. Most of the information provided in the app did not require the user to have internet connection unless a video or a link to another website or app was selected.

Parents received three messages a week via app push notifications on their mobile phone on infant feeding topics relevant to the age of their infant and tailored to their feeding mode (breast, formula or mixed). One app push notification message per week was targeted at the mum, for example*, "Do you feel exhausted? Try taking a nap*", one message was targeted to the infant's general feeding, for example*, "Been told different advice on when to start solids? You're not alone. Watch the advice a dietitan gives a mum experiencing the same here".* One message was targeted to infant feeding practices related to the feeding mode, for example, *"Wondering how much formula is right for [x]? Read more here"*. The app push notification messages were designed to encourage users to engage with the Growing healthy app content relevant to the program's aims. For example, this message was delivered to a mother who had indicated she was mixed feeding when the infant was four weeks of age "*Wondering about your milk supply? These simple feeding rules will help you keep up your milk supply while giving formula- Read more……*". Included in the message were links to additional information that could be found on the app/website (previously: http://www.growinghealthy.org.au) (Denney-Wilson et al., 2015).

A feasibility trial of the Growing healthy program has examined how this intervention can be delivered within the primary health care setting, including the most effective approach to reaching families, as well as the feasibility, uptake, effectiveness and sustainability of the intervention from the perspective of both families and practitioners (Russell et al., 2018, Laws et al., 2018). The Growing healthy program was not developed specifically for an Aboriginal and Torres Strait Islander audience. Therefore, the current study explored the acceptability and appropriateness of the Growing healthy program for Aboriginal and Torres Strait Islander families who attended the Southern Queensland Centre of Excellence in Aboriginal and Torres Strait Islander Primary Health Care (CoE).

1.2 Research context

In order to explore ways to improve health outcomes and close the health gap, this research was conducted with parents of Aboriginal and Torres Strait Islander infants (that is, either the mother or father of an infant identifies as Aboriginal and/or Torres Strait Islander) who reside in an urban area of South Eastern Queensland. The Aboriginal and Torres Strait Islander population is much younger and has higher birth rates than the non-Indigenous population. The Aboriginal and Torres Strait Islander birth rate is 25% higher than that of non-Indigenous Australians and there is a faster growth in the Aboriginal and Torres Strait Islander population than for non-Indigenous Australian populations (current annual growth rate of 2.2% compared to 1.6% respectively). The Aboriginal and Torres Strait Islander population is relatively young, with around 65% being younger than 30 years of age, compared with 39% of non-Indigenous Australians (ABS, 2014).

Across Australia, 57% of Aboriginal and Torres Strait Islander people reside in an urban setting (ABS, 2013a). For the purposes of this thesis, Aboriginal and Torres Strait Islander people living in urbanised environments refers to those living in cities, major regional or rural towns. Conducting research in an urban area may provide important insights into culturally appropriate and engaging mHealth promotion programs for Aboriginal and Torres Strait Islander families in urban communities and reduce the health outcome disparities.

1.2.1 The Southern Queensland Centre of Excellence in Aboriginal and Torres Strait Islander Primary Health Care

In the past, Aboriginal and Torres Strait Islander peoples living in Inala experienced difficultly accessing health care (Greenop, 2008). When the suburb of Inala was founded in 1946, there was no train line that serviced the area and residents were dependent on scarce bus amenities for transport to services unless they could afford their own car (Greenop, 2008). As there were no doctors in Inala, a visit to the doctor could take all day (IPC, 2017). In 1977, the opening of the Inala Community Health Centre general practice greatly

improved access to medical care for the community (IPC, 2017). However, when Dr Noel Hayman, one of Queensland University's first Aboriginal medical graduates, came to Inala in 1995 he found that only twelve Aboriginal people (out of the 1063 Aboriginal and Torres Strait Islander people who lived in Inala at the time) attended the Inala Community Health Centre general practice (Hayman et al., 2009). At this general practice, Dr Hayman found access barriers to primary care including racist attitudes, and an associated unwillingness to accommodate Aboriginal and Torres Strait Islander people's cultural needs (Hayman et al., 2009). In 1995, he established the Inala Indigenous Health Service (IIHS), engaged with the community and addressed barriers to access.

In 2006, the IIHS was permitted to operate with an exemption from section 19(2) of the *Health Insurance Act 1973 (Commonwealth)*, which enables Medicare rebates to be claimed for state-remunerated primary health care services in certain situations (Hayman et al., 2009). Bulk-billing payments enabled the service to employ extra staff members, including two doctors, two nurses and two administration officers (Hayman et al., 2009). By the year 2013, due to Queensland Government funding, The Inala Indigenous Health Service expanded and matured into The Southern Queensland Centre of Excellence in Aboriginal and Torres Strait Islander Primary Health Care (CoE). The CoE improved access to health care and improved health outcomes by providing culturally appropriate high-quality, integrated primary and secondary care and a research agenda focusing on health service delivery (Hayman et al., 2014). Staff of health services that are culturally competent in terms of knowledge, skills and attitudes of Aboriginal and Torres Strait Islander people is critical for effective care (Burton, 2012), and the CoE has been documented to embrace cultural safety and strive for their staff to demonstrate these characteristics (Hayman et al., 2014). With over 4,000 regular patients (a regular patient has attended at least three visits in the past 2 years (RACGP, 2010)) in 2017 the CoE now operates in a stand-alone building which opened in 2013. The building comprises of primary health care practitioners, allied health professionals, Aboriginal Health Workers (AHWs) and research staff members. The building

includes a large kitchen for cooking demonstrations, women's and men's group meeting space and a specially designed paediatric clinic area.

1.2.2 Inala's origins, socioeconomic status and strengths

The suburb of Inala is located within the traditional lands of the Jagara (also written Jagera) people in South East Queensland, approximately 19km southwest of the Brisbane central business district. Before colonisation, Aboriginal people lived in South Eastern Queensland for approximately 60,000 years (Kaeyes, 2006). The Brisbane area was first colonised by the British in 1824, and, at that time, approximately 5,000 Jagara people lived in the Inala area (Chou et al., 2013). Following colonisation by the British settlers and convicts in Brisbane, the Inala area was initially used by the colonists for sheep farming, dairy farming, and timber- getting (Kaeyes, 2006).

Through the latter half of the 20th century, Inala's population increased with waves of immigration. The concentration of families living in government funded houses was and continues to be associated with intergenerational unemployment and socioeconomic disadvantage. Socioeconomic disadvantage may be measured by social indicators including unemployment and income (ABS, 2017, Vinson et al., 2015). Census data from 2016 indicates that a considerable proportion of Inala residents are unemployed (18.4% compared to 7.6% of Queenslanders) and have lower household income than other Queenslanders (35.8% earn less than $650 gross weekly income compared with 19.5% for other Queenslanders) (ABS, 2017). Further evidence of socioeconomic disadvantage in Inala comes from data in the national 2015 "Dropping off the Edge; Persistent communal disadvantage in Australia" report (Vinson et al., 2015). The report indicated that Inala was the only local government area listed in the most disadvantaged areas of Queensland that was located in an urban location (Vinson et al., 2015).

Despite the socioeconomic disadvantage experienced in Inala, the area has always retained a strong sense of community identity, and this is no less the case for Aboriginal and Torres Strait Islander peoples (Greenop, 2008). The

latest census data from 2016 shows that 5.5% of the Inala and the adjoining suburb of Richlands (Figure 1: Map of the Inala and Richlands area) populations identified as being of Aboriginal and Torres Strait Islander ethnicity, one of the highest proportions in Brisbane (ABS, 2017) (Figure 2: Map of Inala's location in Brisbane). By way of comparison 2.8% of the national Australian population identified as being Aboriginal and/or Torres Strait Islander ethnicity (ABS, 2017). The relatively high proportion of Aboriginal and Torres Strait Islander people in Inala can help Aboriginal and Torres Strait Islander people feel at home and more connected (Greenop, 2008).

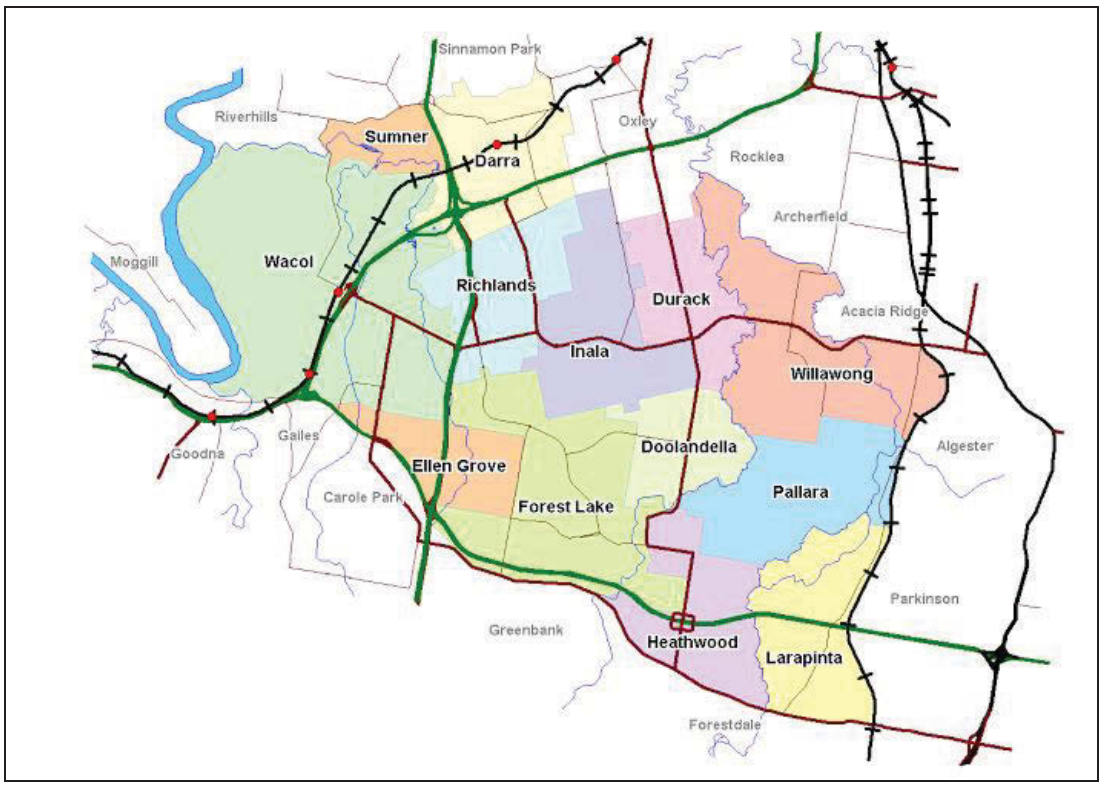

Figure 1: Map of the Inala, Richlands and surrounding suburbs (Hesse-Biber and Johnson, 2013)

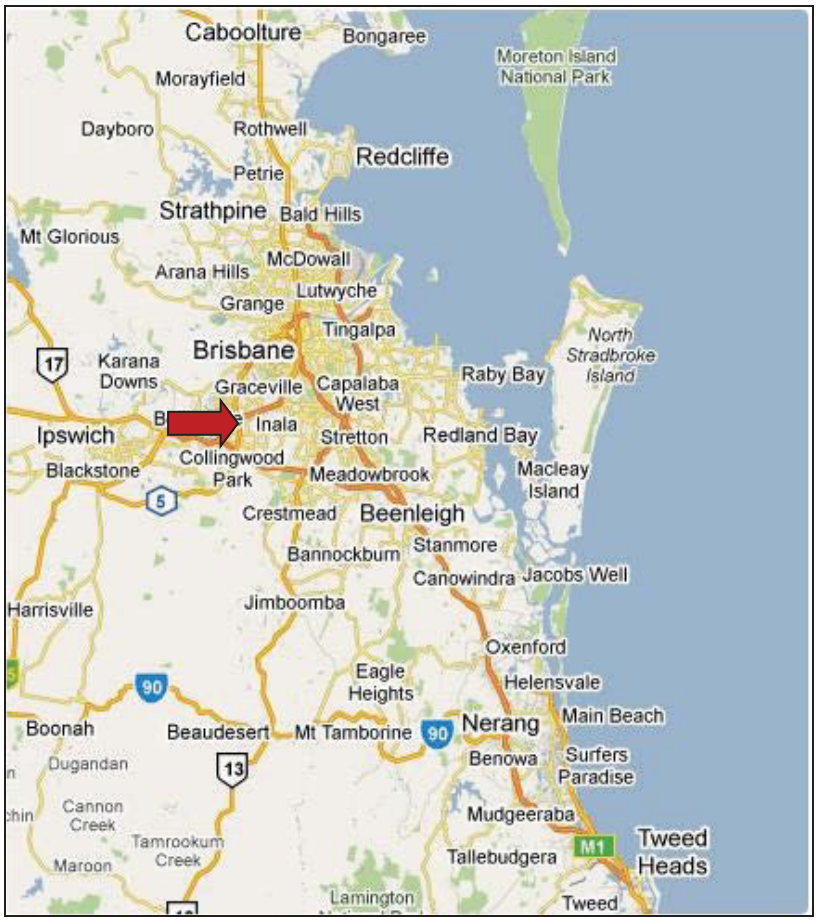

Figure 2: Map of Inala's location (marked by a red arrow) in Brisbane

1.2.3 Positioning the researcher

The higher research degree candidate (hereinafter referred to as the candidate) has worked as the clinical dietitian at the CoE, since the beginning of 2011. She conducts dietitian consultations with individuals and couples or families who predominantly have been referred by General Practitioners (GPs) or specialists at the CoE. She also participates in community events to provide practical nutrition education.

Before working at the CoE, the candidate had no previous experience working with Aboriginal and Torres Strait Islander people, nor in areas where people experience socioeconomic disadvantage. Since commencing in the role, the candidate has learnt a lot about Aboriginal and Torres Strait Islander history, Aboriginal and Torres Strait Islander families, and the Inala area. Learnings

commenced upon orientation with the CoE where the candidate was provided with a community tour guided by a local AHW visiting community housing, centres and shops. Introductions to the Elders and workers in community organisations established relationships with many community members. Meeting, building rapport and getting to know the Inala Aboriginal and Torres Strait Islander community was important as it enabled the candidate to listen to the knowledge and wisdom shared by the Elders and community members.

The tour and orientation had a strong impact on the candidate, providing cultural lessons that facilitated making the dietetic clinic more culturally safe for patients of the health service. Key lessons learned included the style of appropriate education resources, connecting with patients through appropriate communication style such as not using medical jargon and extending appointment times to allow the Elders to tell their story and share their experiences. The learnings and the practises implemented expanded and culturally safe dietetic service improved the availability, acceptability and appropriateness for Aboriginal and Torres Strait Islander people (Foley and Houston, 2014).

The candidate endeavoured to maintain a culturally safe practise and a strong presence in the community through participation in cultural community events (Greenop, 2008). The candidate has interacted with community members, including mothers of Aboriginal and Torres Strait Islander infants regularly over the years, at these events and at the CoE. Aboriginal and Torres Strait Islander mothers visit the CoE early and regularly throughout their pregnancy (Maher et al., 2014).

During the candidate's time at the CoE, she had developed and maintained a Facebook page "Inala Indigenous Health Dietitian". By doing this, she learnt that the social media site was an effective way to engage with patients and community members. The page allowed the candidate to promote nutrition information to a wide audience and communicate with patients of the CoE outside of consultation times. The Facebook page was an excellent avenue to engage with people who preferred accessing dietitian support through social

media rather than attending a face-to-face consultation. The candidate noticed that female adolescents and new mothers seemed to engage with the page very well. It was also useful to regularly promote local Aboriginal and Torres Strait Islander nutrition and health information.

1.3 Ethical Conduct in Aboriginal and Torres Strait Islander Health Research

For this study, the candidate has been informed by two key documents: the Road Map II: A Strategic Framework for Improving the Health of Aboriginal and Torres Strait Islander People through Research (Road Map II) (NHMRC, 2010) and the Values and Ethics: Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research (Values and Ethics) (NHMRC, 2003).

The first guiding document, the Road Map II was developed and endorsed in 2009, and responded to issues raised in the review of the NHMRC Road Map: A Strategic Framework for Improving Aboriginal and Torres Strait Islander Health Through Research (the Road Map) (NHMRC, 2002). The Road Map was reviewed over 2007-2008 by the Aboriginal and Torres Strait Islander Health and Research Advisory Committee (ATSIHRAC). The points the committee raised reviewing the Road Map framework were: (1) The Road Map needs to be action orientated, (2) The Road Map needs a communication strategy, (3) Capacity building career development opportunities need to be maintained and include pathways into research fields for post-graduates (NHMRC, 2002). The Road Map II was therefore developed encompassing these points.

The Road Map II's overall objective is to "close the gap between the life expectancy of Aboriginal and Torres Strait Islander people and the overall Australian population" (NHMRC, 2010). The document was developed to ensure Aboriginal and Torres Strait Islander participants are involved in the planning and the conduct of the research. Page two of the Road Map II states "*Road Map II will be used by the NHMRC's Research Committee to identify Aboriginal and Torres Strait Islander research topics requiring priority funding. Road Map II can be used by researchers to develop research proposals to*

apply for NHMRC funding under NHMRC Targeted Calls for Research in Aboriginal and Torres Strait Islander health, or in any biomedical, clinical, public or health services research field which includes Aboriginal and Torres Strait Islander population level health research" (NHMRC, 2010, p2).

Under the NHMRC's Road Map II framework, "effective research is research that breaks through the barriers to positive social participation caused by poverty and psychosocial stress". Therefore, the underlying principles for conducting research in accordance with the NHMRC's Road Map II are listed in Box 1 (NHMRC, 2010).

Box 1: Underlying principles for Road Map II research:

- Health is whole of life view, which embraces the life, death, life concept;
- The development, conduct and communication of research which requires the involvement of the Aboriginal and Torres Strait Islander community;
- To support effective capacity exchange and requires communication of research plans, progress and results;
- Ethical research that has practical application and value to Aboriginal and Torres Strait Islander people and their service providers;
- Enhancing capacity of the Aboriginal and Torres Strait Islander workforce by developing skills and knowledge; and
- Identifying examples of models of success (NHMRC, 2010).

Road Map II guided research requires to have an action-orientated purpose and/or be linked to the community-capacity building goals of existing primary health care service delivery agencies (NHMRC, 2010). The Road Map II strategy focuses on seven action areas aimed at building capacity for Aboriginal and Torres Strait Islander researchers and investing in research that addresses

issues of importance to Aboriginal and Torres Strait Islander peoples. The seven Road Map II action areas are:

- Improving the participation of Aboriginal and Torres Strait Islander researchers/people in NHMRC programs and in health research generally;
- Capacity exchange;
- Promotion of NHMRC's role in Aboriginal and Torres Strait Islander health;
- Contributing to the Australian Government's *Close the Gap* health initiatives;
- Evaluation research including health literacy research that identifies the best ways of explaining possible treatment options to Aboriginal and Torres Strait Islander people;
- Intervention research, including combining social health and clinical health; and
- Priority-driven research (NHMRC, 2010).

The other guiding document which advised the research, Values and Ethics, (NHMRC, 2003) should be read alongside the National Statement on Ethical Conduct in Research Involving Humans (NHMRC, 2015). The Values and Ethics document's purpose were to provide guidelines on the ethics of health research for the whole community, to provide protection to all Australians, including Aboriginal and Torres Strait Islander peoples. The guidelines provide guidance to researchers in the development and conduct of research, as well as to Human Research Ethics Committees (HRECs). The guidelines were developed by a Working Party, which comprised of relevant stakeholders including researchers, Aboriginal and Torres Strait Islander peoples, and public consultation in addition to a review of relevant literature. These guidelines

emphasise six core values including spirit and integrity, reciprocity, respect, equality, survival and protection, and responsibility (NHMRC, 2003).

Firstly, reciprocity ensures research outcomes are of benefit and value to Aboriginal and Torres Strait Islander communities. Respect is the core value referring to respectful relationships between the researcher and the participants and establishes and acknowledges the right of people to have different values, norms and aspirations. The trust, openness and engagement with participating individuals and communities is as important as the scientific rigour of the investigation. Equality is the value that affirms Aboriginal and Torres Strait Islander people's right to be different and valuing the knowledge of wisdom, equality of partners and the distribution of benefit. Strategies need to be in place to identify and eradicate any threats to Aboriginal and Torres Strait Islander peoples enjoying their cultural distinctiveness and safeguards for possible discrimination. Finally, spirit and integrity, the all-encompassing value that connects all other values into a coherent entity was shown by including the community in decision making. The guiding principle of spirit and integrity required the candidate to have respect for persons which is expressed as regard for the welfare, rights, beliefs, perceptions, customs and cultural heritage of persons involved in research (NHMRC, 2003).

As recommended by the NHMRC Values and Ethics Guidelines (NHMRC, 2003), the candidate, a non-Indigenous health researcher, referred to an AHW throughout the study to ensure the ethical and culturally respectful conduct of the study. The AHW advised and supported the candidate and advocated for the values and perspectives of Aboriginal and Torres Strait Islander participants throughout the study. The AHW was also available for Aboriginal and Torres Strait Islander participants for cultural support throughout the research. The candidate was able to cross-check results and ensure the findings were of practical value to Aboriginal and Torres Strait Islander people as per the NHMRC Values and Ethics Guidelines (NHMRC, 2003). The planning and conduct of the research, dissemination of the findings, and the specific application of the guidelines to the Growing healthy at Inala research, are explained in Section 3.5.

1.4 Research aim and questions

As an exploratory study, this thesis did not attempt to reach definitive conclusions about culturally appropriate mHealth support for parents of Aboriginal and Torres Strait Islander infants. Instead, this thesis attempted to investigate attitudes of parents and staff in an urban setting toward an mHealth program for support with infant feeding. Exploring parent's and staff's ideas, beliefs, attitudes around cultural considerations were also examined. Prevalent literature on the subject matter typically does not include detailed descriptions of cultural considerations an Aboriginal and Torres Strait Islander person might contemplate while using an mHealth program for infant feeding support. One cannot assume the primary health care service and parents attending the service would accept or engage with the program. Therefore, a detailed description of user perceptions and key stakeholder dynamics was suitable for this study which included parents using the program themselves. This included descriptions of parent's experiences with mHealth programs and infant feeding practices, through a multiple method approach.

1.4.1 Research aims

Growing healthy at Inala had two overarching aims. Firstly, to explore whether the Growing healthy program is a suitable approach to provide infant feeding support to parents of Aboriginal and Torres Strait Islander infants. Secondly, to explore the key factors that need to be considered in adapting such a program to ensure that it is culturally appropriate and engaging.

1.4.2 Research questions

1) The study explored the following research questions: Is mHealth an appropriate method of health promotion with families in an urban Aboriginal and Torres Strait Islander area/population?

2) Is the Growing healthy program a culturally acceptable source of information and support on infant nutrition for parents of Aboriginal and Torres Strait Islander infants from an urban area?

3) What adaptations are required, if any, to improve the Growing healthy programs appropriateness for Aboriginal and Torres Strait Islander families living in an urban area?

1.5 Overview of the thesis

This thesis contains five further Chapters. In Chapter 2, the literature pertaining to childhood overweight and obesity is reviewed. Next, infant feeding practices for Aboriginal and Torres Strait Islander people and culturally appropriate health promotion including mHealth programs are reviewed. Finally, the gaps in the literature relevant to Aboriginal and Torres Strait Islander people using mHealth for promotion and support of healthy infant feeding are identified.

In Chapter 3, the study design and methods used to investigate these research questions are described, which included a multiple method approach, with predominantly qualitative methods.

In Chapter 4, the results from this research are described. Findings illustrated mHealth and the Growing healthy app were perceived as appropriate methods of health promotion and of support on infant nutrition for parents of Aboriginal and Torres Strait Islander infants from an urban area. The adaptations that were suggested by the parents and staff are also included in this Chapter.

In Chapter 5, each of the research questions are addressed, which informs the implications and conclusions described in Chapter 6. Implications for researchers, clinicians, primary health care services and mHealth developers are discussed.

Chapter 2: Literature review

2.1 Introduction

This Chapter reviews the current literature regarding overweight and obesity in Aboriginal and Torres Strait Islander children. The prevalence and consequences of excess weight and obesity in childhood are discussed, as are some causes, including parental feeding practices during infancy. It outlines principles of culturally appropriate health promotion and applies these principles to health promotion aimed at preventing excess weight gain in Aboriginal and Torres Strait Islander children. Finally, it explores the emerging area of mHealth, and the evidence for its use as a health promotion modality for Aboriginal and Torres Strait Islander families.

2.1.1 Search strategy

The comprehensive literature search included searches of five health databases; Ovid (MEDLINE), EBSCO (CINAHL), Scopus, PubMed and Informit: Aboriginal and Torres Strait Islander Health to capture Aboriginal and Torres Strait Islander health research publications. In each instance the search parameters limited the results to items published in the English language, in peer reviewed journals and within the most recent 15 years.

Identified articles published targeted major concepts which included Aboriginal, Torres Strait Islander, infant feed*, nutrition, childhood obesity, health promotion and mobile health/ mHealth. This was supplemented with snowballing from existing reviews and papers. Search terms used included “Aboriginal” and “Torres Strait Island*”, “Indigenous”, infant feed*, “health promotion”, “nutrition*”, “diet”, “mHealth” and “digital education”. Table 1 outlines the terms used to search the literature.

Table 1: Literature search strategy

Concept	Number	Search strategy
Child	1	Child*, Paediatri*, Pediatr*, Toddler*, preschool*, pre school*, pre-school*
Obesity	2	Obesity, Obes*, overweight, over weight, over eat, overeat*
Infant feeding	3	Infant feed*, or infant nutrition, or breastfeed*, or formula feed*, introduction of solids
Aboriginal	4	Aborig*, Torres Strait Island*, Indigenous, first nation
Socioeconomic factors	5	Socioeconomic*, socio-economic*, Social* or economic*
Early intervention	6	Early intervene*
Health promotion	7	Health promot*, health educat*
Culturally appropriate programs	8	Cultural* appropriate, cultural* acceptable
mHealth	9	eHealth, mobile health, social media, telemedicine, digital education, smartphone
	10	1 AND 2 AND 3
	11	10 AND 4 AND 5
	12	11 AND 6 AND 7
	13	12 AND 8
	14	13 AND 9
	15	Limit 10/11/12/13/14 to human and English language and within 15 years

Truncate symbol was used to find variations on the end of a word stem. Example: educat retrieved educate, educating, education, educational, educator, educators.

A literature search was conducted to find research describing early interventions for prevention of childhood overweight and obesity. The search was narrowed to focus on Aboriginal and Torres Strait Islander populations in either the title or the abstract. The next search included culturally appropriate

health promotion programs for Aboriginal and Torres Strait Islander families and mHealth types of programs. The search on childhood overweight and obesity included early interventions for prevention of obesity with infant feeding practices. Results for the literature search are listed in Table 2.

Table 2: Literature search results

Theme	Number of items found
A. Early intervention for prevention of childhood overweight and obesity in Australia	9
B. Culturally appropriate health promotion programs for Aboriginal and Torres Strait Islander populations	12
C. mHealth programs for Aboriginal and Torres Strait Islander populations	6
D. Culturally appropriate mHealth programs regarding infant feeding for Aboriginal and Torres Strait Islander people	0

2.2 Childhood overweight and obesity

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health (WHO, 2016). In children, growth patterns and age need to be taken into consideration when defining overweight and obesity. For children less than five years of age overweight and obesity are defined as weight-for-height greater than 2 or 3 standard deviations respectively above the World Health Organisation (WHO) Child Growth Standards median (WHO, 2016). Childhood overweight and obesity is common in Australia and has been for several years (ABS, 2015). In 2011- 2012, 18% of Australian children aged 2-4 years were overweight or obese. For children aged 5-17 years this increased slightly from 26% to 27% in 2014- 2015 (ABS, 2015).

Aboriginal and Torres Strait Islander children experience a higher prevalence of overweight and obesity than non-Indigenous children, and the prevalence continues to grow throughout childhood (Thurber et al., 2017, ABS, 2014).

According to national cross-sectional data from 2011 to 2013, the combined prevalence of overweight and obesity among Aboriginal and Torres Strait Islander children was considerably higher to that of non-Indigenous children at ages 2-to-4 years (a 6% difference) (ABS, 2014). This gap increases in the later years of 10-to-14 years and was significantly higher (an 11% difference) for Aboriginal and Torres Strait Islander children than non-Indigenous children (ABS, 2014). In addition to the ABS data, body mass index (BMI) trajectories of Aboriginal and Torres Strait Islander children have been published from the Longitudinal Study of Indigenous Children (Thurber et al., 2017). The longitudinal study comprised of 1,157 Aboriginal and Torres Strait Islander children aged 0.5-2 years and 3.5-5 years recruited from eleven diverse sites. The BMI change was tracked over three years from 2008 through to 2011 and the findings revealed a rapid onset of overweight and obesity between ages 3-to-6 (12% and 25%) and 6-to-9 years (39% and 42% respectively) (Thurber et al., 2017). Although it is difficult to directly compare the longitudinal prevalence data with national data due to different age group definitions, sample size and time periods, both data sets indicate a high prevalence of overweight and obesity for Aboriginal and Torres Strait Islander children.

2.2.1 Why is childhood overweight and obesity a problem?

The high prevalence of excess weight in Australian children is worrying as overweight and obesity can have short and long term health consequences and is associated with an increased risk of obesity later in life (Lakshman et al., 2012). Short term health consequences from childhood obesity include effects on their social and emotional wellbeing, and self-esteem, and has been associated with poor academic performance and a lower quality of life experienced by the child (Sahoo et al., 2015). Regarding physical health, childhood obesity has been linked to medical conditions during childhood including diabetes, sleep apnoea and heart disease (Sahoo et al., 2015). In addition to these conditions, children who are overweight or obese are at increased risk for stroke, several types of cancer, and osteoarthritis (Freedman, 2001, Bell et al., 2011).

2.2.2 Population subgroups who experience a high prevalence of childhood overweight and obesity

In high income countries, children from low socioeconomic backgrounds and Indigenous families have higher rates of overweight and obesity (Wake et al., 2007). Socioeconomic status (SES) is defined by indicators including geographical area of socioeconomic disadvantage, parental education and family income and wealth (Galobardes et al., 2006). In a large representative sample of almost 5000 Australian pre-school children across the nation, aged between four to five-years, the geographical areas that experience the most disadvantage were almost 50% more likely to be overweight or obese (Wake et al., 2007).

