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**Barriers to a healthy lifestyle for 3-4 year old children of
Australian-born and overseas-born mothers post
gestational-diabetes: An Australian qualitative study**

Journal:	<i>Journal of Child Health Care</i>
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Keyword:	Gestational diabetes, Immigrants, children, Diet, Physical activity
Abstract:	<p>Children of mothers affected by gestational-diabetes (GDM) are at higher risk of long-term cardio-metabolic diseases. We explore the diet and physical activity knowledge and practices of Australian-born and overseas-born-mothers with GDM history, for their 3-4 year old children following ante-natal health promotion education at a tertiary hospital. We conducted face-to-face, semi-structured interviews with 8 Australian-born and 15 overseas-born-mothers with GDM history. Finding indicated that mothers of both groups were unaware of the increased health risks of their GDM for their children and could not recall receiving specific dietary or physical activity advice aimed at future child health. Their understanding of the diet and physical activity recommendations was inconsistent. Mothers of both groups expressed concern about the lack of reiteration of child health promotion messages following childbirth, particularly at postnatal follow-up visits. Diet and physical activity of children of overseas-born-mothers were adversely affected by inadequate maternal understanding of the recommendations due to language barriers, and child weight, healthy eating and physical activity patterns derived from their home countries. We recommend enhanced health education of women with GDM on the future child health risks and their reduction by healthy lifestyle choices. This needs to be culturally relevant and reiterated after pregnancy.</p>

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4 Barriers to a healthy lifestyle for 3-4 year old children of Australian-born and
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6 overseas-born mothers post gestational-diabetes: An Australian qualitative
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13 **Introduction**
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15 Gestational diabetes mellitus (GDM) is associated with increased long-term risk of obesity and
16 cardio-metabolic conditions in the offspring of affected mothers (Logan et al., 2017). Management
17 of GDM aims to prevent short-term adverse pregnancy outcomes and to reduce long-term health
18 risks for both the affected mother and their offspring. A key component in GDM management is
19 education of mothers on the importance of, and how to achieve, healthy diet and physical activity
20 during pregnancy and after childbirth (American Diabetes Association, 2017). This includes
21 advice on the value of breastfeeding and future healthy lifestyle choices for their child. Evidence
22 that gestational diabetes management can delay obesity and lower cardio-metabolic risk in the
23 offspring of GDM mothers, however, is lacking (Gillman et al., 2010; Clausen et al., 2009). This
24 could be due to an inadequate focus on the need for healthy lifestyle practices for the children
25 through their early childhood years.
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37 Limited research has explored the impact of maternal health education during GDM care on the
38 longer-term metabolic health of their children. However, well informed mothers with children at
39 increased risk of type 1 diabetes do encourage healthy eating and physical activity in their children
40 (Baughcum et al., 2005). This indicates that mothers are interested in adopting practices that will
41 improve long-term health for their children, but evidence that this occurs post-GDM is lacking.
42 This may be a consequence of lack of knowledge, particularly, in overseas-born immigrant
43 mothers, who have been reported to have low awareness of diabetes associated health risks and
44 believe GDM is a temporary occurrence associated with pregnancy (Hjelm et al., 2005;
45 Bandyopadhyay et al., 2011).
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1 GDM is more common in overseas-born mothers. Language difficulties and inability of health
2 providers to recognize cultural practices may contribute to less informed immigrant mothers
3 (Zulfiqar et al., 2017; Zehle et al., 2008).
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6
7 We recently reported the results of a qualitative study relating to barriers and facilitators to the
8 adoption of healthy lifestyles in mothers themselves, who had a history of GDM pregnancy 3-4
9 years earlier and were either Australian-born or overseas born (Zulfiqar et al., 2017). The GDM
10 pregnancies had been managed through The Canberra Hospital (TCH) Diabetes in Pregnancy
11 Service (DIPS) in which all women received education on GDM, through at least one
12 multidisciplinary group education session and an individual one-to-one follow up session with a
13 dietitian. This included education on the long-term risks for their own health and that of their
14 offspring and how adoption of healthy lifestyle practices can reduce the risks for themselves and
15 their child. The key finding was that failure to provide ongoing education and support for these
16 mothers after pregnancy was a major barrier, with much more culturally relevant attention required
17 for overseas-born mothers (Zulfiqar et al., 2017). Here, we present the findings of the same face-
18 to-face, semi-structured interviews, but with focus on the mother's knowledge and practices with
19 respect to healthy eating and physical activity for their 3-4 year old child.
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35 **Methods**

