

1 Investigating key beliefs guiding mothers' dietary decisions for their 2-3 year old

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Abstract

2 Currently, there is no research in Australia that systematically investigates the underlying beliefs for
3 mothers' decisions regarding their young child's nutritional needs based on current guidelines. We
4 aimed to determine, using a Theory of Planned Behaviour (TPB) belief-based approach, key beliefs
5 that guide mothers' decisions with regards to: (a) providing their child with a wide range of foods from
6 the five food groups ('healthy eating'); and (b) limiting their child's intake of 'discretionary choices'
7 (e.g. lollies). Mothers (N = 197, Mage = 34.39, SD = 5.65) completed a main questionnaire either
8 online or on hard copy (paper-based), with a 1-week phone follow-up of the target behaviours (N =
9 161). Correlations and multiple regression analyses were conducted, and a number of key behavioural,
10 normative, and control beliefs emerged for both healthy eating and discretionary choice behaviours.
11 For healthy eating, mothers identified behavioural beliefs 'improving my child's health' and 'resistance
12 from my child'; normative beliefs 'other family members' and 'spouse/partner'; and control beliefs
13 'child's food preferences'. For discretionary choices, behavioural beliefs 'maintain consistent energy
14 levels in my child' for intentions, and 'give my child their required nutritional intake'; normative
15 beliefs 'spouse/partner', 'healthcare professionals' and 'friends'; and control beliefs 'child's food
16 preferences' were identified. These findings can inform the development of future intervention
17 programs aimed at modifying mothers' child feeding practices to encourage healthy eating and limit
18 discretionary choice intake and, ultimately, increases the life expectancy of the current generation of
19 children.

20 Highlights

- 21 • Childhood 'healthy eating' and 'discretionary choices' behaviours were investigated
- 22 • Key beliefs predicted mothers' actions for their child's eating behaviours
- 23 • The beliefs provide targets for future interventions to promote healthy eating

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Introduction

26 A nutritionally balanced diet is a key component of a healthy lifestyle (National
27 Health and Medical Research Council [NHMRC], 2013). Poor nutrition, on the other hand, is
28 associated with illness and the development of diet-related chronic diseases including
29 cardiovascular disease, type 2 diabetes, and some forms of cancer (Australian Institute of
30 Health and Welfare [AIHW], 2010). It is estimated that two-thirds of premature deaths are a
31 result of chronic diseases that could have been prevented through reducing key risk factors,
32 including poor nutrition (AIHW, 2010). The burden of disease associated with an inadequate
33 nutritionally balanced diet involves one or both of the following: an inadequate intake of
34 nutritional foods (e.g. fruits and vegetables) and/or an excess intake of energy-dense, nutrient-
35 poor foods (e.g. lollies; National Preventative Health Taskforce, 2009a). The number of

1 children (2-17 years) developing conditions associated with poor nutrition has increased over
2 time (e.g. underweight, overweight and obesity), which is predicted to impact on their health
3 long-term as they become adults (Messiah, Lipshultz, Natale, & Miller, 2013). Early
4 childhood exposure to healthy foods is essential given that eating patterns established in
5 childhood are found to endure into adulthood and assist in the reduction of chronic disease
6 development later in life (Daniels & Greer, 2008; Nicklaus, Boggio, Chabanet, & Issanchou,
7 2004). Children's food preferences (likes and dislikes) and patterns (types and quality of food
8 intake and when foods are consumed) are shaped early in a child's life and can have lasting
9 effects. Thus, this research aimed to target young children (i.e., 2-3 year olds) and the
10 nutritional decisions made for this important cohort of the population.

11 A grim pattern of decreased consumption of healthy foods is evident in the younger
12 years with children aged 2-18 years consuming a diet consisting of 41% of nutrient-poor and
13 energy-dense 'sometimes foods' (e.g. lollies; Australian Bureau of Statistics [ABS], 1995).
14 'Sometimes foods' or 'discretionary choices' refer to foods "... high in kilojoules, saturated
15 fat, added sugars, added salt, or alcohol" (NHMRC, 2013, p.v). More recent data indicates
16 that this trend has persisted with initial results showing approximately one third of a 2-3 year
17 old child's total daily energy needs were consumed from 'discretionary choices' (ABS, 2014).
18 In a move toward ensuring the adoption of healthy lifestyle behaviours, the NHMRC (2013)
19 released an updated version of the Australian Dietary Guidelines. Two of the five guidelines
20 relate specifically to the nutritional intake of food. Guideline two, '*enjoy a wide variety of*
21 *nutritious foods from the five food groups every day*' (healthy eating) is composed of;
22 vegetables; fruits; grain (cereal) foods; lean meats, poultry, fish, eggs, tofu, and/or their
23 alternatives; and dairy products and/or their alternatives. Guideline three, '*limit intake of*
24 *foods containing saturated fat, added salt, added sugar and alcohol*' (termed discretionary
25 choices) refers to limiting 'sometimes foods'. The guidelines recommend that foods from the