Food insecurity, poverty, limited access to healthier and fresher foods may contribute to the higher rates of childhood obesity and overweight in Aboriginal and Torres Strait Islander communities (DAA, 2011). The traditional lifestyle of Aboriginal and Torres Strait Islander peoples involved high levels of physical activity and a well-balanced diet, however colonisation resulted in a disruption of these characteristics and there was a shift to a Western diet, high in energy dense foods (Gracey, 2000). Colonisation has also resulted in ongoing socioeconomic disadvantage such as Aboriginal and Torres Strait Islander people are more likely to have inadequate housing and live in disadvantaged neighbourhoods than non-Indigenous Australians (ABS, 2016) and experience food insecurity (DAA, 2011). This leads to an increased intake of energy dense foods which are consumed more frequently in families from low socioeconomic backgrounds (Dattilo et al., 2012, Drewnowski and Specter, 2004). There is some evidence suggesting behaviours' including lack of daily breakfast and high soft drink consumption are more prevalent amongst Aboriginal and Torres Strait Islander children (Hardy, 2014, Haysom et al., 2009).

There is a need to address the broader social determinants of health and food insecurity for obesity prevention in children from low SES backgrounds, which include those from Aboriginal and Torres Strait Islander families. It is necessary to acknowledge obesity prevention programs are only part of the solution. There

is a need to tackle the broader causes with policy and a system level change (AIHW, 2016b, Davy, 2016), for example, making more opportunities for physical activity and improving access to affordable and nutritious food (Davy, 2016).

2.2.3 Rapid weight gain

Childhood obesity risk can start as early as infancy, during the first two years of life (Gillman and Ludwig, 2013). Rapid weight gain (RWG) in infancy is an abnormal acceleration of growth in early life, defined as change in weight for age z score >0.67 (equivalent to crossing centile lines on a growth chart) (Baird et al., 2005, Druet et al., 2012). RWG, independent of birthweight, is an important predictor of obesity in young children (Goodell et al., 2009, Penny et al., 2016, Druet et al., 2012, Ong and Los, 2006) and adults (Monteiro and Victora, 2005, Mook-Kanamori et al., 2011). RWG is linked to childhood obesity as infants double their birth weight during the first four to six months of life, and this timeframe corresponds to a critical period for the development of biological mechanisms that may regulate obesity later in life (Baird et al., 2005).

High rates of RWG have been documented for Australian Aboriginal infants (Webster et al., 2013). The Gudaga Study, a longitudinal birth cohort of 159 Australian Aboriginal children born on Sydney's urban fringe, found 34% of Aboriginal infants experienced RWG from birth to two years of age, and 37% were overweight and obese at two years of age (Webster et al., 2013). Of the children experiencing RWG, 62% were overweight or obese compared with 24% not experiencing RWG. This study suggests that Aboriginal infants in urban areas may require more intensive monitoring of growth and weight gain to identify or prevent RWG (Webster et al., 2013).

2.2.4 Infant feeding practices

2.2.4.1 Breastfeeding

Current Australian and international infant feeding guidelines recommend exclusive breastfeeding for the first six months and a combination of breastmilk

and age appropriate solids until the infant is 12 months of age, to achieve optimal growth, development and health of the infant (NHMRC, 2012, WHO, 2013). There are a number of benefits of breastfeeding, including mother-infant bonding and secure attachment (Bryanton et al., 2009, Allen and Hector, 2005), protection against infectious diseases for the infant (Duijts et al., 2009, Eidelman, 2012), and lower incidence of high blood pressure and diabetes and improved cognitive development in later life (Horta and Victoria, 2013, Kramer et al., 2008). There is strong evidence that exclusively breastfeeding for six months may prevent unhealthy weight gain in children and later in life (Hector et al., 2010).

In Australia, breastfeeding is more common among women with a tertiary education, and those 25 years of age or older (Hector et al., 2010). The 2010 Australian National Infant Feeding Survey found that breastfeeding was initiated for 96% of infants (their first feed was breastmilk) across Australia (AIHW, 2011). The proportion of babies exclusively breastfed fell to 61% before the end of the first month of life, and continued to fall, with 39% of babies exclusively breastfed to around four months of age and 15% to around six months. National data suggest levels of exclusive breastfeeding declines more rapidly among Aboriginal and Torres Strait Islander mothers than non-Indigenous mothers (AIHW, 2011). At four months of age, only 19% of Aboriginal and Torres Strait Islander babies were exclusively breastfed (AIHW, 2011).

There have been three insightful studies published exploring Aboriginal and Torres Strait Islander mother's reasons why they chose to breastfeed and continued to breastfeed their infants. Participants in the Gudaga birth cohort study chose to breastfeed their babies because of the benefits, including the health of the baby and saving money by not buying formula (Craig et al., 2011). However mothers who ceased breastfeeding by 2 to 3 weeks encountered problems related to encouraging infants to breastfeed and increasing their milk supply, implying a lack of readily available and appropriate support (Craig et al., 2011). Two qualitative studies further explored Aboriginal and Torres Strait Islander mother's experiences of breastfeeding, and the reasons why they chose to continue or cease breastfeeding. Both were done in Aboriginal and

Torres Strait Islander health services: one urban and the other rural (Foley et al., 2013, Helps and Barclay, 2015). The mothers all experienced multifactorial challenges, and the decision to cease breastfeeding was made in complex and stressful circumstances and every mother expressed how she wanted to do the best for the baby. Additionally, the mothers valued and trusted the knowledge around infant feeding from respected women in the community and their extended family members (Foley et al., 2013, Helps and Barclay, 2015).

2.2.4.2 Best practice formula feeding

Current Australian guidelines indicate that when it is not possible for infants to be breastfed, infant formula is the only suitable and safe alternative to meeting their primary nutritional needs to around six months of age (NHMRC, 2012). Formula-fed babies can be kept on formula in addition to complementary food from around six months until twelve months of age. Best practice formula feeding is imperative to keep infants safe from infection and ensure they get the right nutrition. Best practice formula feeding includes preparing the infant formula according to the instructions on the container (therefore to the correct concentration), sterilising the feeding bottles prior to use, washing hands before preparing the feeding bottle, feeding baby on demand and holding infants while they are drinking the formula (NHMRC, 2012).

From about three months of age to twelve months of age formula-fed infants gain weight more rapidly than breast-fed infants (Owen et al., 2005, Spyrides et al., 2008, Mihrshahi et al., 2011, Arenz et al., 2004). Feeding to a schedule and best practice formula feeding recommendations may influence RWG in infancy (Mihrshahi et al., 2011). A randomised controlled trail (RCT) of 17,000 infants in Canada found a relationship between formula feeding and RWG (Kramer et al., 2004). The findings showed a dose-response relationship between formula intake and RWG, and between three to six-months was when these effects were the greatest (Kramer et al., 2004).

Possible explanations related to increased obesity rates in formula-fed babies include their difficultly to self-regulate their intake of milk (Li et al., 2010). It is

more difficult for infants to regulate their appetite and easier to overfeed an infant with formula-fed infant than a breast-fed infant (Dewey, 1998). Mothers who might lack confidence in their ability to make sufficient breast-milk find that formula-feeding allows them to measure their infants' milk intake. Therefore, mothers who formula-feed their infants are more likely to routinely control the amount of formula. When infants are regularly encouraged to finish their formula in their bottle, even if they are full, they may not learn how to regulate their milk intake (Nelson, 2006). The higher protein content in formula than breastmilk (Koletzko et al., 2009), consuming formula beyond weaning age (Ciampa et al., 2010, Bonuck et al., 2010) and formula use near bedtime (Kimbro et al., 2007) are all potential mechanisms for over-feeding. Formula feeding is also associated with early introduction of solids and infants being provided with unhealthy food and drinks later in infancy compared to infants who were breastfed (Noble and Emmett, 2006).

Mothers choose to use infant formula to feed their baby for a number of reasons, including knowledge, attitudes, social or biological reasons (Brown and Lee, 2011, Meedya et al., 2010, AIHW, 2011). Common beliefs include mothers thinking that infant formula is just as good as breastmilk (AIHW, 2011), believing there is not enough breastmilk for their infant (Thulier and Mercer, 2009, Redsell et al., 2010) or thinking the infant may sleep for longer periods (Li et al., 2008). Furthermore, formula feeding is often thought to be more convenient for mothers than to breastfeed (Brown et al., 2011).

Infant formula feeding is more expensive than breastfeeding and yet among Indigenous women in Canada, those who experienced food insecurity were more likely to formula feed than breastfeed their infant, as were Canadian women experiencing economic disadvantage (Health Canada, 2010).

Common themes found for Aboriginal and Torres Strait Islander mothers choosing to formula feed their infants included breastfeeding related problems (such as difficulty with attachment) or because they had formula fed their previous children (Craig et al., 2011). Reasons expressed by the mothers also included anxiety, stress, lack of support, or perceived belief that baby would be

more settled or sleep better (Craig et al., 2011, Helps and Barclay, 2015, Foley et al., 2013).

2.2.4.3 Introduction of solids

As discussed previously, the Australian Infant Feeding Guidelines recommend introducing solids at around six months (NHMRC, 2012). A review of studies regarding the association between timing of introduction of solids and obesity risk are inconsistent, with one study finding no association (Barrera et al., 2016). However, a meta-analysis of prospective cohort studies found that the introduction of solids before 4 months of age is associated with excess weight during infancy, and increases the risk of overweight and obesity in childhood (Wang et al., 2016). The latest infant feeding survey found that 35% of Australian infants were being introduced solids at four months, and 70% at five months (AIHW, 2011) and this may increase their risk of obesity.

Aboriginal and Torres Strait Islander infants are more likely to have solids introduced earlier than four months (Eades et al., 2010). A cohort study of 274 infants from an urban area of Western Australia found 66% of Aboriginal infants had solids introduced into their diet before four months. This study also highlighted the dependence of urban Aboriginal women on infant feeding advice from health professionals that have little understanding of Aboriginal culture. It showed that a lack of appropriate support for difficulties with infant feeding escalated quickly and lead to poor feeding practices (Eades et al., 2010).

It is important to note that these studies cannot be generalised to all Aboriginal and Torres Strait Island communities but still provide some insight into infant feeding practices.

2.2.4.4 Infant feeding practices relating to socioeconomic status and Aboriginal and Torres Strait Islander families

In Australia and other high income countries socioeconomic status (SES) is related to infant feeding practices (Wijlaars et al., 2011). Mothers from higher SES groups are more likely to breastfeed for longer (van Rossem et al., 2009),

choose breastmilk over formula feeding (Kramer et al., 2004) and delay the introduction of solids (Huh et al., 2011) compared to mothers from lower SES groups.

Parental education has been explored in detail in a cohort of 1,684 participants in Amsterdam (Van den Berg et al., 2013). The findings revealed that infants with higher-educated mothers had steadier weight gain, including weigh-for-length growth during the first year of life compared to infants with lower-educated mothers (Van den Berg et al., 2013). Given the socioeconomic inequalities in obesity commence in infancy (Gibbs, 2014, Wijlaars et al., 2011) efforts should be targeted toward approaches including support and health promotion initiatives likely to be effective in lower SES families.

Helps and Barclay (2015) identified an ‘interruption of breastfeeding culture’ in Aboriginal and Torres Strait Islander communities from an influence of colonisation and the loss of family and community breastfeeding knowledge (Helps and Barclay, 2015). Prior to European arrival in Australia, Aboriginal and Torres Strait Islander peoples were healthy people who ate a traditional diet rich in nutrients and low in energy density and were extremely active (NHMRC, 2000). The dispossession of land and disruption to family structures and communities through death, disease, forced resettlement and the removal of children since this colonisation has severely affected the holding of knowledge, access to and use of traditional foods (NHMRC, 2000). The trans-generational trauma Aboriginal and Torres Strait Islander peoples have endured, and societal and historical influences have impacted on infant feeding practices (Atkinson et al., 2010). Colonisation has disturbed the traditional passing down of skills and parenting practices, including breastfeeding, from older women to new mothers. This ‘interruption of breastfeeding culture’ still influences the Aboriginal and Torres Strait Islander women of today (Helps and Barclay, 2015).

2.2.5 Early interventions to decrease the risk of childhood obesity

There is increasing evidence that early intervention is needed for children from low SES backgrounds and Aboriginal and Torres Strait Islander families. Maternal care is an ideal time to implement nutrition health behaviour changes, with the potential to influence the health of two generations (Hoffman, 1998, Darnton-Hill et al., 2004). Encouraging healthy eating behaviours in children right from the start is important because infancy is a critical period when many children's weight and eating habits are formed, and these behaviours may track into adulthood (Baird et al., 2005, Craigie, 2011). Infant feeding practices, including breastfeeding, formula feeding, age appropriate introduction of solids are important in influencing healthy weight gain in infancy and later in childhood (Lefebvre and John, 2014, Gibbs, 2014). Three Australian RCTs explored the prevention of childhood obesity in early life through improving infant feeding practices.

The NOURISH RCT was conducted between 2008 to 2011 in Brisbane and Adelaide among first-time mothers (Daniels et al., 2009). Mothers in the NOURISH intervention group were provided with anticipatory guidance about appropriate infant feeding practices relevant to the developmental stage of the child, commencing when the infant was four months of age, for a total of six interactive group sessions. Mothers in the control group received the usual care of the child health nurses through the community health services (Daniels et al., 2009).

The anticipatory guidance for the intervention group was provided by child health nurses and co-facilitated by dietitians and psychologists. The sessions were based on three aspects of early feeding associated with positive outcomes in children's eating behaviour and weight status: 1) exposure to a wide range of textures and tastes; 2) responsive feeding; and 3) positive parenting (Daniels et al., 2009). The NOURISH RCT enrolled 698 mothers and found that found the anticipatory guidance on appropriate infant feeding practices up to two-years of age supports healthy eating and growth patterns in children at two-years of age

(Daniels et al., 2013). The intervention effects did not translate to statistically significant differences in weight outcomes, however there was a 4%-point reduction in prevalence of overweight and obesity at two-years of age. The authors provided possible explanations why there was no difference in weight outcomes at two-years of age. Firstly, the intervention was provided to mothers who lived in settings that were socially and economically neutral or advantaged and there may have been more scope for intervention response in populations experiencing socioeconomic disadvantage. Secondly, the authors thought that the intervention provided in a group delivery format may not have been as effective as individual, home visit support (Daniels et al., 2013).

An area of South West Sydney experiencing social and economic disadvantage was the location of another RCT that has explored the prevention of childhood obesity in early life (Wen et al., 2007). The Healthy Beginnings Trial, a home visiting intervention was conducted among 782 first time mothers. The intervention was conducted over the first two years of life and comprised of eight home visits and proactive telephone support between the visits from a specially trained community nurse. The control group families received the usual childhood nursing service from the area health service, which included one home visit by a community nurse within the first month of the child's life plus child health clinic visits. The intervention aimed to increase healthy feeding behaviours and physical activity to prevent the onset of childhood overweight and obesity with community nurses providing education and support in a timely fashion (Wen et al., 2007). The intervention was effective in preventing early childhood obesity with findings of a significant reduction in BMI for children at age two in the intervention group. Important aspects of the intervention design were the use of community nurses providing consistent and credible information on infant feeding practices, nutrition and physical activity. The findings also revealed that longer breastfeeding duration and delayed introduction of solids was associated with lower BMI at two years of age. Lessons learnt from the intervention findings were that regular home visits from trained nurses providing education and support around infant feeding behaviours to mothers may reduce the risk of childhood obesity (Wen, 2014).

The third RCT, The Melbourne InFANT Program was a parent-focused intervention and involved 542 parents of new infants (Campbell et al., 2013). The intervention aimed to build parental knowledge, skills and social support regarding infant feeding and physical activity (Hesketh and Campbell, 2010), through a group based program targeting first time parent groups. At 20 months of age the children from the intervention group consumed fewer sugary drinks, fewer sweet snacks and viewed fewer minutes of television per day compared to the control group and the program was well accepted by parents across all socioeconomic levels (Campbell et al., 2013).

These studies suggest that it is possible to impact on obesity risk behaviours and prevent obesity in early childhood. However, a systematic review from Laws et al. found there is a lack of early intervention studies to prevent obesity in young Aboriginal and Torres Strait Islander children (Laws et al., 2014). The search strategy used in the Laws et al. review was repeated for this study and no further intervention studies were found (Appendix A).

2.3 Culturally appropriate health promotion for Aboriginal and Torres Strait Islander peoples

2.3.1 Aboriginal and Torres Strait Islander health

Aboriginal and Torres Strait Islander people consider health to be holistic concept that encompasses health and mental wellbeing, as well as acknowledging the connection to culture, family, community and land. It also acknowledges the impact of loss and trauma associated with the practices of colonisation, such as dispossession from land and separation from family and community (Nguyen and Cairney, 2013, Guerin et al., 2011, Department of Health and Ageing, 2016b, Altman, 2003). Therefore, health and lifestyle behaviours of Aboriginal and Torres Strait Islander people, including children are related to the broader social, cultural and economic environment in which people live, and are impacted on by social and economic disadvantage (Altman, 2003).

Social and economic factors influence the health of all Australians; however, their impact is more notable on Aboriginal and Torres Strait Islander peoples. A disproportionate number of Aboriginal and Torres Strait Islander people experience lower SES than the non-Indigenous population, and explanations are intricate and involve a number of influences (AIHW, 2016b). Factors such as lower levels of education, employment, income and not having access to culturally appropriate services or support have been reported for Aboriginal and Torres Strait Islander peoples (AIHW, 2016b).

Social determinants of health theory recognises that health and inequality is determined by many interrelated social factors (Saggers and Gray, 2007). The social determinants of health are the conditions in which people are born, grow, live, work and age (WHO, 2017). These circumstances are shaped by the distribution of money, power and resources at global, national and local levels. Factors including whether a person is working, feels safe in their community, has a good education, enough money and feels connected to friends and family influence health outcomes (WHO, 2017). Furthermore, the social determinants of health include housing (Bailie, 2007), SES, education (Dunbar and Scrimgeour, 2007), lived environment, transport, income, racism and cultural determinants (Marmot, 2005). Cultural determinants include an Aboriginal and Torres Strait Islander person's connection to land and the long history of being forced from their traditional lands and away from their families (Marmot, 2011). These factors have led to poorer health outcomes for Aboriginal and Torres Strait Islander people than non-Indigenous Australians (AIHW, 2016a).

While Aboriginal and Torres Strait Islander children have many risk factors for poor health, there are also many protective factors present in Aboriginal and Torres Strait Islander families. The literature on Aboriginal and Torres Strait Islander parenting and child rearing practices identifies many common strengths embedded within traditional beliefs and practices that still exist in communities today. This includes Aboriginal and Torres Strait Islander peoples attachment to extended family, stable nurturing, spiritual faith and positive community networks (Penman, 2006, Yeo, 2003, Kruske, 2012).

Health behaviours are influenced by the broader social and economic determinants of health (Marmot, 2005). The impact of racism is a fundamental driver of undesirable health behaviours, for example, when smoking and alcohol are used a coping mechanism to experiences of racism and discrimination for Aboriginal and Torres Strait Island people (Paradies et al., 2008). Other pathways impacting on undesirable health behaviours for Aboriginal and Torres Strait Islander peoples include reduced and unequal access to employment, education, housing and social support. The societal and historical factors, including ongoing colonisation and dispossession contribute to the poorer health outcomes for Aboriginal and Torres Strait Islander people than non-Indigenous people (Paradies et al., 2008).

2.3.2 Culturally appropriate health promotion considerations for Aboriginal and Torres Strait Islander people

Health promotion is the process of enabling people to increase control over, and to improve, their health (WHO, 1986). The statement of principles known as the "Ottawa charter for health promotion", developed by the World Health Organisation (WHO), is internationally accepted as the guiding framework for health promotion activity (WHO, 1986). It presents five principles of health promotion; building healthy public policy, creating supportive environments, strengthening community action, developing personal skills, and reorienting health services. Health promotion methods may include activities such as provision of health information and advice, professional training, and community development in complex interventions (WHO, 1986).

Culturally appropriate health promotion is critically important for Aboriginal and Torres Strait Islander people as it has the potential to improve health outcomes (Calma, 2008). Cultural factors can influence Aboriginal and Torres Strait Islander people's decisions about the acceptance and likely success of health promotion approaches in their communities (Department of Health and Ageing, 2013b). Culturally appropriate health promotion for Australian Aboriginal and Torres Strait Islander people has been described specifically as "taking place within community defined cultural boundaries" to ensure cultural safety for the

community (Coffin, 2007, p.22). Cultural safety is the linking of understanding to action and is a commitment to the cultural rights, values and expectations of Aboriginal and Torres Strait Islander peoples. Culturally appropriate principles should be integrated into health promotion program design to support and build on positive aspects of culture (Coffin, 2007).

Tailored health promotion principles to guide culturally appropriate health promotion theory and practice for Aboriginal and Torres Strait Islander people have been established. In addition to the "Ottawa Charter for Health Promotion" principles (WHO, 1986), there have been specific recommendations made in the literature. Firstly, be holistic in nature, addressing the needs of the whole person by acknowledging their connection to land and spirit and allow this to be a positive influencing factor for effective health promotion outcomes (Mikhailovich et al., 2007, Demaio et al., 2012, Kingsley et al., 2013). Next, programs must recognise a strengths-based approach by adopting a model of health improvement that recognises and draws on the strengths, assets and capacities of Aboriginal and Torres Strait Islander peoples (WHGNE, 2008, Brough et al., 2004, Wise et al., 2012, Osborne et al., 2013), such as the existing network within the communities (Wise et al., 2012, Yeo, 2003).

Brough, Bond and Hunt (2004) describe five key strengths identified by urban Aboriginal and Torres Strait Islander people: (1) extended family, (2) commitment to community, (3) neighbourhood networks, (4) community organisations and (5) community events (Brough et al., 2004). These key strengths were identified through analysis of qualitative interviews (n=100), conducted by Aboriginal and Torres Strait Islander people across urban areas in and around Brisbane, Queensland. The purpose of the study was to describe the potential for strengths-based approaches in health promotion with the example of an urban Aboriginal and Torres Strait Islander community. Many initiatives had been carried out over a two-year period, including activities such as football, NAIDOC (National Aboriginal and Torres Strait Islander Day of Celebration) events and nutrition promotion. These community events, in particular, were seen as positive ways to provide health messages. The publication's evidenced-based recommendation for providing strengths-based

health promotion approaches provides useful insight for future health promotion programs with Aboriginal and Torres Strait Islander people in urban areas (Brough et al., 2004)

Appreciating Aboriginal and Torres Strait Islander people's sociocultural, economic and educational determinants and recognising the historical context of the community, rather than a single health behaviour change, is culturally respectful health promotion (Demaio et al., 2012, McCalman et al., 2014). In addition, health promotion programs are best developed in conjunction with Aboriginal and Torres Strait Islander people (Coulehan et al., 2005, Osborne et al., 2013, Demaio et al., 2012, Mikhailovich et al., 2007). Community involvement and localised decision making (Mikhailovich et al., 2007), including community consultation throughout all phases of health promotion programs may increase the success of programs outcomes (Mikhailovich et al., 2007, Demaio et al., 2012, Clarke and Boyle, 2014). Therefore, ensuring there is appropriate partnership between the health promotion organisation or facilitator and the community is imperative. This includes participation and empowerment when working with an Aboriginal and Torres Strait Islander community for health promotion programs (WHGNE, 2008). Health promotion programs should endeavour to understand the relationship between the colonisation process, trauma, and its impact on the health of Aboriginal and Torres Strait Islander peoples for respectful practise (WHGNE, 2008). Other considerations in the literature which is relevant to this research were for health promotion programs to be sustainable and recognise the local language to empower the community (Brough et al., 2004, Demaio et al., 2012).

A study conducted across three Aboriginal communities in Queensland examined factors that would increase the participation of Aboriginal and Torres Strait Islander people in health promotion programs (Barnett, 2011). Thirty-nine Aboriginal people, including AHW's, community Elders and health care practitioners were interviewed, and the findings included as important: 1) the local Elder structure, 2) local cultural traditions (for example learning from respected Elders), 3) local cultural structures that can promote health (for

example: peer influence and Murri[1] Grapevine), and 4) the development of local Murri leadership network to drive the health promotion process. The study found a need to engage in local development activities before implementing any health promotion programs. The purposes of these activities were to gain trust and acceptance of the program by community members and for facilitator/s of the program to learn and understand the local structures and history, and to take advantage of the existing network. Engaging influential community Elders or champions to promote the course from initial stages was also valuable. The study also highlighted the importance of local community structures and the engagement of local people in the design of health promotion programs (Barnett, 2011).

There are several other recommendations of importance in providing culturally appropriate health promotion programs and/or messages for Aboriginal and Torres Strait Islander people. Firstly, to be non-confrontational in nature and for health care practitioners to have a non-judgemental approach when delivering messages (McPhail-Bell et al., 2015). Image use in health promotion messages is extremely important, for instance resources should contain appropriate artwork and be culturally and visually appealing (Blinkhorn et al., 2014, Stuart et al., 2015). Messages promoting health can be told through stories rather than words and knowing the preferred method of communication, which may be different in every community, is vital for successful delivery to Aboriginal and Torres Strait Islander people (France, 2000). When these factors are taken into consideration for health promotion programs, they may support Aboriginal and Torres Strait Islander people to increase control over their health.

A recent, systematic review of Indigenous narratives of culturally safe healthcare communication revealed communication strategies relevant to the research reported in this thesis (Jennings et al., 2018). The key theme was appropriate communication or 'talk' in which Aboriginal and Torres Strait Islander people identified whether the health care practitioner or health service

[1] "Murri" is a term used to describe an Aboriginal and Torres Strait Islander person from the modern-day Queensland area

provided culturally safe care. Talk within health care interactions had the power to foster relationships of trust, strengthen engagement and produce positive outcomes for Aboriginal and Torres Strait Islander people. Positive and appropriate communication was a critical element to improving Aboriginal and Torres Strait Islander people's engagement with health care services. It also reduced the risk of power differentials between Aboriginal and Torres Strait Islander people and the health care system (Jennings et al., 2018).

2.3.3 Culturally appropriate health promotion considerations for parents of Aboriginal and Torres Strait Islander infants and children

An early intervention program that focused on improving the health and wellbeing of Aboriginal mothers and their newborn babies, 'Strong Women, Strong Babies, Strong Culture' has been evaluated through qualitative methods (Lowell et al., 2015). The findings provided useful cultural insights for successful early intervention programs for Aboriginal and Torres Strait Islander families. The program recognised the traditional cultural approaches to parenting and lifestyle, supporting pregnant Aboriginal women and their babies through better diet, education and antenatal care. A thematic analysis of semi-structured interviews with 76 participants across five communities was used to evaluate the program. The analysis revealed the successful outcomes of the program were due to recognising traditional cultural approaches to parenting and lifestyle. The key lessons identified in The program evaluation were the strong community development focus and the use of a strengths-based approach (Lowell et al., 2015). These lessons were important for future early intervention programs for Aboriginal and Torres Strait Islander families.

Another study which investigated childhood (years 0-8 years) nutrition concerns of Aboriginal families in Victoria identified issues of low levels of breastfeeding, inappropriate introduction of solids, and childhood overweight (Myers et al., 2014). A culturally responsive systems approach to providing support for breastfeeding and child nutrition advice and support were suggested outcomes

from the study to resolve these issues. Parents described inconsistencies in the advice they received, or they were unaware of where to access childhood and infant feeding information. Parents requested more culturally relevant and applicable information and more information on child development via an mHealth mode (websites, apps and social media) and a reduction in paper-based resources. Parents also described powerlessness to change their children's eating which may reflect gaps in knowledge and self-efficacy in parenting (Myers et al., 2014).

Low rates of antenatal and postnatal attendance to health services have been reported for Aboriginal and Torres Strait Islander women (Rumbold et al., 2011, Oliver et al., 2015). Studies that have explored successful antenatal care with Aboriginal and Torres Strait Islander families have found they are more likely to be accepted when they are provided by a trusted source (Wilson, 2009, Kruske, 2012). Other key strategies identified in the literature include health care practitioners providing home visits, having flexibility in service delivery times, and providing transport to health services (Kruske, 2012, Homer et al., 2012, Oliver et al., 2015).

2.4 Using mHealth in health promotion programs

2.4.1 What is mHealth?

One potential delivery mechanism for health promotion programs is via mobile technologies. Mobile technologies include mobile phones; Personal Digital Assistants (PDAs) and smartphones; portable media players; handheld and ultra-portable computers such as tablet personal computers (PCs) and Smartbooks. These devices have a range of functions from mobile communication using SMS, photos, video, telephone, and World Wide Web/internet access. As of late 2016, 90% of mobile device sales in Australia are now Smartphones (Lancaster, 2016) which allow smart device applications or "apps" to be downloaded. The features of mobile technologies including their mobility and their technological potential makes them popular for providing individual support to health care consumers. This is known as "Mobile Health"

or “mHealth” which the WHO defines as “the provision of health services and information via mobile technologies such as mobile phones and PDAs" (Misha et al., 2011, p.6). There are several benefits of using mHealth as a health promotion tool, which include:

- Cost effectiveness, as fewer locations and human resources are needed long term
- Expanded monitoring abilities
- The ability to reach people who would otherwise be difficult to reach
- Being less intrusive, more confidential, and less threatening than face to face health promotion programs
- Improved forms of interactions in a virtual space, such as one-on-one communication and peer interaction
- The ability to occur in real-time, in real-life situations (Nancy et al., 2014, Becker et al., 2014).

The many benefits of mHealth tools have led to an escalation in mHealth interventions across the globe, including for health promotion (Agarwal et al., 2016). Research into the effectiveness of mHealth interventions in changing health behaviour is promising (Free et al., 2013, Militello et al., 2012). mHealth has been found to positively impact behaviour changes in areas of smoking cessation (Knip et al., 2010), weight management (Fjeldsoe et al., 2009), diabetes management (Zhang et al., 2013), physical activity (Walsh et al., 2016, Glynn et al., 2014) and depression treatment (Burns et al., 2011).

mHealth programs that support behaviour change engage and support users best when the design is streamlined, and the app or website has few technical difficulties (Tang et al., 2015, Tonkin et al., 2017a). Smartphone users value mHealth programs that are well structured, have personalised features, are easy to access, download and use. For example, low effort and free to download are preferred, and complex set-up and log-ins inhibit use (Dennison

et al., 2013). Trialling an mHealth program with the target group ensures successful outcomes are more likely achieved (Tonkin et al., 2017a).