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37 Ethical approval for the study was obtained from the Australian Capital Territory (ACT) and
38 Australian National University (ANU) Human Research Ethics Committees. The study conforms
39 to the Australian National Statement on Ethical Conduct in Human Research (National Health
40 Medical Research Council, 2007).
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45 **Sampling and recruitment**

46
47 Australian-born and overseas-born mothers with a history of GDM managed by The Canberra
48 Hospital (TCH) Diabetes in Pregnancy Service (DIPS) were recruited, as previously described
49 (Zulfiqar et al., 2017). Briefly, TCH DIPS staff invited participation to the study through a
50 telephone call to Australian-born and overseas-born mothers who had attended health education
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1 sessions for GDM and who had delivered a live singleton child between 1 June 2009 and 31 May
2 2011 at the hospital (Figure 1). Mothers who had another pregnancy after the study cut-off point,
3 who had developed type 2 diabetes, or could not communicate in English were excluded. Eighteen
4 Australian-born-mothers and 53 immigrant-mothers agreed to be contacted by the chief study
5 investigator (TZ). Of these, 30 mothers agreed to be interviewed, however, seven overseas-born
6 mothers were found ineligible (two had type 2 diabetes, and five had another childbirth), leaving a
7 final study group of 8 Australian-born and 15 overseas-born mothers. The demographic
8 characteristics of the participating Australian-born and overseas-born mothers has previously been
9 reported (Zulfiqar et al., 2017).
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21 **Interviews**

22 TZ conducted 40 minute face-to-face semi-structured interviews with the mothers during March-
23 July 2014. The interviews were conducted in English at a time and place convenient to the
24 participants. A topic guide was used to initiate discussion with the mothers. The topic guide
25 included questions on healthy lifestyle for the baby after GDM pregnancy, infant feeding, current
26 child feeding practices, child activities, and weight (Table 1 supplementary material). The
27 interviews were audio-recorded with permission of the participating mothers.
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37 **Data collection and analysis**

38 TZ transcribed the interviews verbatim. Data was managed in NVivo (version 10). Thematic
39 analysis was conducted to identify themes or patterns within the interviews (Braun and Clarke,
40 2006). Coding and analyses were conducted simultaneously, with coding being refined as the
41 interviews continued. Both inductive and deductive coding was used and themes were identified,
42 some of which reflected the interview questions. The main themes shared among all mothers are
43 discussed below, as well some differences between Australian-born and overseas-born mothers.
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Results

Table 1 shows profile of the study children. All children were Australian-born. Overseas-born mothers were born in Bangladesh, India, Pakistan, Sri Lanka, Indonesia, China, Peru, Thailand and Philippines.

Maternal awareness of healthy lifestyle recommendations for the affected child

At the outset, differences in the interpretation of health messages by Australian-born compared to overseas-born mothers became obvious. The majority of overseas-born mothers (12/15) thought that the GDM education was focused on their own health rather than the health of the whole family, compared to majority of Australian-born women (6/8), who reported that the GDM education was aimed at all the whole family including the child who was affected by GDM pregnancy. The overseas-born mothers reasoned that they may have misunderstood the information, as it was provided when the GDM was first diagnosed, and they were more concerned about how their own health could affect that of their unborn child. Timing, however, did not influence the recall of the Australian-born mothers.

Half of Australian-born and majority overseas-born mothers (12/15) had poor recall of information given to them about how their GDM was associated with increased long-term health risks of obesity and cardio-metabolic conditions for their child. They presumed that the child was no longer at risk if their own GDM was managed well during pregnancy.

“If the blood sugar levels are under control in pregnancy, the child will have less chances of becoming...weighing too much...and the other health risks associated with it.”

(Overseas-born mother)

Mothers with a previous GDM history, or a family history of type 2 diabetes, were more cognizant of the future diabetes risk for their child compared to the ones without any history.