1 discretionary choices category are avoided by children below the age of 2 years (NHMRC,
2 2013). Children aged 2-3 years are recommended to have no more than 0-1 serves of
3 discretionary choices per day (NHMRC, 2013). The revised edition of the guidelines now
4 includes all age groups, amending the previous gap between infant and child guidelines which
5 omitted specific dietary targets for each of the five food groups for 2-3 year old children
6 (Commonwealth Scientific Industrial Research Organisation [CSIRO], 2008). This omission
7 of information in previous editions of the guidelines limited parents' knowledge and ability to
8 cater for their child's nutritional needs. In a review of feeding guidelines relating to children
9 from the beginning of complementary feeding (the introduction of solids, recommended from
10 6 months) up to 3 years, it was found that guidelines providing recommended serves assisted
11 parents in making informed decisions in feeding their children (Schwartz, Scholtens, Lalanne,
12 Weenen, & Nicklaus, 2011).

13 Young children (especially those below 5 years-old) are dependent on their parents to
14 provide them with food as they are not yet able to do so (Bourdeaudhuji, 1997). Thus, while
15 children may have their own food preferences (i.e., the foods which they like or dislike), their
16 parents control the exposure to various types of food (Briefel, Reidy, Karwe, Janowski, &
17 Hendricks, 2004). Within the Australian context, mothers remain the primary care giver in a
18 child's life spending approximately double the time with their child than fathers (ABS,
19 2012a). Mothers have also been found to spend more time with children at meal times, thus
20 increasing their impact on their child's eating behaviours (Scaglioni, Salvioni, & Galimberti,
21 2008). Despite mothers' involvement in their child's eating habits, the current literature tends
22 to take an individual or child-centred approach to investigate health-related decisions.
23 Adopting such a focus fails to address the critical role that mothers' decisions have on their
24 child's health-related behaviours, in this case, their child's eating behaviours. Previous
25 research has found evidence supporting the investigation of parental decision-making for their

1 young child's health behaviours including dietary physical activity-related behaviours
2 (Hamilton, Hatzis, Kavanagh, & White, 2014) dietary behaviours (Conner & Sparks, 2005),
3 sun-screen use (Thomson, White, & Hamilton, 2012), and the introduction of complementary
4 feeding (Hamilton, Daniels, White, Murray, & Walsh, 2011).

5 One study, in particular, has examined maternal decision-making with regards to
6 nutritional behaviours for their child. Swanson and colleagues (2011) investigated the
7 decision-making processes of mothers with a two year-old child with regard to their child's
8 dietary quality. It was found that mothers' intentions to engage in three health promoting
9 behaviours (providing breakfast, cooking from scratch, and having a proper sit-down meal)
10 were significantly related to actual behaviour. However, none of the mothers in this study
11 provided a balanced diet according to the Scottish dietary guidelines (Swanson et al., 2011).
12 When using criteria developed by the researchers, allowing for four out of five food groups to
13 be achieved, mothers were more likely to provide their child with a nutritionally balanced diet
14 (Swanson et al., 2011). Due to the dearth of research into maternal decision-making for their
15 young child's nutritional intake, the current study continues this line of investigation by
16 Swanson and colleagues to provide a novel investigation using sound theory to examine the
17 important factors which impact on this important child health behaviour. In particular, the
18 current study will draw on the Australian Dietary Guidelines to examine the decision-making
19 of mothers with a 2-3 year old child and examine the health promotion behaviours of 'healthy
20 eating' and 'discretionary choices' as specified in these Guidelines.

21 The theory of planned behaviour (Ajzen, 1991) has been adopted by many studies to
22 understand better people's health behaviour decision making (McEachan, Conner, Taylor, &
23 Lawton, 2011). The model suggests intentions as the proximal determinant of behaviour with
24 intentions determined by one's attitudes toward the behaviour and perceptions of social
25 pressure (subjective norm) and control (perceived behavioural control; PBC; also suggested to

1 predict behaviour) to engage in the behaviour. Underpinning attitude, subjective norm, and
2 PBC are behavioural (advantages/disadvantages), normative (social approval/disapproval
3 from performing the action) and control (inhibitors/motivators to performing the action)
4 beliefs respectively. These beliefs reflect the underlying cognitive structure that determines an
5 individual's intention and behaviour.