Other research suggests that mHealth is an effective way to engage all audiences, including people experiencing social and economic disadvantage (Mackert et al., 2014). Mobile phones may be uniquely positioned to bridge gaps in health disparities and reach across diverse demographics (Hunter, 2009, Nancy et al., 2014). mHealth strategies are ideally suited for reaching and maintaining contact with populations experiencing disadvantage that often create significant challenges for programs using traditional approaches. This could help to improve access for Aboriginal and Torres Strait Islander peoples who have traditionally had less access to health services than non-Indigenous Australians, due to cost or long wait times (AIHW, 2016a).

There is a need for tailored infant feeding mHealth programs that are easy to access and are available for parents experiencing disadvantage and Aboriginal and Torres Strait Islander people. mHealth interventions may be a useful strategy for these groups (Akter and Ray, 2010). In regards to infant feeding, seeking advice and support online is common practice for mothers with low educational attainment, with mothers relying upon social networking sites, government websites or commercial providers for information (Russell et al., 2016a), which likely differ considerably in their quality (Taki et al., 2015). There is huge potential for mHealth to be a platform for delivering health programs to populations experiencing disadvantage (Chou et al., 2013), including Aboriginal and Torres Strait Islander populations (Tonkin et al., 2017b).

2.4.2 The potential of health promoting mHealth programs for Aboriginal and Torres Strait Islander peoples

Internet usage among Aboriginal and Torres Strait Islanders is high, and Aboriginal and Torres Strait Islander mothers are already using the internet and mobile phone apps for educational purposes (Department of Finance, 2014b). Results have been published by the Department of Finance, from a survey with 1,018 Aboriginal and Torres Strait Islander people, conducted by Aboriginal and

Torres Strait Islander interviewers around Australia. The activities on the internet involved participating in online communities or social networking (79%) and researching or obtaining information (78%). Young females were the highest users. Among those with mobile phone and access to the internet, there was a high prevalence of using 'apps' among younger respondents (Department of Finance, 2014b). Further insights were gained through qualitative research which included extensive interviews with 187 Aboriginal and Torres Strait Islander people who had completed the survey (Department of Finance, 2014a). The recommendations arising from the in-depth interviews included using an 'everyday' level of English and use mainstream, as well as Aboriginal and Torres Strait Islander, media communications. This was consistent with the principles described earlier for culturally appropriate health promotion with Aboriginal and Torres Strait Islander peoples by recognising the local language to empower the community (Demaio et al., 2012, Barnett, 2011).

There were valuable recommendations resulting from the Department of Finance qualitative component publication to make mHealth programs more engaging and appropriate for Aboriginal and Torres Strait Islander people (Department of Finance, 2014a). Firstly, programs should use culturally specific elements incorporating suitable Aboriginal and Torres Strait Islander design and imagery into key messages. Secondly, they should include well-respected and recognisable people, such as community Elders to maximise engagement. Finally, agencies and health promotion officers should actively provide information, and not presume the target audience will necessarily seek out information on their own (Department of Finance, 2014a). Although this research was conducted more than four years ago, it provides valuable insights for health promotion tools via mHealth for Aboriginal and Torres Strait Islander people.

2.4.3 Health promoting mHealth programs for Aboriginal and Torres Strait Islanders

There is growing evidence supporting the use of phone apps in health promotion within Aboriginal and Torres Strait Islander organisations (Brusse et

al., 2014). The National Aboriginal Community Controlled Health Organisation (NACCHO) was an early adopter of mHealth distributing daily Aboriginal health news alerts via an app. They reported that when the app was first released it was downloaded over 1000 times within the first few days (NACCHO, 2013). There have been several health promotion organisations embracing mHealth to engage users in a more interactive way and to widely disseminate their messages with the aim of improving health outcomes. However, evidence of their efficacy to improve health knowledge, health behaviours, and health outcomes is limited (Brusse et al., 2014). This information was provided by a scoping review of social media and mobile apps (mHealth) for health promotion for Australian Aboriginal and Torres Strait Islander people (Brusse et al., 2014).

The search by Brusse et al's was replicated by the candidate for the mobile app component of the research reported in this thesis. The approach included a search of publicly available mobile apps with the criteria for inclusion being that they were created or promoted by Australian health bodies (including government departments and agencies, Indigenous health organisations, and health promotion agencies) and were targeted at Aboriginal and Torres Strait Islander peoples. Searches were through iPhone Operating System (iOS) and android phone app stores and through the Australian Indigenous Health *Info*Net website (Australian Indigenous Health*Info*Net, 2017). The search found only one app had been developed in addition to the three that Brusse et al. had identified in since 2014. This may have been due to the apps being removed from the stores in between Brusse et al.'s review and the current review.

There were two apps found targeting Aboriginal Torres Strait Islander child health. The first was a 'Talking book/ Care for Ears' app, for information for parents about ear health (Department of Health and Ageing, 2016a). The information was presented in a style of interactive children's book, read in English or many Indigenous languages, developed by the Australian Government Department of Health and Ageing. There was no publicly available formal evaluation for the mobile app. However, an evaluation from the paper-based resources developed for the wider project were published in 2013 with positive feedback (Department of Health and Ageing, 2013a). The key findings

revealed the community engaged well with the resources, due to the local development and cultural relevance, and therefore participants felt connected with the resources. Other key features used throughout the resources were recognisable, well-known, respected and recognisable people from the community people, and a variety of Aboriginal and/or Torres Strait Islander languages (Department of Health and Ageing, 2013a). These findings are consistent with cultural appropriate health promotion principles for Aboriginal and Torres Strait Islander peoples (Demaio et al., 2012, Wise et al., 2012).

The other mobile app available was called 'Deadly Tots', funded by New South Wales (NSW) Government Departments of Families and Health and was targeted at Aboriginal and Torres Strait Islander parents, enabling the user to track their babies' health stages, immunisation and nurse reminder visits (ACYFS, 2017). There was no publicly available evaluation report for the 'Deadly Tots' app (ACYFS, 2017).

The results of the mHealth search revealed there were only two apps publicly available targeting Aboriginal and Torres Strait Islander child health, however they had not been evaluated. Cross-disciplinary research including contributions from cultural researchers and communities themselves may improve the effectiveness of mHealth programs with Aboriginal and Torres Strait Islander peoples (Brusse et al., 2014).

There are two mHealth programs that are not publicly available, but which have been formatively evaluated and published, that provide useful insights for the current thesis. One study involved user-testing of a smartphone app in two remote Aboriginal communities of the Northern Territory, which was aimed at improving nutritional intake and reducing consumption of sugar-sweetened drinks among young adults (Tonkin et al., 2017b). The study findings provided insights into recommendations for Aboriginal and Torres Strait Islander people using an app for health promotion. Thematic analysis was used following semi-structured interviews (n=20). The participants reported that they used the app to access information, and, as they used their mobile phones frequently it was convenient for them. The games included in an app were important for

satisfaction, as was the use of audio features and a streamlined app design (Tonkin et al., 2017b).

Secondly, a feasibility study conducted with Aboriginal fathers (n= 20) in NSW during 2014 provided useful insights about support for new fathers through mHealth (Fletcher et al., 2017). The purpose of the study was to provide men with online- and mobile-based resources and see whether they engaged with this method of support. Cultural appropriateness was also explored. The men were sent 25 messages over the project (four weeks), with some messages containing links to websites providing additional parenting and support. Findings indicted that strengths-based approach through the online support were most engaging, and they preferred more culturally appropriate information. This was evaluated through interviews and data collected from use of the websites. This study provides valuable information about what new Aboriginal fathers may require from an mHealth program, in particular more culturally appropriate support and information (Fletcher et al., 2017).

2.5 Summary

Childhood overweight and obesity is a problem in Australia, including amongst Aboriginal and Torres Strait Islander families. Overweight and obesity in Aboriginal and Torres Strait Islander children starts early and its prevalence continues to grow throughout their childhoods. Rapid weight gain has been recorded for Aboriginal and Torres Strait Islander infants and is a risk factor for childhood obesity. Infant feeding practices influence rapid weight gain, and therefore focusing on early health promotion and support around infant feeding for Aboriginal and Torres Strait Islander families is relevant. A challenge is finding the most appropriate ways to implement culturally appropriate and effective support and health promotion strategies to address this. Cultural adaptations of mainstream health promotion programs that have been designed with Aboriginal and Torres Strait Islander people may have higher rates of recruitment and retention of Aboriginal and Torres Strait Islander people.

The complexities of childhood experiences, cultural influences, societal norms and the events of daily life all influence infant feeding decisions and research suggests Aboriginal and Torres Strait Islander mothers need care that acknowledges their history and culture. There is little published literature on early interventions for infant feeding support and obesity prevention in Aboriginal and Torres Strait Islander families considering these cultural influences. mHealth is a promising approach, due to the extensive benefits of a mobile device, and the increasing number of people accessing this mode across Australia, including Aboriginal and Torres Strait Islander peoples. However, little is known about how mHealth programs can be developed and implemented for Aboriginal and Torres Strait Islander people. It is important to ensure health promotion materials are acceptable and culturally appropriate when using resources or programs with Aboriginal and Torres Strait Islander people, therefore they need to be adequately trialled and adapted as required before they are implemented in the Aboriginal and Torres Strait Islander community.

The key gaps in the literature highlight the need for appropriate early intervention and support programs for Aboriginal and Torres Strait Islander mothers and/or families. mHealth is an exciting new avenue which may provide reach to these mothers and families, however other research suggests health promotion programs need to be cultural appropriate for Aboriginal and Torres Strait Islander families. There is no literature describing the effect and considerations of culturally appropriate and acceptable mHealth programs for infant feeding support with Aboriginal and Torres Strait Islander families.

Chapter 3: Methods

3.1 Introduction

This chapter describes the research approaches used in this study including a description of the study setting, the epistemological position of the researcher which informed data collection and analysis procedures.

3.2 Study setting

The Growing healthy at Inala study was conducted at the CoE, which is an Aboriginal and Torres Strait Islander primary health care service (Hayman et al., 2014). The CoE is known for delivering culturally appropriate services to the Aboriginal and Torres Strait Islander community of Inala and surrounding suburbs (Hayman et al., 2009). As described in Section 1.2.1, the CoE is located in Inala, an outer south-western suburb of Brisbane, Queensland. Inala is the second most disadvantaged suburbs in Brisbane (ABS, 2013b) and in 2011, Aboriginal and Torres Strait Islander people made up 6.6% of the population (910/ 13,796), significantly more than the national proportion of 2.5% in the same year (ABS, 2011). As mentioned in Section 1.2.3, the CoE has grown considerably over the years due to several factors including provision of culturally safe health care (Hayman et al., 2014). The CoE cares for around 4,000 Aboriginal and or Torres Strait Islander regular patients, including 80 mothers of Aboriginal and Torres Strait Islander infants each year (Maher et al., 2014).

3.3 Epistemological position

The epistemology position developed for this study formed the basis for thinking further about how the investigation into the acceptability and cultural appropriateness of an mHealth program might proceed. Epistemology is the "study of the nature of knowledge and justification" (Schwandt, 2001, p.71). It is important to outline the candidates epistemological stance as it influenced how the candidate approached, conducted, interpreted and presented the study (Crotty, 1998).

Crotty (1998) identifies three epistemological approaches including objectivism, constructionism and subjectivism (Crotty, 1998). Objectivism assumes that there is an objective truth and that meaningful reality exists independently of human consciousness and experience. That is, objects exist, and human interpretation is not necessary to establish the meaning of these objects. On the other hand, constructionism and subjectivism acknowledge the role of humans in creating meaning. Constructionism suggests that meaning is created when a subject interacts with an object, while subjectivism suggests that meaning is constructed through something other than an interaction between an object and a subject (Crotty, 1998). To clearly identify epistemology and associated concepts, Crotty (1998) suggests addressing four elements in research (Figure 3).

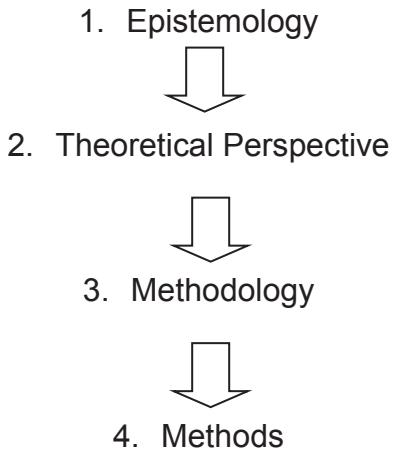

Figure 3: Four important elements to identify in the research process (Crotty, 1998)

The elements that were used in the Growing healthy at Inala research process in relation to Crotty's (1998) model are shown below in Figure 4.

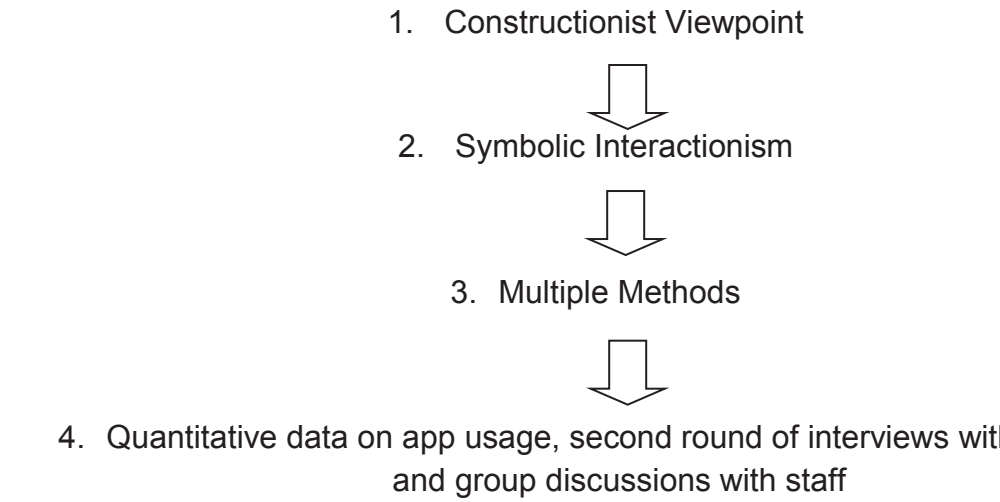

Figure 4: The elements that were used in the Growing healthy at Inala research process

The research aim was to understand participants views on the Growing healthy program, which was knowledge co-constructed between participants and the candidate together. Therefore the candidates' epistemological position was a constructionist viewpoint (Crotty, 1998), presented as Figure 4 (1). Constructionism maintains that knowledge is co-constructed by the researcher and the participants (Crotty, 1998), in this instance the candidate recognising and acknowledging her relationship with the participants through the CoE. Constructionism is a philosophy that is based on the idea that an understanding is formed via reflection on their personal experiences and relating new knowledge to the knowledge that is already acquired (Crotty, 1998). Hence, the discipline the candidate came from provided her with the knowledge and experience supporting patients in a culturally appropriate manner through the dietitian services at the CoE (Foley and Houston, 2014).

The final methodology choice used in this study was informed by a constructionist epistemology and the theoretical perspective of symbolic interactionism, presented as Figure 4 (1 and 2 respectively). Symbolic interactionism assumes that meanings and reality can vary from one individual to another, from one context to another and over time (Crotty, 1998). Using this approach, the researcher is primarily concerned with understanding the realities of participants and how they define and experience the world. At the heart of

this approach is the ability of researchers to put themselves in the place of research participants and to become immersed in their world (Crotty, 1998).

The constructionist viewpoint and symbolic interactionism influenced the choice of methods as the candidate recognised her understanding of cultural appropriateness was constructed through her interaction between herself and the participants and that such knowledge was situated in the time and place of the study (therefore, contextually bound). It assumed the candidate understood a range of factors influencing cultural appropriate information delivery and therefore she conducted interviews herself, allowing her to use her own experiences and understandings. This also influenced the types of questions asked during interviews which were similar to how she conducted dietitian consultations, for example with open-ended questions, asking the participant to 'tell a story about a time', and therefore a more in-depth interpretation of their responses.

The constructionist viewpoint and symbolic interactionism approach recognised the pre-existing relationship between the researcher and the participants was vital for sound engagement with the participants. Therefore, this provided more in-depth exploration of participants experiences of the program, and has been recommended for research with Aboriginal and Torres Strait Islander peoples (Hunt, 2013). The change in the candidate's epistemology position required the candidate to facilitate a second round of interviews with parents and the group discussions with staff, presented as Figure 4 (4).

3.4 Study design and methods

The Growing healthy at Inala study used a multiple method (Morse and Cheek, 2014) research design, presented in Figure 4. Multiple methods are quantitative and qualitative components which are planned and conducted separately and then interpreted together to form essential parts of the study to address the overall aim (Morse, 2003). Multiple methods were used as there were numerous stages of data collection and several data sources and one method alone would

not have been sufficient to answer the research aim (Creswell and Plano Clark, 2011).

The study included four components and are outlined in Figure 5:

(1) Qualitative informal discussion with parents on app push notifications

(2) Quantitative data on app usage using app analytics

(3) Qualitative semi-structured interviews with parents

(4) Qualitative group discussions with staff.

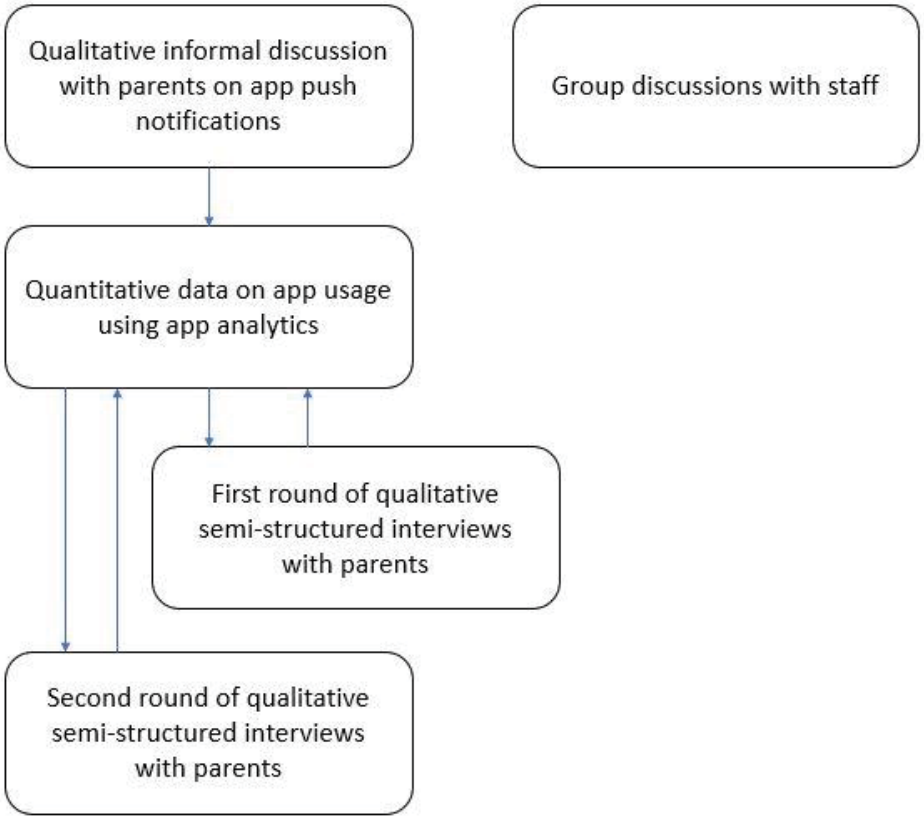

Figure 5: The components used during the Growing healthy at Inala study

The study comprised mostly of qualitative methods with quantitative data on app usage used in a complementary way. For example, data on app usage provided information on how the program was used by different participants which in turn informed exploration of app usage in the qualitative interviews with

parents. The insights from the qualitative interviews also helped to interpret the app usage data, for example why particularly topics or features of the app had or had not been used.

Experiences, attitudes, perceptions and learnings from participants regarding the Growing healthy program were sought, and therefore qualitative methods (Creswell, 2003, Brannen, 2005) were the predominant research method used. Qualitative research methods involve the systematic collection, organisation, and interpretation of word-based data obtained from dialogue or observation (Silverman, 2010). It is used in the exploration of meanings of social phenomena as experienced by individuals themselves, in their natural context (Lincoln and Guba, 1985, Miles and Huberman, 1994). The findings from the different qualitative data sources (discussion with parents, semi-structured interviews with parents and group discussions with staff) were triangulated in the analysis phase (Byrman, 2004) in an attempt to learn more about cultural appropriate mHealth programs for Aboriginal and Torres Strait Islander families.

3.5 Ethics statement

The Inala Community Jury for Aboriginal and Torres Strait Islander Health Research provides community approval for all research conducted by or through the CoE to ensure the cultural appropriateness and community relevance of the topic and approach (Bond et al., 2016). The Community Jury accepted the Growing healthy at Inala study proceeding research and provided a letter of support (Appendix B).

Ethical approval for the study was obtained from the district health service, through The Metro South Human Research Ethics Committee (ethics approval number: HREC/14/QPAH/634) (Appendix C).

The external ethics approval was ratified through the host university, The University of Technology of Sydney Human Research Ethics Expedited Review Committee, which reviewed this research and agreed that the application met the requirements of the NHMRC National Statement on Ethical Conduct In

Human Research (2007) (ethics approval number: UTS HREC REF NO. 2015000062) (Appendix D).

3.5.1 Ethical Conduct in Aboriginal and Torres Strait Islander Research

Methods were selected that endeavoured to be respectful to Aboriginal and Torres Strait Islander people in accordance with the NHMRC's Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research (NHMRC, 2003). Firstly, an Aboriginal research partner who was an AHW at the CoE was sought early in the research proposal planning phase. There was a level of pre-established trust with the candidate as the AHW had worked with the candidate over three years at the CoE and she was familiar with candidate's previous research and dietetic work. Respect is the core value at the heart of ethical conduct in Aboriginal and Torres Strait Islander Health Research (NHMRC, 2007). The trust, openness and engagement with the AHW ensured the candidate selected methods that acknowledged the right of participants to have different values, norms and aspirations.

The methodology and study design were discussed at early phases of the study and throughout the study at regular meetings with the AHW. The candidate continually checked with the AHW whether the progress of the study were respectfully engaging Aboriginal and Torres Strait Islander participants prior to and during participant interviews which is important when doing research with Aboriginal and Torres Strait Islander people (NHMRC, 2007). The candidate was also aware the partnership between her, the AHW and participants needed to be nurtured throughout the duration of the research (Jamieson et al., 2012) for respectful research conduct (NHMRC, 2003).

The information about the purpose of the study, the methods, risks, inconveniences, discomforts and possible outcomes of the research were explained by the candidate to the participants. The AHW was available for cultural safety purposes so the participant could make an informed decision to participate or not, as per the Values and Ethics Guidelines (NHMRC, 2003).

As mentioned in Section 1.3, the candidate was also informed by the NHMRC's Road Map II which provides a strategic framework for research priorities with Aboriginal and Torres Strait Islander communities (NHMRC, 2010). The NHMRC's Road Map II research topics are required to be linked to the capacity building goals of primary health care services to support improved health outcomes for Aboriginal and Torres Strait Islander people (NHMRC, 2010). The Growing healthy at Inala research was linked to the capacity building goals of the CoE primary health care service which were to trial novel health care delivery approaches (Hayman et al., 2014). mHealth is a novel health care delivery approach that the candidate explored with parents who attended the CoE. The Growing healthy program was intended to complement routine care provided by primary health care practitioners, however has not been implemented previously with Aboriginal and Torres Strait Islander primary health care services.

Establishing a research relationship which value Aboriginal and Torres Strait Islander knowledge supports capacity exchange. Capacity exchange is an action area for improving the health of Aboriginal and Torres Strait Islander people through research outlined in the NHMRC's Road Map II strategic framework (NHMRC, 2010). As mentioned in Section 1.2.3, the candidate started building relationships with the Inala Aboriginal and Torres Strait Islander community members from the commencement of her employment at the CoE. From an early stage a solid foundation of community engagement was founded between the candidate and the Inala Aboriginal and Torres Strait Islander community. This began the partnership between the candidate and the community from the beginning of employment at the CoE. The candidate continued building relationships throughout her employment and had a strong presence in the community through participation in cultural community events. Community engagement and participation was a suggested application for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research (NHMRC, 2003).

Addressing priority health concerns is an essential principle relevant to health research among Aboriginal and Torres Strait Islander populations (Jamieson et

al., 2012).The Growing healthy program addressed priority health issues including nutrition and obesity that The Council of Australian Governments (COAG) have identified in Aboriginal and Torres Strait Islander communities across Australia (COAG, 2009). The Growing healthy program also addressed priority health issues in the Inala Aboriginal and Torres Strait Islander community. This was confirmed by The Inala Community Jury for Aboriginal and Torres Strait Islander Health Research approving the research. The approval was an endorsement that infant feeding practices and supporting new mothers was considered to be a local community health priority. This endorsement demonstrated reciprocity (NHMRC, 2003), by confirming the research was linked to the Inala Aboriginal and Torres Strait Islander community health priorities.

Responsibility, a core value of Ethical Conduct in Aboriginal and Torres Strait Islander Health Research (NHMRC, 2003) was demonstrated in this study through the accountability the candidate and the research team showed. Timely feedback of findings was provided to the community through The Inala Community Jury for Aboriginal and Torres Strait Islander Health Research at meetings. Feedback of findings was also provided to participants, either through staff meetings or parents individually. The Inala Community Jury for Aboriginal and Torres Strait Islander Health Research providing acceptance for the study, acknowledged the proposal demonstrated a commitment to working within the spirit and integrity of Aboriginal and Torres Strait Islanders peoples (NHMRC, 2007).

3.5.2 Informed consent and confidentiality

Given the candidate works in a professional capacity as a dietitian at the CoE, it was essential that both participant groups, parents and staff did not feel obligated to participate in the study. Voluntary participation was ensured by making it clear to the participants that their involvement in the study was completely voluntary and they were free to withdraw from the study at any time, as per ethical research principles (Kumar, 2005). Parents were made aware that if they did not want to participate in the study or decided to withdraw from

the study, they would not suffer any negative consequences, such as unfair discrimination or reduction in the level of care by the CoE.

Informed written consent was obtained by providing the parents and staff (in person, posted in the mail or emailed) with Participant Information and Consent forms (PICF) (Appendix E and Appendix F respectively). The PICF outlined the 'Growing healthy at Inala' study and the participants' involvement if they chose to take part in the study, why the study was needed and who was involved in the research. The ethical considerations and contacts for further information were provided. The candidate allowed the parents to take extra time and were encouraged to discuss their participation with someone else to make an informed decision about their inclusion in the study. The candidate offered to explain the PICF to parents verbally if they required clarification and the parents were made aware that the AHW was available for cultural support if needed. The candidate had emailed the staff the PICF at the time of recruitment and the AHW collected the PICFs prior to the group discussions. The staff were encouraged to ask questions regarding the study to the AHW and/or candidate prior to the group discussions and providing consent.

Group discussion, interview transcripts and analyses were kept on a password protected computer file on a backed-up server with only access to research team members. The key to re-identify study materials was stored separately, and only accessible by the research team. Any printed copies of the group discussion, interview transcripts and PICFs were kept in a locked filing cabinet, accessed only by the research team and the key held by the candidate.

3.6 Participant sampling and recruitment

There were two groups of participants in the Growing healthy at Inala study: parents who attend the CoE and staff of the CoE.

3.6.1 Parent participants

The first group of participants involved in the study were parents of Aboriginal and Torres Strait Islander infants between the ages of zero to nine months who

attended the CoE. This age group of infants were selected as the Growing healthy program targeted optimal infant feeding in the first nine months of life (Denney-Wilson et al., 2015).

The Growing healthy at Inala study involved parents:

1) Participating in an informal group discussion on app push notifications
2) Using the app for six weeks and providing feedback in individual qualitative interviews.

3.6.1.1 Eligibility and exclusion criteria

CoE clients were eligible to participate in the Growing healthy at Inala study if they were aged 16 years and older, were parents of Aboriginal and Torres Strait Islander infants younger than nine months and attending the CoE. Parents aged 16 years and over were included in the study. Parents were ineligible to participate in the study if they were unable to provide informed consent, or unable to read or understand English as the Growing healthy app was only available in English.

3.6.1.2 Recruitment

The recruitment methods were the same for the informal discussion as it was for parents using the app. There was a recruitment time of two-weeks leading into the informal discussion exploring the push notifications and during this time six parents were invited to participate in the study. The limited timeframe for recruitment was due to an unexpected delay in ethics obtainment from the local health district and therefore reduced time to promote the discussion and underestimating the difficulty in recruiting participants. Recruitment for parents to use the app and provide feedback in qualitative individual interviews continued for a further three months following the discussion, inviting ten more parents. Therefore, sixteen parents in total were invited to participate in the study.

Recruitment for the Growing healthy at Inala study commenced on the 20th of May 2015 and finished on the 4th of August 2015. The recruitment approach for the parents included:

- The CoE staff were made aware of the research and encouraged to let potential patients know about the study. Staff members asked potential participants' consent for the principal researcher to contact them to inform them of the research project and what it involved.

- A flyer about the research was placed in the clinic waiting area, and on the clinic Facebook sites (Research project poster Appendix G). This also led to snowballing sampling from members of the Facebook community.

- The candidate used a snowball sampling approach where participants were asked whether they could provide information about the study to other potential participants who had similar characteristics (attended the CoE and had an infant under the age of nine months).

Snowball sampling was chosen as a recruitment method for this part of the study as this recruitment process is suitable when the study sample is limited to a small subgroup of the population (Patton, 2002), as was the case in this study. Snowball sampling was useful because the approach allowed the candidate to reach potential participants that did not attend the CoE during the recruitment time.

When the potential participant expressed their interest in the research the candidate contacted them via a phone call or in person at the CoE. The researcher then explained the research using an invitation script (Appendix H). This was done to standardize the way the program was explained to mothers with an emphasis on the voluntary nature of enrolment and that choice to enroll would not in any way affect the care provided by the CoE.

