



## RESEARCH ARTICLE

# Effectiveness of a food literacy and positive feeding practices program for parents of 0 to 5 years olds in Western Australia

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## Abstract

**Issue Addressed:** Lifelong eating behaviours are established in childhood. Improving parents' food literacy skills is essential, as parents play a fundamental role in establishing their children's healthy eating behaviours and preferences for nutritious food. This paper describes the development and evaluation of an innovative program that combines food literacy with positive parent feeding practices, targeting parents in disadvantaged areas of Western Australia.

**Methods:** The *Food Sensations*<sup>®</sup> for Parents five-week program was delivered to participants from community-based parenting organisations during 2020 and 2021. Formative research and a pre-post evaluation design were adopted.

**Results:** Pre- and post-evaluation data were collected from 224 participants (96% female). There was a statistically significant improvement in the mean score for 13 food literacy behaviours, 10 positive parenting feeding practices and a mean increase in parents' daily vegetable intake of 1/3 serve. Participants reported significantly greater net improvements in food literacy behaviours than feeding practices, the largest being the *Use a nutrition information panel to make food choices* (33.1%). Multivariate logistic regression analyses found English as a first language, being older than 35, and from a higher Socio-Economic Index for Areas resulted in a higher likelihood of positive changes in behaviours and practices.

**Conclusions:** The findings indicate that the program is effective in improving the frequency of use of food literacy behaviours, positive parenting feeding practices and increasing vegetable consumption.

**So What?:** Analysing improvements in food literacy behaviours and feeding practices provides clarity on what change can be expected with a five-week parent program.

## KEYWORDS

child feeding behaviour, cooking, disadvantaged populations, healthy diet, parents

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## 1 | INTRODUCTION

Parents play a fundamental role in establishing their children's healthy eating behaviours and preferences for nutritious food. This occurs because of the complex interaction between parenting styles and the early feeding environment.<sup>1</sup> The family environment supports the formation and maintenance of eating behaviours that persist into adulthood. Therefore, supporting families in preventing and minimising feeding challenges is a crucial step in ensuring that children thrive. A child's attitudes, beliefs and behaviours around food are shaped by the unique feeding practices a parent employs, which include the when, what and how of child feeding.<sup>2</sup> Strategies, such as repeated exposure to foods and responsive feeding, are evidence-based techniques that support health and wellbeing at the parent, child and family levels.<sup>3</sup> Responsive feeding is an interactive process between parents and children that provides a routine, structured, emotionally supportive and developmentally appropriate feeding environment that values the child's ability to self-regulate eating.<sup>4</sup> The practice of responsive feeding creates a supportive environment that values a child's ability to self-regulate eating and develop autonomy. It also provides positive parenting responses that are appropriate to a child's development and competence, including their level of maturation and developmental stage.<sup>5</sup> The practice of attending to internal cues of hunger and fullness rather than parental pressure to eat or food restrictions, allows children to be intrinsically motivated to feed themselves and aids them in learning to self-regulate their eating.<sup>5</sup>

Research shows that parents are motivated to provide nutritious foods; however, feeding children under 5 years of age presents many challenges, including a lack of time, multiple and conflicting sources of information, children's own food preferences, cost and food insecurity.<sup>6,7</sup> Children who are perceived as fussy eaters create anxiety, frustration and stress for parents, which affects parents' feeding decisions.<sup>3,6</sup> The term 'positive parenting feeding practices' will be used throughout this paper to describe the combined evidence-based feeding strategies encompassing responsive feeding practices.

In Western Australia (WA), the Sustainable Health Review<sup>8</sup> and Health Promotion Strategic Framework<sup>9</sup> advocate for the allocation of resources to children's early years to benefit both the community and children in the long run. These WA government policy initiatives recognise the importance of the first 1000 days of life as a critical period for the future health, growth and neurodevelopment of children,<sup>10</sup> and the need for early intervention. The Sustainable Health Review<sup>8</sup> recommends providing stronger support to local communities, including non-profit organisations, to address key public health issues, such as nutrition.

Early years nutrition interventions recommend focusing on priority groups, such as families living in areas of social disadvantage, as socio-economic status is a contributing determinant in health inequalities in children.<sup>11</sup> In WA, the overall poverty rate among children under 5 years is 20.9%, higher than the national average.<sup>12</sup> This equates to 33 000 young children living in poverty (below 50% of median household income).<sup>12</sup> Aboriginal and children from a non-English-speaking background experience even higher rates of

developmental vulnerability.<sup>12</sup> Children with lower socio-economic status are also less likely to meet nutrition recommendations than those living with less disadvantage.<sup>12,13</sup> Children from priority groups have dietary deficiencies that are noticeable as early as 9 months of age and increase with time.<sup>14</sup> The differences in the over consumption of discretionary foods and low vegetable intakes among these groups are particularly concerning.<sup>13</sup>

Children's eating habits can be significantly influenced by programs that aim to improve parents' abilities to promote and maintain their children's long-term healthy behaviours.<sup>1</sup> Successful interventions include strategies that empower parents, provide feeding-related advice and offer social support. In Australia, there have been successful large-scale randomised controlled trials of parent nutrition interventions targeting childhood obesity. These interventions focused on enhancing early feeding practices as children transition from breast milk and formula to family diet,<sup>15,16</sup> parents' nutrition awareness<sup>16</sup> and parental efficacy in fostering positive parenting feeding practices.<sup>15,16</sup> However, they did not focus on supporting practical food literacy skills and behaviours as their objectives related to increasing knowledge and awareness of positive parenting feeding practices.