6 Such beliefs are suggested to provide specific targets that can be utilised to tailor
7 interventions through a greater understanding of the underlying processes guiding behavioural
8 decision-making (Ajzen, 2011). Thus, determining the key beliefs underlying mothers'
9 decision-making is an essential component of providing a sound evidence- and theoretically-
10 based intervention to improve their child's health. A recent study by Epton and colleagues
11 (2014) utilised the TPB to identify university student's key beliefs regarding their health, and
12 consequently implemented an intervention to increase health promotion behaviours (e.g.
13 eating fruit and vegetables). In addition, numerous studies have successfully applied the TPB
14 belief-based approach to examine the key beliefs underpinning parental decisions for their
15 own (Hamilton & White, 2011) and their child's (Walsh, Hyde, Hamilton, & White, 2012)
16 health. A study investigating the introduction of solids to infants using a TPB approach
17 provided support for the model in guiding the systematic collection of the data to explore the
18 key determinants influencing maternal decision-making for their young child's nutritional
19 intake (Hamilton, et al., 2011). Given the important role beliefs play in guiding decision-
20 making, the current study sought to investigate the key beliefs underlying mothers' decisions
21 for their child's healthy eating and discretionary choices.

22 **The Present Study**

23 Given the importance of a nutritionally balanced diet, the alarming statistics of
24 overweight and obesity in children, and the consensus that diet patterns early in life are often
25 sustained long-term (ABS, 2012b; Melanson, 2008), it is the aim of this study to investigate

1 the beliefs guiding maternal nutritional decision-making for their young child. Specifically,
2 we focused on the behavioural, normative, and control expectancy beliefs underlying
3 mothers' perceptions about 'healthy eating' and 'discretionary choices'. First, we expected
4 that significant correlations between the target behaviours and the behavioural, normative,
5 and control beliefs and intention and behaviour would be observed. Second, we expected that
6 some of the significant key beliefs would independently predict mothers' intentions and
7 behaviour. However, given that it is suggested that belief-behaviour relations are fundamental
8 to providing preliminary evidence to support the usefulness of targeting a belief in a
9 behavioural intervention, we placed a critical focus on identifying those beliefs that predict
10 maternal behaviour. Finally, in an exploratory manner, we examined the relative amount of
11 mothers who fully and strongly accept each of these key beliefs to determine the usefulness of
12 the belief for subsequent intervention strategies.

13 **Method**

14 **Participants and Procedure**

15 Ethics approval was obtained from the University Human Research Ethics Committee.
16 The study adopted a prospective correlational design with a one-week follow-up of behaviour.
17 This study was part of a larger project aiming to investigate the ability of the TPB and
18 additional variables to predict mothers' decisions to provide a nutritionally balanced diet, and
19 identify mothers underlying behavioural, normative, and control beliefs. A pilot study (N=16)
20 was conducted on a representative sample of the target population to elicit behavioural,
21 normative, and control beliefs as per recommendations made by Fishbein and Ajzen (1975) to
22 include in the main study.

23 Participants for the main study comprised 197 Australian mothers ranging in age from
24 18 to 46 years ($M_{age} = 34.39$, $SD = 5.65$), with at least one child aged 2 or 3 years. The
25 majority of mothers were in a partnered relationship ($n = 188$, 95%) and just over half held a

1 university qualification ($n = 113, 57\%$). Participants were recruited face-to-face via a swim
2 school or childcare facility; and on-line through social networking sites (e.g. Facebook;
3 *Australia's Mothers Group*) and parenting websites (e.g. singlemothersforum.com.au). As an
4 incentive to participate, individuals were provided the opportunity to go into a draw to win
5 one of three double-pass movie vouchers (valued at AUD\$36 each) upon completion of the
6 main and follow-up studies.

7 **Measures**

8 **Target behaviour.** Two target behaviours as outlined in the Australian Dietary
9 Guidelines (NHMRC, 2013) were investigated: (1) 'ensure that my child eats a wide variety
10 of foods from the five food groups according to the recommended serves' and (2) 'ensure that
11 my child's consumption of discretionary choices is limited to 0-1 serves'. To assist
12 participants in accurately responding, examples of what constituted a serving from each food
13 group and the recommended serves for children aged 2-3 years and adult women, were
14 presented at the beginning of each survey section.