All parents were provided with a $25 gift voucher for each interview they participated in as a token of appreciation for their participation.

3.6.2 Staff participants

This component of the study involved participants who were staff members of the CoE. Group discussions with staff were held during a regular meeting time. The groups were defined as group discussions due to the large number of participants expected to attend. A group discussion as part of an existing staff meeting was considered the most pragmatic means of gaining staff's perceptions of the Growing healthy app. It was more suitable for staff as meetings were the only time that clinic staff were together and available as the CoE was closed to patients during that time each week.

3.6.2.1 Eligibility and exclusion criteria

The Growing healthy program was intended to complement routine care provided by primary health care practitioners (Denney-Wilson et al., 2015), and therefore practitioners from the CoE, a primary health care centre were targeted. The group discussions with staff were used to capture a range of different opinions from varying types of primary health care practitioners who had experience with supporting parents of Aboriginal and Torres Strait Islander infants.

3.6.2.2 Recruitment

Twenty-five staff members of the CoE (out of a total of CoE staff) were invited to participate in this component of the study. Staff who had experience supporting parents of Aboriginal and Torres Strait Islander infants, including GPs, paediatricians, nurses, child health nurses and administration staff were invited. The staff members met once a fortnight for a staff meeting, and therefore the group discussions were planned during this time. Two paediatricians and two child health nurses were not able to attend the first discussion group and had extensive experience supporting parents of Aboriginal and Torres Strait Islander infants. Therefore, a second group discussion was arranged to gather their valuable insights.

The staff members were emailed information about the study and the group discussion's purpose by the candidate four weeks in advance of the group discussion (Appendix I). The email contained an invitation to participate with a link to the Growing healthy website, so they were able to do their own research of the program to make an informed contribution in the group.

3.7 Data collection

3.7.1 Informal discussion with parents on app push notifications

The informal discussion with parents aimed to explore whether the push notification messages delivered in the app (described in chapter 1.1) were appropriate, acceptable or understandable from an Aboriginal and Torres Strait Islander perspective. The push notification feature was the messages delivered by the Growing healthy programs app or SMS. Initially a focus group was planned as an appropriate method for exploring peoples understanding of, and responses to health related messages (Wilkinson, 1998). However, only two participants attended, and it was decided between the candidate, the AHW and the facilitator that an informal discussion with the parents about the key messages would be more appropriate. Rather than using an interview schedule as originally intended (Appendix J), participants were individually asked their views and some discussion took place between the two participants. With only two people it did not provide as much breadth and capacity to elicit quality information (Krueger and Casey, 2000), as focus groups use the communication between participants to generate data from a group of people, rather than just one or two individuals (Kitzinger, 1995).

The informal discussion with parents was held at the Ngutana-Lui Aboriginal and Torres Strait Islander Cultural Studies Centre. The Centre was located 1.4 kilometers from the CoE and was familiar to the many CoE clients, and it promoted a relaxed, friendly atmosphere, which aimed to reflect Aboriginal and Torres Strait Islander perspectives.

There were several facilitators present during the informal discussion as there were more than two participants who were expected to attend. Associate Professor Elizabeth Denney-Wilson who has had extensive experience in conducting research in primary health care facilitated the discussion, and she did not have any prior relationship or knowledge with any of the participants. An AHW from the CoE, who was the AHW partnering with the study and had a respectful and ongoing relationship with the candidate. The AHW was also present during the information discussion, to provide cultural support for the facilitator and participants as needed. The AHW did not have any prior relationship or knowledge of the participants either. The AHW was an Advanced Nutrition AHW, therefore had a background in appropriate nutrition for Aboriginal and Torres Strait Islander people. The AHW had input in selecting the key messages for discussion. The messages were selected in advance of the discussion, during consultation with the AHW and the candidate out of a total of approximately sixty messages. This process was done by selecting the messages the AHW felt were inappropriate or not easy to understand for Aboriginal and Torres Strait Islander new parents. The candidate organized the discussion with parents by arranging the venue and setting up the room. The candidate also confirmed participants the day before by phoning each of them.

The candidate was present during the informal discussion. It was decided in the research planning stage that she would not facilitate the discussion to reduce bias, considering the previous relationship between her and some of the parents.

Before the informal discussion commenced, participants completed a brief survey to obtain their demographic information (Appendix K), this included:

- Date of birth for both participant and baby
- Whether the participant and baby identified as Aboriginal and or Torres Strait Islander
- Level of education of participant

- Infant feeding practices/ mode of feeding (breast, formula, mixed feeding or solids only)
- Baby's gender
- Type of phone used

To promote a comfortable environment and demonstrate reciprocity and respect (NHMRC, 2003), refreshments were offered upon arrival to each participant. Offering refreshments to each participant valued reciprocity by respecting the wellbeing of the participant and is in accordance to Ethical Conduct in Aboriginal and Torres Strait Islander Health Research (NHMRC, 2003). The informal discussion commenced with the participants being informed about the purpose of the discussion, followed by an introduction and overview of the Growing healthy program, including the push notification key messages.

Prior to the discussion, several of the key messages that were delivered by the Growing healthy app's push notifications were selected during a research meeting with the AHW and candidate for discussion. They were selected as they were the messages that the AHW felt unsure whether they would be appropriate and/or understandable by the participants. Seventeen key messages were selected for discussion and were displayed around the room (Box 2) in large font, each on a separate piece of A4 paper. The facilitator asked parents to provide feedback on the content of each push notification by placing a coloured dot on each message. A red dot indicated the message was not acceptable/understandable; a yellow dot indicated uncertainty about the acceptability or understandability of the message; and a green indicated the message was acceptable or understandable. Following this exercise, participants responses were explored informally as a discussion. This was prompted by the facilitator through open-ended questions and discussion to help understand why or why not the messages were considered appropriate or understandable.

Box 2: Push notification key messages selected for discussion

1. Napping can help you get through the day – see here for sleep tips.
2. If friends or neighbours offer to provide help or meals, accept their offer [x]!
3. Eating healthily and getting as much sleep as you can are key!
4. Tempted by 'fast food' to save time when you're tired? Doing so is unhealthy for your waist and wallet!
5. Feel overwhelmed by everything you want to 'get done'? When you're adjusting to motherhood, it's a good idea to start with small goals!
6. Lacking energy? Start with breakfast to keep you going all day- see more here….
7. Are you wondering if [baby's name] has colic?
8. Did you know starting solids early can affect your baby's health?
9. Food rewards might be good for training your dog but not for [baby's name]! Rewarding your baby with sweets if they eat veggies is rarely a long-term solution.
10. Cuddles and feeding at your breast is soothing and helps them adapt to their new surrounds – more here.
11. If you are thinking of trying a dummy, try waiting 1 more week till you set up your milk supply, and learn the best way to use one here….
12. It gets easier as your baby gets older! Focus on your successes knowing you're doing the best thing for your baby.
13. How are you adjusting to being a breastfeeding mum? I'm sure you are doing great.
14. Breastfeeding can be a challenging and rewarding journey.
15. Wondering about your milk supply? These simple feeding rules will help you keep up your milk supply while giving formula – read more….
16. Stuck for easy portable snack ideas? Try pieces of rice cakes, fruit and soft bread.
17. Be proud of your successes and keep up the good work!

The candidate took detailed written notes following the discussion with the participant's permission as a record of the data and then she asked the facilitator and AHW to input into the notes to add their interpretation of the discussion. Written notes were chosen to collect data rather than using a digital recorder as it was felt to be more appropriate for an informal discussion setting. Written notes were used as a data collection method to describe not only what was said during the discussion, but the researcher's observations, reflections and interpretations (Rice and Ezzy, 1999) which were important in this setting. The notes were then transcribed into an appropriate format (a table drawn in a Microsoft Word document) against each message. This was done by the candidate as a way to familiarise herself with the data in preparation for the analysis phase.

3.7.2 Quantitative data on app usage

The quantitative component of the study involved examining app analytic data on app usage following six weeks of parents using the Growing healthy app. Initially, the candidate provided each participating parent with instructions on how to download the app either in person, over the phone, through an email, private Facebook message or SMS. A code was sent to participants and required to activate the app allowing the researcher to track app usage for each participant. The candidate made a follow up call, Facebook message or SMS to check with each parent to see whether they had been able to download and activate the app. The candidate encouraged parents to contact her if the parent experienced technical difficulties with the app.

As described in Section 1.1, the parents received three push notification messages a week on their mobile phone tailored to the age of their baby and the parent's feeding method, with links to more information on the app/website (Denney-Wilson et al., 2015).

App analytics is the tracking and measurement of data from app usage on mobile devices (Agarwal et al., 2016). The app analytics provided information on what aspects of the app were used by individual participants including which

sections were used, how often they were used, and which push notifications were opened. Specifically, data was available on:

- Number of participants who downloaded the app
- Total pages of information accessed by each individual app user
- Percentage of push notifications opened by individual app user
- Topics accessed by each individual app user.

The available app analytics were provided by the Growing healthy app developer/data manager at the end of the six weeks, before the first interviews with identified participant's use of the app. The data manager also provided the updated app analytics to the candidate again before the second interviews. There was no data available on the use of the web component of the program, therefore the was no data available from the participants without Smartphones (n=2) who received only text and email messages rather than a push notification through the app.

As mentioned previously, this information helped guide the questions in the semi-structured interviews. For example, if the app analytics showed a participant didn't open many of the push notifications sent, an interview question explored why they didn't use this feature. The app usage data was also used to help interpret the qualitative interviews. For example, why particularly topics or features had or had not been used.

3.7.3 Qualitative interviews with parents

Two rounds of qualitative interviews were conducted with participating parents following at least six weeks of using the Growing healthy app. Two rounds of interviews were held because following preliminary analysis of the initial interviews (n=6), the research team determined that more in-depth data was needed to answer the research questions.

Interviews were chosen as a method as they allowed the participant to tell their story about how they found using the program. The semi-structured interviews explored the appropriateness and acceptability of the program in terms of:

- frequency of messages
- engaging and encouraging
- reputable, readable and appropriate source of information
- informative and sufficiently comprehensive
- a source of information that they would recommend
- cultural relevance and suitability

Interviews also covered questions about the use of mobile phone apps and the internet in general, including health and infant feeding information. It also explored parent's experiences around infant feeding practices and where they usually source their information or advice from. Lastly, the interviews included discussion around the parent's perception of the Growing healthy apps culturally appropriateness. An interview guide was prepared in advance to help the researcher with structure and flow of the interview, and therefore to enable comfortable conversations. The full interview guide is attached (Appendix L), and an overview of questions are described in Box 3.

Box 3: Overview of initial interview guide for parents

1. When and how did you use the Growing healthy app and/or website? (specific probe questions used related to app usage data, for example, what did you find useful about the push notifications and when did you use them?)
2. I'm wondering if you only used the app when you received the messages? Did you browse the content out of interest?
3. What did you think of the look, feel and content of the program? For example, what were the most/least helpful sections of the program?
4. Where do you usually get your support and information about feeding baby

from?

5. How easy were the messages to understand? What did you think of the language used? How did you feel when the messages popped up?
6. Did these messages and content of the app fit with your culture? For example: *As a Murri Mum/ Dad?*
7. Do you have any suggestions on how to make the Growing healthy app and other mHealth programs more culturally appropriate or engaging?

Initial interviews (n=6) were facilitated by an AHW who was a CoE staff member. The candidate was in attendance during the interviews intending to create a comfortable environment for the participant as most parents were familiar with the candidate. The candidate and the AHW were both present during the informal discussion and therefore knew two parents already. The AHW conducted the first round of interviews rather than the candidate as this was thought to be a more suitable approach at this stage of the research. The candidate assumed a facilitator who was unknown to participants and who identified as Aboriginal was therefore, less likely to influence parent's views. The AHW was not an experienced researcher which impacted on the quality of the data collected. Therefore, a second round of interviews were planned.

Differing from the first round of interviews, the second round of interviews (n=10) were facilitated by the candidate alone, as a respectful relationship was established between her and the parent participants. By the candidate conducting the interviews herself, guided by a constructionist approach, a clearer understanding of the parent's realities and how they defined and experienced the world in relation to cultural appropriateness may be obtained. The candidate also was able to investigate and explore during the second round of interviews more in-depth responses provided during the first interviews which is the benefit of qualitative methods (Creswell, 2003).

The second round of interviews followed a revised interview schedule (Appendix M). An overview and examples of questions are provided in Box 4. Ethics approval (Appendix N) was sought for the amendment made to the study

for additional semi-structured interviews facilitated by the candidate rather than the AHW, following a modified interview guide.

Box 4: Overview of the interview guide for the second round of interviews with parents

1. What has been the best thing about feeding your baby? Can you please tell me a story about a time?
2. Where do you usually get your support from, for caring for your baby? what about information about breastfeeding/formula feeding/solids?
3. What was the most helpful part of the app? Can you tell me a story about a time when you used it and how it helped? Can you tell me a story about a time when you used it and it didn't help?
4. How did you feel when the messages popped up? Can you tell me a story about a time when you got a message and how you felt?
5. Do you use any apps on your phone? If so which ones? Can you tell me about how you use them? What about apps for health information? Can you tell me about these or how and why you use them? What do you like about them?
6. If you were developing an app for this community what kind of things would you put in it? Can you tell or show me more about that?
7. What features would make it strong for Aboriginal and Torres Strait Islander families? Can you tell me more about them?

The interview started with questions around the participant's positive infant feeding experiences to help promote a comfortable environment. This perspective was informed by a constructionist viewpoint to help the candidate and parent become more understanding of one another, by allowing the participant to share experiences. This was similar to how the candidate conducted a dietitian consultation at the CoE. She applied more of a yarning-

style approach, allowing time for the parent to become more understanding of the candidate's inquiries. Yarning-style approaches have been recommended for research methods with Aboriginal and Torres Strait Islander peoples (Putt, 2013). The candidate explored the parent's responses further by asking the parent "tell a story about a time when……." and pausing more during the interview to allow the parent to share rich, compelling experiences.

There were also questions included to explore how the participants sought infant feeding information prior to the Growing healthy app. The interview guide included more questions exploring parent's cultural considerations for themselves and their community, such as, "If you were developing an app for the community what kind of things would put in it? Would you recommend the Growing healthy app to your sisters and/or cousins?" The second round of interviews also explored mHealth in general and parents use of other apps, including what they do and don't like about these.

The second round of interviews were conducted until theoretical data saturation was reached evidenced by no new information recurring within the interviews (Miles and Huberman, 1994). By the tenth interview similarity and repetition in instances were apparent and no new data were being collected, indicative of data saturation (Miles and Huberman, 1994). Where possible and with permission, interviews were audio recorded with a digital recorder. To complement the recordings, hand written notes were also taken by the candidate following the interviews to record the candidate's reflections, observations and perceptions of the interviews.

The interviews were conducted at a location of participants' choice in either the participant's home, over the phone, or at the CoE.

3.7.4 Group discussions with staff

Lastly, the group discussions with CoE staff were conducted, which were intended for staff to share their views on the content, appearance, utility and cultural appropriateness of the program as well as to explore whether they

thought that mHealth was an appropriate health promotion tool for use with Aboriginal and Torres Strait Islander families living in an urban area.

Group discussions were chosen for this section of the research as it was more time efficient than individual interviews and more appropriate for the research question than questionnaires. A group setting was an efficient way to gather data and enabled discussion amongst the staff which helped to identify convergent and divergent opinions.

Two group discussions were conducted with staff at the CoE. The second group discussion was held because four clinicians were not able to attend the first group discussion as they were not working that day.

The first group discussion was held in the waiting room of the CoE which was large enough to accommodate the number of people attending, and the second group was held in a private clinic room that was more suitable for fewer participants.

The candidate facilitated the first group discussion and an AHW assisted by providing and collecting the PICFs to the participants and was available to provide cultural support to the participants if needed. There was another research assistant who made written notes during the group discussion. The candidate facilitated the second group discussion on her own. The candidate planned to do this on her own as there were only a small number of participants attending, and no persons identified as Aboriginal and or Torres Strait Islander. Therefore, the candidate felt she didn't require any research assistance or cultural support during the discussion.

Both group discussions followed the same format. A short PowerPoint presentation was shown to the staff at the beginning of the discussion to explain the Growing healthy program and the Growing healthy at Inala's project aims. The presentation demonstrated how the program worked, including some of the content, the visual appearance, and examples of key messages. The presentation also provided a link to the Growing healthy program website and a sample app was shown personally to interested staff participants by the

candidate. This was followed by a group discussion lead by the candidate guided by a discussion schedule for both groups (Appendix O). Key topics explored during the CoE discussion groups included the appropriateness of the Growing healthy app and mHealth as a delivery mode for health promotion programs for their patients (Box 5).

Box 5: Overview of interview guide for group discussions with CoE staff

1. What do you think of the appearance, feel and content of the Growing healthy app?
2. What cultural issues do you think would be important to consider in the design of an app on infant feeding for Aboriginal and Torres Strait Islander parents?
3. What do you believe makes a successful, culturally appropriate program and why?
4. What are the main nutrition issues you face in the community including infant feeding concerns?
5. Where do your patients usually get their infant feeding information from?
6. Do any of your patients use health related apps, including ones related to infant feeding?

The group discussions were audio-recorded with a digital recorder. When this was not possible due to poor quality of audio recording, as occurred during the first group discussion when the audio-recorder failed to record clear audio, detailed field notes were taken by a research assistant. The hand-written field notes from the first group discussion were discussed, and the accuracy agreed upon in consultation with the candidate, the AHW and research assistant who were all present during the discussion. To complement the recordings and field notes, hand written notes were taken by the candidate following the discussions to record the candidate's reflections, observations and perceptions of the discussions.

3.8 Data analysis

3.8.1 Informal discussion with parents on app push notifications

Thematic analysis (Braun and Clarke, 2006) was used to interpret the small amount of data from the informal discussion with parents. Braun and Clarke (2006) define thematic analysis as “a method for identifying, analysing and reporting patterns within data” (Braun and Clarke, 2006, p. 79). Patterns are identified through a rigorous process of data familiarisation, data coding, and theme development and revision. Thematic analysis was chosen for this section of the study because it suits addressing research questions related to people’s experiences, or people’s views and perceptions, such as parent’s perceptions of acceptable app push notification notifications.

The data collected by hand written notes taken by the candidate were discussed with the AHW, and the facilitator of the discussion for data verification. During the analysis phase, codes were created relative to whether the message was acceptable and/or understandable. Further to this, themes were identified during discussion and analysis with another research team member as to what the parents perceived to be an acceptable and or understandable message. Overarching themes about parent’s perceptions of acceptable messages were determined through ongoing research team discussions. This involved discussing the codes and searching for themes by identifying any reoccurring themes across the data and highlighting any differences in the data. Sub-themes were developed from the codes, and finally four main themes arose from the discussion data relating to parent’s perceptions of acceptable messages.

3.8.2 Quantitative data on app usage

The app usage data was provided by the data manager in several Microsoft excel spreadsheets. The data manager had created an individual profile for each participant. The app usage data was used by the candidate to interpret

whether the parent accessed the information through a push notification and how frequently the pages were accessed. If any pages of information were accessed frequently, this told the candidate the parent was interested in a particular topic. App analytics were used to see how the participant interacted with the program and frequency of usage. For example, which pages were accessed by which user, the total pages accessed by the user, if any, and the percentage of push notifications opened.

3.8.3 Qualitative interviews with parents and group discussions with staff

The data from the qualitative interviews with parents and the group discussion with staff were analysed together. Thematic analysis informed by the methods of (Braun and Clarke, 2006) was used to structure and interpret the large amount of data collected from the semi-structured interviews and the group discussion with staff. Thematic analysis was chosen for its flexibility and ability to provide a rich and detailed account of the data. Thematic analysis highlighted any similarities or differences in the data or divergent cases (staff participants whose views differed from the parent views). Detailed accounts of a particular theme, or groups within the data were considered across both participant group data sets. The analytic process involved a progression from description (where the data had simply been organised) to show patterns in semantic content, and summarized, to interpretation, to theorize the significance of the patterns and their broader meanings and implication (Patton, 1990). Prior to analysis the recordings of the first round of interviews were transcribed verbatim by a professional transcription service.

The data analysis consisted of multiple stages. Once the transcripts were returned, the first stage of analysis occurred, which involved the accuracy of transcriptions being checked against audio recordings by the candidate. This helped immerse the candidate in the data by repeatedly listening and reading the transcribed interviews. The candidate removed names and other identifying information from transcripts and codes were used instead of names. During this process, the candidate made analytical notes on the margins of the interview

transcripts which comprised of marking ideas for future coding. This entailed reading and re-reading the data by the candidate which helped the candidate to familiarize herself with the data during the first stage of thematic analysis (Braun and Clarke, 2006).

The second stage of analysis involved organising the data (text) from the interviews and assigning descriptive codes for sections of text using the software program QSR International's Nvivo 11 (QSR, 2015). QSR International's Nvivo 11 was chosen for the programs ability to allow organisation of qualitative data, retrieval of data during analysis and to identify reoccurring codes throughout the data. Initial codes were generated including interesting features of the text relevant to the research questions. The margin notes of the transcripts were used to guide the candidate about which text was of interest and needed to be transferred to a code via the software program. This was done in a systematic method across data sets. Table 3 shows an example of codes applied to two short segments of text.

Table 3*:* **Examples of text with codes applied**

Text extract	Coded for
A bit plain, not that eye catching [the look of the app] but the photos were all nice, and a few more pictures would have been good. (Female, parent 4)	• Language • Visual presentation • Too plain
A little bit difficult to navigate [the website]. (Female, parent 9)	• Functionality • Hard to use

A long list of codes was created then sorted into groups of similar codes in NVivo 11. This initial coding tree was then sent to the research team along with a selection of transcripts (five) for discussion about the usefulness of the initial coding tree. During this stage of analysis, it was decided amongst the research team more data was needed. Therefore, a second round of interviews was conducted. The group discussions with staff were also conducted, and the candidate repeated the two phases of analysis described above. The additional

transcripts were coded using the existing coding trees, and additional codes added. All sets of data (the first and second round of interviews, and the group discussions with staff) were collated into NVivo 11. The stages that led to searching for themes is summarised in Figure 6.

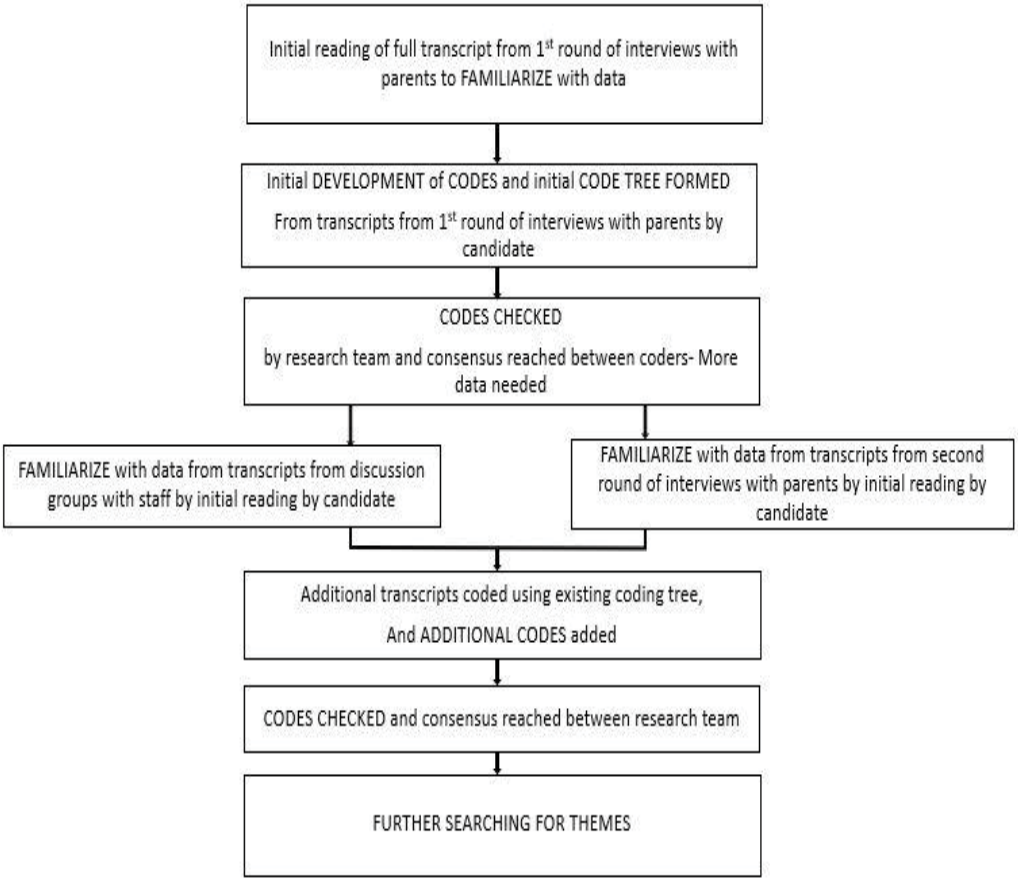

Figure 6: Analysis procedure - flow chart of qualitative data analysis procedure prior to searching for quality themes

Subsequently, the next stage of analysis involved searching for themes by identifying any reoccurring themes across codes and highlighting any differences in the data or divergent cases (participants whose views differed from others). An initial thematic map was created from the list of codes and coding tree in NVivo 11 and discussed with the research team. Figure 7 shows an example of the initial six main themes (coloured in light blue) that centred on the research aim (coloured in green) related to cultural considerations (codes are coloured in darker blue) of the program.

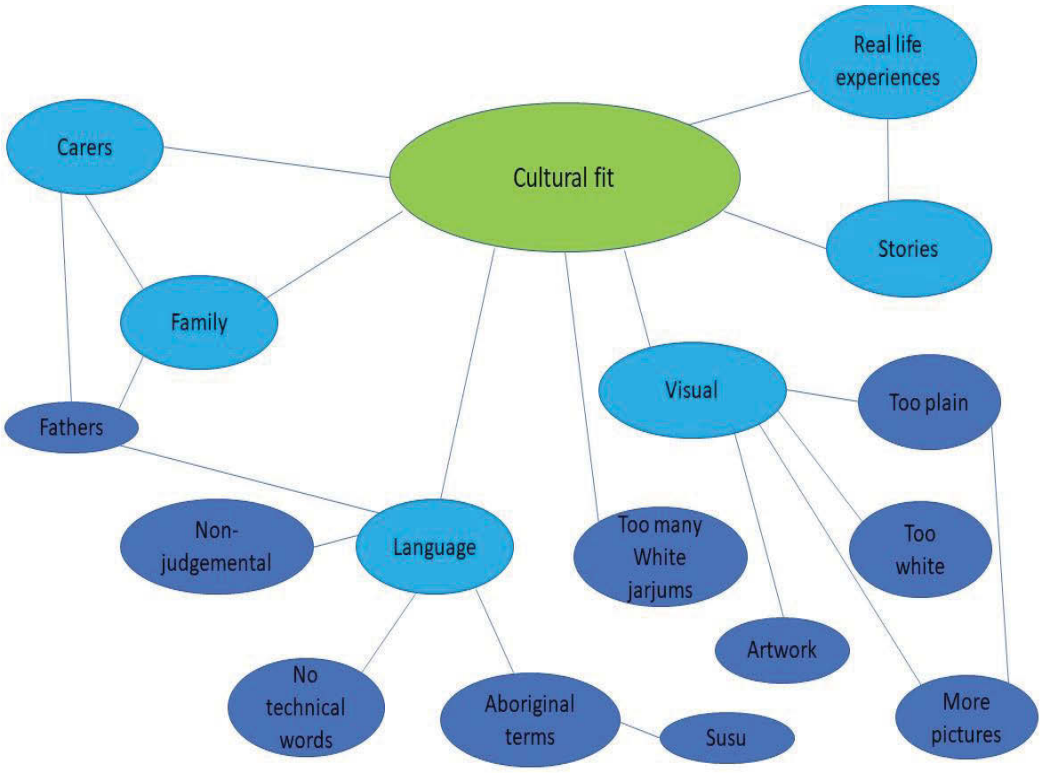

Figure 7: Example of the initial thematic map, showing six main themes (coloured in light blue) related to cultural considerations (codes are coloured in darker blue)

The next stage of analysis involved reviewing themes, which was the process of rechecking the transcripts and codes again, which allowed the candidate to modify emerging themes. This required checking whether the themes worked in relation to the coded extracts and the entire data set; generating a thematic map of the analysis. The themes were then refined and named which involved ongoing analysis to refine initial themes, sub-themes and the overall story the analysis told. The coding of the data and the emerging theoretical map of the analysis were discussed extensively with the research team (supervisors and AHW) to challenge assumptions, provide new insights and to ensure that the map fitted the data. There were clear definitions and names generated for each theme. An example of a final thematic map that centred on the cultural considerations of the program participants suggested throughout the data (Figure 7) is presented in Figure 8.

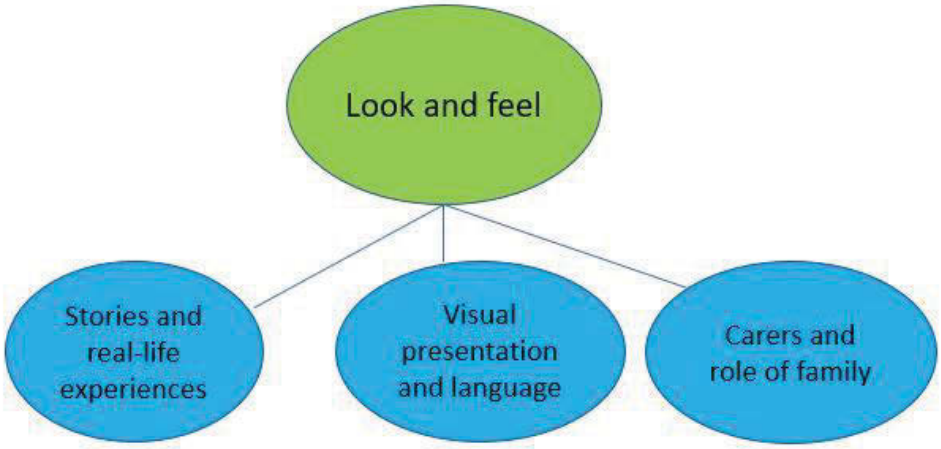

Figure 8: Example of a thematic map showing one main theme (coloured in green) from refinement from the initial thematic map in Figure 7 regarding cultural considerations

Transcripts, preliminary codes, sub-themes and themes were discussed with other members of the research team (including the AHW) to cross-check interpretation and to obtain additional insights into the data to improve the validity of the analysis (Malterud, 2001). During the final stage of analysis clear, rich, compelling examples were selected from the data which related back to the research questions and literature and findings were summarised in the results Chapter, section 4.5. The AHW provided ongoing analysis and cross-checking of the data to ensure that the validity was improved. The AHW was involved in the production of the report to ensure the candidate had presented culturally respectful extracts from participants.