“Although I do realize she is more likely to have it because I had it and mum had it too. She obviously has to be careful with diet and exercise too, especially when she is pregnant.” (Australian-born mother)

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3 Only three Australian-born and two overseas-born mothers reported receiving health information
4 on infant and child feeding practices from the DIPS staff. Two overseas-born mothers who
5 remembered information about future health risks for their child were aware of the importance of
6 modeling their own diets in order to establish healthy eating patterns in their children.
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11 *“The doctor said, if I don’t follow the lifestyle, he may take my eating and develop obesity*
12 *and diabetes.”* (Overseas-born mother)
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14
15 Majority mothers identified the need of higher support and guidance on infant and child feeding-
16 practices and child activities. A lower focus on child physical activity or sedentary lifestyle was
17 evident from the lower maternal recall about recommendations related to physical activity or
18 sedentary lifestyle. Child physical activity was also restricted by maternal health and her liking of
19 physical activity. If the mothers didn’t like physical activity, it was more likely that the children
20 would play inside or watch television.
21

22
23 The experience of having had GDM increased the maternal awareness of both groups about
24 healthy foods, healthy cooking techniques and physical activity for themselves. They also had
25 learned about healthy eating for children and themselves from public health campaigns, the
26 internet, magazines and health pamphlets. The mothers deemed foods high in sugar and fat as
27 unhealthy, while fruits, vegetables, brown bread, chicken, milk, yogurt and water were regarded as
28 healthy. Despite this, many mothers revealed that their children ate foods that they knew were high
29 in sugar and fat content, such as cakes, doughnuts and fries. Women said that the GDM
30 experience made them more aware of the use of sugar in food and that without the GDM
31 experience they may have given their children more sweets and sugary foods.
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36 *“If I haven’t had that diabetes, I would probably give her more candy, more chocolates.”*
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38 (Overseas-born mother)
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44 45 46 47 48 49 50 51 **Perceptions of child weight**

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53 Maternal child feeding practices and views on weight were influenced by the cultural practices of
54 their origin country. Heavy babies were considered healthy by few Australian (2/8) and most
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1 overseas-born mothers (12/15). One petite overseas-born mother, who delivered a 4.3 kg baby,
2 was happy with this heavy birth weight, saying, “*He was worth the long labor.*” She revealed that
3 some of his milestones were delayed at eight months, such as delayed crawling due to his weight.
4 She was, however, more worried about his current weight, as the child lost weight as he grew taller
5 with age.
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10 Two Australian-born and four overseas-born mothers overfed and restricted their children physical
11 activity to promote weight gain despite information from health professionals that their child fell in
12 the normal weight category.
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17 *“He is very above average, tall and heavy. So the weight is fine. But I prefer*
18 *him... may be a little bit fat... I try to feed him as much as I can...I try to get*
19 *him sit down and be less active.” (Overseas-born mother)*
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23 Generally, all mothers considered “*some fat*” as healthy at this age as it was considered protective
24 against common infections.
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29 *“Her weight is alright...she is well within 50th percentile, but she is tall, she is*
30 *90th percentile for height so I think she should be a bit heavier... I would like*
31 *her to have some fat on her, because every now when she has cold, she vomits*
32 *and I always think oh alright... It is such an effort to put the food in and when*
33 *she vomits I think oh...that is not what I need. So I guess a little more weight*
34 *will be helpful. Even if she loses some weight when she gets sick, she'll still be*
35 *fine.” (Australian-born mother)*
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43 **Influences on breastfeeding**

44 Being a baby-friendly hospital, all mothers received health education on breastfeeding benefits
45 from health professionals during the DIPS health education sessions. Most mothers breastfed their
46 children although many stopped before their children were 6 months old. They had poor recall of
47 the advice given to them on how maintenance of breastfeeding could reduce long-term health risks
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1 for their child or the positive effects of breastfeeding on maternal weight loss. This resulted in
2 some mothers from both groups, quitting breastfeeding to lose weight within the first 6 months.
3 Overseas-born mothers often introduced cow's milk and solid foods before the child was six
4 months old because they considered formula milk, diluted condensed milk and cow's milk to be
5 superior to breast milk in their countries of origin, because they promote child weight gain. Some
6 overseas-born mothers breastfed to fit into the Australian culture. Other mothers breastfed as they
7 considered it a natural and best way to feed the baby, despite family discouragement.