Parents can promote positive feeding habits by setting an example of healthy food selection, preparation and dietary behaviours.<sup>7</sup> Children establish dietary behaviours that track into adulthood.<sup>14,17</sup> In Australia, only 5.4% of adults meet the dietary guidelines for fruit and vegetable recommendations and two thirds (67%) are overweight or obese.<sup>18</sup> Parents that lack the necessary food literacy skills may be poor role models of healthy eating behaviours for their children, therefore, improving parents' own food literacy—the combination of knowledge, skills and behaviours used to plan, manage, select, prepare and eat a healthy diet<sup>19</sup>—is fundamental to enhancing their own dietary intake and nutritional outcomes for their children. There have been several international interventions (USA, Germany and New Zealand) targeting parents of 0–5 years that combine food literacy and positive parenting feeding practices.<sup>20–25</sup> These have reported positive impacts on children's dietary intakes<sup>20</sup> and improvements in parenting feeding practices.<sup>22</sup> The duration of these interventions ranged from 6 weeks<sup>24</sup> to 18 months.<sup>21</sup> Improvements included a decrease in controlling behaviours such as pressuring children to eat or using food as a reward.<sup>21,22</sup> Interventions that combine food literacy and feeding practices have the potential to build parents' skills and self-efficacy and support longer term behaviour change; however, there have not been any reported interventions in Australia that combine both capabilities.

Since the mid-1990s, Foodbank WA has developed and implemented food literacy programs tailored to specific population groups, particularly low-to middle-income populations,<sup>26</sup> which have led to improved dietary behaviours.<sup>27</sup> In 2019, Foodbank identified a gap in nutrition interventions that contextualised food literacy for parents of 0–5-year-old children living in disadvantaged areas. Foodbank offered one-time workshops to parents of 0–5-year-old children living in the East Pilbara region of WA. These workshops recognised the specific needs of these parents and considered the areas uniqueness, which included a large Aboriginal population, low breastfeeding initiation

rates, and high levels of disadvantage, teenage births and children with developmental challenges.<sup>28–30</sup> Effective design elements of the existing East Pilbara nutrition workshops<sup>30</sup> and adult food literacy program<sup>27</sup> provided the foundation for developing the *Food Sensations*® Parents (FSP) program, which is, to our knowledge, the first reported in Australia to integrate concepts of food literacy, including a focus on cooking skills, and positive parenting feeding practices to improve health outcomes for families.

The development of the FSP program filled a gap in program delivery throughout disadvantaged areas of the Perth metropolitan area, targeting parents considered a high priority group by the WA Government.<sup>31</sup> The FSP program aims to improve the dietary intake of parents of children aged 0–5 years in the disadvantaged areas of WA. This paper reports on the development and evaluation of the program implementation. The evaluation determined if the program (1) increased parents' food literacy behaviours and confidence, (2) increased the application of positive parenting feeding practices to support healthy eating and (3) increased parents' vegetable consumption.

## 2 | METHODS

### 2.1 | Program design

The program's development was shaped by formative research conducted to assess the feeding experiences and challenges faced by the parents' of 0 to 5 year old children in providing them with a healthy diet. Formative research included eight focus groups with parents<sup>6</sup> ( $n = 67$ ); semi-structured interviews with stakeholders ( $n = 14$ ) from parenting organisations in WA; and consultation via a stakeholder forum ( $n = 31$ ) with professionals in child health, nutrition, health promotion and community organisations that work with families.

Additionally, the program content was adapted from the Foodbank WA's *Food Sensations* for Adults program<sup>27</sup> and the East Pilbara nutrition workshops<sup>30</sup> curriculum was guided by the Australian Infant Feeding Guidelines<sup>32</sup> and Australian Dietary Guidelines.<sup>33</sup> The food literacy skills that were included in the curriculum were the four domains that Vidgen and Gallegos<sup>19</sup> characterised as supporting a healthy diet by planning and managing, selecting, preparing and eating healthy food. Also underpinning the program curriculum were responsive feeding strategies based on the Satter Eating Competence Model<sup>34</sup> and Division of Responsibility Framework.<sup>35</sup> Theoretical application included aligning program curricula with the Self Determination Theory Framework<sup>36</sup> to include responsive feeding strategies that foster relatedness, autonomy and children's competence. The Social Cognitive Theory<sup>37</sup> guided the program strategies, which aimed to motivate and increase parents' confidence. The strategies included experiential learning activities such as selecting healthy foods, hands-on cooking and eating experiences, discussions and lessons to address perceived benefits and barriers to healthy eating, and goal-setting activities to encourage parents' self-efficacy.<sup>38</sup>

A pilot program was created by combining the findings from formative research with effective elements of the existing Foodbank initiatives.<sup>39</sup> Five pilot FSP programs were launched in 2019, which provided opportunities to refine program content, determine acceptability and review the scheduling and logistics of delivering the program within community organisations. Following the piloting, minor curriculum revisions were made, and the program session time was extended from 2 to 2.5 h to provide more time for program activities.