Member checking was not conducted, a process of cross-checking theoretical findings, conclusions and outcomes of the research with participants (Lincoln and Guba, 1985). Thematic findings were fed back to the research team and discussed in detail with the AHW for clarification and further discussions to ensure that analysis reflected the views of participants.

3.8.4 The practice of reflexivity

Reflexivity is integral to the process of constructionist epistemology (Charmaz, 2006). An important component of a constructionist approach to research is recognising and making clear the role of the researcher/candidate, including underlying values and assumptions bought to the research process. How the background of the candidate might affect what one understands, how one acts and interprets within a research project (Charmaz, 2006). The constructivist approach adopted assumed that the candidate took an active role in constructing knowledge in partnership with research participants. In this section the candidate makes clear her background, experiences and values, and the implications for the research process including how reflexivity was used to identify underlying assumptions and ensure that analysis was justified in the data.

Reflexivity has been defined as “the process of reflecting critically on the self as a researcher” (Lincoln and Guba, 1985, p.183). Reflexive practice maintains critical reflection on the conscious and unconscious beliefs, assumptions, attitudes and actions influencing the candidate during the research process (Rix et al., 2014). The candidate’s position as a non-Indigenous health care practitioner and researcher in an Aboriginal and Torres Strait Islander community working for a health service was intrinsically problematic. The health service (CoE) was administered by a State with a history of dispossessing land and children from Aboriginal and Torres Strait Islander peoples, bringing further complexities to the research. Using the practice of reflexivity was therefore necessary for the candidate, as a non-Indigenous researcher working with Aboriginal and Torres Strait Islander people as it is an effective tool for softening power, class and cultural differences in research (Nicholls, 2009).

There are three layers of reflexive practice when doing research with Aboriginal and Torres Strait Islander people, which include the examination of self within the research, examining interpersonal relationships with participants and system reflexivity (Rix et al., 2014). Self-reflexivity explores biases and identifies what may be brought to the study from past experiences. Interpersonal

reflexivity examines interactions from the candidate with participants, exploring power imbalances and the learning that occurs within relationships. System reflexivity examines and reflects on institutional practice that may negatively influence the experiences of Aboriginal and Torres Strait Islander participants in the study (Rix et al., 2014).

The candidate maintained regular mentoring and reflection meetings with a supervisor who is a clinician/academic with broad experience supervising Aboriginal health research projects. The candidate was able to reflect on biases and explore past experiences brought to the research by the supervisor offering critique, debate and her own and other employees/students experiences. The candidate acknowledged the power imbalance and unequal relationship and using the skills gained over the years at the CoE listened carefully and was considerate of the participant's responses and situations. Importantly, the candidate realised that despite her identity as a non-Indigenous health care practitioner-researcher, she discovered that relationships and building trust with participants were critical to conducting culturally safe research.

Reflexivity is also a vital tool for non-Indigenous researchers in Aboriginal and Torres Strait Islander health research to develop culturally safe behaviour (Wilson, 2014, Fredericks, 2006). It encourages researchers to reflect on their own attitudes and values and change their practice, based on these reflections (reflexivity) (Nicholls, 2009). The candidate maintained reflexivity throughout the research, in particular the analysis process by keeping a reflexive journal to help recognize and critique her place within the scope of investigation (Byrman, 2004) and bring to surface her underlying assumptions and beliefs. One assumption that the candidate became aware of was her belief in the value of an open-minded attitude to the participants and community, which enabled the perspectives and insights of participants to be heard. A principle of cultural safety is the ability to recognise and address power differentials through practice and therefore critical reflection is likely to facilitate culturally safe practice (Taylor and Guerin, 2010). Therefore, reflexivity enabled the candidate to acknowledge some of the subjectivities during the qualitative research

processes including the power variance between the candidate and the participants.

Chapter 4: Results

4.1 Introduction

This Chapter presents the results of the study and is divided into four sections. The first section, 4.2 presents results collected from the informal discussion with parents regarding the push notifications in the Growing healthy app. In the second section, 4.3, parent participants who used the Growing healthy app and participated in interviews are shown as well as the data collected from the quantitative data on app usage. Finally, the participants from the group discussions with staff are presented in Section 4.4. The interviews with parents and the discussion groups with staff data were analysed together and presented in Section 4.5 to present and compare parent and staff views about appropriateness and acceptability of the Growing healthy program and mHealth.

4.2 Informal discussion with parents on app push notifications

4.2.1 Participants

Six parents were invited to participate in the discussion, however four parents did not turn up on the day and as a result the discussion went ahead with only two parents. Parents reported they were not able to attend the discussion as they had difficulty getting transport to the venue and not having adequate support to attend. For instance, two parents said that they were not able to attend the discussion as they did not have anyone available to care for their other children while they attended. The recruitment period for the discussion was two weeks. The recruitment time was not extended as the candidate only learnt about the small numbers of participants attending on the morning of the discussion.

The two mothers who attended the discussion had different levels of education and different modes of feeding for their infants, although were similar ages. One

participant identified as Aboriginal and the other identified as neither Aboriginal nor Torres Strait Islander, however her infant's father was Aboriginal (Table 4).

Table 4: Socio-demographic characteristics of participants who attended the discussion

	Parent 1 (P1)	Parent 2 (P2)
Parental Characteristics		
Gender	Female	Female
Ethnicity	Not Aboriginal or Torres Strait Islander	Aboriginal
Highest level of education	Certificate Level (TAFE)	Junior Secondary Education (year 10)
Type of phone used	Smartphone	non-Smartphone
Infant characteristics		
Age (months)	3	4
Gender	Female	Female
Mode of feeding	Breastfeeding	Formula and solids
First-born child	No	No
Ethnicity	Aboriginal	Aboriginal

4.2.2 Findings from the informal discussion with parents on app push notifications

Although only two parents attended, valuable points were discussed, and four main themes were identified during analysis in relation to the research aims. Overall, mothers preferred messages that were perceived as positive, affirming and encouraging. Mothers appreciated that the messages were the same as what they had received from health professionals and including family into the messages.

As described in section 3.7.1, the mothers were prompted by the facilitator to place colored dots on the messages (listed again in Box 6) to denote the level

of acceptability/usefulness (red: unacceptable or not useful; orange: unsure; and green: acceptable/useful).

Box 6: Push notification key messages selected for discussion

1. Napping can help you get through the day – see here for sleep tips.
2. If friends or neighbours offer to provide help or meals, accept their offer [x]!
3. Eating healthily and getting as much sleep as you can are key!
4. Tempted by 'fast food' to save time when you're tired? Doing so is unhealthy for your waist and wallet!
5. Feel overwhelmed by everything you want to 'get done'? When you're adjusting to motherhood, it's a good idea to start with small goals!
6. Lacking energy? Start with breakfast to keep you going all day- see more here….
7. Are you wondering if [baby's name] has colic?
8. Did you know starting solids early can affect your baby's health?
9. Food rewards might be good for training your dog but not for [baby's name]! Rewarding your baby with sweets if they eat veggies is rarely a long-term solution.
10. Cuddles and feeding at your breast is soothing and helps them adapt to their new surrounds – more here.
11. If you are thinking of trying a dummy, try waiting 1 more week till you set up your milk supply, and learn the best way to use one here….
12. It gets easier as your baby gets older! Focus on your successes knowing you're doing the best thing for your baby.
13. How are you adjusting to being a breastfeeding mum? I'm sure you are doing great.
14. Breastfeeding can be a challenging and rewarding journey.
15. Wondering about your milk supply? These simple feeding rules will help you keep up your milk supply while giving formula – read more….
16. Stuck for easy portable snack ideas? Try pieces of rice cakes, fruit and soft bread.
17. Be proud of your successes and keep up the good work!

Green dots were placed on all seventeen messages by the mothers. While green dots were placed on all messages, the comments the mothers made during and after they placed the dots were not reflective of all messages being perceived as appropriate and or understandable. The themes identified about the acceptability and understanding of the message are explained below.

1) Consistency of advice

The messages that were provided were consistent with advice provided during their hospital stay with the baby and affirmed the mother's knowledge.

> "*I heard that in the hospital*." Parent 1, related to message 2

> *"This would be good… others say different things and it gets confusing… what everything and everyone says… hard and conflicting advice."* Parent 1, related to message 16.

2) Encouragement and anticipatory guidance

Encouragement messages and messages about what to expect were favoured, and one of the parents suggested if these were sent early on they may have been helpful.

> *"Knowing what to expect before or in the early parts would be really helpful for younger mums."* Parent 2, related to message 13.

> *"This is good because I have heaps of friends who are younger and think that breastfeeding is too hard, and it's because they weren't educated at the beginning or before their birth and told how hard it would be and to persist with this it will get easier."* Parent 1, related to message 17.

3) Fit with mothers feeding/life experience

The mothers reported they could relate to many messages as they fit with their feeding experiences as well as other life experiences.

> *"My partner is terrible; he takes the little ones out with no prepared food and always buys them fast food. He loves nuggets and hot chips. It is really hard. That's the first thing they think of when I say I am not cooking. That's just what they want. My partner loves it."* Parent 1, related to message 4.

"Yep, that's when I get in my "I'm done" phase" Parent 1, related to message 5.

"I probably would click on this. My second child did" Parent 1, related to message 8.

"Aunty always brings over mashed vegetables for baby." Parent 2, related to message 2

4) Address knowledge and information gaps

The final theme that was identified was that some of the messages addressed knowledge and information gaps. One of the mothers was interested in one of the messages because she wanted to know about information on expressing breastmilk.

"Yes, I've always wondered about that, as expressing doesn't work for me, and what if I wanted to go away for the weekend….. or have a night away… knowing how to do this would be good" Parent 1, related to message 15.

However, some messages were not understood or received positively by the mothers. In some cases, this was because they were unfamiliar with the condition being referred to, for example 'colic' in message 7. In other cases, this was because the message contradicted their infant feeding practices, for example, one mother had introduced solids to her infant at least two months before the recommended six months. Her response (to message 8) indicated that she did not accept the advice and would not change her behaviour.

"It's never affected any of my 5 kids [starting solids early], nor my sisters and she has 7 [kids]. I've started them on solids at 3 to 4 months. I just give it to them when they want." Parent 2, related to message 8.

Some words used in the messages were misinterpreted by the participants, such as 'reward' and 'dummy'. Neither parents liked the term 'reward' included in the message.

"Not comparing a dog to a baby [food rewards]" Parent 2, related to message 9.

One mother did not find the message relating to breastfeeding (message 14) suitable as she commented that she preferred formula over breastmilk. She also talked about babies being too attached to the mother if breastfed.

"…. Five days and that was it for me [breastfeeding]…. she was loving it [the formula] and was drinking more than she could get from the breast…. But some get too attached on the mother's breast". Parent 1, related to message 14.

4.3 Quantitative data on app usage and qualitative interviews with parents

4.3.1 Participants

Sixteen eligible parents expressed interest in the study and were approached by the candidate over a five-week recruitment period to use the Growing healthy app (including the two mothers who attended the informal discussion exploring the push notifications). Twelve parents provided consent to participate, however ten parents took part in the study by downloading the app or receiving the program through SMS/website depending on the type of phone used. Parents who took part in the study comprised of eight mothers and two fathers, which included two couples and six individual parents.

Parents who expressed interest in the study and were approached by the candidate but decided not to participate (n=6) provided rationale of 'too busy, because too many other children to care for at the time' (one parent expressed she had seven other children in her care and another parent had three other children under the age of five). Two parents were not able to be contacted following initial contact due to telephone disconnection and therefore could not participate. Another parent reported she did not want to partake in the study due to her infant having a severe chest infection which lasted for several months

requiring numerous medical appointments. Other parents did not provide a reason for non-participation.

The parents who participated in the study varied in age ranges (from 18 years to 35 years). Two parents were 18 years of age, four parents were above 30 years of age and three other parents were 19, 20 and 27 years of age. The parents varied in level of education and modes of feeding (breast/formula/mixed feeding) (Table 5). Two parents were non-Indigenous; however, the father of their infant identified as Aboriginal and therefore were included in the study. No parents identified as both Aboriginal and Torres Strait Islander or Torres Strait Islander. Eight parents used the Growing healthy program via the app on a Smartphone and two parents received SMS messages and used the Growing healthy website as they didn't use a Smartphone at the time of recruitment. The parents used a different type of phone, an Alcatel type which didn't have Smartphone features (the Growing healthy program delivery modes were explained in section 1.1).

Table 5: Participant and infant characteristics

	Parent's characteristics					Infant characteristics	
	Mother or Father	Education level	Parent's first child	Ethnicity	Smartphone used	Age (month ranges)	Mode of feeding
Parent 1	Mother	Year 12	Yes	Aboriginal	yes	0-3	FF
Parent 2	Mother	Certificate	No	Non-Indigenous	yes	4-6	Br
Parent 3	Mother	Diploma	No	Non-Indigenous	yes	6-9	FF & S
Parent 4	Mother	Year 12	Yes	Aboriginal	yes	4-6	Br
Parent 5	Mother	University	No	Aboriginal	yes	6-9	Br & S
Parent 6	Father	Year 12	Yes	Aboriginal	yes	0-3	FF
Parent 7	Mother	Year 12	No	Aboriginal	yes	4-6	FF
Parent 8	Mother	Year 10	No	Aboriginal	no	4-6	FF & S
Parent 9	Mother	University	No	Aboriginal	no	0-3	Br
Parent 10	Father	Diploma	No	Aboriginal	yes	6-9	FF & S

Mode of feeding: Br = Breastfeeding exclusively; FF = Formula feeding exclusively; Br & S = Breast feeding plus solids; FF & S = formula feeding plus solid;

Semi-structured interviews were conducted with eight mothers and two fathers who had used the program. Table 6 presents the patterns of participation in the study to clarify who participated in which component of the study. Six of the parents participated in an initial interview conducted by the AHW with the candidate present and were interviewed again by the candidate alone in a second round of interviews. Following the first round of interviews, and due to the extended time period of data collection, there was an opportunity for the candidate to interview four other participating parents (parents 5, 7, 8, 9).

The extended time period for data collection allowed for times when the candidate did not contact several parents who were affected by Sorry Business. Sorry Business is a cultural necessity for Aboriginal and Torres Strait Islander people (QLD Health, 2015). This cultural ritual maintains the responsibility to family and community relationships which allow respectful practises to be conducted. Connection to kin is still a major social driver of social practice (Greenop, 2008). The candidate respected this commitment as an appropriate

conduct of research with Aboriginal and Torres Strait Islander people (NHMRC, 2007). The candidate endeavoured to be respectful of the Aboriginal and Torres Strait Islander participants and families and did not try or contact parents or conduct interviews during this time. The timeframe for data collection was extended to allow for respectful research practice.

The four parents were not interviewed by the AHW, as the interviews were conducted by the candidate when she had a better understanding of qualitative research.

Table 6: Patterns of participation in the Growing healthy at Inala study

	Informal discussion with parents	Pilot test of the Growing healthy program		Interview 1**	Interview 2**
		App	Website & SMS		
Parent 1		✓		✓	✓
Parent 2	✓	✓		✓	✓
Parent 3		✓		✓	✓
Parent 4		✓		✓	✓
Parent 5		✓			✓
Parent 6		✓		✓	✓
Parent 7		✓			✓
Parent 8	✓		✓		✓
Parent 9			✓		✓
Parent 10		✓		✓	✓

**Interview 1 was conducted by the AHW with candidate present and interview 2 was conducted by the candidate only.

4.3.2 Findings from the quantitative data on app usage

Descriptive information available from the app analytics showed which participants used the app, the total number of pages accessed, and the

percentage of push notifications opened (Table 7). Eight participants downloaded the app onto their Smartphone. The other two participants (ID 8 and 9) did not have a Smartphone and thus used the website and SMS feature only. Tracking of individual participant use using app analytics was only available for participants using the app not the website. Therefore, there were no usage data available from the participants who used the website and SMS feature.

As explained in section 3.7.1, total pages accessed by the user refers to the number of pages the user clicked on to find out more information about a certain topic, prompted by a push notification, or browsing information on the app. Percentage of notifications opened refers to the percentage of the push notification messages clicked on at the time when the app sent the message which refers the user to more information about that topic.

Table 7: App analytics of program usage

Participant Identification (ID)	Means of accessing the program	Total Pages accessed by user	% of push notifications sent opened
1	App	11	0
2	App	20	82
3	App	40	48
4	App	27	15
5	App	94	0
6	App	9	3
7	App	11	13
8	SMS with website	N/A[2]	N/A
9	SMS with website	N/A	N/A
10	App	21	0

The available app usage data in Table 7 shows that participants used the program in a variety of ways. The participants accessed the content differently, either through the push notification function in the app or browsing the app for information on a page. Parent 5 accessed many pages in the app. Parent 1, 5 and 10 browsed the content through the app rather than opening the push notifications that were sent. Five parents opened push notifications and parent 2 opened most (82%) of the push notifications while parent 3 opened around half (48%) of the push notifications.

[2] N/A: Not available, this occurred if the feature was not available for the type of phone they used

4.3.3 Qualitative interviews with parents

The first round of interviews facilitated by the AHW lasted between 8-19 minutes. The subsequent interviews with six of the same parents and four other parents were facilitated by the candidate and lasted between 17-33 minutes. The findings of the semi-structured interviews and the staff focus group were grouped together for analysis and are presented in section 4.5.

4.4 Group discussions with staff

4.4.1 Participants

All clinical and administration staff of the CoE (n=25) were invited to participate in the group discussions. A total of twenty-one staff including administrative staff, paediatricians, child health nurses, general practitioners (GPs), and registered nurses participated in the group discussions (Table 8).

The first group discussion with staff (n=17) was held in a large space, the CoE clinic waiting room. This discussion was held immediately after a staff meeting, and therefore there were staff in the room who were present for the meeting and were not interested in staying for the group discussion. Therefore, two staff members (a chronic disease nurse and an administration officer) chose to leave after the introduction because they felt they could not contribute as they did not have any experience supporting parents with infant feeding issues.

Four staff who were not available on the day of the first group discussion participated in a second group discussion which was held in a private clinic room of the CoE. The other three staff who were invited to participate in the group discussions (a registered nurse and two GPs) did not attend the groups because they were not rostered onto work the days of the group discussions. All three declined further participation due to their limited time working in the clinic attending to patients.

The first group discussion with staff went for thirty minutes and the second thirty-four minutes. The duration of the group discussions was limited because

they were held at a meeting time when the clinic was closed to patients. Therefore, the group discussions could only run for a length of time until the doors of the CoE were unlocked to patients.

Table 8: Job title of the participants who participated in group discussions with staff

Staff job title	Number of participants in the first discussion	Number of participants in the second discussion
Registered Nurse	8	0
Child Health Nurse	2	2
Paediatrician	0	2
Administration Officer	2	0
General Practitioner	5	0

4.5 Findings from the interviews with parents and group discussions with staff

The data from the semi-structured interviews and the group discussions with staff were analysed together in relation to the research aims and are presented below.

4.5.1 Research aim 1: To explore whether mHealth was a suitable approach to deliver infant feeding support to parents of Aboriginal and Torres Strait Islander infants

Four main themes were identified in the analysis of the data when exploring mHealth as a potential resource for providing parents with infant feeding support. These included parents use of mobile phones; functionality and technical issues; easily accessible and credible information sources; and the potential to influence infant feeding practices.

1) Parents' use of mobile phones

A central theme to emerge through data analysed from parent and staff participants was the high use of mobile phones by parents.

> *"they [mothers] read their mobiles…. I see them, I call out and they're busy reading their mobiles."* Child health nurse 1.

> *"Parents are always on their phones [in the waiting area of the health service]"* GP 2.

Many parents mentioned they enjoyed using mobile phone apps and were already using apps for several reasons, for example: games, home safety tips and colouring in.

> *"apps are… the best, they're the best thing"* Female, parent 2.

Staff and parent participants spoke of parents being technologically savvy, and their use of mobile phones to seek and engage with health information. Parents referred to previously accessing video's, social media and the internet from their mobile phones for infant feeding information and support.

> *"I tried Googling stuff…. like the food, when to start giving her baby foods."* Female, parent 1.

> *"It's [sleep tips] been coming up a lot in my news-feed [social media site], just little articles and stuff, and it's an interesting to read because...It talks about it a lot."* Female, parent 3.

Additionally, many parents and staff reported parents use apps to monitor and record their baby's developmental milestones.

> *"some of the mums use their phones for 'tracking their babies' stages and logging their feeds or other milestones"* Child health nurse 2.

"this app [Baby Day Book app] is great…..and so it will tell me that, she's eight months old and that these are the things that she'll be doing…. yep, there's heaps, like sick babies – how to help if they're unwell…. these sorts of apps really interest me." Female, parent 2.

2) Functionality and technical issues

The functionality and technical difficulties were identified as issues and barriers of using the Growing healthy app appropriately by parents. Almost every parent said they experienced technical difficulties which prevented them from using the app for a period of time. Parents expressed frustration at not being able to open the app, or had difficulty navigating through the website and app.

"I've been having some problems with my app… It won't let me log on… it doesn't let me go anywhere…. I've been trying. It's only been for about a week… The other thing was I wasn't sure if the - her date of birth was right, because she's five months on the 7th of this month and it sent the message saying she was ready for solids, yet it's been telling me for a couple of times that it's not till six months, so I wasn't sure." Female, parent 2.

Some parents were confused with the app functions, such as the correct and required direction to swipe[3] the screen for information, and therefore they overlooked sections of information. Parents also identified an excessive number of pages containing content to swipe through, resulting in overlooked content.

"There were too many taps to reach the content in some sections" Female, parent 3.

The time taken to load the app or information within the app was another issue and barrier presented by parents using the app.

[3] The user of an app 'swipes' their finger across the phone screen in a direction of either right or left to detect further information

"I hate that bit at the beginning with the writing … it's like as if it's a computer so it's like it's loading and then it goes into the app whereas normally you can just click on it and it goes straight to the app, …. just the delay." Female, parent 3.

In relation to the Growing healthy program internet site, one parent expressed the difficulty in navigating the content.

"A little bit difficult to navigate [the website]." Female, parent 9.

Some staff raised the point that the app and internet site needed to be user friendly and quick and easy to upload because they were time poor during practise.

3) Easily accessible and credible information sources

Another theme to emerge was the potential of mHealth programs for providing health information to parents of Aboriginal and Torres Strait Islander babies. Many parents mentioned the content within the program and features such as the push notifications were useful, helpful, reassuring and coincided with their baby's stage of development.

"I thought it would be annoying (receiving the push notifications/ text messages) and it wasn't…. it was to the point and seemed to coincide with the stages that my baby was going through…….so I was thinking he's not sleeping this week and next thing you know I'll get a text saying you want your baby to sleep more often?" Female, parent 9.

The Growing healthy program was trusted by parents as a credible source of information. All parents reported they trusted the program's content without any hesitation.

"A lot about have people been saying - oh you should start her on solids or what's the appropriate time to start, so that was good. But I had read the first one [push notification] about [start feeding the baby solids] at six months, I'm like - okay yep, I'll just keep waiting. Because there have

been people that have been saying - oh, you should start her on solids you know. I'm like - no, no I'm going to wait till six months this time, because I did start a little bit early I think [with previous child], so I'm going to wait for the six months…" Female, parent 2.

Overall, most of the parents were satisfied with the frequency of the text messages and push notifications sending key messages. Two parents had differing views, one thought three text messages were too many and another parent thought there could have been more messages sent via the program.

Staff mentioned that they had previously found internet sites relating to infant feeding too content heavy and difficult to use themselves, and therefore were reluctant to refer patients to internet sources and the idea of the Growing healthy app appealed to them due to the simplicity.

"Because websites are often confusing and overwhelming for the patients…. something simple like a simple app to refer to would be good". GP 2.

"I am interested in this [Growing healthy program] as a reference tool for education for patients because of its simplicity." Child health nurse 4.

"I think it's good to have a source that they [parents] can access easily….they want to go and look for information and they don't know where to look….and you can give them something". Child health nurse 3.

Parents also talked about having searched for internet sources and apps for information and support regarding infant feeding. One parent even described ceasing breastfeeding because she could not access appropriate information on the internet prior to having the Growing healthy app, which she was relying on for infant feeding support at the time.

"Yeah, and I couldn't find anything [searching for apps relating to infant feeding] …. I know with breastfeeding, we've looked up so many stuff.

And he [partner, father of infant] was YouTubing everything. Because I couldn't produce and sometimes it like really hurt…. [looked on the internet] Yeah, on how to produce. I watched some videos and that on YouTube. I've probably done most of them. I even stood in the shower for ages, with like a hot shower, where I could just stand it, and I couldn't do it. It hurt so much……. I just ended up stopping my breastfeeding." Female, parent 1.

Another theme that emerged throughout the interviews was the importance of consistency of the messages alongside health professional's advice which reinforced accurate health information for the parents. This comment was made by a parent who was also an experienced health care practitioner who had worked with Aboriginal and Torres Strait Islander new mothers for several years.

"that's definitely one of the biggest things that we get from parents is that inconsistency of information is really quite prevalent … it makes things really hard for them, and I would say it's maintaining that consistency of information, which, I think, a lot of it comes from being, you know, coming back to your basics." Female, parent 5.

Staff felt this was important and would be useful to provide a credible source and enhance their advice.

"I think it's good to have that [an app and internet site] as a source that they can access easily…. you know, you can give them something…to complement our practice…" Child health nurse 3.

"….well for us [GP's] giving patients credible information… - or directing them [parents] is something I'm always looking for." GP 3.

There was positive discussion in both staff and participant responses regarding the range of features of the app and internet site catering for a range of different learning styles and literacy levels.

"[the app reaches] different literacy levels… you're also considering different people's learning capacities, which helps. … if you have people that are visual learners, and you've got images that's much more useful to them than words are. Or video clips might be more useful or more practical. It depends on the learner… but the other thing, too, is that it allows some of those parents who already have some knowledge in that area, so they could just quickly look over [at the app], and go, 'Oh, yeah. I know that…. That's fine,' or, 'There's something I'm not so sure on. I'll double check that one and see what….'a bit more information about that." Female, parent 5.

Many parents and most staff optimistically reported the idea of the app and internet page being a 'one-stop-shop', one place they can use for infant feeding advice they could refer to. Using the Growing healthy app and website over searching the internet for infant feeding advice was appealing for the parents.

"Instead of going on Google, I'd probably go into the app, because then I don't have to go in and type things in, it'd just be there. I can select it, and then the information would be there." Female, parent 3.

"You go and search on the internet and you Google things, and you've got 50 million different websites that you can go to, but an app is so specific to what you're looking for." Female, parent 2.

The staff expressed mHealth had the potential to provide around the clock, and credible health information in real-time to offer support when health services are unavailable, for example in the middle of the night.

"I think it's good to have a source that [parents] can access easily." Paediatrician 1.

"The app could be really useful when the baby is screaming in the middle of the night and the mum has no idea of what to do or where to turn and doesn't want to wake partner or doesn't have a partner." GP 1.

Three parents had to travel distances unexpectedly during the pilot testing phase due to family reasons and/or Sorry Business[4]. The parents commented that having the app available on their phone during these times was useful as it was transportable.

"… you could just look it up on the app and stuff like that [while traveling] …., that comes in really handy." Female, parent 4.

4) Potential to influence infant feeding practices

More than half of the parent participants reported that the information provided from the program influenced their infant feeding practices and improved their knowledge of the appropriate time to introduce solids.

> *"when it [push notification] said something about the solids…… because I actually thought it wasn't until twelve months that you're meant to introduce that stuff, so it did give me that tip to actually start her now instead of leaving it."* Female, parent 3.

For others, it reinforced parent's knowledge, or improved confidence with feeding, particularly in relation to the timing of introduction of solids.

> *"I looked at the solids section, and learnt that you only give very small amounts, and once I accidentally gave her chicken and this was too much and too hard so when I got the message about solids I realised this."* Female, Parent 8.

Many parents mentioned that the push notifications were useful as reminders and reinforced information around infant feeding, providing support and reassurance they were doing the right thing.

[4] Sorry Business is a term used by Aboriginal and Torres Strait Islander peoples to refer to the death of a family or community member and the mourning process.

"Some of the messages that I got prompted me about things that I might've forgotten about, like not always feeding her when she's not hungry." Female, parent 2.

"it wasn't really a learning thing….. it's just more a reassuring thing, like yeah well, I'm doing alright…. reassuring, more like a support thing…..." Female, parent 9.

Staff reported the most common questions they hear from parents relating to infant feeding in the clinic is regarding the topic of 'introduction of solids' and were pleased to hear its content was included in the program.

"The most questions I've had is - how do you introduce solids, or when do you introduce solids?" Child health nurse 3.

The child health nurses reported a concern of parents introducing solids before the recommended age of six months, and as early as two months.

"Some of them start pretty early…. some people will start from two months even…… some people start earlier… because they nurse their baby while they're eating, the mums." Child health nurse 1.

One child health nurse shared her thoughts about influences of parents infant feeding decisions, which started in the hospital and was related to the support provided in the hospital, financial reasons and the power of word of mouth or how other mums were infant feeding at the time.

"Talking about breast feeding – there's few more mothers' breast feeding at present…. They come in spasm, one tells a friend, "it's really money saving". Money always comes first. It depends on how busy the maternity ward is, because I've had some come in and they've been discharged on, sort of, day two, day three – their milk hasn't come in, so haven't established breast feeding, and there's no support…so it depends on how much support and how busy the midwifery staff are as to how long they can establish that initial breast feeding…." Child health nurse 1.

4.5.2 Research aim 2: To explore the key factors that need to be considered in adapting mHealth programs, including the Growing healthy program to ensure that it is culturally appropriate for Aboriginal and Torres Strait Islander families

Generally, parents didn't raise any concerns with the cultural appropriateness of the program and when asked, several parents expressed they felt comfortable using it, and other parents reflected they didn't consider this issue when using the program.