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15 *"I had caesareans for both children, and I was very disappointed about that. I*
16 *felt this [breastfeeding] was one way of me doing what I was supposed to do for*
17 *my child, give my child the best start in life given that children didn't come out*
18 *the right way." "I actually felt like there was my mother saying ".... just put her*
19 *on the bottle, put her on the bottle". I just resisted...I knew breast is the best...*
20 *In the end that was all she had. She had my breast milk, she didn't have*
21 *anything else."* (Overseas-born mother)
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32 **Childrens' diets**

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34 Children of Australian-born and overseas-born mothers differed in their dietary intake. Overseas-
35 born mothers commented that Australian health professionals did not recognize differences in food
36 culture.
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40 *"The dietitian said give her healthy vegetables and fruit, instead of junk food like burger*
41 *and cheese... but we eat vegetables, bread and fruit...we don't eat burgers."* (Overseas-
42 born mother)
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48 All children of Australian-born mothers consumed breakfast daily, while a quarter of children of
49 overseas-born mothers (4/15) commonly skipped breakfast. Both groups restricted sugar in their
50 childrens' food, however, some overseas-born mothers added honey as a 'healthy' substitute.
51 Water consumption was higher in children of Australian-born mothers compared to the children of
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1 overseas-born mothers who preferred watered down juices or softdrinks. Children of Australian-
2 born mothers consumed more snacks (average three snacks/day) compared to children of overseas-
3 born mothers (two snacks/day). Many overseas-born mothers were anxious about their child's diet
4 because he or she was a fussy eater who often ate slowly, disliked new foods or refused foods
5 which they previously liked. Mothers of both groups used strategies to encourage children to eat
6 healthy foods, particularly vegetables.
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13 *“Vegetables require a bit of a push until I hide them in a dinner.... he will try them, and*
14 *then spits them out.” (Australian-born mother)*
15
16

17 Eating out was common in both groups, but more so in families of overseas-born mothers.
18 Australian-born mothers reported fast-food consumption of about once in one to two months; and
19 more often while travelling or when parents were too busy to cook. They reported a significant
20 reduction in family fast-food consumption since the mothers were diagnosed with GDM. On the
21 contrary, overseas-born mothers reported more fast-food consumption. Promotional
22 advertisements of kid's meals with popular toys and the presence of indoor playing areas in these
23 fast-food were commonly cited reasons for parents and children preference. Four overseas-born
24 mothers believed that fast foods were healthy as they contain meat, vegetables and bread.
25 Overseas-born mothers reported eating out at social gatherings at friends or at relatives' houses
26 more often than at restaurants. At these social gatherings, rich ethnic foods and soft drinks were
27 consumed by mothers and their children.
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41 **Children's physical activity**

42 Children of Australian-born mothers were more likely to participate in activities such as
43 swimming, biking and trampolining, compared to children of overseas-born mothers. Most
44 mothers from both groups wanted to incorporate more activities into their children's routine but
45 felt constrained due to their work, health, social commitments or a fear of child safety.
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51 *“I think his physical activity is not much. I want him to do more. I think he*
52 *could do more.” He enjoys playing outside. He wants me to play with them. It is*
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1 *easier for me to turn on the television rather than play with him. So his physical*
2
3 *activity depends on me. (Overseas-born mother)*
4
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6 This mother thought her dislike for physical activity and preference for sedentary lifestyle may be
7 the reasons for her child's low level of physical activity. Other mothers also acknowledged that
8 "children copy their parents" and discussed their children's obsession with playing games on
9 mobile phones or iPads, which they see their parents using most of the time.
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11

12
13 When mothers received practical support from other family members such as if their partners
14 helped in household chores, or took the children out to play, it improved childrens' activities.
15 However, overseas-born mothers tended to receive less family support with the result that some
16 children were not involved in any physical activity at home. According to the overseas-born
17 mothers who reported less physical activity in their children, their and their partners' work
18 schedules, poor English language skills of their children, no siblings or children in neighborhood
19 with whom to play, or not being in child-care were the reasons for inactivity.
20
21

22 The Australian daily screen time recommendation for children younger than five years is less than
23 one hour (Department of Health, 2011). All the mothers in the current study believed that the
24 National screen time guidelines were two hours/day. In the present study, average screen time for
25 children of Australian-born mothers was 75 minutes/day (range 10-180 minutes/day) and 140
26 minutes/day (range 30-300 minutes/day) for children of overseas-born mothers. Most mothers
27 considered television and video games on computer as 'screen-time' but revealed that children
28 often spend additional time on other electronic devices such as "tablets" and mobile phone games.
29 Children from both groups also spent a considerable amount of time in other productive sedentary
30 activities, such as reading books, colorings, drawing or craft.
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48 **Discussion**