15 **Pilot study.** A pilot study was conducted to elicit model salient behavioural,
16 normative, and control behaviours to include in the main questionnaire. The participants
17 comprised a convenience sample of 16 mothers ranging in age from 25 to 42 years ($M_{age} =$
18 $35.69, SD = 5.19$) with at least one child aged 2-3 years. Participants were recruited through
19 one childcare facility and personal networks, and were largely representative of the target
20 population. Mothers were asked open-ended questions, according to the recommendations
21 outlined by Fishbein and Ajzen (1975). Thematic content analysis was conducted to elicit the
22 salient behavioural, normative and control beliefs. A cut-off point of 30% (Hamilton &
23 White, 2010), was used for each of the beliefs identified by mothers as being most relevant to
24 them. To elicit their behavioural beliefs, participants were asked to list the advantages and
25 disadvantages of providing a wide variety of foods and limiting discretionary choices.

1 Normative beliefs were identified by asking participants to list who would approve or
2 disapprove of them implementing these behaviours. Participants' control beliefs were
3 identified by asking mothers to list the factors which may encourage or prevent them in
4 engaging in these behaviours. Table 1 refers to the beliefs elicited in the pilot study.

5 **Main questionnaire.** The main questionnaire contained items measuring TPB belief-
6 based constructs related to the two target behaviours of health eating and discretionary
7 choices.

8 **Intention.** Three items measured the strength of intention to perform the target
9 behaviours (e.g. "I intend to [target behaviour] EVERY DAY in the next week", scored [1]
10 *strongly disagree* to [7] *strongly agree*). The scale was reliable with an alpha of .88 for
11 healthy eating and .92 for discretionary choices.

12 **Behavioural Beliefs.** Behavioural beliefs were measured by assessing the nine beliefs
13 elicited from the pilot study. Participants were asked to rate how likely the costs
14 ("Inconvenient to prepare a variety of foods"), and benefits (e.g. "Improve my child's growth
15 and development") would result if they performed the target behaviours. Responses ranged
16 from [1] *extremely unlikely* to [7] *extremely likely*.

17 **Normative Beliefs.** Normative beliefs were measured using the normative beliefs
18 pertaining to six socially relevant individuals or groups (e.g. "Friends", "Teachers/Childcare
19 providers") obtained in the pilot study. Participants were asked to rate how likely these
20 individuals or groups were to think they should perform the target behaviours, with responses
21 ranging from [1] *extremely unlikely* to [7] (*extremely likely*).

22 **Control beliefs.** Control beliefs were assessed by the ten control beliefs elicited from
23 the pilot study. Participants were asked to rate how likely internal and external factors (e.g.
24 "Cost", "Child's food preferences") were to prevent or discourage them from performing the
25 target behaviours, scored from [1] *extremely unlikely* to [7] *extremely likely*.

1 university education). Hierarchical multiple regression analyses, within each belief set, were
2 conducted with age and education status entered at Step 1 and significant beliefs entered at
3 Step 2. All beliefs in all regression analyses remained significant.

4 **Key Beliefs Analysis of Intentions**

5 **Healthy eating.** Bivariate correlations show five of seven behavioural beliefs ($r = .33$
6 to $.42$), five of six normative beliefs ($r = .30$ to $.47$), and one of eight control beliefs ($r = -.36$)
7 as significantly correlated with intention (see Table 1). Multiple regression analyses on the
8 significant behavioural beliefs identified ‘improve my child’s health’ ($\beta = .42$) as a significant
9 predictor of intention. Multiple regression analyses identified two normative beliefs, ‘other
10 family members’ ($\beta = .35$) and ‘spouse/partner’ ($\beta = .19$); and one control belief, ‘child’s food
11 preferences’ ($\beta = -.36$) as significantly related to intention. Refer to Table 2.

12 **Discretionary choices.** Bivariate correlations show that all eight behavioural beliefs (r
13 = $.24$ to $.42$), five of six normative beliefs ($r = .44$ to $.51$), and all eight control beliefs ($r = -$
14 $.16$ to $-.38$) were significantly correlated with intention (see Table 3). Multiple regression
15 analyses on the significant behavioural beliefs identified ‘maintain consistent energy level in
16 my child’ ($\beta = .40$), as a significant predictor of intention. Multiple regression analyses
17 identified three normative beliefs, ‘spouse/partner’ ($\beta = .34$), ‘healthcare professionals’ ($\beta =$
18 $.28$) and ‘friends’ ($\beta = .17$); and one control belief, ‘child’s food preferences’ ($\beta = -.39$) as
19 significantly related to intention. Refer to Table 4.