> *"I didn't really think about that very much [fitting with their cultural background]."* Female, parent 9.

Many parents said that they would recommend it to other parents in the community, including their family members and friends.

> *"I'd recommend it … I've already showed one of my partner's cousins … I showed her the app ... she's a new time mum as well, and she was like 'that's really good' ... I showed her a few things like the feeding path, and mixed feeding, and all this stuff, and she was like … 'oh, that's good'."* Female, parent 4.

In contrast, most staff thought modifications were required for the program to be considered culturally appropriate and some parents had suggestions to make the app more engaging. One major key theme identified related to the 'look and feel' of an mHealth program, to make it more engaging and culturally appropriate for Aboriginal and Torres Strait Islander families. Three sub-themes emerged from the key theme, and several useful recommendations were made by parents to make the program more culturally appropriate.

1) Look and feel

1a) Visual presentation and language

Most parents and staff felt that the overall visual presentation of the app was important to effectively engage participants. The use of images was considered extremely important to almost every staff member and some parents felt that the pages within the program looked plain and uninteresting.

> *"A bit plain, not that eye catching [the look of the app] but the photos were all nice, and a few more pictures would have been good."* Female, parent 4.

The participants provided suggestions on what could engage Aboriginal and Torres Strait Islander people to use the app including art work, more images, and colours.

> *"A bit of artwork or something on there".* Female, parent 10.

All parents considered that the absence of Aboriginal and Torres Strait Islander cultural representations did not prevent them from using the program.

> *"It doesn't matter what, picture, as long as it's got the information in it and it's helping you. It's got nice little colours on there [the app], and so I don't see no problem with it."* Female, parent 7.

> *"with all the pictures, ……it wouldn't matter [having Aboriginal pictures] just like something, like a picture that would explain everything with just looking at a picture pretty much."* Male, parent 6.

However, parents did commonly remark that pictures of Aboriginal and Torres Strait Islander babies would make the program more engaging for them and perhaps more culturally appropriate.

> *"Yes it was good, but there were lots of white babies there..... not just looking at white "Jarjums[5]" on there".* Female, parent 8.

In contrast, staff had strong opinions about this and collectively reported a need for images, design and colours to be representative of Aboriginal and Torres Strait Islander populations throughout the app. Some staff thought this was imperative for engagement and effectiveness with clients accessing health information, with one Aboriginal administrative officer commenting:

> *"The more visual the better…. nothing wordy or long, or it loses us….. then I would recommend this to my sisters/cousins….it has to be visual, appealing with lots of photos for me to use this... Otherwise I would just think 'meh, another white people telling us black people what to do'……."* Administration officer 1.

Non-Indigenous staff also felt strongly about this.

> *"Too white; need images of Aboriginal and Torres Strait Islander babies and parents; if too white – Aboriginal and Torres Strait Islander mums won't even open it up, let alone consider it a reputable source of information."* Registered nurse 2.

> *"I'd want more real people……. real people from an Aboriginal Torres Strait Islander background."* GP 1.

When the parents were asked about the language used in the program they all provided positive feedback, with everyone commenting it was understandable and used the words 'good', 'plain' and 'simple' and 'no technical words' to describe the language used.

> *"Plain and simple….. easy for me. Easy to understand, no technical words, plain and simple."* Female, parent 4.

[5] "Jarjum" is an Aboriginal term for "child" used in the community

"When things get complex, and people try to get too in-depth, that's when you tend to find that things can get inconsistent." Female, parent 5.

In contrast, two parents had a different view, preferring more in-depth content in the program. This reflected the education level of both parents who held university degrees.

"Maybe some more information would be good……. Just sort of expand a bit on the topics." Female, parent 9.

"Probably…. more in depth - - -." Female, parent 2.

In relation to Aboriginal and Torres Strait Islander terms or the use of Aboriginal and Torres Strait Islander language in the app most of the parents said the program was fine the way it was. However, one parent spoke about the importance of using Aboriginal terms and imagery in terms of relating to a program:

"I showed him [partner who identifies as Aboriginal] and talked to him about it [the app] and he was reading it and he's like, oh, yeah, that's pretty deadly, and was reading it…. I think that's always appropriate [language such as deadly] and I think it's appreciated, because they can relate to that …. they relate to that language, I know that when my son, when he watches NITV (National Indigenous Television) and they are doing their dance with the wand …. and the language they use on there…. he has a giggle and laughs at, you know, they've got that real joking, happy, funny, kind of, talk, you know, the way that they talk, but my son finds it very funny, the lingo, like that….so he knows it… I think that they tend to relate to that kind of language." Female, parent 2.

Staff members felt strongly about this issue and were concerned about the language and terminology used not being familiar with some Aboriginal and Torres Strait Islander parents.

> *"Straight away looking at the home page I see the word 'breastfeeding' and I would never use that term, only use familiar words like 'susu[6]', as that is what I would use in a consultation*." Child health nurse 5.

> *"I was just thinking generally terminology and the level of the language is a big consideration….I think when you're targeting a range of ages and mothers and a different culture, I think that's a big thing to check."* Registered nurse 1.

One parent articulated that the benefit of the app was that the information was depersonalised.

> *"the advantage that you have in an app is that it's…. depersonalised in a way.. it's generalised information…it's just presenting the information as it is."* Female, parent 5.

The parent suggested that the information received via the program reduced the risk of parents feeling inadequate or judged for less optimal feeding practices and provided reassurance they were doing the right thing during uncertain times.

> *"It's presenting the information in a way that it's non-judgemental, that's a big one..... if a mother comes in and says, "oh, I've started solids at about three months", or something. It's taking that information and being able to provide it in a way that – it helps them understand that it probably, you know, it's, maybe, not the best thing to do without making them feel bad about it, which is actually quite difficult to do." Female, parent 5.*

1b) Carers and role of family

Information inclusive of and available to other family members and carers of Aboriginal and Torres Strait Islander children was expressed as important by participants. Many parents talked about sharing the responsibility of infant

[6] "Susu" is an Aboriginal term for 'breast' used in the community.

feeding with family members, as well as family members providing feeding guidance prior to using the Growing healthy program. One parent spoke of her sister caring for her baby during the time of the interview and sought advice from her Nan and mother.

> *"I Asked Nan and Mum, oh when she will do this, and all that."* Female, parent 7.

Parents felt if the app was available to fathers and other family involved in caring for the infant it would make it better and recommended including topics dedicated to specific family members. One parent observed that the app referred to 'Mum' only and thought the term 'parents' or similar would be more appropriate. The parent also stated that if there was a section for dads, it could offer guidance for fathers.

> *"I think there should be a dads one because it always says for mums.... maybe if it said parents or just something along those lines……. I think if there maybe was a section for dads, because dads are completely different to mums, and there are dads that are raising their children on their own."* Female, parent 3.

Staff also expressed the importance of including information in the program for all carers of an infant, as families were a considerable source of advice and guidance for parents relating to infant nutrition. Staff sometimes found it challenging to offer information that conflicts with advice provided by family members and favoured the idea of a credible program to support their advice.

> *"Families are the main source of nutrition advice."* GP 1.

> *"Grandmothers and aunties are more difficult to educate because they believe that what they did was right when they were raising their families and therefore they believe they know better than a new mum today."* Child health nurse 2.

1c) Stories and real-life experiences

Parents felt that stories of personal experiences or case studies to resolve infant feeding concerns would be helpful, providing more of a connection between the information and themselves. This would strengthen their belief and trust about the advice knowing that someone else in the similar situation had used the techniques in feeding their baby.

> *"They could have had the information in a dreamtime story perhaps or characters for fun and better learning ….. stories are better."* Female, parent 8.

> *"You can have like speech bubbles about what other people have done or real experiences..., a story maybe."* Female, parent 9.

Staff suggested including videos and images that offer advice or guidance via representation of a trusted/respectful family or community member. Aunties, Grandparents and/or Elders were suggested by several staff; the rationale offered was that the information provided could potentially be more meaningful and helpful to parents and carers.

> *"'Aunty ……. reminds you to get your …… shot every month'…. And it's got her image."* GP 2.

One of the health care practitioners reported that health promotion posters in the clinic were more appealing to patients when there was a local or familiar face in them and suggested including this element into the Growing healthy app for better engagement.

> *"They make comments about the posters [promoting smoking cessation] upstairs, I notice, 'Oh, that's this person'".* Paediatrician 1.

2) Other topics other than infant feeding included in the program

Other parents suggested having more topics other than infant feeding in the app such as immunisations, and the additional ones for Aboriginal and Torres Strait Islander infants, appropriate equipment for formula feeding and how to interact or play with their infant.

> *"What about needles? Because I actually forget about what's what, and I know that the indigenous needles….is it the tuberculosis one or something for Indigenous kids…. some special one…... I wasn't sure if there were any extras and things like that with her [baby]."* Female, parent 3.

4.6 Summary of results

The data suggested that the Growing healthy app and mHealth has the potential to be a suitable approach to provide infant feeding support to parents of Aboriginal and Torres Strait Islander infants. The informal discussion with two parents suggested that these mothers preferred messages that were perceived as positive, affirming and encouraging and aligned with their infant feeding experiences. The app analytic data suggested parents accessed the program content differently, with some parents predominantly browsing the app while others were triggered to use the app via the push notifications that were sent.

Four main themes were identified in the qualitative analysis exploring the Growing healthy app and mHealth as a suitable approach for providing parents with infant feeding support. This included the high use of mobile phones and apps by parents, including for heath information seeking. By rectifying the functionality and the technical issues of the app, including an easier way to navigate through the app and website, the parents and staff would welcome an mHealth mode as a source for infant feeding information. Finally, parents shared their experiences expressing the programs potential to influence infant feeding practices.

Overall, parents had few concerns with the program regarding cultural considerations and accepted the program as a trustworthy source for infant feeding information. However, the staff felt that the presentation of the program was not culturally appropriate and made recommendations how to address this. Both parents and staff recommended some adaptations including more imagery and appropriate language, incorporating real life experiences or stories into the program and expanding the content to cater for carers and family members Incorporating well-respected Elders, or recognisable community members delivering some of the messages was also suggested by parents and staff. In summary, participants thought there should be more images of Aboriginal babies, more artwork, and the value of family and family connections should be recognised more in an app for Aboriginal and Torres Strait Islander parents.

Chapter 5: Discussion

5.1 Introduction

The Growing healthy at Inala study explored if the Growing healthy app was a suitable approach to provide infant feeding support to parents of Aboriginal and Torres Strait Islander infants. It also explored the key considerations or adaptations that were required to ensure cultural appropriateness. This chapter presents the results in the context of the research questions.

Section 5.2 addresses the first research question exploring whether mHealth was an appropriate method for health promotion with families in an urban Aboriginal and Torres Strait Islander population. Parents in the study were already using apps to access health information without finding suitable sources for infant feeding support. Parents and staff agreed that mHealth was an appropriate method of delivering infant feeding support.

The next section, 5.3 addresses whether the Growing healthy app was a culturally acceptable source of information and support on infant nutrition for parents of Aboriginal and Torres Strait Islander infants from an urban area. Parents did not identify as many cultural concerns with the program as staff who reported strong views about cultural appropriateness for their patients which are explored.

Section 5.4 explores the final research question, whether any adaptations were required to improve the Growing healthy app's appropriateness for Aboriginal and Torres Strait Islander families living in an urban area. The main theme that arose in relation to this research question was the look and feel of the program, which was an important factor for cultural considerations that both parents and staff mentioned. Another suggestion was to incorporate the role of family into the app as well as including stories or real-life experiences from other parents.

Section 5.5 presents the challenges the candidate faced throughout the research and how they may have impacted the research outcomes. Finally, Section 5.6 describes the strengths and limitations of the study.

5.2 Research question one: Is mHealth an appropriate method of health promotion with families in an urban Aboriginal and Torres Strait Islander area/population?

Parents and staff agreed that mHealth was an appropriate method of delivering infant feeding support for parents of Aboriginal and Torres Strait Islander infants. Participants commented that parents were already using their mobile phones and the internet regularly for a variety of purposes, including accessing health information. One parent spoke of 'apps being the best thing' and other mother spoke of referring to a social media site for feeding information and sleeping tips for her infant prior to the study. This finding is consistent with national data for both Aboriginal and Torres Strait Islander people (Department of Finance, 2014b) and non-Indigenous people (Lancaster, 2016) that suggests a high level of engagement with apps to explore health information.

Parents expressed preference for suitable infant feeding information readily accessed on smartphone apps and/or the internet. One mother mentioned she had used 'Google' to find information about the timing of introduction of solids for her baby prior to the study. There is evidence that parents in Australia are using mHealth as a source of information on infant feeding (Buultjens et al., 2012, Hearn et al., 2014) however, the quality of websites and apps are generally poor (Taki et al., 2015). Most parents in the current study stated they were unaware of where to access up to date and suitable information via mHealth regarding infant feeding practices prior to Growing healthy, which has been reported elsewhere for Aboriginal families (Myers et al., 2014).

Parents (n=6) found the features and messages from the program complemented and built on the resources and advice provided by health care practitioners and appreciated the consistency of information provided. Consistent messages were important for the parents, as both parents and staff identified inconsistencies in the advice parents received from family members compared to health practitioner's advice relating to infant feeding practices. Smartphone apps are a good way to reassure new parents; to confirm their

knowledge and reinforce the information they receive from health care practitioners (Grimes et al., 2014). The parents expressed they felt less anxious knowing they were doing the right thing for their baby while using the Growing healthy app. A child health nurse in the study said it was good to be able to give parents a source of information to complement her practice. When mHealth program advice is complementary to a that of a trusted health care practitioner, it reinforces the messages to promote healthy maternal behaviours (Hearn et al., 2014, Grimes et al., 2014).

The findings suggest that the Growing healthy app was a suitable approach to provide infant feeding support to Aboriginal and Torres Strait Islander families by complementing existing key health messages. mHealth can complement information provided by health service (Department of Health and Ageing, 2012), and this was reflected during the interviews with parents. The parents mentioned they noticed the information in the app coincided with information and support that had been provided by health care practitioners and continued to access these services while using the app. Parents also reflected on occasions when they noticed information from the program concurred with previous advice provided by a health care practitioner, strengthening the infant feeding message. For example, in relation to push notification messages, one parent commented: "*I heard that in the hospital"*, which built on credible advice provided by other health care practitioners.

The app push notification messages were personalised with the content tailored to the infant's age, stage of development and feeding method. The parents appreciated this and said they felt supported and reassured by the personalisation feature of the program. For example, a mother mentioned the push notification messages were to the point and coincided with the stages her baby was going through at the time. During the interview, she reflected on a time when she thought her baby wasn't sleeping and then got a message saying '*you want your baby to sleep more often*' which she appreciated. Personal tailoring has been a positive feature for mHealth programs in behaviour change (Tang et al., 2015, Hearn et al., 2014). Tailoring and

personalization of a mHealth program features are considered important and desirable across all population groups (Tonkin et al., 2017a).

The Growing healthy app provided the parents with a feeling of empowerment as they could use the information to clarify the conflicting advice they received from others, including family members. Conflicting information provided by other people, including family members, regarding infant feeding practices has been reported in other studies with Aboriginal and Torres Strait Islander parents (Eades et al., 2010, Myers et al., 2014, Foley et al., 2013).

Some of the parents stated they changed their infant feeding practices to be more closely aligned to the guidelines presented in the Growing healthy app. For example, one mother spoke about reading a push notification message and learning that introducing a particular solid food to her infant was okay, which was earlier than she thought. Another mother spoke of learning to wait to provide a particular solid food to her infant. Supporting healthy infant nutrition practices is particularly important as it presents a significant opportunity for shaping healthy eating patterns and appetite regulation for later in childhood to reduce the risk of childhood obesity (Baird et al., 2005, Lefebvre and John, 2014). Other mHealth interventions have been effective in changing health behaviours (Free et al., 2013, Militello et al., 2012) and the GPs and child health nurses appreciated the potential mHealth had to provide support to parents and assist behaviour change.

mHealth has been widely accepted across many populations (Akter and Ray, 2010) and was appreciated by the participants in this study as it provides health information when it is needed. For example, if a mother had a question about expressing breastmilk while breastfeeding she or her partner or other family member could browse through the Growing healthy app and find appropriate information. mHealth may also support or extend health services (Puszka et al., 2016), and infant feeding problems may occur during times when parents are not able to attend a health service in person. The participants reported that the Growing healthy app offered a “one-stop-shop” to provide short, quick answers to immediate concerns. As noted in previous research (Hearn et al., 2014) the

parents reported that they were reassured that their issues were typical, and that they didn't need to visit a health care practitioner.

Key factors in successful programs for improving health in Aboriginal and Torres Strait Islander mothers and babies have been identified elsewhere and may apply to mHealth programs. This includes a preference for home visiting, flexibility in service delivery and appointment times, and provision of transport to health services (Kruske, 2012, Eades et al., 2010, Homer et al., 2012, Oliver et al., 2015). In the current study, some of the parents expressed the difficulty of attending the health service on occasions, either due to cultural responsibilities or family reasons and appreciated the convenience of the Growing healthy app during these times. One parent mentioned that having the app available on her phone was useful as it was transportable, remarking:

> *"… you could just look it up on the app and stuff like that [while traveling] …., that comes in really handy."* Female, parent 4.

The GPs also welcomed the idea of an mHealth program to provide parents with user friendly, real-time and credible information and support for infant feeding challenges. This is particularly useful, as Aboriginal mothers have reported early cessation of breastfeeding as difficulties escalated quickly due to a lack of appropriate support for infant feeding challenges (Eades et al., 2010). Mobile phone apps are an enticing option for infant feeding support because they are installed on devises that users can carry around with them everywhere, anytime, and internet connection is not always required (Brusse et al., 2014). One GP spoke of infant feeding experiences which were challenging and stressful for new mothers, often occurring during the middle of the night when health services weren't available. The GP said:

> *"the app could be really useful when the baby is screaming in the middle of the night and the mum has no idea of what to do or where to turn and doesn't want to wake her partner or doesn't have a partner".* GP 1.

Staff were concerned that websites were often too content heavy, and apps were difficult to use which prevented them from offering such tools to parents.

They were therefore welcoming of the idea of a credible and simple mHealth app such as Growing healthy. Other health care practitioners report the need for an evidence based mHealth app to recommend to parents to reinforce their consultations that is user-friendly, credible and has real-time features (Taki et al., 2015, Hearn et al., 2014, Mackert et al., 2014).

Aboriginal and Torres Strait Islander parents make infant feeding decisions in stressful circumstances and in complex situations (Foley et al., 2013). However, parents exhibit resilience, and a supportive and acceptable program such as the Growing healthy app may help them overcome infant feeding challenges. One parent in the study spoke of using many internet and YouTube clips for guidance on how to breastfeed as she felt she was not producing enough breastmilk for her infant. The mother's story of continuing to try to breastfeed despite the pain she endured, and even trying in a hot shower suggested she would have benefited from an easily accessible information source to help guide her.

The interviews and the analytics from the app suggested that parents accessed the Growing healthy app in different ways: some browsed for information as they needed it while some responded to push notifications. This supports the notion that mHealth may be user friendly at an individual level (Agarwal et al., 2016) allowing the parent to choose the function that suits them: app push notification, text message, or browsing information in the app or website.

Some parents reported that the information in the Growing healthy app was not always easy to access and were prevented from using the app for a period of time. Some of the parents reported that the app was difficult to navigate, and experienced some technical difficulties at times, which limited their ability to use the program to its full capacity, which is imperative for effective behaviour change mHealth programs (Brusse et al., 2014, Dennison et al., 2013, Tang et al., 2015). mHealth programs with easy-to-navigate functions, and rectify technical issues quickly facilitate user engagement support behaviour change for Aboriginal and Torres Strait Islander people (Tonkin et al., 2017b).

Therefore, addressing these issues so the app is used to its full potential would be essential if the Growing healthy app were implemented in the future.

Involving CoE staff in the promotion of the mHealth program and using health care practitioners (the candidate and CoE staff) to introduce the program to parents was a valuable approach. Involving health care practitioners as a strategy to support Aboriginal and Torres Strait Islander families has enhanced the engagement of mHealth programs (Bennett-Levy et al., 2017, Povey et al., 2016). mHealth programs supporting Aboriginal and Torres Strait Islander people have been effective when health centre staff are involved (Puszka et al., 2016). The candidate introduced the program to the parents initially and explained the overall concept of the app and described the purpose. The candidate also encouraged the parents to let her know whether they were experiencing any technical difficulties while using the app, so these could be rectified promptly. When mHealth programs are presented and explained to users during visits to their health service provider, it can enhance comprehension and engagement of the program which is favourable (Tonkin et al., 2017b).

5.3 Research question two: Is the Growing healthy program a culturally acceptable source of information and support on infant nutrition for parents of Aboriginal and Torres Strait Islander infants from an urban area?

Parents did not identify as many cultural issues with the Growing healthy app or website as the staff. The staff had a different viewpoint from the parents and identified many app characteristics that could be modified to improve engagement and had strong views about cultural appropriateness for their patients.

There are several reasons why the staff may have had different views of the Growing healthy app compared to parents. Firstly, the staff didn't use the app for a length of time for a complete experience, as the parents did. Other

reasons could be due to the diversity of background of staff members, their previous work experience, and their mandatory cultural capability training (QLD Health, 2010) which may have informed their views, assumptions and interpretations of the app.

The unique interaction between the health care practitioner and the patient within health services is considered an important aspect of Aboriginal and Torres Strait Islander cultural safety (Jennings et al., 2018). It is well-known that health promotion initiatives work better for Aboriginal and Torres Strait Islander people and are more likely to be accepted when they are provided by a trusted source (Wilson, 2009). The Growing healthy app was implicitly endorsed by a culturally appropriate health service (the CoE) and the candidate, who was part of the health service, was known to provide culturally appropriate services (Foley and Houston, 2014, Hayman et al., 2014). The relationships and trust built by the candidate and the health service (the CoE) were fundamental to parents in the study accepting the Growing health app.

The candidate frequently engaged in local activities such as community events and had been attending the community centre for many years. The candidate had gained the trust of the Aboriginal and Torres Strait Islander community before the research commenced, (Foley and Houston, 2014).Consequently, the candidate was able to better understand the local structures, processes and history, and could capitalise on the existing network within these communities (Barnett, 2011, Wise et al., 2012). By demonstrating a prior understanding of the parents' culture and acknowledging differences between the candidate and the parents, the candidate was able to create a culturally safe environment for the participants.

The 'Murri grape vine' is an established informal communication network that exists within the Aboriginal and Torres Strait Islander community and through which information is dispersed. It is an important factor in successful health promotion program outcomes with Aboriginal and Torres Strait Islander families (Barnett, 2011). This process may have influenced the likelihood of parents accepting the Growing healthy app, because they heard about the culturally

safe care the candidate and CoE had provided to other community members leading into the study. The candidate's prior community networks may have strengthened the endorsement and uptake of the app, as seen in other successful health promotion programs with Aboriginal and Torres Strait Islander peoples (Barnett, 2011).

The non-confrontational nature of the Growing healthy app may support culturally appropriate health promotion approaches with Aboriginal and Torres Strait Islander populations (McPhail-Bell et al., 2015) and this was reflected in the study findings. Parents were able to engage with the Growing healthy app as much or as little as they wished, as reflected in the app usage data which showed parents accessing the content in varying ways. During one of the interviews, one of the parents who was also a health care practitioner mentioned that providing information to Aboriginal and Torres Strait Islander mothers that is non-threatening and non-judgemental of parents' feeding practices is important for culturally appropriate care. This finding is consistent with other culturally acceptable maternal support for Aboriginal and Torres Strait Islander mothers (Kruske, 2012).

Parents were able to choose whether they received the programs key messages via SMS or the app. Most parents were satisfied with the modes of delivery however there was no agreement about the frequency of the messaging. One parent indicated there were too many messages, and another parent thought there could have been more. The mode of delivery and the frequency of the messages sent were received favourably. Understanding and applying the preferred methods of communication is important for health promotion with Aboriginal and Torres Strait Islander people (France, 2000). The parent could choose and access the communication method that was appropriate for them at the time to retrieve the program information, whether it was by SMS, a push notification message, the app, an email or general browsing of the app.

As mentioned earlier, parents had the freedom to use the Growing healthy app in a way that best suited their needs. The features and functions in the Growing

healthy app allowed the parents to refer and respond to the information when it was appropriate for them. This had the potential to increase a sense of empowerment over decision making process; therefore enhancing and supporting individual health literacy (Zarcadoolas et al., 2003). Health literacy is a vital tool to build health knowledge and enable empowerment in health decision making. Health literacy means the skills and competencies required to "seek out, comprehend, evaluate, and use health information and concepts to make informed choices, reduce health risks, and increase quality of life" (Zarcadoolas et al., 2003, p 199). The Growing healthy app also presented information in different ways as one parent who was also a midwife reflected during the interview. She mentioned the app was good because it could reach many different literacy levels:

"If you have people that are visual learners, and you've got images that's much more useful to them than words are. Or video clips might be more useful or more practical". Female, parent 5.

Findings from the study indicated that if family were included into the program delivery it would made it more engaging for parents to use and more socially and/or culturally appropriate. For example, offering the app to the parent's family members or encouraging the parents to share the app with extended family members. Also, the language in the app should be inclusive of family members. Rather than just referring to the mother it would be culturally appropriate to acknowledge fathers and extended family members as primary care givers for infants. One parent said she would usually ask "Nan or her Mum" questions about timing of introducing solids to her baby and about her sister caring for her baby at the time of the interview. While the role of primary health care services is integral to promoting a culturally safe service delivery for new mothers (Reibel, 2015), health services and health promotion programs alike need to understand the role senior family members have on influencing health seeking behaviours (Helps and Barclay, 2015). Therefore, it would be useful to include senior family members or other family members in the program delivery.

Most parents reported they found the content of the Growing healthy app appropriate, helpful, useful, and easy to understand. There was feedback from two parents who wanted more detailed information on the content presented in the program, however they both held university degrees. Providing more detailed information creates challenges, as increasing the complexity of material may make it less accessible for other families. The Growing healthy program was originally developed for families experiencing socioeconomic disadvantage (Denney-Wilson et al., 2015) and the content had the reading age of 12-13 years (grade 7-8). To include more detailed information in health resources is not recommended for supporting health literacy across populations (Vass et al., 2011). A function in a mHealth program that take users out of an app to webpages with more detail is also not advised (Tonkin et al., 2017a). Executing this recommendation would require further consultation and user testing with Aboriginal and Torres Strait Islander families in urban areas.

Parents in the study identified several factors likely to influence positive health outcomes. Beyond providing messages that communicate knowledge and the costs and benefits of recommendations, there is a need to acknowledge what captures users to engage with health promotion messages (Gordon, 2002). Messages that contained features that were strengths-based and those that promoted self-efficacy were favoured by the parents. Strengths-based health promotion programs have been successful with Aboriginal and Torres Strait Islander communities (Brough et al., 2004, Lowell et al., 2015, Myers et al., 2014). The Growing healthy app did not deliver negative content (Denney-Wilson et al., 2015), for instance, the negative effects of incorrect feeding practices. Instead, it highlighted the positive effects of appropriate practices to affirm, reassure and empower the parents.

5.4 Research question three: What adaptations are required, if any, to improve the Growing healthy programs appropriateness for Aboriginal and Torres Strait Islander families living in an urban area?

There were several adaptations recommended during the study that have useful insights for future mHealth programs to be more engaging for Aboriginal and Torres Strait Islander families living in urban areas. As with other health promoting mHealth platforms there is a need to provide a program that is attractive to Aboriginal and Torres Strait Islander people, to support an effective intervention (Brusse et al., 2014). Parents and staff had some suggestions about how to do this. These related to the 'look and feel' of the app, providing access to other family members and presenting the information as a story or a real-life experience.

Key considerations for maximising engagement and cultural appropriateness for Aboriginal and Torres Strait Islander families were the 'look and feel' of the app, including the use of pictures and narratives to deliver content. General imagery, colour and including well respected and recognisable people from the community were important elements recommended to enrich communication of key messages. These considerations have been reported in other health promotion research with Aboriginal and Torres Strait Islander peoples (Department of Finance, 2014a). By acknowledging these considerations and enhancing the communication and understanding between health services and parents, this may lead to better engagement of health promotion messages (Vass et al., 2011, Lambert et al., 2014).

Most parents' recommendations to improve the 'look and feel' of the app were made to enhance their, or other Aboriginal and Torres Strait Islander people's engagement, which included having pictures of Aboriginal and Torres Strait Islander babies. One parent commented there were lots of white "Jarjums" displayed in the app. Another parent reflected on the visual aspect of resources in relation to her partner and son who both identified as Aboriginal. The parent

said her son was attracted to the television content when there were Aboriginal and Torres Strait Islander people culturally dancing. The parent made this insightful comment about the engaging and appealing features of recognisable material by Aboriginal people. These findings support other research with Aboriginal and Torres Strait Islander parent's recommendations for resources are to contain appropriate artwork, be culturally and visually appealing (Blinkhorn et al., 2014, Stuart et al., 2015).

Although recommendations were made by staff and parents to potentially increase engagement from Aboriginal and Torres Strait Islander parents, this did not appear to be imperative for parents to access or use the app. The parents said the information in the Growing healthy app was seen to be culturally appropriate and respectful in the way it was presented. One parent commented:

> *"I didn't really think about that very much [cultural appropriateness]".*
> Female, parent 9.

The information was readily available and accessible which was the priority for them to use it. The parents were not as concerned about having actual pictures to describe the information as the staff were. Resources that contain too many pictorialised messages have been found to be too simplistic and unrelated in other research with Aboriginal and Torres Strait Islander people, and may not address health literacy, contributing to disempowerment (Vass et al., 2011). This may explain why the parents accepted the information presented as words rather than through pictures.