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50 Our study explored the knowledge and practices of Australian-born and overseas-born-mothers
51 with a history of GDM with respect to diet and physical activity for their children. The results
52 show that health education given during pregnancy to the GDM mothers relating to post-
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1 pregnancy health issues for their baby was not remembered well, particularly by overseas-born
2 mothers.
3

4 All mothers, Australian and overseas-born, apply cultural knowledge and meanings to raising their
5 children. However, the cultural understandings of Australian mothers is somewhat closer to public
6 health advice on child health and they are less likely to experience pressure from their families to
7 follow alternative practices or to have linguistic and educational difficulties.
8

9 All mothers had some appreciation for the value of healthy foods and physical activity and were
10 more aware, which foods were not good for themselves or their children because of their GDM
11 experience. However, overseas-born mothers had to negotiate their own and their families' cultural
12 beliefs about breastfeeding, child fatness, making their adoption of healthy choices for their GDM-
13 affected children more difficult.
14

15 Mothers from both groups showed poor recall of aspects of the education that were relevant to the
16 future health of their children. They were confused about whether the education was being
17 addressed to them only, or also had relevance to the whole of their family. Overseas-born mothers
18 had greater trouble remembering advice, suggesting that their comprehension was limited by the
19 complexity of the health messages delivered in a language that was not their native tongue
20 (Renzaho et al., 2012; Wilson and Hughes, 2017). All overseas-born mothers spoke English but
21 their level of skill and comprehension was mixed. The literature on cultural competencies
22 emphasizes the need to ensure that messages are provided, either through interpreters, bi-lingual
23 speakers or are translated so that they can be clearly understood by culturally and linguistically
24 diverse people (Anderson et al., 2003; Betancourt et al., 2016).
25

26 A previous study also reported poor maternal recall post-pregnancy of advice given to them during
27 pregnancy on their future health risks following GDM pregnancy (Hjelm et al., 2012). The authors
28 strongly advised providing more post-GDM support and on-going education to mothers,
29 particularly migrant mothers (Hjelm et al., 2012). The results of the current study are consistent
30 with this previous study, such that we fully support their recommendation for post-pregnancy on-
31 going education and support for these mothers. The current study, however, indicates that an
32

1 additional focus of this post-pregnancy education should be on healthy eating and physical activity
2
3 of the child (and the whole family) to lessen the child's future health risks.
4

5 Mothers in our study said that experiencing gestational diabetes did raise their awareness about
6
7 healthy food and physical activity but it did not effectively promote breast-feeding, which may
8
9 attenuate the risk of future metabolic disorders in mothers with GDM and their affected children
10
11 (Horta et al., 2015; Martens et al., 2016). Other studies also showed that health professionals'
12
13 advice in promoting breastfeeding was ineffectual and that mothers with gestational diabetes quit
14
15 breastfeeding earlier than mothers with no gestational diabetes (Oza-Frank et al., 2015). Such
16
17 findings identify the need to educate health professionals on breastfeeding benefits associated with
18
19 hyperglycemia of pregnancy and also to strengthen the health professionals' support to mothers
20
21 during post-natal period.
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25 The findings of our study clearly demonstrate the extra challenges overseas-born mothers to
26
27 Australia have in modifying their own lifestyle and that of their children associated with their
28
29 different cultural beliefs. This was true for breastfeeding, as well as perception healthy weight
30
31 status and views on healthy eating and physical activity. Social dimension of food consumption,
32
33 family pressure and poor awareness of good cooking practices (Råberg Kjøllesdal et al., 2010),
34
35 lack of access to tailored physical activity services and poor access to health information (Gele et
36
37 al., 2015) are some of the known barriers among immigrants to adopt healthy diet and physical
38
39 activity. Evidence that children of immigrants have both higher snack, fast food, sugar and soda
40
41 consumption, as well as less physical activity and greater time spent watching screens has been
42
43 reported extensively (Guerrero et al., 2015). Immigrants are more likely to believe that high
44
45 bodyweight of children is a sign of happiness and health, and thinness is a sign of morbidity
46
47 (Caprio et al., 2008; Renzaho et al., 2012) This could be because in their countries of origin
48
49 'thinness' was a consequence of under-nutrition and ill-health (Renzaho et al., 2012). Our findings
50
51 show that these cultural preferences could be acknowledged and discussed rather than being
52
53 ignored as a cultural deficit. In our study, we also report a few Australian mothers who found
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1 fatness in children as desirable, even though malnutrition & infant mortality have declined over the
2
3 last century, suggesting that such beliefs take longer to change.
4