20 **Key Beliefs analysis of Behaviour**

21 **Healthy eating.** Bivariate correlations show that all seven behavioural beliefs ($r = -.17$
22 to $.33$), two of six normative beliefs ($r = .20$ to $.21$), and three of eight control beliefs ($r = -.16$
23 to $-.42$) were significantly correlated with behaviour (see Table 1). Multiple regression
24 analyses on the significant behavioural beliefs identified ‘improve my child’s health’ ($\beta = .34$)
25 and ‘resistance from my child’ ($\beta = -.24$), as significant predictors of behaviour. Multiple

1 regression analyses identified one normative belief, 'other family members' ($\beta = .21$); and one
2 control belief, 'child's food preferences' ($\beta = -.42$) as significantly related to behaviour. Refer
3 to Table 2.

4 **Discretionary choices.** Bivariate correlations show three of eight behavioural beliefs
5 ($r = .19$ to $.20$), three of six normative beliefs ($r = .16$ to $.39$), and five of eight control beliefs
6 ($r = -.19$ to $-.35$) were significantly correlated with behaviour (see Table 3). Multiple
7 regression analyses on the significant behavioural beliefs identified 'give my child their
8 required nutritional intake' ($\beta = .20$), as a significant predictor of behaviour. Multiple
9 regression analyses identified one normative belief, 'spouse/partner' ($\beta = .39$); and one
10 control belief, 'child's food preferences' ($\beta = -.37$) as significantly related to behaviour. Refer
11 Table 4.

Table 1

Means and Standard Deviations of Behavioural, Normative and Control Beliefs and Correlations with Intention and Behaviour for Healthy Eating

Beliefs	<i>M</i>	<i>SD</i>	Intention <i>r</i>	Behaviour <i>r</i>
Behavioural Beliefs				
Encourage my child to adopt healthy food choices in the future	6.12	0.95	.35**	.21**
Improve my child's growth and development	6.24	0.97	.42**	.28**
Maintain adequate energy levels in my child	6.3	0.89	.41**	.29**
Improve my child's health	6.26	0.96	.42**	.33**
Give my child their required nutritional intake	6.37	0.80	.33**	.24**
Resistance from my child	4.79	1.76	-.08	-.23**
Too much food wastage	3.86	1.79	-.12	-.17*
Normative Beliefs				
Spouse/partner	5.83	1.53	.41**	.14
Other family members	5.63	1.37	.47**	.21**
Friends	5.37	1.41	.38**	.20**
Teachers/Childcare providers	5.93	1.28	.33**	.04
Healthcare professionals	6.22	1.15	.30**	.03
Fast food companies	2.17	1.41	-.03	-.03
Control Beliefs				
Lack of time to prepare meals	3.72	1.85	.00	-.14
Cost	2.56	1.69	-.01	.00
Child illness	3.54	1.90	-.07	.02
Parent illness	3.31	1.84	.01	.08
Child's food preferences	4.40	1.84	-.36***	-.42**
Lack of organization	3.32	1.73	-.03	-.16*
Parent fatigue	3.58	1.78	-.02	-.19*
Lack of support	2.86	1.79	-.06	-.13

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2

Summary of the Multiple Regression Analyses Identifying the Key Belief Targets for Mothers of a 2-3 year old Child.

Key beliefs	β	R ²	df	F	% fully accepting the belief ^a	% strongly accepting the belief ^b	Both
Intentions							
Behavioural beliefs							
Improve my child's health	.42***	.18	1, 195	41.48***	51.3%	32.0%	83.3%
Normative beliefs							
Other family members	.35***	.25	2, 194	31.71**	31.5%	31.0%	62.5%
Spouse/partner	.19*				44.7%	25.9%	70.6%
Control beliefs							
Child's food preferences	-.36***	.13	1, 195	29.79***	14.2%	19.3%	33.5%
Behaviour							
Behavioural beliefs							
Improve my child's health	.34***	.17	2, 160	16.41***	51.3%	32.0%	83.3%
Resistance from my child	-.24**				22.3%	16.8%	39.1%
Normative beliefs							
Other family members	.21**	.04	1, 161	7.28**	31.5%	31.0%	62.5%
Control beliefs							
Child's food preferences	-.42***	.17	1, 161	33.85***	14.2%	19.3%	33.5%