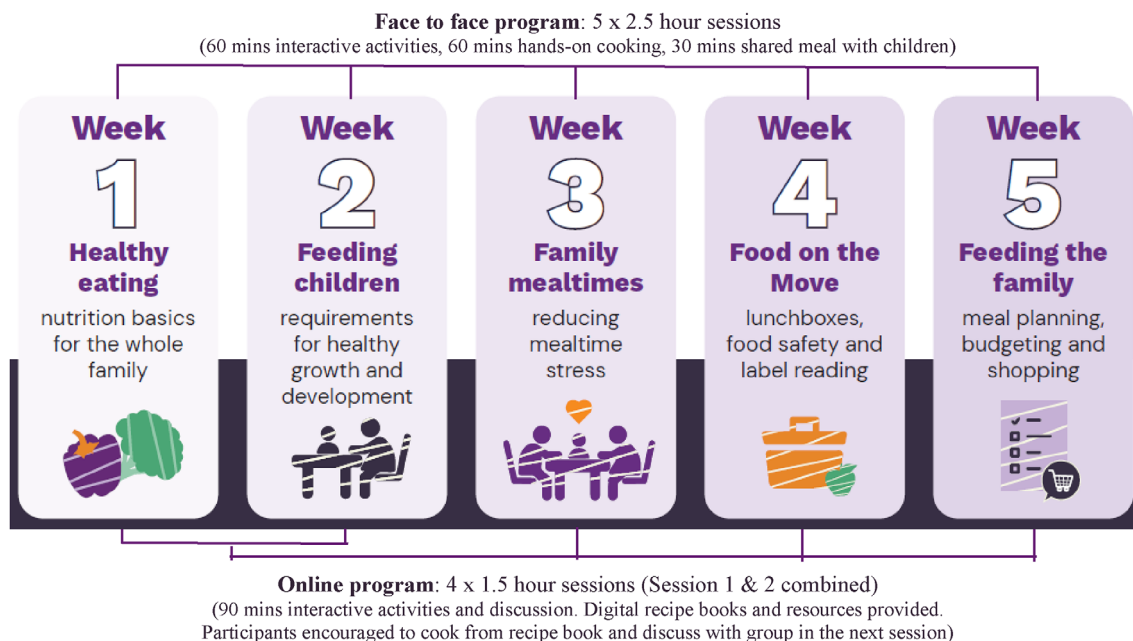
The final program consisted of weekly education and cooking sessions over 5 weeks, each with a specific focus. The topics included, basic nutrition principles for the whole family, child feeding development stages, strategies to overcome fussy eating using the Division of Responsibility Framework,<sup>34</sup> food safety, label reading, meal planning, food shopping and budgeting. The FSP program content is summarised in Figure 1. Each workshop included 60 min of hands-on learning activities, 60 min of cooking and 30 min of eating with the participants to taste new foods. At the end of each workshop, children were encouraged to taste prepared foods in a social environment and participants could use new feeding techniques with their children.

Due to the unanticipated COVID-19 lockdowns, the program curriculum was adjusted for online delivery of the program objectives. The program content was mapped for online delivery over 4 weeks of the same curriculum. The curriculum content from weeks one and two of the in-person workshops was combined, enabling the program to be delivered online across 4 weeks. Through audio and chat options, participants were actively encouraged to ask questions during online live workshops, which aimed to increase the interaction between the facilitator and participants. The program's content was delivered as a PowerPoint presentation to increase visual appeal and interest. Participants were emailed program resources each week, including recipe booklets and content from the weekly topics in the workbook. The hardcopy program resources were mailed to the participants at the conclusion. The cooking and sharing of food components were removed from the online program; however, participants were encouraged and supported to cook recipes during the week as 'homework'. At the beginning of weeks two, three and four, participants discussed recipes they had prepared the week before, replicating the way the program was delivered in-person.

Program resources included a range of pictorial recipe booklets, a comprehensive program workbook which incorporated program content using infographic style imagery, a reusable shopping bag and a child's size healthy eating plate with cartoon-style depictions of five food groups. Each week, participants were encouraged to set short-term goals (within 1 to 5 weeks) and, towards the end of the program, long-term dietary goals (within 6 months) and record them in the workbook provided.

### 2.2 | Delivery method

From February 2020 to November 2021, community-based parenting organisations hosted program workshops. The workshops were conducted weekly with 5–12 participants and offered childcare.



**FIGURE 1** The Food Sensations<sup>®</sup> for Parents program content.

Workshops lasted 2.5 h and were facilitated by qualified public health nutritionists. Due to COVID-19 lockdowns, the in-person program was temporarily suspended, and an online version was created. The online version was delivered via Zoom<sup>®</sup> during COVID lockdowns, with four online programs delivered between May and June 2020. Face-to-face program delivery recommenced July 2020 and due to the uncertainty with Covid, online programs were offered as well, with an additional four online programs delivered between July and November 2020, and four between February and June 2021.

## 2.3 | Sample and recruitment

Participants were required to be 18 years old and over, and the parent or primary caregiver of a child aged 0–5 years. In-person participants were recruited through community-based parenting organisations, who advertised the program through flyers, Facebook posts and conversations with parents. The Socio Economic Index for Areas (SEIFA) index,<sup>40</sup> derived from Australian Census data, was used to identify socially disadvantaged areas, and community organisations were chosen based on their presence in those areas. Online participants were recruited through paid advertisements via Foodbank WA's Facebook page. Eventbrite<sup>®</sup>, an event management software program, was used to coordinate recruitment.

## 2.4 | Study design

A pre- and post-program design was used to evaluate the curriculum. FSP facilitators were trained in the evaluation processes and administered questionnaires. If program attendance was high, a research

assistant also administered questionnaires. Participants in the in-person program had the research information sheet points read to them, and consent was assumed if they completed the paper questionnaires. Online participants had participant information sheets emailed to them and were able to provide consent by completing an online Qualtrics<sup>®</sup> questionnaire. Ethics approval was obtained from the Human Research Ethics Committee at (Curtin University) (HRE2019-0796).

### 2.4.1 | Questionnaire design

The pre- and post-questionnaire comprised 13 items from a 15 item validated tool developed to assess food literacy behaviours and confidence in the Foodbank's adult food literacy program.<sup>41</sup> Positive parenting feeding practices were measured using 10 questions selected from published validated child feeding questionnaires, including the Feeding Practices and Structure Questionnaire,<sup>42–44</sup> which were matched to weekly workshop objectives. The burden on the participants and evaluation time were the primary reasons for developing a short questionnaire. Participants were asked to rate the frequency of their behaviours and practices over the course of the previous month on a five-point Likert scale; 1 *never*, 2 *rarely*, 3 *sometimes*, 4 *most of the time* and 5 *always*. For questions directly addressing a child's eating, participants who had children younger than 6 months old or whose children were in foster care could select *not applicable*.