5 Cultural competent lifestyle interventions and advice must be considered when planning post-natal
6
7 follow-up health education sessions for immigrant mothers with gestational diabetes (Renzaho et
8
9 al., 2010). In order to disseminate health promotion to a culturally diverse population, culturally
10
11 competent modes of communication, including explanatory models of health and illness, should be
12
13 developed (Cioffi, 2003; Wilson and Hughes, 2017). Health care providers trained in cultural
14
15 competence have been found to be more helpful with culturally diverse patients (Henderson et al.,
16
17 2011), such as immigrant mothers. However in many cases, cultural competence rests
18
19 predominantly on provision of interpreters or bi-lingual health workers.
20

21 The importance of establishing healthy eating patterns through parenting approaches to prevent
22
23 excess weight gain in children has previously been researched (Chaidez and Kaiser, 2011; Tovar et
24
25 al., 2015). The majority of Australian-born mothers in our study were more likely to actively
26
27 promote healthier eating and lifestyle in their children during meal times than overseas-born
28
29 mothers, who were more likely to allow their child to make food choices. Low demand and high
30
31 responsiveness parenting practices, such as those observed in overseas-born mothers may
32
33 contribute to children having increased energy consumption and higher intakes of total fat,
34
35 saturated fat, and sweetened beverages (Chaidez and Kaiser, 2011). Parenting styles change in
36
37 immigrant mothers with longer duration of stay in host country, which indicates role of health
38
39 education in parental styles (Tovar et al., 2015).
40

41 Our study participants recognized the role of partners and grandparents in child physical activity.
42
43 These results are in agreement with other studies which suggest that partners' involvement
44
45 promotes child physical activities.(Savage et al., 2007; Lloyd et al., 2014) Grandparent's role in
46
47 child care is usually associated with childhood obesity, (Hawkins et al., 2008) however our
48
49 participants reported their positive role in child physical activities. Although, most overseas-born
50
51 mothers did not have partners' or child's grandparents' support, educating partners and
52
53 grandparents of children of mothers with gestational diabetes may benefit the child.
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1 The results of our study suggest that children of mothers from both groups with previous
2 gestational diabetes have unhealthy lifestyles due to poor maternal risk awareness of obesity and
3 cardio-metabolic disease for the child. These children need health system support by early and
4 continuous health education of mothers on child diet and physical activity. The children of
5 immigrant mothers need additional support as they face higher risk due to their cultural beliefs and
6 poor understanding of the health messages and require culturally competent support by the health
7 system.
8

9 **Limitations of the study**

10 There were a number of limitations in the study which invites caution when interpreting the
11 results. As a qualitative exploratory study with small numbers of participants, the results are not
12 generalizable. The pool of participants included only those attending the Canberra Hospital, and
13 included a small percentage of those initially invited. Furthermore, only overseas-born mothers
14 with at least moderately good English-speaking skills were included, due to time and budgetary
15 constraints. Maternal recall of lifestyle recommendations provided three years ago, may have
16 resulted in recall bias. In addition, social desirability bias may have resulted in recruiting mothers
17 who were more compliant with health promotion advice.
18

19 In conclusion, the results of this study show that all tiers of health system need to improve their
20 efforts to raise awareness of mothers with GDM on the long-term health risks for their child of
21 obesity and metabolic conditions. This requires improved models of care to support these mothers
22 and children after pregnancy. The efficacy of the education programs already provided to mothers
23 with GDM needs ongoing evaluation and improvement, with particular focus on the particular
24 needs of immigrant mothers in a way that acknowledges their cultural and linguistic diversity. By
25 preventing obesity and metabolic conditions in children of mothers with previous GDM, enormous
26 health resources could be saved.
27

28 **Acknowledgements**

29 We wish to acknowledge the mothers who participated in the study.
30

31 **Conflict of interest**

1 The authors declared no potential conflict of interest with respect to the research, authorship and/or
2 publication of this article.
3