* $p < .05$, ** $p < .01$, *** $p < .001$

^aScale measured on a 7-point scale (1=extremely unlikely, 7=extremely likely), with a score of 6 indicating strongly accepting the belief for positively worded items, and a score of 2 indicating strongly accepting the belief for negatively worded items

^bScale measured on a 7-point scale (1=extremely unlikely, 7=extremely likely), with a score of 7 indicating fully accepting the belief for positively worded items, and a score of 1 indicating fully accepting the belief for negatively worded items

Table 3

Means and Standard Deviations of Behavioural, Normative and Control Beliefs and Correlations with Behaviour for Discretionary Choices

Beliefs	<i>M</i>	<i>SD</i>	Intention <i>r</i>	Behaviour <i>r</i>
Behavioural Beliefs				
Improve my child's health	5.93	1.38	.29**	.08
Decease my child wanting/asking for these sometimes foods	4.93	1.82	.27**	.14
Encourage my child to adopt healthy food choices in the future	5.81	1.21	.36**	.19*
Improve my child's behaviour	5.44	1.58	.24**	.06
Maintain consistent energy level in my child	5.84	1.35	.42**	.19*
Give my child their required nutritional intake	6.03	1.20	.38**	.20*
Convenience	4.75	1.41	.24**	.12
Prevent child misbehaviour	5.08	1.66	.29**	.14
Normative Beliefs				
Spouse/partner	5.82	1.46	.51**	.39**
Other family members	5.46	1.41	.44**	.16*
Friends	5.28	1.40	.44**	.20*
Teachers/Childcare providers	6.04	1.15	.45**	.10
Healthcare professionals	6.44	0.93	.48**	.10
Fast food companies	2.11	1.42	-.03	-.12
Control Beliefs				
Lack of time to prepare meals	3.29	1.98	-.27**	-.15
Cost	2.51	1.72	-.16*	-.14
Child illness	2.94	1.83	-.27**	-.23**
Parent illness	2.89	1.76	-.21**	-.13
Child's food preferences	3.48	1.81	-.38**	-.35**
Lack of organization	3.07	1.68	-.30**	-.31**
Parent fatigue	3.25	1.79	-.28**	-.25**
Lack of support	2.87	1.82	-.26**	-.19*

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4

Summary of the Multiple Regression Analyses Identifying the Key Belief Targets for an Intervention with Discretionary Choices for Mothers of a 2-3 year old Child.

Key beliefs	β	R ²	df	F	% fully accepting the belief ^a	% strongly accepting the belief ^b	Both
Intention							
Behavioural beliefs		.16	1, 149	27.66***			
Maintain consistent energy level in my child	.40*				42.1%	26.9%	69.0%
Normative beliefs		.38	3, 193	39.26***			
Spouse/partner	.34***				40.6%	31.5%	72.1%
Healthcare professionals	.28***				65%	21.3%	86.3%
Friends	.17*				19.3%	33.5%	52.8%
Control beliefs		.15	1, 149	26.42***			
Child's food preferences	-.39***				4.1%	11.7%	15.8%
Behaviour							
Behavioural beliefs		.04	1, 161	6.47*			
Give my child their required nutritional intake	.20*				45.2%	30.5%	75.7%
Normative beliefs		.15	1, 161	28.30***			
Spouse/partner	.39***				40.6%	31.5%	72.1%
Control beliefs		.14	1, 132	20.96***			
Child's food preferences	-.37***				4.1%	11.7%	15.8%

* $p < .05$, ** $p < .01$, *** $p < .001$

^aScale measured on a 7-point scale (1=extremely unlikely, 7=extremely likely), with a score of 6 indicating strongly accepting the belief for positively worded items, and a score of 2 indicating strongly accepting the belief for negatively worded items

^bScale measured on a 7-point scale (1=extremely unlikely, 7=extremely likely), with a score of 7 indicating fully accepting the belief for positively worded items, and a score of 1 indicating fully accepting the belief for negatively worded items

1 addition, mothers may experience difficulty in ensuring their child receives a nutritionally
2 balanced diet given that children may need to be presented with a food item multiple times
3 before accepting this food (Cook, 2007). Given the amount of preparation and persistence
4 required to present new foods, mothers may experience difficulty in providing nutritious
5 foods, and give up instead of dealing with the resistance from their child or trying to prepare
6 healthy foods in a favourable way for the child. When examining the limiting of discretionary
7 choices, *providing their child with their required nutritional intake* and *maintaining*
8 *consistent energy levels*, were the most poignant beliefs. These beliefs indicate that mothers
9 hold the view that discretionary choice foods interrupt nutritional eating, and may give their
10 child a sugar fix, thus making their behaviour more hyperactive (Hoover & Milich, 1994).