The participants were asked about their typical daily vegetable intake over the previous month. Vegetable servings were provided in ½ serve increments. Demographic data included 11 questions: sex of the participant, age, relationship with the child (i.e., parent or caregiver), number of children under 18 years, age of children aged

0–5 years, household structure, education level, employment status, postcode, English as a first language to identify culturally and linguistically diverse (CaLD) participants and identification as an Aboriginal or Torres Strait Islander. Postcodes were converted to a SEIFA index of low, middle or high using the decile rankings, where low corresponded to deciles 1 to 4, middle to deciles 5 to 7, and high to deciles 8 to 10.<sup>40</sup> The questionnaire was tested in the first few programs and, where required, facilitators assisted participants with lower English proficiency by reading the questions to them.

## 2.5 | Statistical analysis

Data were analysed using SPSS®(IBM) version 26. Results were considered statistically significant at  $p < .05$ . Paired t-tests were used to assess changes in food literacy behaviours, positive parenting feeding practices and vegetable intake. The five-point Likert scale was also divided into two categories for analysis: *Never to Sometimes* (1–3) and *most of the time and always* (4, 5). McNemar's test was used to assess the change from pre to post. A participant shifting from *never to sometimes* (1–3) at pre-program to *most of the time and always* (4, 5) post program was classified as improvement for the variable. Conversely, the variable was deemed to be reducing for a participant who went from *most of the time and always* (4, 5) pre-program to *never to sometimes* (1–3) post program. The net improvement was calculated as the difference between the proportion of participants who improved and those who did not. Multivariate logistic regression analysis was used to predict relationships and identify demographic variables associated with improved food literacy behaviours and parenting feeding practices. Post program outcomes were assessed using the multivariate logistic regression analysis after adjusting for baseline behaviours. The effects of the variables are represented as odds-ratio and associated 95% confidence intervals.

## 3 | RESULTS

A total of 44 FSP programs were delivered, comprising 32 face-to-face and 12 online programs. Three hundred and two participants from 41 of the FSP programs consented to completing the questionnaires. The data collected included 287 completed pre-program (T1) and 239 completed post-program (T2) questionnaires. A total of 224 matched pre- and post-questionnaires were available for analysis (74.2% of the consenting participants). Missing data in the questionnaires were random, and no questions were frequently missed.

### 3.1 | Demographic characteristics

Participants were mostly female (96.6%), aged 26–35 years (60.6%), with one or two children less than 18 years (85.0%), and just over half (50.2%) with children aged 0 to less than 1 year. Just under half of the participants (42.4%) indicated that they lived in the most

**TABLE 1** Demographic characteristics of participants.

Characteristic	Responses	n (%)
Sex <sup>a</sup> (n = 297)	Female	287 (96.6)
	Male	10 (3.4)
Age (n = 284)	18–25 years	10 (3.5)
	26–35 years	172 (60.6)
	36–45 years	87 (30.6)
	46+ years	15 (5.3)
Parent/caregiver role (n = 287)	Parent	275 (95.8)
	Caregiver/guardian/grandparent/relative	12 (4.2)
Number of children under the age of 18 (n = 287)	1	142 (49.5)
	2	102 (35.5)
	3+	43 (15)
Age group of children under 5 years (n = 283, n responses <sup>b</sup> = 358)	0–1 year	142 (50.2)
	1–2 years	34 (12.0)
	2–3 years	47 (16.6)
	3–4 years	33 (11.7)
	4–5 years	27 (9.5)
Household structure (n = 281)	Live with a partner and children	233 (82.9)
	Single parent with child/children	25 (8.9)
	Grandparent/Caregiver/Guardian with children	9 (3.2)
	Extended family	8 (2.8)
	Shared house/with partner and no children	6 (2.1)
	Education level (n = 283)	Primary or some high school
Finished high school, trade/apprenticeship	34 (12)	
Certificate or diploma	76 (26.9)	
Bachelor's degree or higher	147 (51.9)	
Employment status (n = 284)	Full-time	40 (14.1)
	Part-time/casual	75 (26.5)
	Unemployed	42 (14.8)
	Household duties	93 (32.7)
	Maternity leave/volunteer/retired/unable to work/self employed	31 (11.0)
	SEIFA Index (n = 283)	Low
Middle		97 (34.3)
High		66 (23.3)
English as a first language (n = 290)		180 (62.1)
Identify as Aboriginal or Torres Strait Islander (n = 282)		24 (8.5)

<sup>a</sup>Additional sex included from the attendance sheet.

<sup>b</sup>Participants included up to two age groups.

**TABLE 2** Change in food literacy behaviours, parenting feeding practices and dietary behaviour (pre and post) assessed using paired *t*-tests.