Harnessing the strengths of the Aboriginal and Torres Strait Islander culture, such as the supportive extended family network and kinship can improve health outcomes (Yeo, 2003). Aboriginal and Torres Strait Islander family and kinship relationships are the primary structures that provide cultural and emotional unity and support to many Aboriginal and Torres Strait Islander people. This kinship network includes large extended family members, often biological and non-biological (Kruske, 2012). Infant feeding, in particular breastfeeding, has been

identified as a whole community issue in many studies related to Aboriginal and Torres Strait Islander peoples (Eades et al., 2010, Cromie et al., 2012). Women require a supportive culture to breastfeed and engage in appropriate infant feeding practises, including support from men (Nagel and Thompson, 2010, Helps and Barclay, 2015, Stuart et al., 2015). Modifying the program to fit these principles, for example having the app available to more than just the mother; with the father of the infant and other family members may lead to more powerful advice. One parent observed that the language in the app could be more inclusive to reflect cultural practice, as fathers and extended family provide advice, or are responsible for infant feeding. This may also widen the support for the mother and has the potential to provide supportive information about infant feeding practices to family members who can in term encourage the mother with challenges.

Information or key messages presented in the Growing healthy app as stories or real-life experiences were recommendations made by parents and staff during the study. Aboriginal and Torres Strait Islander people have not traditionally had a biomedical Western worldview in their history (Vass et al., 2011) and therefore may prefer health information presented differently to non-Indigenous peoples. Providing information in familiar ways like story-telling or sharing real-life experiences creates opportunities for Aboriginal and Torres Strait Islander families to improve their understanding of correct infant feeding practices. This may support a range of health literacy levels and styles (Vass et al., 2011). Recognising customs and acknowledging that words and worldview concepts vary between cultures are perhaps more likely to have relevance for Aboriginal and Torres Strait Islander people (Lambert et al., 2014).

Building on the above recommendation to present information as stories or real-life experiences was for the message to be delivered by a respected Elder or recognisable community member in the Growing healthy app. For example, one of the GPs commented to make the message more engaging for the parent:

"'Aunty…. reminds you to get your…. shot every month'….and it's got her image" GP 2.

Working with whole families rather than individuals and respecting the cultural influences which determine interaction is imperative when providing appropriate health care support for Aboriginal and Torres Strait Islander people (Wise et al., 2012). Respect for relatives who are older and more experienced are powerful principles in the Inala community, as for other Aboriginal and Torres Strait Islander communities (Helps and Barclay, 2015). By embracing this principle and adapting the app to include an Elder or well respected and recognisable person delivering a positive key infant feeding message may strengthen the meaning.

5.5 Challenges experienced during the research

There were several challenges the candidate experienced throughout the research process. The most challenging situations arose due to social, cultural and environmental conditions. Communicating with parents to arrange interviews was difficult, as parents did not always answer phone calls or changed phone numbers during the study and therefore had limited options to answer phone calls or respond to text messages. The candidate had to use a different contact method, and one that parents preferred, which was the Facebook messenger. Once this was learnt, the candidate was able to contact the parents more easily and it allowed the parents to contact the candidate when needed.

There were challenges with the first round of interviews with the parents when the AHW facilitated the interviews. The candidate misunderstood qualitative research in the initial stages of the research and made an error in judgement. An AHW facilitated the first round of interviews with the parents and it was learnt this was not an appropriate research strategy to investigate attitudes and gain a deeper understanding. The AHW was a good support person for the candidate, including providing her with cultural considerations for the research, but she did not have a pre-existing relationship with any of the parents and she

was inexperienced as a researcher and interviewer. This meant that she was not able to conduct an in-depth exploration of parent's experiences using the app, rather she was only able to ask questions in a broad and general way and was not comfortable exploring the interviewee's response.

5.6 Strengths and limitations

Throughout the research several strengths and limitations were identified.

5.6.1 Strengths

Using both quantitative and qualitative research methods to investigate the acceptability of the Growing healthy program in the Inala Aboriginal and Torres Strait Islander community was a strength of this study. Asking parents to use the Growing healthy app helped to gain high quality data as the participants were testing the app under real world conditions (Barnett, 2011, Demaio et al., 2012).

A key strength of this research was the trust and pre-existing relationships genuinely established and maintained between parents, the candidate and health service. The relationship may have contributed to parents agreeing to participate and comprehensively engaging with the Growing healthy app. Previous studies suggest strong, respectful relationships between health professionals and participants is an essential component of effective health promotion programs with Aboriginal and Torres Strait Islander peoples (Bond et al., 2012). The location for the research, the CoE health service is well known for providing culturally acceptable care (Hayman et al., 2014). This includes during the antenatal period where 80% of women present to the service during their first trimester which is notably higher than for other Aboriginal and Torres Strait Islander women in the state (Maher et al., 2014). Considering the CoE has been identified as a trusted health service for Aboriginal and Torres Strait Islander people (Hayman et al., 2009), the candidate's position as the dietitian at the CoE may have supported openness and engagement from the participants.

The candidate reflected on her own growth throughout the study and learned the value of trust and respect. The candidate was aware of the historical context of colonisation and the practices of racism at individual and institutional level. This assisted her to use reflexive practise and continue to check in with the AHW and research team to ensure her research processes and practises were respectful for Aboriginal and Torres Strait Islander people.

The candidate believed her background experience of a dietitian was an asset for conducting interviews and in undertaking the qualitative analysis. The candidate had interviewing skills she had gained working as a dietitian for several years, including yarning as a consultation style with Aboriginal and Torres Strait Islander people. The candidate was able to conduct interviews using open-ended questions, allowing time for responses and actively listening to participants when they spoke, therefore generating more robust data. The reflective practise techniques assisted in the process of standing back, asking questions and challenging assumptions throughout the analysis process.

Another strength of the study was that parents who used the Growing healthy app varied in ages, levels of education and infant feeding approaches. Therefore, capturing views relating to different parts of the app accessed depending on what feeding methods were used. Acquiring views about the app from parents of different ages and education types potentially makes the research relevant to a wider audience.

Finally, a strength of this study was the communication of research outcomes within the Inala community, which aimed to follow best practice culturally appropriate health research principles for Aboriginal and Torres Strait Islander research (O'Donahoo and Ross, 2015, Jamieson et al., 2012). Research outcomes were communicated back to the parents, staff and community through contact with the participants individually and via a presentation at an Inala Aboriginal and Torres Strait Islander Community Jury for Health Research meeting held in July 2017 (Bond et al., 2016).

5.6.2 Limitations

A number of limitations are acknowledged in the conduct of this study. Firstly, the location chosen for the informal discussion with parents. Only two parents attended the informal discussion, and the parents may have felt uncomfortable considering the number of the research personnel (the facilitator, candidate and the AHW) outweighed the number of parents. The limited timeframe required to promote the informal discussion likely contributed to the smaller number of participants at the informal discussion. The limited timeframe was due to the candidate underestimating how difficult recruitment for the study would be, and an unexpected delay in ethics obtainment from the local health district. It was theorised that if a culturally acceptable location was used parents might feel welcome to attend, however this was not the case. Lessons were learnt from the fewer participants than expected that the cultural centre, Ngutana-Lui was not a suitable location for the parents. Therefore, lessons were learnt and interviews with parents that followed were conducted at a location of the parents' choice and there was a longer recruitment time (three and a half months) for the next phase of the research with parents.

Another limitation of the research was the limited number of app users and the inability to extrapolate much from the quantitative data.

There were unforeseen circumstances and cultural responsibilities the parents endured over the four months of data collection. Cultural responsibilities such as occasions of Sorry Business were experienced by parents during the study timeframe which were not necessarily a limitation to the study but did cause some stress to the candidate and parents during these times. The timeframe for interviewing parents was extended to allow for respectful research practice by being respectful of parents human dignity and respecting Aboriginal and Torres Strait Islander culture in accordance with Values and Ethics (NHMRC, 2007). Sorry Business is a cultural necessity for Aboriginal and Torres Strait Islander people (QLD Health, 2015). The candidate endeavoured to be respectful of the Aboriginal and Torres Strait Islander participants and families who lived in Inala through one significant stage during the study by not contacting parents during

this time to arrange interviews. For instance, at one stage during the data collection period of the research the candidate attended two funerals in one week, of which most of the parent participants in Inala were affected.

It is important to note that Aboriginal and Torres Strait Islander communities across Australia are not a homogenous group and there is great heterogeneity among the many groups, and they vary in their cultural beliefs and practices, language, historical events and geography (McGregor, 1997). Therefore, it is extremely important to note that this research refers to the outcomes found in this community and may not reflect other Aboriginal and Torres Strait Islander communities, nor generalise to the whole population of Aboriginal and Torres Strait Islander peoples. It does however provide insights into the use of mHealth to support infant feeding practices in one urban Aboriginal and Torres Strait Islander community, which may provide important lessons for similar communities.

Chapter 6: Conclusions

6.1 Summary of major findings

The Growing healthy at Inala study found that mHealth has the potential to be a suitable mode of delivery of health promotion programs addressing infant feeding support for Aboriginal and Torres Strait Islander families. The Growing healthy app, which was initially developed for families experiencing socioeconomic disadvantage, was a suitable program for Aboriginal and Torres Strait Islander families in this study. Parents in the study were already using apps to access health information. Staff welcomed the idea of having an easily accessible and credible app to recommend parents for infant feeding support to complement their advice. The Growing healthy app had the potential to influence infant feeding practices for parents of Aboriginal and Torres Strait Islander infants.

There were differences in staff and parent's views on whether the Growing healthy app was culturally acceptable and appropriate. Parents identified modifications were required, although overall parents raised less concerns with the cultural appropriateness of the app than the staff. Most staff thought modifications were required for the app to be considered culturally appropriate and acceptable. The look and feel of the app was an important factor for cultural considerations that both parents and staff mentioned. This included the visual presentation and language used in the app and including the role of family into the app. Presenting information as stories or real-life experiences in the app were other suggestions parents and staff made to make the app more engaging and culturally appropriate for parents of Aboriginal and Torres Strait Islander infants.

Features and messages that affirmed, complemented and built on the resources and advice provided by health care practitioners and health services were favoured in the app. The findings suggest that mHealth may offer considerable promise as a delivery mode for health promotion programs by strengthening health promotion messages.

6.2 Learnings from the research

It was speculated that building relationships and trust by the candidate were fundamental to the cultural acceptance of the Growing health app by the parents in the study. Community engagement, building relationships with community members and participation within the community was a suggested application for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research. The Growing healthy at Inala study reinforced the importance of these principles.

In addition, the respect for Aboriginal and Torres Strait Islander people and their culture including family involvement in infant care was important for acceptance of the Growing healthy app. Strengths-based messages, consistent messages and messages that complement existing key health messages were preferred by parents. These factors should be considered in future mHealth programs for parents of Aboriginal and Torres Strait Islander infants. It is also important to rectify functionality and technical issues of an app for parents to get maximum benefit from the information and support mHealth can provide. Staff welcomed the idea of a credible mHealth program they can recommend to new parents of Aboriginal and Torres Strait Islander infants in the area of infant feeding.

Member checks were not performed due to the candidate's lack of understanding of their value at the time. If member checks were conducted, they may have provided more rigorous data and therefore this was an error in judgement by the candidate during early stages of the research.

The candidate conducted the second round of interviews which was a powerful modification in the research process. The candidate did not have a full understanding of qualitative research in the early stages of the research. She made an error in judgement when she organised an AHW to conduct the informal discussion with parents and the first round of interviews. When the candidate conducted interviews herself and became to understand more about qualitative research, the findings then reflected shared experiences between the researcher and participants. This offered insights and understandings rather

than broadened knowledge. The candidate recognised her understanding of participant's views on the Growing healthy app was knowledge co-constructed between participants and the candidate together. The candidate's better understanding of qualitative research and a constructionist viewpoint and enabled the research questions to be addressed more suitably.

6.3 Implications of the study

There was no published literature on mHealth exploring the cultural appropriateness relating to infant feeding for Aboriginal and Torres Strait Islander families. Therefore, key findings of the look, feel and accessibility are all factors for mHealth with Aboriginal and Torres Strait Islander families. However, most importantly mHealth is likely to be perceived as culturally appropriate when the program is promoted by a trusted source. Whether this is a health professional, a family member, a friend or someone in their similar situation this makes the information delivered and app more engaging, credible and useful.

If an mHealth program that is developed for a non-Indigenous population is introduced by a trusted source, then it is more likely to be accepted and used effectively. Including the Aboriginal and Torres Strait Islander community in all aspects of the delivery of a health promotion program, including permission to provide the program may increase the likelihood of the program being accepted. Ensuring the mHealth program messages are understandable and non-confrontational are also factors which may increase the likelihood of the app being accepted into an Aboriginal and Torres Strait Islander urban community.

Features of the Growing healthy at Inala study, which were in accordance with the NHMRC's Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research assisted the study's conclusions. Linking a health promotion program that is associated with capacity building goals of a primary health care service was beneficial. The research was also addressing community health priority goals, evidenced by the Inala Community Jury for Aboriginal and Torres Strait Islander Health Research approving the research.

Addressing priority health concerns was an essential principle relevant to research among parents of Aboriginal and Torres Strait Islander infants in an urban area.

6.4 Implications for future research

A next step would be to develop an Aboriginal and Torres Strait Islander version of the app including the recommendations from this study and engaging Aboriginal community and Torres Strait Islander in developing this. In addition, ideas for future research may be to trial the Aboriginal and Torres Strait Islander version of the Growing healthy app in other Aboriginal and Torres Strait Islander areas where health professionals and infant feeding information may be difficult to access (ABS, 2014) providing a greater reach.

It would also be beneficial to study the effectiveness of the app in supporting optimal infant feeding practices. Monitoring infant's growth patterns, infant and parents future eating habits would be a practical way to measure the effectiveness of the program's outcomes long term.

The Growing healthy app may be more effective if the app were provided to parents during the perinatal phase. Many women, particularly those having a first baby is a time when they seek information to help them during the transition to parenthood, including infant feeding practises (Shieh et al., 2010). If the app was provided to parents early, prior to their baby's birth this may enhance support further.

It may be valuable to have the Growing healthy app available to all new parents of Aboriginal and Torres Strait Islander infants who attend the CoE after implementing the recommended adaptations provided from the study. The app may provide additional support to achieve optimal infant feeding practises. It would be interesting to see how the parents respond to the mHealth program in recent times, considering the escalation of smartphone apps since the study was conducted three years ago (Agarwal et al., 2016).

Appendices

Appendix A: Systematic Literature Search

(page 1 of 3)

A systematic literature search was carried out in January 2017 for early intervention studies to prevent obesity in young (zero-to-five-year age group) Aboriginal and Torres Strait Islander children. The search did not find any published intervention studies following on from the systematic reviews publication in 2014 by Laws et al (Laws et al., 2014).

The search focused on three key elements:

1. Population/target group (example: infants/young children/families from Indigenous backgrounds)
2. Outcomes of interest
3. Intervention content
4. Study design

Key search terms, mapped to appropriate subject headings in each database were searched as a key word in the title. The sign (*) stands for character(s); the question mark (?) substituted for one or no characters.

Set 1: Population/ Target group

Subset 1.1 Infants, young children and families

#	Concept	Key word (phrase searching)
1.	Child	Child* , Paediatr*, Pediatr*,
2.	Infant	babies, baby, neonat*, infan*
3.	Family	famil*
4.	Parents	Parent*
5.	Mothers	Mother*, mum*, maternal
6.	Fathers	Father*, dad, paternal
1. OR 2. OR 3. OR 4. OR 5. OR 6.		

Subset 1.2 Indigenous populations

#	Concept	Key word (phrase searching)
1.	Oceanic ancestral group	Aborig*, indigenous, Torres Strait Island*, first nation, tribe, tribal, Maori

Set 1 = Subset 1.1 AND 1.2

Set 2. Outcomes of interest

Appendix A: Systematic Literature Search (page 2 of 3)

Subset 2.1 Weight/obesity

#	Concept	Key word (phrase searching)
1.	Obesity	Obes*, overweight, over weight, over eat, overeat*,
2.	Weight gain	Weight gain
3.	Weight loss	Weight loss
4.	Body mass index	BMI or body mass index
1. OR 2. OR 3. OR 4.		

Subset 2.2 Nutrition/diet

#	Concept	Key word (phrase searching)
1.	Diet	Diet*, nutr*
2.	Fruit	Fruit*
3.	Vegetables	Vegetable*
4.	Beverages	Beverage*, drink*,
5.	Energy intake	Energy intake, calorie*
6.	Feeding behaviour	Feeding practice*, Feeding behaviour*
1. OR 2. OR 3. OR 4. OR 5. OR 6.		

Subset 2.3 Physical activity and sedentary behaviours

#	Concept	Key word (phrase searching)
1.	Exercise	Physic* activ*, exercis*, enduran* training, aerobic training, physical training, fitness
2.	Play	Play*
3.	Television	Television, TV, small screen recreation, video game*
4.	Sedentary lifestyle	Sedentar*, inactiv*
1. OR 2. OR 3. OR 4.		

Set 2 = Subset 2.1 OR 2.2 OR 2.3

Appendix A: Systematic Literature Search (page 3 of 3)

Set 3: Intervention content

#	Concept	Key word (phrase searching)
1.	Life style	Lifestyle*, life style*
2.	Health behaviour	Health behavio*
3.	Behaviour therapy	Behavio* therapy, behavio* modification
4.	Health education	Health education
5.	Health promotion	Health promot*
6.	Early intervention	Early intervene*
7.	Diet therapy	Nutrition therapy
8.	Exercise therapy	Exercise therapy
9.	Motivation	Motivate*
10.	Social support	Social support
11.	Family therapy	Family therapy, parent* intervention, family intervention
12.	Parenting	Parent*, 'parent group*"
1. OR 2. OR 3. OR 4. OR 5. OR 6. OR 7. OR 8. OR 9. OR 10. OR 11. OR 12.		

Set 4: Study design (comparison)

#	Concept	Key word (phrase searching)
1.	Intervention studies	Intervent*
2.	Clinical trial	Clinical trial
3.	Randomized controlled trial	Randomi?ed control* trial, RCT
4.	Comparative study	Comparative stud*, comparison stud*
5.	Cross-over studies	Cross-over stud*, cross over stud*
6	Evaluation studies	Evaluation stud*
7.	Intervention studies	Intervent*
1. OR 2. OR 3. OR 4. OR 5. OR 6. OR 7.		

Final set:

Set 1 AND set 2 AND set 3 AND set 4

Appendix B: Letter of support from The Inala Community Jury for Aboriginal and Torres Strait Islander Health Research

The Inala Community Jury for Aboriginal and Torres Strait Islander Health Research

c/o PO Box 52, Inala, Qld 4077

17 July 2014

To Whom It May Concern:

On behalf of the Inala Community Jury for Aboriginal and Torres Strait Islander Health Research, I wish to offer our full support to Annalie Houston and Dr Deborah Askew and the Inala Indigenous Health Service to undertake research at the service.

The Community Jury for Aboriginal and Torres Strait Islander Health Research is an initiative established by the Inala Indigenous Health Service to ensure that all research undertaken by the service is supported and monitored by local Indigenous community representatives and stakeholders. This initiative seeks to respond to the National Health and Medical Research Council's (NHMRC) Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research (2003) and ensures a level of accountability to the community is maintained throughout all aspects of the research endeavour. The Jury comprises of 12 Aboriginal and Torres Strait Islander community members who were selected to provide broad representation, including 4 nominated positions from the existing local Indigenous community controlled organisations.

We have met and discussed this research proposal with Annalie Houston from Inala Indigenous Health Service. We feel that it is extremely important to ensure that the health service research is community driven. The Community Jury for Aboriginal and Torres Strait Islander health Research recognises that this research will help ensure the quality of the data collected through the health service. We are confident that the service will undertake this research in a manner that is sensitive to and respectful of our community cultural protocols. We understand that the research team will feedback at regular milestones on the progress and findings of this research.

We have no hesitation in offering this letter of support and we look forward to working with Inala Indigenous Health Service on this research.

Yours sincerely

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Uncle Albert Holt

Appendix C: Approval letter for the study from Metro South Human Research Ethics Committee

(page 1 of 3)

Metro South Health

Enquiries to: Metro South
Human Research Ethics Committee
Phone: 07 3443 8049
Fax: 07 3443 8003
HREC Ref: HREC/14/QPAH/634
E-mail: Ethicsresearch.pah@health.qld.gov.au

Ms A Houston
Senior Dietician
Queensland Health
P O Box 52
Inala Qld 4077

Dear Ms Houston

HREC Reference number: HREC/14/QPAH/634
Project Title: Determining the culturally appropriateness of the Growing Healthy program for urban Aboriginal and Torres Strait Islander mothers

Thank you for submitting the above research protocol to the Metro South Human Research Ethics Committee for ethical and scientific review. This protocol was first considered by the Human Research Ethics Committee (HREC) at the meeting held on 2 December 2014.

You are reminded that this letter constitutes ethical approval only. You must not commence this research protocol at a site until separate authorisation from the Metro South Chief Executive or Delegate of that site has been obtained.

A copy of this approval must be submitted to the Research Governance Office(r)/Delegate of the relevant institution with a completed Site Specific Assessment (SSA) Form for authorisation from the Chief Executive or Delegate to conduct this research at the Inala Indigenous Health.

I am pleased to advise that the HREC has granted approval of this research protocol. The documents reviewed and approved include:

Document	Version	Date
Cover letter		11 November 2014
NEAF		12 November 2014
Research Protocol	2	
Participant Information and Consent Form	2	14 January 2015
Script Recruitment Invitation	2	14 January 2015
Growing healthy in Inala Advertisement		
Parents Focus Group – Participant Demographic Form		
Letter of Support from the Inala Community Jury for Aboriginal And Torres Strait Islander Health Research		17 July 2014
Letter in response to HREC comments		15 January 2015
Facebook Page		n.d.

This HREC approval is valid from 20 January 2015 until 20 January 2018.

Please note the following conditions of approval:

Appendix C: Approval letter for the study from Metro South Human Research Ethics Committee (page 2 of 3)

1. The Principal Investigator will immediately report anything which might warrant review of ethical approval of the protocol in the specified format, including unforeseen events that might affect continued ethical acceptability of the protocol. Serious Adverse Events must be notified to the HREC as soon as possible. In addition the Investigator must provide a summary of the adverse events, in the specified format, including a comment as to suspected causality and whether changes are required to the Patient Information and Consent Form. In the case of Serious Adverse Events occurring at the local site, a full report is required from the Principal Investigator, including duration of treatment and outcome of the event.
2. Amendments to the research protocol which may affect the ongoing ethical acceptability of a protocol must be submitted to the HREC for review. Amendments should accompanied by all relevant updated documentation and a cover letter from the principal investigator, providing a brief description of the changes, the rationale for the changes, and their implications for the ongoing conduct of the study. Hard copies of the cover letter and all relevant updated documents, with *tracked changes*, must also be submitted to the HREC office as per standard HREC SOP.
3. Amendments to the research protocol which only affect the ongoing site acceptability of the protocol are not required to be submitted to the HREC for review. These amendment requests should be submitted directly to the Research Governance Office/r.
4. Proposed amendments to the research protocol which may affect both the ethical acceptability and site suitability of the protocol must be submitted firstly to the HREC for review and, once HREC approval has been granted, then submitted to the Research Governance Office/r.
5. Amendments which do not affect either the ethical acceptability or site acceptability of the protocol (e.g. typographical errors) should be submitted electronically (track changes) and in hard copy (final clean copy) to the HREC Coordinator. These should include a cover letter from the Principal Investigator providing a brief description of the changes and the rationale for the changes, and accompanied by all relevant updated documents with tracked changes.
6. The HREC will be notified, giving reasons, if the protocol is discontinued at a site before the expected date of completion.
7. The Principal Investigator will provide at least, an annual report to the HREC on the anniversary of the approval and at completion of the study in the specified format.
8. If you require an extension for your study, please submit a request for an extension in writing outlining the reasons. Note: One of the criteria for granting an extension is the compliance with the approval's conditions including submission of progress reports.
9. Any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects on health outcomes (WHO / ICMJE 2008 definition) should be registered, including early phase and late phase clinical trials (phases I-III) in patients or healthy volunteers (WHO Recommendation / ICMJE policy). If in doubt, registration is recommended. All studies must be registered prior to the study's inception, i.e. prospectively. http://www.anzctr.org.au/

Should you have any queries about the HREC's consideration of your protocol please contact the Metro South HREC Office on 07 3443 8049.

Please note that the Metro South HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research (2007), NHMRC and Universities Australia Australian Code for the Responsible Conduct of Research (2007)* and the *CPMP/ICH Note for Guidance on Good Clinical Practice*. Attached is the HREC Composition (Attachment I).

Once authorisation to conduct the research has been granted, please complete the Commencement Form (Attached) and return to the Metro South Human Research Ethics Committee.

Queensland Government

Page 2 of 3

Appendix C: Approval letter for the study from Metro South Human Research Ethics Committee (page 3 of 3)

The Metro South HREC wishes you every success in your research.

Yours sincerely,

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A/Prof Richard Roylance
Chair
Metro South Hospital and Health Service
Human Research Ethics Committee (EC00167)
Centres for Health Research
Princess Alexandra Hospital

20/1/15

Appendix D: Approval letter for the study through The University of Technology of Sydney Human Research Ethics Expedited Review Committee

UTS
Research & Innovation
Building 1, Level 14
PO Box 123 Broadway
NSW 2007 Australia
T: +61 2 9514 9681
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UTS CRICOS PROVIDER CODE 00099F

25 March 2015

A/Prof Elizabeth Denney-Wilson
Faculty of Health
CB10.07.226
UNIVERSITY OF TECHNOLOGY, SYDNEY

Dear Elizabeth,

UTS HREC 2015000062 – A/Prof Elizabeth Denney-Wilson, (for Ms Annalie Houston, Masters student) – "Growing Healthy in Inala" [External Ratification: Metro South Health HREC, HREC/14/QPAH/634, 20/01/15 to 20/01/18]

The UTS Human Research Ethics Expedited Review Committee reviewed your application titled, "Growing Healthy in Inala", and agreed that the application meets the requirements of the NHMRC National Statement on Ethical Conduct In Human Research (2007). I am pleased to inform you that your external ethics approval has been ratified.

Your approval number is UTS HREC REF NO. 2015000062

Please note that the ethical conduct of research is an on-going process. The National Statement on Ethical Conduct in Research Involving Humans requires us to obtain a report about the progress of the research, and in particular about any changes to the research which may have ethical implications. This report form must be completed at least annually, and at the end of the project (if it takes more than a year). The Ethics Secretariat will contact you when it is time to complete your first report.

I also refer you to the AVCC guidelines relating to the storage of data, which require that data be kept for a minimum of 5 years after publication of research. However, in NSW, longer retention requirements are required for research on human subjects with potential long-term effects, research with long-term environmental effects, or research considered of national or international significance, importance, or controversy. If the data from this research project falls into one of these categories, contact University Records for advice on long-term retention.

If you have any queries about your ethics approval, or require any amendments to your research in the future, please do not hesitate to contact the Ethics Secretariat at the Research and Innovation Office, on 02 9514 9772.Yours sincerely,

Production Note:
Signature removed prior to publication.
Professor Marion Haas
Chairperson
UTS Human Research Ethics Committee

THINK.CHANGE.DO

Appendix E: Participant Information and Consent forms for parent participants

(page 1 of 3)

Growing Healthy at Inala

Information for participants

Introduction

The Growing Healthy Program is a new mobile phone app, website and online forum for trustworthy advice and tips on infant feeding in the first 9 months of life.

Parents who have a baby under 9 months of age, who are patients of the Inala Indigenous Health Service will be invited to take part in this study.

This form is a summary of what is involved in the study. Please read it carefully.

Ask questions about anything that you want to know more about.

This study is low risk, however, before deciding whether or not to take part, you might want to talk about it with a relative or friend.

What do I need to do?

- Sign the consent form to show you are willing to participate
- You may be asked to have a yarn from the Growing Healthy Program as well as your experience with trialling it for 4-6 weeks. This will take about 1 hour and can involve family members if you like.
- The researchers will record the yarn, with your permission. If you do take part in the group, we will give you a $25 shopping voucher to thank you for your time.

Who is doing this study?

The study is being conducted by Inala Indigenous Health Service researchers Annalie Houston & Deb Askew, Tanya Saldahna in partnership with colleague Elizabeth Denny- Wilson from University of Technology Sydney in Sydney.

What will happen if I agree to take part in this study?

Participation in this research involves having two separate yarn's with a group of mothers and the research team including an Advanced Aboriginal Health Worker.

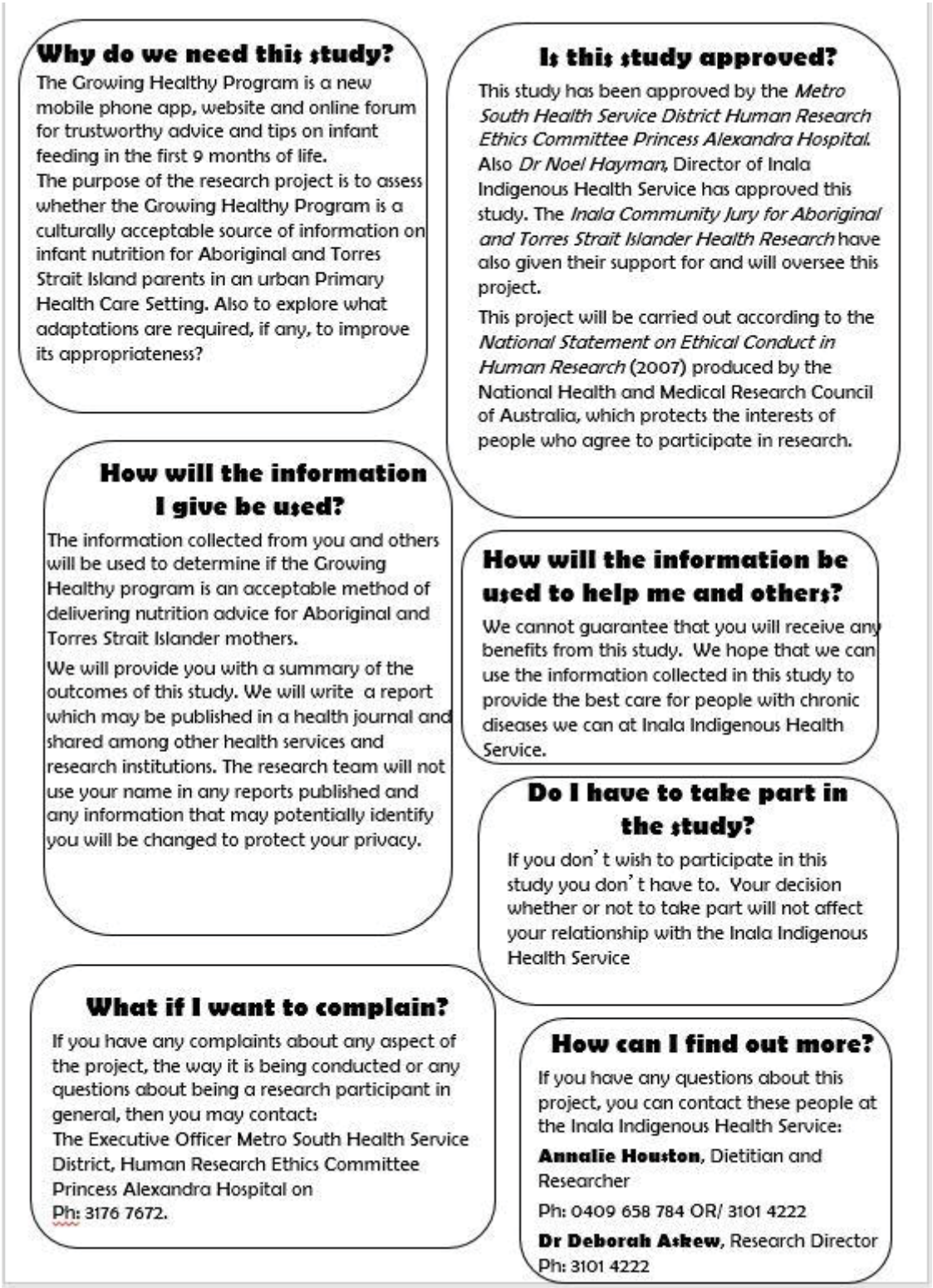
The first yarn with the researchers will be about your thoughts on the key infant feeding messages used in the program in a focus group.