4
5 **Author's contributions**
6

7 TZ developed the original idea and plan the study. TZ led the writing and analysis. CN and FL
8 contributed to the idea and planning. LB, RY and MI helped in participant recruitment. CN, FL
9 and CB contributed to writing and interpretation of results. All authors reviewed and approved the
10 final manuscript.
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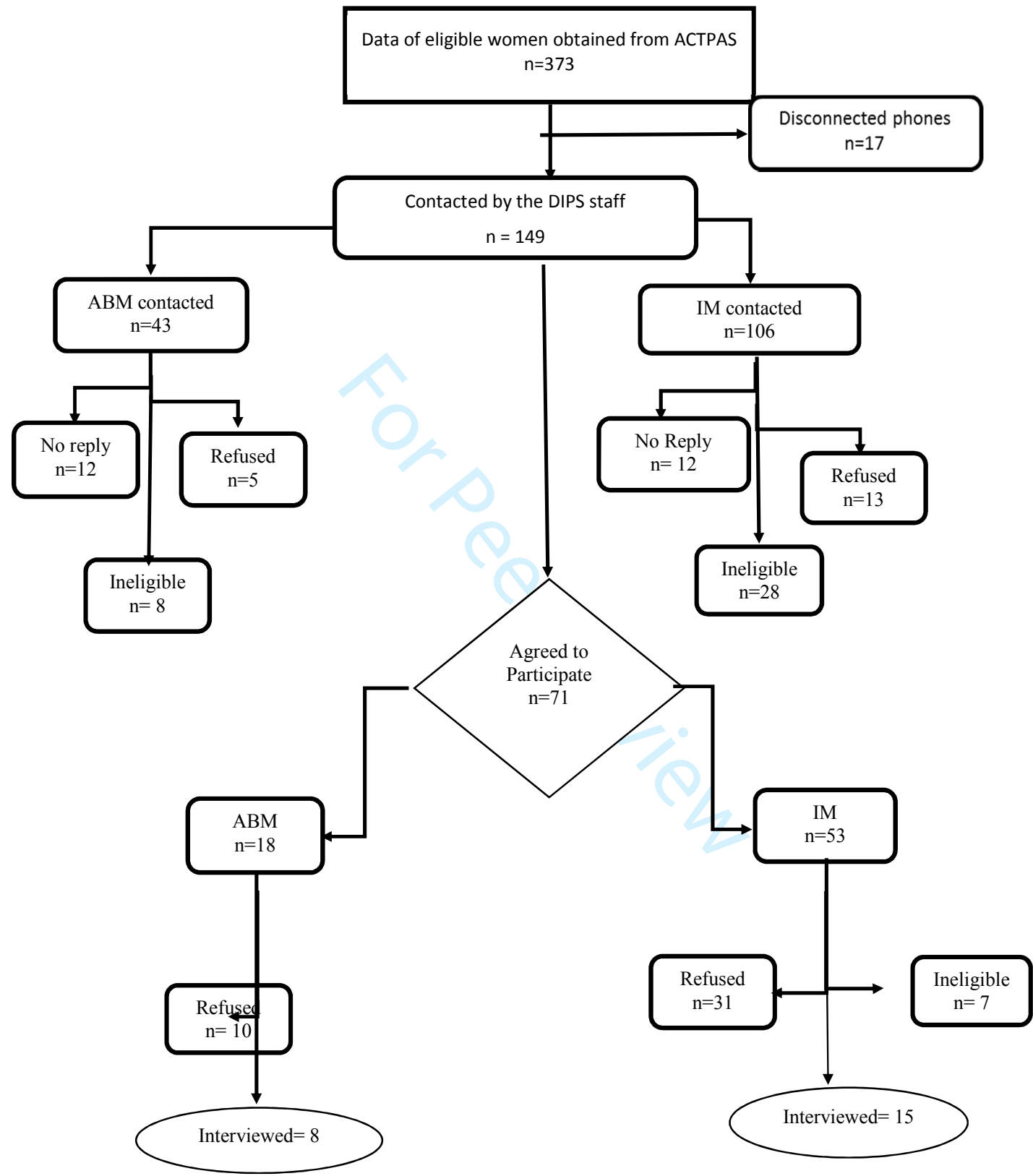