11 Social influence beliefs were also identified as important considerations for mothers'
12 decision-making in this context. *Other family members* were identified as a particularly
13 salient group with regards to healthy eating intentions and behaviour. In a qualitative study of
14 nutritional decision-making among parents, family members were seen as a positive resource
15 in enhancing healthy eating in their child (Kahlor, Mackert, Junker, & Tyler, 2011). In
16 addition, a mother's *spouse or partner* was identified as a salient normative influence for both
17 healthy and discretionary food choices. Indeed, research has found that spouses' behaviours
18 are influential in parental decision-making for children's dietary intake (Kahlor, et al., 2011).
19 Research specifically looking at the nutritional intake of infants further supports the
20 suggestion that partners are a critical social influence on mothers' dietary decisions for their
21 child (Hamilton et al., 2011). It is not unexpected for a woman's partner, who is often also the
22 father of the child, as well as other family members to play a major role in influencing
23 mothers' nutritional decisions for their child. The positive relationship between spouse and
24 family members' approval on mothers' decisions indicates that these more close family
25 connections are an important influence on mothers' decisions for their child's diet. These

1 findings are consistent with previous research which suggests that proximal rather than distal
2 (e.g. healthcare professionals) groups are the most influential on people's decision-making
3 (Agnew, Thompson, & Gaines, 2000). However, *friends* and *healthcare professionals* did
4 emerge as a potential social influence on mothers' intentions to limit discretionary choices.
5 These groups can serve to both support and reinforce healthful eating in the home
6 environment, with the Australian Dietary Guidelines providing resources for professions to
7 assist individuals (NHMRC, 2013).

8 In addition, control beliefs emerged as being important for mothers when providing a
9 nutritionally balanced diet for their child. Specifically, a *child's food preferences* was the
10 most salient belief for both healthy eating and discretionary choices indicating its importance
11 for maternal child-feeding decisions. Children's food preferences, namely the tendency to be
12 neophobic (avoidance of novel foods), emerges towards the end of a child's second year of
13 life and has been found to be an added challenge in mothers' implementation of providing a
14 nutritionally balanced diet (Kahlor et al., 2011; Scaglioni et al., 2008). The experiences of
15 mothers in the current study support this view, with child food preferences identified as an
16 inhibiting factor for ensuring their child eats a healthy diet and limiting their child's
17 discretionary choices.

18 **Application of Findings**

19 Targeting key beliefs is an important part of informing intervention strategies aimed at
20 preventing or promoting health behaviour change (Fishbein, Haeflten, & Appleyard, 2001).
21 The behavioural, normative and control beliefs identified in the current study can form the
22 foundation for the development of a theory-based intervention to improve mothers' nutritional
23 decisions for their child. Ajzen (2002) recommends focusing intervention strategies according
24 to the strength of the underlying beliefs revealed in formative research. In a recent study of
25 adolescents' sun-safety behaviours, the intervention condition reported stronger beliefs and

1 intentions, and more sun-safe behaviours post-intervention, than did the control group (White,
2 Hyde, O'Connor, Naumann, & Hawkes, 2010). Similarly, experimental research has also
3 found support for belief-based interventions in a range of behaviours, with a 28% change in
4 intention, and a subsequent 26% change in behaviour (Webb & Sheeran, 2006). Health
5 behaviour interventions use a range of techniques to change behaviour, such as providing
6 information about health benefits, others' approval, and barriers to uptake (Michie et al.,
7 2011). Regardless of the technique adopted, in order to change people's social cognitions that
8 guide behavioural actions it is necessary to target the underlying beliefs that are key to their
9 motivation (Conner, Norman, & Bell, 2002; Conner & Sparks, 2005).