Description	N	Pre: Mean ± SD	Post: Mean ± SD	Mean difference post/pre: (95% CI)	<i>p</i> -Value
<b>Food literacy behaviours questions</b>					
Plan meals ahead of time	220	3.39 ± .91	3.65 ± .72	.26 (.14 to .37)	<.001
Make a list before you go shopping	223	3.87 ± .99	4.08 ± .90	.21 (.09 to .32)	<.001
Plan meals to include all food groups	221	3.20 ± .96	3.63 ± .72	.43 (.31 to .56)	<.001
Plan to keep food safe when transporting outside of the home	220	4.10 ± .99	4.35 ± .81	.25 (.11 to .38)	<.001
Use a nutrition information panel to make food choices	221	2.56 ± 1.09	3.47 ± .93	.91 (.75 to 1.07)	<.001
Compare unit prices of healthy foods when deciding what to eat	223	3.42 ± 1.07	3.95 ± .92	.53 (.39 to .67)	<.001
Think about healthy choices when deciding what to eat	223	3.84 ± .69	4.12 ± .65	.28 (.18 to .38)	<.001
Change recipes to make them healthier	223	3.34 ± .92	3.70 ± .81	.36 (.25 to .48)	<.001
Confident to manage money to buy healthy foods	221	3.55 ± .98	3.93 ± .76	.38 (.25 to .51)	<.001
Confident to select low-cost healthy foods	221	3.39 ± .92	3.83 ± .78	.44 (.31 to .58)	<.001
Confident to cook a variety of healthy meals	221	3.55 ± .81	3.88 ± .64	.33 (.22 to .44)	<.001
Confident to make changes in your food choices	221	3.24 ± .75	3.75 ± .70	.51 (.39 to .63)	<.001
Confident to keep foods safe to avoid food poisoning	220	4.34 ± .77	4.50 ± .67	.16 (.07 to .26)	<.001
<b>Parenting feeding practices questions</b>					
Allow my child to choose the food they want to eat from food already prepared	217	2.70 ± 1.57	3.06 ± 1.61	.36 (.20 to .53)	<.001
Prepare a different meal for my child from the family meal <sup>a</sup>	220	2.60 ± 1.48	2.26 ± 1.30	-.34 (-.52 to -.17)	<.001
Serve something else for a meal or snack if my child does not like what is served <sup>a</sup>	220	2.48 ± 1.42	2.10 ± 1.24	-.38 (-.52 to -.23)	<.001
Model healthy eating for my child by eating healthy food myself	219	3.23 ± 1.51	3.67 ± 1.47	.43 (.28 to .59)	<.001
Eat a meal with my child	220	3.43 ± 1.66	3.87 ± 1.52	.45 (.30 to .60)	<.001
Hand feed my child (under 12 months) <sup>a</sup>	219	2.19 ± 1.46	1.97 ± 1.29	-.22 (-.36 to -.08)	.003
Let my child serve themselves	217	2.63 ± 1.61	2.90 ± 1.57	.27 (.10 to .45)	.003
Distract (e.g., use electronic devices), praise or play with my child to get them to finish their food <sup>a</sup>	219	2.50 ± 1.49	2.05 ± 1.35	-.44 (-.59 to -.30)	<.001
Let my child eat whenever they want <sup>a</sup>	218	2.31 ± 1.43	2.00 ± 1.16	-.31 (-.46 to -.15)	<.001
Discuss with my child why it is important to eat healthy foods	218	2.62 ± 1.68	2.93 ± 1.68	.30 (.16 to .45)	<.001
<b>Participant dietary behaviour</b>					
Servings of vegetables	219	2.29 ± 1.15	2.63 ± 1.13	.33 (.20 to .46)	<.001

<sup>a</sup>As variables are reserve-coded, a reduction (or negative post-pre difference) in these variables denotes an improvement.

disadvantaged SEIFA areas and over half (51.9%) reported having a bachelor's degree or higher education level. More than one-third of the sample (37.9%) indicated that their first language was not English, and 8.5% identified as either Aboriginal or Torres Strait Islanders (Table 1).

### 3.2 | Changes in food literacy behaviours and confidence, parenting feeding practices and dietary behaviour

There was a statistically significant change in all food literacy behaviours and positive parent feeding practices (Table 2). At the end of the program, 47% of participants self-reported increasing their vegetable intake ( $n = 103/219$ ), with a statistically significant mean increase of

.33 (1/3) servings of vegetables, from 2.29 to 2.63 serves per day ( $p < .001$ ).

### 3.3 | Net improvement in food literacy and parenting feeding practices

Table 3 provides a summary of the net improvements in behaviours (never/rarely/sometimes versus most of the time/always) in the order of highest to lowest. The net improvement for all variables was statistically significant ( $p < .05$ ) and ranging from 5.9% to 33.1%. The largest net improvement in a food literacy behaviour was the *Use a nutrition information panel to make food choices* (33.1% net improvement). Net improvements in positive parent feeding practices were of a lower magnitude, with the largest

**TABLE 3** Net improvement in behaviours from highest to lowest, assessed using McNemar's test.

Variable	Improved (%)	Reduced (%)	Net improvement (%)	p-Value
Use a nutrition information panel to make food choices (1)	36.7	3.6	33.1	<.001
Confident to make changes in your food choices (2)	39.8	8.1	31.7	<.001
Compare unit prices of healthy foods when deciding what to eat (3)	30.0	6.7	23.3	<.001
Confident to select low-cost healthy foods (4)	32.6	9.5	23.1	<.001
Confident to cook a variety of healthy meals (5)	27.6	7.2	20.4	<.001
Confident to manage money to buy healthy foods (6)	26.2	5.9	20.3	<.001
Let my child eat whenever they want <sup>a</sup> (7)	20.8	2.2	18.6	<.001
Plan meals to include all food groups (8)	24.4	7.2	17.2	<.001
Prepare a different meal for my child from the family meal <sup>a</sup> (9)	22.3	5.4	16.9	<.001
Serve something else for a meal or a snack if my child does not like what is served <sup>a</sup> (10)	20.3	3.8	16.5	<.001
Change recipes to make them healthier (11)	23.8	8.1	15.7	<.001
Plan meals ahead of time (12)	22.7	9.1	13.6	<.001
Eat a meal with my child (13)	15.1	1.6	13.5	<.001
Allow my child to choose the food they want to eat from food already prepared (14)	25.0	11.9	13.1	.006
Model healthy eating for my child by eating healthy food myself (15)	16.7	4.8	11.9	<.001
Think about healthy choices when deciding what to eat (16)	16.6	5.4	11.2	<.001
Distract (e.g., use of electronic devices) praise or play with my child to get them to finish their food <sup>a</sup> (17)	15.9	4.9	11.0	.002
Let my child serve themselves (18)	20.5	10.8	9.7	.030
Discuss with my child why it is important to eat healthy foods (19)	16.0	6.9	9.1	.017
Make a list before shopping (20)	14.8	6.3	8.5	.008
Plan to keep food safe when transporting out of the home (21)	14.1	6.4	7.7	.016
Hand feed my child (under 12 months n/a) <sup>a</sup> (22)	10.0	2.9	7.1	.017
Confident in keeping foods safe to avoid food poisoning (23)	10.0	4.1	5.9	.029

<sup>a</sup>Variables were reverse-coded.

being *Let my child eat whenever they want* (18.6% net improvement).