Table1. Profile of index child of Australian-born and Immigrant mothers

	Index Child of Australian-born mothers (n=8)	Index Child of Overseas-born mothers (n=15)
Average age of index child (years) (mean± SD (range))	3.4 ± 0.5 (3-4.5)	3.9 ± 0.9 (3.0-4.9)
Birth weight kg, (mean± SD (range))	3.4 ± 0.3 (3.1-3.9)	3 ± 0.6 (2-4.1)
Low birth weight <2.5 kg %(n)	0	27(n=4)
Breastfeeding		
Exclusive (months) (mean± SD (range))	4 ± 2.3 (0.5-8)	3.39 ± 2.3 (0.1-6)
<3 months %(n)	40 (n=2)	40 (n=6)
4-6 months %(n)	60(n=6)	60 (n=9)
Total duration (months) mean± SD (range)	13 ± 8.4 (1-24)	14 ± 13 (0.25-36)
<3 months %(n)	0	26.7 (n=4)
4-6 months %(n)	0	20.0 (n=3)
7-12 months %(n)	37.5 (n=3)	26.7 (n=4)
12 and above %(n)	62.5 (n=5)	26.7(n=4)

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Table 1.

Topic Guide for qualitative interview

Healthy lifestyle for the baby after GDM pregnancy	<p>Do you remember any recommendations given to you about healthy lifestyle choices before or after the pregnancy for the long term health of your baby?</p> <p>(If needing prompting)</p> <p>Was advice given to you about breast-feeding?</p> <p>Was advice given to you about future healthy eating for your child?</p> <p>Was advice given to you about future activities for your child?</p>
Infant feeding	<p>Can you tell me about how your baby was fed in the first year of life?</p> <p>(If needing prompting also ask)</p> <p>Was your baby breast fed and if so for how long?</p> <p>If so, did you exclusively breast feed or was it mixed with formula feeding?</p> <p>When did you introduce other foods (e.g. solids) and what types of other foods did your baby have?</p> <p>Were you able to follow the advice given by health professionals on feeding of your baby in the first year of life?</p> <p>What factors made it easy or difficult for you to follow this advice?</p> <p>(if needed prompting- add)</p> <p>For example: the level of family support, cultural or religious factors influencing infant feeding choices, life too busy with work or other children, support from health professionals (e.g. MACH nurse or your GP)?</p>
Current child eating habits	<p>Can you tell me about your baby's current diet?</p> <p>Does your child eat breakfast daily? What is his/her favourite breakfast and how often do you give him/her that in a week?</p> <p>What is his/her favourite lunch food? How often in a week he/she eats it? What did he/she have for lunch yesterday?</p> <p>What is his/her favourite dinner food? How often in a week he/she eats it? What did he/she have for dinner yesterday?</p> <p>Does he/she get up at night and demand food?</p> <p>How many times did he/she eat snacks yesterday? What did he/she eat as snack? Is this a normal routine? What is his/her favourite snack and how often he/she eats it during the week?</p> <p>How often in a week do you have a family meal together?</p> <p>Do you eat out with children? How often do you eat out and what is the most visited place to eat out? What is his/her favorite food when you eat out?</p> <p>How often in a day does he/she drink milk, juice, sweetened beverages?</p> <p>Do you encourage/discourage him to eat? Have you ever given him some food as a reward or stopped food as a punishment? How often do you do this?</p> <p>Do you think the feeding habits of your child are healthy and according to health professional advice that you may have been given?</p> <p>How did your experience of having GDM influenced the way you</p>

	<p>look after your child's eating behaviour? What factors make it easy or difficult for you to keep your child eating healthy foods? (if needed prompting- add) For example: the level of family support, cultural or religious factors influencing food choices, life too busy with work or other children, cost of food, support from health professionals (e.g. MACH nurse or your GP)?</p>
<p>Current child activity</p>	<p>Can you tell me about your child's current activity levels? Are there any organised sports he/she participates? In the last week was he/she involved in any physical activity with his siblings/peers? Do you remember for how which activities and for how long? Do you think the activity habits of your child are healthy and how do you know about it? How much time does he/she spend watching TV, videos, playing screen and computer games in a day? How do you think your experience of having GDM has influenced the way you look after your child's activity behaviours? What factors make it easy or difficult for you to keep your child physically active? (if needed prompting- add) For example: the level of family support, cultural or religious factors influencing activity, life too busy with work or other children, physical environment, TV helps me manage my child, support from health professionals (e.g. MACH nurse or your GP)?</p>
<p>Child's current weight</p>	<p>Do you have any concerns about your child's weight? Do think your child is of right weight for his/her age, low weight for his/her age or high weight for his/her age?</p>