10 Across both healthy eating and discretionary choice behaviours, the salient
11 behavioural beliefs of mothers related to their children's overall health and nutritional needs.
12 Thus, these beliefs are important motivations to consider when developing interventions.
13 Information giving is identified as a useful strategy to assist parents in their child feeding
14 practices (Wardel, Parmenter, & Waller, 2000). Therefore, by providing specific information
15 on a wide variety of healthy foods and their nutritional content may assist mothers in
16 implementing their positive beliefs to improve their child's health. There is evidence to
17 support that providing people with the nutritional content of foods may help to change their
18 attitudes and purchasing behaviour (Lewis et al., 2002). As the majority of mothers already
19 held favourable behavioural beliefs, it is also important to target the unfavourable belief of
20 child resistance (Ajzen, 2011). Identifying barriers and problem solving can assist mothers to
21 overcome resistance if they have contingency plans in place (Michie et al., 2011). This is in
22 line with the HAPA model developed by Schwarzer (1992) which suggests that for intentions
23 to translate into the health promotion behaviour an individual must construct specific action
24 plans, and also in line with the finding in the current study that child resistance was predictive
25 of behaviour and not intentions. Prior strategies have provided mothers with healthy foods

1 ideas (e.g., ants on a log – a celery stick with peanut butter and sultanas), as an interesting
2 way to prepare healthy foods in the hope of avoiding some child resistance (Melanson, 2008).
3 By utilising problem solving techniques and having plans in place (e.g., providing foods in
4 interesting and novel ways) may help to decrease child resistance, and thus, dispelling
5 mothers' belief that resistance is a likely outcome of trying to provide a nutritionally balanced
6 diet.

7 The findings of the current study also highlight social pressure from important others,
8 in particular those which are more proximal (spouse/partner, other family members) rather
9 than distal referent groups (teachers/childcare providers), as being important to mothers'
10 decisions in this context. To enhance mothers' adherence to the Australian Dietary
11 Guidelines, intervention strategies ought to highlight the approval of these important people
12 in ensuring mothers' provide healthy foods and limit discretionary choices to their child. Prior
13 research indicates that 'providing information about others' approval' by specifying what
14 others will like, approve or disapprove of can increase health promotion behaviours (Michie
15 et al., 2011). In addition, providing feedback on performance has previously been found to be
16 a key component in intervention strategies designed to promote healthy eating and/or physical
17 activity (Michie, Abraham, Wittington, McAteer, & Gupta, 2009). Given that
18 spouses/partners and other family members tend to also be involved in child feeding, these
19 groups can also be targeted to assist mothers in their child feeding practices. For example,
20 significant others may be able to provide encouragement to mothers, which have been found
21 to be important to mothers in the physical activity domain (Hamilton & White, 2012).

22 In addition, to improve mothers' self-efficacy and perceived control over providing a
23 nutritionally balanced diet and limiting discretionary choices, targeting their belief regarding
24 children's food preferences as being a barrier to action may be useful. Research has shown
25 that continued exposure to healthy foods, particularly at a young age, can lead to acceptance

1 of these foods and a healthy dietary pattern that endures into adulthood (Cook, 2007).
2 Utilising environmental restructuring can support mothers in their attempts to promote
3 healthy eating and limiting discretionary choices (Michie et al., 2011). For example, ensuring
4 that healthy foods are present and discretionary choices are minimised within the home can
5 assist mothers in performing these health promoting behaviours. Thus, mothers may become
6 more confident and in control if their environment supports their child feeding goals. In
7 addition, goal setting and action planning can be useful for mothers to ensure their child has a
8 nutritionally balanced diet (Michie et al., 2011). Mothers can create specific plans related to
9 their own child's food preferences, such as building up the number of vegetables their child is
10 exposed to. By using intervention strategies that increase mothers' self-efficacy and perceived
11 control in relation to their child's food preferences, this barrier to action may be reduced, and
12 as a result, a child's overall health may be increased.

13 **Strengths and Limitations**

14 The current study is novel in that it is the first to identify, using a sound theoretical
15 approach, mothers' beliefs underpinning their decisions to ensure their child eats a healthy
16 nutritional balanced diet and limit their discretionary choices. The current study is also the
17 first to apply the revised edition of the Australian Dietary Guidelines to research which, for
18 the first time, includes guidelines specifically targeted at 2-3 year old children. The systematic
19 exploration to identify key beliefs of mothers in this context can be used to design resultant
20 interventions to improve young children's nutritional intake, which, in turn, may lead to
21 healthy food habits that persist into adulthood. The findings, however, need to be viewed in
22 light of the study's limitations. First, the participants primarily resided in a large Australian
23 city, were married, and held a tertiary education. As research has identified links with poorer
24 quality diets as a result socioeconomic status and living locations between regional and rural
25 regions (Dollman, Maher, Olds, & Ridley, 2012; Swanson et al., 2011), generalisability of the

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