Figure 2 shows the net improvement across all variables, in descending order. The variables are denoted by numbers on the horizontal axis in Figure 2 and described in full in Table 3. It is evident from this graph and table that greater improvement was observed in food literacy behaviours (blue bars) as compared to parenting feeding practices (orange bars).

Six of the 13 food literacy behaviours had the largest net improvement of 20% to 33.1%, and 3 of the 10 parent feeding practices improved between 15% and 20% (Table 4).

### 3.4 | Multivariable logistic regression analyses

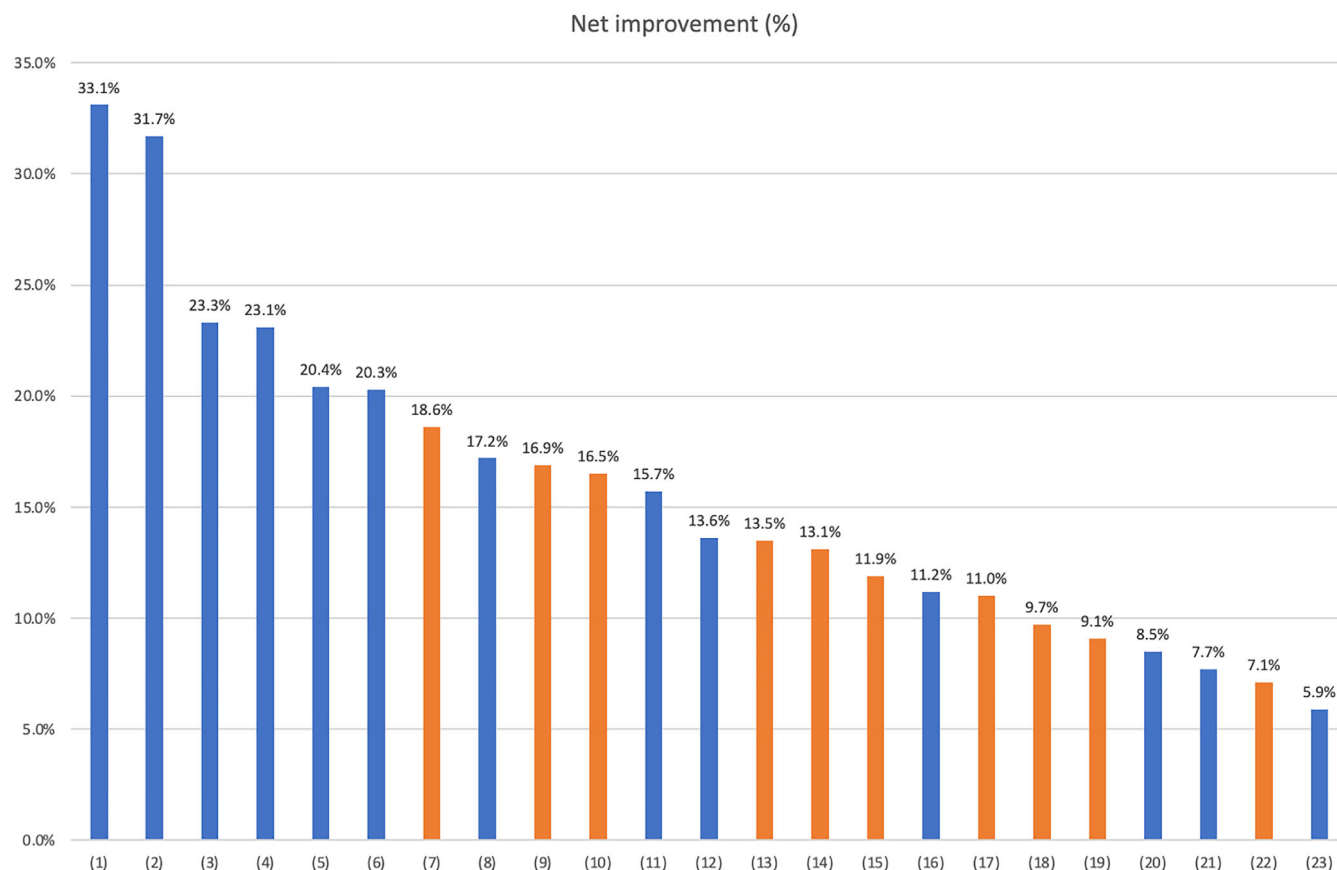
For each of the 13 food literacy and 10 parent feeding practice variables, baseline behaviours were significantly associated with behaviours post program ( $p < .05$ ).

Having English as a first language was associated with five behaviours or practices: (1) a higher likelihood of *Plan meals ahead*

*of time* [OR (95% CI): 2.25 (1.13–4.48)], (2) *NOT Handfeeding my child* [OR (95% CI): 3.71 (1.00–13.86)], and (3) *NOT Distracting, praising or playing with my child to get them to finish their food* [OR (95% CI): 3.72 (1.23–11.24)]; but (4) a lower likelihood of *Plan meals to include all food groups* [OR (95% CI): .50 (.26–.96)], and (5) *Use a nutrition information panel to make food choices* [OR (95% CI): .34 (.18–.63)].

Being female was associated with a higher likelihood of three feeding practices: (1) *Plan to keep food safe when transporting it out of the home* [OR (95% CI): 18.68 (2.63–132.77)], (2) *Model healthy eating for my child by eating healthy food myself* [OR (95% CI): 8.92 (1.06–75.43)] and (3) *NOT Distracting, praising or play with my child to get them to finish their food* [OR (95% CI): 14.99 (1.70–132.08)].