You will then be asked to trial the Growing Healthy Program for 4-6 weeks, which involves receiving 3 messages per week containing information about feeding your baby and suggestions on looking after yourself either via text messages or through a phone app. These messages will contain links to a particular website where we will place useful information such as videos of cooking demonstrations and the appropriate time and suggested strategies to introduce solids. You will not be forced to follow the links.

Because we want to know if the App is useful, we will be collecting information about how study participants use the App from the App analysts. We will also provide a Facebook page for you to chat with other mums in the study (don't feel as though you have to do this though). If you agree to use the 'Growing Healthy in Inala' Facebook page to post comments, please be aware you will be identifiable to other participants joining the Facebook page.

You will then be asked to participate in an interview (yarn) to discuss your thoughts about the Growing Healthy Program's appropriateness and acceptability with the research team if you choose to use it for 4-6 weeks.

Appendix E: Participant Information and Consent forms for parent participants (page 2 of 3)



Why do we need this study?

The Growing Healthy Program is a new mobile phone app, website and online forum for trustworthy advice and tips on infant feeding in the first 9 months of life.
The purpose of the research project is to assess whether the Growing Healthy Program is a culturally acceptable source of information on infant nutrition for Aboriginal and Torres Strait Island parents in an urban Primary Health Care Setting. Also to explore what adaptations are required, if any, to improve its appropriateness?

Is this study approved?

This study has been approved by the *Metro South Health Service District Human Research Ethics Committee Princess Alexandra Hospital.* Also *Dr Noel Hayman,* Director of Inala Indigenous Health Service has approved this study. The *Inala Community Jury for Aboriginal and Torres Strait Islander Health Research* have also given their support for and will oversee this project.

This project will be carried out according to the *National Statement on Ethical Conduct in Human Research* (2007) produced by the National Health and Medical Research Council of Australia, which protects the interests of people who agree to participate in research.

How will the information I give be used?

The information collected from you and others will be used to determine if the Growing Healthy program is an acceptable method of delivering nutrition advice for Aboriginal and Torres Strait Islander mothers.

We will provide you with a summary of the outcomes of this study. We will write a report which may be published in a health journal and shared among other health services and research institutions. The research team will not use your name in any reports published and any information that may potentially identify you will be changed to protect your privacy.

How will the information be used to help me and others?

We cannot guarantee that you will receive any benefits from this study. We hope that we can use the information collected in this study to provide the best care for people with chronic diseases we can at Inala Indigenous Health Service.

Do I have to take part in the study?

If you don't wish to participate in this study you don't have to. Your decision whether or not to take part will not affect your relationship with the Inala Indigenous Health Service

What if I want to complain?

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:
The Executive Officer Metro South Health Service District, Human Research Ethics Committee Princess Alexandra Hospital on
Ph: 3176 7672.

How can I find out more?

If you have any questions about this project, you can contact these people at the Inala Indigenous Health Service:

Annalie Houston, Dietitian and Researcher

Ph: 0409 658 784 OR/ 3101 4222

Dr Deborah Askew, Research Director
Ph: 3101 4222

Appendix E: Participant Information and Consent forms for parent participants (page 3 of 3)

Consent

I have read, or have had read to me in a language that I understand, this document and I understand the purposes, procedures and risks of this research project as described within it.
I understand that information provided to the research team about me will remain confidential.
I have had an opportunity to ask questions and I am satisfied with the answers I have received.
I freely agree to participate in this research project as described.
I understand that I will be given a signed copy of the information document to keep.

Participant's name (printed) ……

Signature Date ……

Name of witness to participant's signature (printed) ……

Signature Date ……

Declaration by researcher*: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) ……

Signature Date ……

** A senior member of the research team must provide the explanation and provision of information concerning the research project.*
Note: All parties signing the consent section must date their own signature and the Witness cannot be an employee of Queensland Health.

Appendix F: Participant Information and Consent forms for staff participants

(page 1 of 3)

Growing Healthy at Inala

Information for participants- staff

Introduction

The Growing Healthy Program is a new mobile phone app, website and online forum for trustworthy advice and tips on infant feeding in the first 9 months of life.

Parents who have a baby under 9 months of age, who are patients of the Inala Indigenous Health Service will be invited to take part in this study.

This form is a summary of what is involved in the study. Please read it carefully.

Ask questions about anything that you want to know more about.

This study is low risk, however, before deciding whether or not to take part, you might want to talk about it with a relative or friend.

What will happen if I agree to take part in this study?

Participation in this research involves having a yarn with a group of staff members about your thoughts on the Growing Healthy Programs appropriateness and acceptability.

Why do we need this study?

The Growing Healthy Program is a new mobile phone app, website and online forum for trustworthy advice and tips on infant feeding in the first 9 months of life.
The purpose of the research project is to assess whether the Growing Healthy Program is a culturally acceptable source of information on infant nutrition for Aboriginal and Torres Strait Island mothers in an urban Primary Health Care Setting. Also to explore what adaptations are required, if any, to improve its appropriateness?

What do I need to do?

- Sign the consent form to show you are willing to participate
- You may be asked to have a yarn with the Growing Healthy Program team. This will take between ½ to 1 hour.
- The researchers will record the yarn, with your permission.

How will the information I give be used?

The information collected from you and others will be used to determine if the Growing Healthy program is an acceptable method of delivering nutrition advice for Aboriginal and Torres Strait Islander mothers.

We will provide you with a summary of the outcomes of this study. We will write a report which may be published in a health journal and shared among other health services and research institutions. The research team will not use your name in any reports published and any information that may potentially identify you will be changed to protect your privacy.

Who is doing this study?

The study is being conducted by Inala Indigenous Health Service researchers Annalie Houston & Deb Askew, Tanya Saldahna in partnership with colleague Elizabeth Denny- Wilson from University of Technology Sydney in Sydney.

22/04/2015
Version 1

Participant Information & Consent Form for staff

Appendix F: Participant Information and Consent forms for staff participants (page 2 of 3)

What if I want to complain?

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:
The Executive Officer Metro South Health Service District, Human Research Ethics Committee Princess Alexandra Hospital on
Ph: 3176 7672.

Is this study approved?

This study has been approved by the *Metro South Health Service District Human Research Ethics Committee Princess Alexandra Hospital.* Also *Dr Noel Hayman*, Director of Inala Indigenous Health Service has approved this study. The *Inala Community Jury for Aboriginal and Torres Strait Islander Health Research* have also given their support for and will oversee this project.

This project will be carried out according to the *National Statement on Ethical Conduct in Human Research* (2007) produced by the National Health and Medical Research Council of Australia, which protects the interests of people who agree to participate in research.

How will the information be used to help me and others?

We cannot guarantee that you will receive any benefits from this study. We hope that we can use the information collected in this study to provide the best care for people with chronic diseases we can at Inala Indigenous Health Service.

Do I have to take part in the study?

If you don't wish to participate in this study you don't have to. Your decision whether or not to take part will not affect your relationship with the Inala Indigenous Health Service

How can I find out more?

If you have any questions about this project, you can contact these people at the Inala Indigenous Health Service:

Annalie Houston, Dietitian and Researcher

Ph: [redacted] OR/ 3101 4222

Dr Deborah Askew, Research Director
Ph: 3101 4222

Appendix F: Participant Information and Consent forms for staff participants (page 3 of 3)

Consent

I have read, or have had read to me in a language that I understand, this document and I understand the purposes, procedures and risks of this research project as described within it.
I understand that information provided to the research team about me will remain confidential.
I have had an opportunity to ask questions and I am satisfied with the answers I have received.
I freely agree to participate in this research project as described.
I understand that I will be given a signed copy of the information document to keep.

Participant's name (printed) ……

Signature Date ……

Name of witness to participant's signature (printed) ……

Signature Date ……

Declaration by researcher*: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) ……

Signature Date ……

** A senior member of the research team must provide the explanation and provision of information concerning the research project.*
Note: All parties signing the consent section must date their own signature and the Witness cannot be an employee of Queensland Health.

Appendix G: Research project poster

Growing Healthy in Inala

Do you have a baby 9 months or younger?
Do you own a mobile phone?
We need your help!

The Inala Indigenous Health Service wants your feedback about an infant feeding nutrition education program called Growing Healthy.
We want to yarn with mums who have young babies to find out if a **MOBILE PHONE** app or text message system is a good way to give nutrition information.....

We would like you to join in the **Growing Healthy in Inala** study
If you have a baby under 9 months of age

'Growing Healthy' provides information from expert dietitians and nurses based at Deakin University and the University of Technology Sydney via a FREE mobile phone app and website, on topics such as:

- breastfeeding and formula feeding
- sleeping patterns of babies
- how and when to introduce solids
- recipes and cooking
- tips for mums
- where and how to get more help

Participation in this study will involve 2 separate yarns as well as getting nutrition messages through text messages or a phone app for 4-6 weeks.

Join us for morning tea and catch up with other mums on
11:00am Tuesday the 2nd of June at Ngutana-Lui,
100 Lilac Street, Inala

We would offer a small gift to thank you for your time.
If you would like to be involved, or want more information, please contact:
Annalie Houston (dietitian)
Inala Indigenous Health Service Phone: 3101 4222

Appendix H: Script recruitment invitation for parents

Dear [insert name]My name is ……. and I am the dietitian who works at Inala Indigenous Health Service.

I am calling/ texting/ talking to you today because you have expressed your interest to assist in some research we are doing at the health center, as you have a baby under the age of 9 months of age.

What is the aim of the research?

The Growing Healthy Program is a new mobile phone app, website and online forum for trustworthy advice and tips on infant feeding in the first 9 months of life.

Would you like to know more about the research? Do you have time to talk now? If so I can tell you a little more.

What is involved?

Participation in this research involves having two separate yarn's with a group of mothers and the research team including an Advanced Aboriginal Health Worker (Nutrition Promotion).

The first yarn with the researchers will be about your thoughts on the key messages used in the program in a focus group.

You will then be asked to trial the Growing Healthy Program for 4-6 weeks, which involves receiving 3 messages per week containing information about feeding your baby and suggestions on looking after yourself either via text messages or through a phone app. These messages will contain links to a particular website where we will place useful information such as videos of cooking demonstrations and the appropriate time and suggested strategies to introduce solids. You will not be forced to follow the links.

You will then be asked to participate in an interview/ yarn to discuss your thoughts about the Growing Healthy Program's appropriateness and acceptability with the research team if you choose to use it for 4-6 weeks.

Is participation voluntary?

Yes. You are free to withdraw from participation at any stage. Your decision about whether to take part, or if you take part and later withdraw, will not affect your relationship or care with the Inala Indigenous Health Service.

Who can I contact for further information?

Annalie Houston email: annalie.houston@health.qld.gov.au, phone: [redacted] or Find her on Facebook as: Annalie Dietitian Inala Indigenous

Appendix I: Email invitation to staff regarding the group discussion with staff

We're currently developing a program called Growing healthy through a smartphone application and a website to help guide mothers with feeding their baby in the first year of life.

Approximately 10 parents from Inala Indigenous Health Service have this App over 4-6 weeks and we would like to hear your feedback about this.

The Growing Healthy program (App) information comes from a variety of credible sources and we would like your feedback about whether you think it is suitable and culturally appropriate for your patients and whether it has affected your practise or not.

Parents who downloaded the Growing Healthy app received 3 messages a week on their mobile phone on infant feeding topics relevant to the age of their baby with links to more information on the app/website: www.growinghealthy.org.au

If anyone wants to see an example of the mobile app, Annalie has this on her phone so please email Annalie directly for viewing.

Time 9:00am- 9:30am on the 30th November 2015 during the clinic staff meeting in the waiting room of CoE.

PHOTO

Participation in the group discussion is voluntary.

Thank you, please contact Annalie if you have any queries before the group discussion,

Annalie Houston (dietitian)

Appendix J: Intended interview guide for informal discussion with parents on app push notifications

(page 1 of 2)

Introduction

I would like to acknowledge the original custodians, the Jagera people, on whose land we are meeting today. I would also like to pay my respects to Elders past and present, and welcome all Aboriginal and or Torres Strait Island people here with us today. 'Good morning and welcome. Thank you for taking the time to join us today. My name is and I am from the University of Technology Sydney. Annalie who is the dietitian at the Inala Indigenous Health Service is also here as is Tanya Saldahna an Advanced Aboriginal Health Worker (Nutrition).

We're currently developing a program called Growing Healthy through a smartphone application and a website to help guide mothers with feeding their baby in the first year of life.

Parents who have the Growing Healthy app will receive 3 messages a week on their mobile phone on infant feeding topics relevant to the age of their baby with links to more information on the app/website.

These messages have come from a variety of sources and we would like your feedback about how suitable they are for you. We expect to receive different answers and opinions from you all. Feel free to discuss your answers with each other; I would like to make sure that everybody has a chance to have their say. We will be taking notes down and if everyone feels ok we will record the session to help us remember what was being said. No names will be included in the reports, so all your comments will be anonymous.

Ice Breaker:

To start with, I would like to spend just a couple of minutes to introduce ourselves by saying your name, how old your child/children are and whether there are any apps or websites you currently use about taking care of your baby, and what you like and dislike about the apps.

Now I would briefly like to explain a bit more about Growing healthy.

Brief background on what the program will offer.

Appendix J: Intended interview guide for informal discussion with parents on app push notifications

(page 2 of 2)

CONTENT

We have brought along messages you might receive from the program that we would like some feedback on. These have been stuck on posters all around the room for you to see.

We are particularly interested in understanding whether the text messages are of interest to you and would encourage you to want to find out more. Equally we would like to know which messages you don't like or are not useful, for whatever reason or which messages are confusing or difficult to understand.

We will now give you some time to walk around the room and read the messages.

When you read them please think about**:**

- What do you think of the length of the message? Too long?
- Useful/interesting why/why note
- Easy to understand, why/why not
- Encourage you to click on link for more info in the app/website? Why? Why not?

We are going to give you some coloured dots and in your own time please place a green dot on the message if you think it IS appropriate/ acceptable and or useful or a red dot on it if you think it IS NOT appropriate/ acceptable and or useful. You can place an orange dot on the message if you have no opinion. This is to be done in your own time and we will not be watching you do this. (Need to allow plenty of time for this)

Table: Key Messages (Refer to Box 1)

Now we would like to discuss the reasons why or why not you thought these messages were appropriate, acceptable or useful or not.

Go through each message and ask the participants about the feedback/ coloured dot.

Can you tell me why this message was appropriate? Why not? What would you like it to say instead?

Thank you all for your time we really appreciate your thoughts and feedback that you have provided us on the program.

Appendix K: Survey for parent participants for demographic information (page 1 of 2)

Participant Demographic Form page 1 of 2

Please fill in the following questions:

DOB: ___/___/___

Main language spoken at home: _____

What type of phone do you own?

- Samsung Galaxy, S3, S4 and S5
- Nexus 5
- HTC One
- iPhone 4, 4s, 5, 5s, 5c
- Other, please specify: _____
- Do not own a mobile phone

Are you of Aboriginal or Torres Strait Islander origin?

Yes–Aboriginal ☐
Yes–Torres Strait Islander ☐
No ☐

For persons of both Aboriginal and Torres Strait Islander origin, mark both 'Yes' boxes. This question is voluntary.

Level of education *(Please tick <u>one</u> response only)*

Year 10	High school	Trade/ apprentice-ship (e.g. hairdresser, chef)	Certificate/diploma (e.g. child-care, technician)	University Degree
O	O_1	O_2	O_3	O_4

Postcode: _____

***Is your baby*: Male: O or Female: O**

What is your baby's Date of Birth: _____

Is this your first child? **Yes: O No: O**

How are you currently feeding your baby?. (Please tick *<u>one</u>* response only.)

• Breastfeeding exclusively (no other food or fluids)	O_1
• Breastfeeding fully with occasional water and juices (no solid food)	O_2
• Formula feeding only (no solid food)	O_3
• Combination breast and formula feeding (no solid food)	O_4
• Breastfeeding and solids	O_5
• Formula feeding and solids	O_6
• Combination of breast and formula feeding and solids	O_7

Appendix K: Survey for parent participants for demographic information

(page 2 of 2)

Would you be interested in any of the following:

Testing the app once it is fully developed for a 4-6 week period. This would involve:

- ***downloading the app (free of charge)***
- ***receiving 3 messages per week from the app relevant to your baby's age and how you're feeding them***
- ***providing feedback on the app and the messages***

YES / NO

Being contacted by the research team to participate in other studies related to this project YES/NO

If Yes, please provide your contact details below

Name _____

Number: MOB:_____HOME:_____

Email: _____

Appendix L: Interview guide for first round of interviews with parents (page 1 of 2)

Thank you for your time today.

Would you like a cup of tea/ are you (and your baby) comfortable?

I just want to let you know I will be asking a lot of questions today, so I don't want to you feel overwhelmed, it is just to get the best information we can and your thoughts. It may take up to 20 minutes, but just let us know if it is getting too much.

You can always come back to me/ us if you go away and think of something.

Here is Annalie's phone with the Growing Healthy Program App on it if you wanted to spend anytime looking at it as a reminder? Or feel free to refer to this at any time.

THE LOOK AND FEEL OF THE APP:

Firstly- I would like to talk about the look and feel of the App and whether you liked it or not.

- What do you really think of it?
- Did you understand it? If not, what is confusing?
- How could it be made better?
- Do you think it covers all the topics you might be interested in around feeding your baby?
    - What is missing?
    - Is there anything that could be removed? *What other features would you not like to see in the Growing Healthy app / text messages that would interest you? Was there content, pictures or features that you didn't like about the program?*

DELIVERY:

Now I would like to talk about how the Growing Healthy program was delivered to you, so that means how often the text messages/ notifications were sent.

- How did you find 3 messages or notifications a week? Too many, too little?
- What did you think of the messages? *Useful / interesting? Helpful at all?*
- Tell me what you thought was relevant?
- How did you feel when the messages popped up? For example, tell me about a message you can remember and how it made you feel…….
- Did the messages remind you of stuff? Did you act on this?
- What did you think of the messages that linked you to information on the app?
    - Did you ever use the click/tap on links?
    - Did the messages ever prompt you to think about something differently or do something differently?
    - Did they help you in any way?

Appendix L: Interview guide for first round of interviews with parents

(page 2 of 2)

Now I just want to talk to you about the QUALITY and CONTENT of the Growing Healthy Program

- *How often did you use the app?* (*prompt, did you actually use it? Tell me why?)*
- I'm wondering if you only used the app when you received the messages? Or did you use it outside this time? *Did you ever look at the App when you wanted to know something that might have been in the App*? *When and how did you find this? Was it easy*?
- Did you browse the app just out of interest?
- What did you think of the look of the app? *For example, the colours*, *the wording*?
- Did it have enough pictures or would you have liked more? More than words/ writing?
- How easy were the messages to understand? What did you think of the language used?

These questions are about your culture:

- Did these messages and content of the app fit with your culture? For example: As a murri Mum/ Dad? *an Aboriginal and or Torres Strait Island person or parent*?
    - Was the content culturally appropriate?

Ending session: (Just recapping, going over questions that may have been asked before, but just in case):

- What do you think about the name 'Growing Healthy'? Does this appeal to you or not? Do you have any ideas for other names?
- Do you think you would like to participate in this program for 9 months, or do you think you might stop using it earlier? *(Prompt: what would keep you engaged?)*
- Is there anything else you would like to add that might help us to make this program appealing to mothers/ parents like you?
- Final question:

Where did you use the App mostly? *Did you need to access the internet on your phone to watch the videos/ get information? Could you do this at home?*

Thank you all for your time we really appreciate your thoughts and feedback that you have provided us on the program.

Appendix M: Interview guide for second round of interviews with parents (page 1 of 3)

Prior to turning on the tape recorder:

Thank you for your time today.

Would you like a cup of tea/ are you (and your baby) comfortable?

Just to give you a summary- This is a yarn about feeding your baby and also your experience with using the Growing healthy app/ program

There are no right or wrong answers

We are interested in YOUR experiences

If what I say doesn't make sense, please tell me and I will change the way I ask the question just stop me, thanks

Related to RECORDING:

Are you okay for me to record this over a tape recorder? It will mean that I don't need to take notes. When we use this information/ your responses, we will not use your name so please know that whatever you tell me today it will be kept confidentially. Please know that what you say will not be recorded at the health service, or on the dietitian file, unless you say something today that you want me to take back to the health service.

I just want to let you know I will be asking a lot of questions today, so I don't want to you feel overwhelmed, it is just to get the best information we can and your thoughts. It may take up to 20 minutes, but just let us know if it is getting too much.

You can always come back to me/ us if you go away and think of something. Your stories are very valuable to us.

OKAY NOW I AM GOING TO TURN ON THE TAPE RECORER

USE THE APP TO EXPLAIN*- have THE PHONE READY, and REFER TO IT- for a guide*

WE WANT TO HEAR YOUR STORIES / give me an example/ time of uncertainty then how they used the App

BEGIN QUESTIONS:

The Growing healthy program- Have phone and App there

What were your first thoughts of the Growing healthy App – when you heard about it from me?

What has been the most helpful part of the App? Can you tell me about a time when you used it and how it helped? A story…….

What is the least helpful part of the App? Can you tell me about a time when you used it and how it didn't help? A story…….

How did you feel about the messages that popped up? Can you tell me about a time when you saw/ noticed a message and how it helped? A story…….

Appendix M: Interview guide for second round of interviews with parents (page 2 of 3)

Experiences of being a mother:

What has been the best thing about feeding your baby or caring for your baby? Can you please tell me a story about a time?
What has been the hardest thing about feeding your baby? Can you please tell me a story about a time?
Where do you get your support from? For caring for your baby? Breastfeeding/ infant formula feeding/ solids? What about information?

Apps/ electronic information
Do you use any other Apps on your phone? If so, which ones? Can you please tell me about these or show me……..
If so- why do you use them?
Can you tell me a bit about them?
What do you like about them?
What don't you like about them?

Do you use any other health Apps? If so, which ones? Can you please tell me about these or show me……..
If so- why do you use them?
Can you tell me a bit about them?
What do you like about them?
What don't you like about them?

- Do you use any baby Apps? If so, which ones? Can you please tell me about these or show me……..
If so- why do you use them?
Can you tell me a bit about them?
What do you like about them?
What don't you like about them?
Information about feeding your baby
Where do you usually get your information from about 'feeding your baby' or about baby care? Or where have you got information from in the past?

Appendix M: Interview guide for second round of interviews with parents (page 3 of 3)

CULTURAL QUESTIONS/ RECOMMENDATIONS

If you were developing an App for this community what kind of things would you put it in that isn't in this App?

Prompts – should it have Aboriginal art work? or the Aboriginal & Torres Strait Island flag colours?

What features of an App would make it strong for Aboriginal and Torres Strait Islander families

Would you recommend this App to your sister or cousin or other family members? Why?

Is there anything in this App that would stop you from recommending it to your sister or cousin or other family members? Why?

Do you think that Aboriginal and Torres Strait Islander families could see themselves in the photos & videos? Were they relevant? Were they too "white"?

Show video of feeding your baby- breastfeeding: https://www.youtube.com/watch?v=du3F0LGOJKM

Does this appeal to you?? What do you think of this?

Do you like the look of this Deadly Tots App? Why/ why not?

From the other interview, do you have anything else to add:

What other features would you like to see in the Growing Healthy app/ text messages to keep you using it more?

What other features would you not like to see in the Growing Healthy app / text messages that would interest you?

Thank you all for your time we really appreciate your thoughts and feedback that you have provided us on the program.

Appendix N: Notification of Amendment/ MSF49 in respect to a second round of interviews with parents

Metro South Health

Enquiries to: Metro South
Human Research Ethics Committee
Phone: 07 3443 8049
Fax: 07 3443 8003
HREC Ref: HREC/
E-mail: Ethicsresearch.pah@health.qld.gov.au
Amendment AM02

Ms A Houston
Senior Dietician
Queensland Health
P O Box 52
Inala Qld 4077

Dear Ms Houston

HREC Reference number: HREC/14/QPAH/634
Project Title: Determining the culturally appropriateness of the Growing Healthy program for urban Aboriginal and Torres Strait Islander mothers

The Office of the Metro South Human Research Ethics Committee noted and approved the following:-

Document	Version	Date
Notification of Amendment/MSF49 in respect to additional semi-structured interview facilitated by A Houston		20 October 2015
Second Interview Guide	1	20 October 2015

The Metro South Hospital and Health Service HREC is constituted and operates in accordance with the National Health and Medical Research Council's *"National Statement on Ethical Conduct in Human Research (2007), NHMRC and Universities Australia Australian Code for the Responsible Conduct of Research (2007)* and the *"CPMP/ICH Note for Guidance on Good Clinical Practice"*.

This will be ratified by the HREC at its 1 December 2015 meeting.

Please provide a copy of this approval letter to the Research Governance Office.

It should be noted that all requirements of the original approval still apply. Please continue to provide at least annual progress reports until the study has been completed.

If you have any queries please do not hesitate to contact the Human Research Ethics Committee office on +617 3443 8049.

Yours sincerely,

Production Note:
Signature removed prior to publication.

A/Prof Richard Roylance
Chair
Metro South Hospital and Health Service
Human Research Ethics Committee (EC00167)
Centres for Health Research
Princess Alexandra Hospital
Woolloongabba QLD 4102

22/10/15

Queensland Government

Appendix O: Interview guide for group discussions with staff

(page 1 of 2)

I would like to acknowledge the original custodians, the Jagera people, on whose land we are meeting today. I would also like to pay my respects to Elders past and present, and welcome all Aboriginal and or Torres Strait Island people here with us today.

'Good morning and welcome. Thank you for taking the time to join us today. My name Annalie and am a dietitian at the Inala Indigenous Health Service and Tanya Saldahna an Advanced Aboriginal Health Worker is also here for support.

We're currently developing a program called Growing healthy through a smartphone application and a website to help guide mothers with feeding their baby in the first year of life.

Approximately 10 parents from Inala Indigenous Health Service have pilot tested this App over 4- 6 weeks and we would like to hear your feedback about this.

Parents who downloaded the Growing Healthy app received 3 messages a week on their mobile phone on infant feeding topics relevant to the age of their baby with links to more information on the app/website. (show powerpoint slides).

The Growing Healthy program (App) information comes from a variety of sources and we would like your feedback about whether you think it is suitable for your patients and whether it has affected your practise or not. We expect to receive different answers and opinions from you all. Feel free to discuss your answers with each other; I would like to make sure that everybody has a chance to have their say. If everyone feels ok we will record the session to help us remember what was being said so we don't miss anything. No names will be included in the reports, so all your comments will be anonymous.

QUESTION GUIDE:

GENERAL WEBSITE/ APP DISCUSSION:

- Do you already use any Apps or the Internet for education or engagement with your patients, and can you can me about this?

- What about with regards infant feeding?
- Are there any Apps or websites that you recommend in regards to infant feeding?
- Do your patients mention Apps during consultations? Or the Internet for information?
- Where do your patients get their infant feeding advice from other than yourselves (referring to child health nurses or doctors present)? For example family members, internet, friends, mums and bubs groups etc?

I would like to talk about the Growing healthy App and whether this appeal to you and whether you think it might appeal to your patients.

* ***Show PowerPoint slide- home screen as example*.**

CONTENT:

Appendix O: Interview guide for group discussions with staff

(page 2 of 2)

What do you think of the app?

How understandable do you think the content is for your patients?

Are there other features, topics or content you think your patients might be interested in and worth including?

CULTURAL APPROPRIATENESS:

What do you believe makes a successful, culturally appropriate, engaging health program? What cultural issues do you think would be important to consider in the design of an App on Infant feeding for Aboriginal and Torres Strait Islander parents?

What can you tell me about the App fitting with the Aboriginal and or Torres Strait culture of patients of the service?

OTHER:

What other features would you like to see in the Growing Healthy app/ text messages to keep mothers more engaged?

ENDING SESSION:

Is there anything else you would like to add that might help us to make this program appealing to patients who identify as Aboriginal and or Torres Strait Island?

Thank you all for your time we really appreciate your thoughts and feedback that you have provided us on the program.

Appendix P: Publications arising from the thesis

Houston, A., Laws, R, Askew, D, Saldanha, T, Denney-Wilson, E. (2017) Exploring the cultural appropriateness and usefulness of an mHealth promotion program for infant feeding in an Urban Aboriginal Health Service: a qualitative study. *Australian Indigenous HealthBulletin* 17(3). Retrieved [15th May 2018] from http://healthbulletin.org.au/articles/exploring-the-cultural-appropriateness-and-usefulness-of-a-mhealth-promotion-program-for-infant-feeding-in-an-urban-aboriginal-health-service-a-qualitative-study

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