Being older than 35 years, compared to those between the ages of 18 and 35 years, was associated with a higher likelihood of three food literacy behaviours: (1) *Think about healthy choices when deciding what to eat* [OR (95% CI): 3.60 (1.09–11.93)], (2) *Confidence in managing money* [OR (95% CI): 2.96 (1.36–6.42)] and (3) *Compare unit prices of healthy foods when deciding what to eat* [OR (95% CI): 2.38 (1.21–4.71)].



**FIGURE 2** Net improvement in food literacy and parenting feeding practices behaviours, in descending order. Variable numbers appearing on the horizontal axis are as indicated in Table 3. Blue-coloured bars denote food literacy behaviours and brown-coloured bars denote parenting feeding practices.

**TABLE 4** Proportion of variables with net improvements in food literacy and positive feeding practices.

Range of net improvement	Proportion of variables with net improvements	
	Number of food literacy behaviours	Number of positive feeding practices
≥30%	2 (15.4%)	0 (0%)
≥25% to <30%	0 (0%)	0 (0%)
≥20% to <25%	4 (30.8%)	0 (0%)
≥15% to <20%	2 (15.4%)	3 (30%)
≥10% to <15%	2 (15.4%)	4 (40%)
≥5% to <10%	3 (23.1%)	3 (30%)
Total	13 (100%)	10 (100%)

Being a parent versus being a caregiver, guardian, grandparent, or relative was associated with a higher likelihood of three feeding practices: (1) *Model healthy eating for my child by eating healthy food myself* [OR (95% CI): 15.57 (2.47–98.20)], (2) *Eat a meal with my child* [OR (95% CI): 15.64 (1.56–156.66)] and (3) *NOT Distracting, praising or playing with my child to get them to finish their food* [OR (95% CI): 8.29 (1.20–57.09)].

Being from a high SEIFA compared to a low SEIFA area was associated with a higher likelihood of two food literacy behaviours:

(1) *Planning meals ahead of time* [OR (95% CI): 2.52 (1.03–6.13)] and (2) *Confidence in cooking a variety of healthy foods* [OR (95% CI): 3.60 (1.25–10.38)]. Being from a middle SEIFA compared to a low one was associated with a higher likelihood of two variables: (1) *Think about healthy choices when deciding what to eat* [OR (95% CI): 3.58 (1.18–10.80)] and (2) *NOT Distracting, praising or playing with my child to get them to finish their food* [OR (95% CI): 5.84 (1.32–25.71)].

Identifying as an Aboriginal or Torres Strait Islander was associated with one feeding practice, which was a lower likelihood of *Model healthy eating for my child by eating healthy food myself* [OR (95% CI): 6.91 (1.28–37.25)].

## 4 | DISCUSSION

The FSP program is a novel initiative that combines food literacy with positive parenting feeding practices. Participation in the program resulted in improvements in self-reported food literacy behaviours, positive parenting feeding practices and vegetable intake among parents of young children recruited from socially disadvantaged communities. Our findings showed that behaviour changes related to food literacy were more likely to occur than those related to positive feeding practices. Building on an existing program's design and evaluation



processes, using validated instruments<sup>41</sup> and recruitment of participants at the organisation level were strengths of this research.

The FSP program was successful in attracting a range of participants, including people who are considered priority groups or described as hard to reach groups, such as Aboriginal and CaLD people.<sup>8,12</sup> More than one-third of our participants (37.9%) reported their first language to be other than English, which is more than double that of WA (17% are born in non-English-speaking countries),<sup>8</sup> demonstrating the diversity of cultures. A total of 8.5% of participants attending the program identified as Aboriginal or Torres Strait Islander, which is 2.5 times the WA representation of Aboriginal people of 3.3%.<sup>45</sup> Other international nutrition interventions recruited similar participants to programs with a focus on low socio-economic or low income<sup>22,25,46</sup> and male parents rather than just targeting females/mothers.

#### 4.1 | Food literacy behaviours

Participants reported mean positive changes in food literacy behaviour across all four domains. The largest improvements in food literacy behaviours were in the *select* domain such as; *Use a nutrition information panel to make food choices*, *Compare unit prices of healthy foods when deciding what to eat* and *Confident to make changes in food choices*. In a qualitative review of 88 studies, parents' own food behaviours and feeding strategies were found to be the most dominant contributor to the eating behaviour and food choices of children aged 6 months to 19 years of age.<sup>1</sup> FSP is demonstrating similar food literacy results to other interventions. For example, a 6-week parent cooking program in the United Kingdom that integrated food literacy skills, through healthy eating education elements and practical activities, resulted in several changes to parent's selection of foods.<sup>46</sup> The program included a focus on selecting healthy food through label reading and understanding the traffic light system and resulted in families reducing the amount of discretionary and takeaway foods and an increase in children's intakes of fruit and vegetable portions.<sup>46</sup> The *Food Sensations for Adults* program also resulted in 'selection' being the largest change of the food literacy domains with 25.1% of participants significantly improving pre-post factor scores for selection, 11.8% for preparation and 9.7% for planning and management.<sup>27</sup>

The second largest change occurred in the food literacy domain *prepare* which was integrated into the program through hands on cooking activities where parents prepared a tasty meal from simple, budget friendly ingredients with basic cooking equipment. Parents showed an increase in their confidence to cook a healthy meal after completing the program. Results from other food literacy programs show increases in similar food literacy behaviours as those of the FSP.<sup>27,47-49</sup> Programs that incorporate experiential cooking have demonstrated positive outcomes for confidence in cooking with basic ingredients, following a recipe and favourable impacts on food literacy, such as comparing food prices, using shopping lists and planning meals ahead of time.<sup>49</sup> Exposure to healthy foods through cooking and tasting experiences offers opportunities and the potential to increase the likelihood that people will buy and prepare these foods in the future.<sup>46,49</sup>

A unique feature of this analysis is the presentation of net improvements in addition to mean change, as very little known about how much change can be expected from a 4 to 5-week program for parents, with the most change in food literacy behaviours.<sup>1</sup> Multiple small changes accumulate to produce an overall change in food literacy behaviours related to all domains. A plausible explanation for the difference in net improvement between food literacy and feeding practices is that some food literacy behaviours can be learned and adopted in a short time.<sup>27</sup> In comparison, parenting feeding practices require parents to adopt behaviours that support autonomy, such as providing a feeding structure, which may take more psychological effort and time to develop.<sup>36</sup> Further, once certain behaviours become habitual, they may be more difficult to change within the short duration of a program. The behaviour that saw the largest net improvement was the *Use a nutrition information panel to make food choices*. This example illustrates a behaviour that is simple to apply when shopping and may have been easier for the participants to adopt. Parents also reported improvements in their confidence in several food literacy behaviours such as, increased confidence in making dietary changes and selecting low-cost, healthy foods. It may also be that, for those participants who did not change the frequency of a behaviour or practice, the program may have reinforced behaviours and practices they were already doing.

*Eating* is considered a domain within food literacy and is particularly important for parents within a social context of eating with their child or with the family. The term *eating* includes knowing appropriate portion sizes, frequency of intake and balancing intake, and the knowledge of the impact of food on wellbeing and health.<sup>19</sup> In line with past food literacy initiatives,<sup>27,46,50</sup> we found a mean change in participants' own dietary behaviour at post-program, with a one-third serving increase in vegetable consumption per day. An improvement in vegetable consumption is an encouraging result, given that only 7.5% of Australian adults consume the recommended daily servings.<sup>18</sup> Parental role modelling of positive dietary behaviours during family meals and using encouragement rather than pressuring children to eat have been found to have the most significant influences on children's eating habits.<sup>17</sup> Considering this, it is reasonable to assume that improving the nutritional habits of parents will benefit children's eating habits. Although not directly measured in this study, there is potential for future programs to examine this. Positive improvements in children's dietary intakes have been reported in other international interventions incorporating a cooking component that included; increasing fruit and vegetables intakes,<sup>20,25</sup> less consumption of takeaway/fast foods and ready meals, and less consumption of convenience foods, discretionary food and drinks.<sup>46</sup> Family meals provide an opportunity to expose children to healthy food, observe others eating through role modelling, and establish routines and behaviours in a familiar social setting.<sup>51</sup>

#### 4.2 | Parenting feeding practices

The FSP program supported parents feeding children by integrating parent feeding practices into the food literacy elements of the

curriculum, such as hands on activities that taught principles of the sDOR in feeding framework,<sup>35</sup> including the what, when and where of feeding children. An important component of positive parenting feeding practices is responsive feeding, which is in line with a child's development and competence. This creates a supportive environment where a child can self-regulate their eating and develop autonomy.<sup>5</sup> Parenting feeding practices significantly improved as a result of this, the largest being *Eat a meal with my child* and *Model healthy eating for my child by eating healthy food myself*. Another positive result was the mean reduction in controlled feeding practices, with an increase in practices, such as allowing children to serve themselves or less distracting, praising, or playing with children to get them to finish their food. These results are consistent with those from other interventions that have been conducted for longer periods of time, such as a 12-week USA intervention with mothers of children aged three to five<sup>52</sup> and an 18-month New Zealand study with parents of children aged 0–2 years.<sup>21</sup> These interventions resulted in parents using more responsive feeding strategies, such as giving children a guided choice around feeding,<sup>52</sup> putting less pressure on children to eat at mealtimes and supporting children's autonomy around eating.<sup>21</sup> During the time spent sharing food at the end of each workshop, the program encouraged participants to model eating behaviours and practice responsive feeding strategies with their children. Our findings show that around one in six participants were able to learn and adopt responsive feeding strategies within 5 weeks. These strategies included net improvement in establishing routines around their child's feeding, such as reducing the likelihood of allowing their child to eat whenever they want or preparing a different meal for their child from the family meal. Our results showed female participants were more likely to carry out positive feeding practices such as modelling healthy eating than male participants, which is consistent with other research.<sup>1</sup> There was no significant difference between males and females in the majority of food literacy behaviours and feeding practices measured.

### 4.3 | Implications for future program delivery

The findings from this research highlight several implications for future program implementation including future co-design to target priority groups, pre-screening participants to tailor the program to the needs of the group and exploring effectiveness of multi-modal of delivery program.

Applying multivariate logistic regression analysis enabled us to determine which participants benefitted the most from the FSP program to provide directions for future program iterations. The most variables associated with any demographic characteristic was 5 of the 23, indicating small predictive factors affecting reported outcomes. The program was more effective in improving food literacy behaviours for participants with English as their first language, older than 35 years and from a higher SEIFA within the domains of planning and selection. In another 12-week parent nutrition intervention, higher levels of education correlated with higher levels of nutrition

knowledge however, ethnicity and employment status did not have any effect on outcomes.<sup>23</sup>

Participants who were older (>35 years) and from a higher SEIFA were more likely to report increased food literacy behaviours post program, including improved confidence in managing money and preparing a variety of healthy meals. This suggests that food literacy skills may take time and experience to build. More than two-thirds of the program participants were under the age of 35; therefore, our findings suggest that it might not be feasible to improve all variables for younger participants (<35 years) in 5 weeks.

Participants identified as Aboriginal or Torres Strait Islander were equally likely ( $p < .05$ ) to make significant improvements as other participants for 22 out of the 23 variables. This finding supports the conclusion that the FSP program is suitable for a range of participants in the target group.

To focus on parents who need more support to change, future program design could consider sub-groups of parents where there are significant associations for less likelihood of change. For example, participants from CaLD backgrounds, as those participants who reported English not being their first language, were less likely to report significant changes to several food literacy behaviours and positive parent feeding practices. This is a future focus area; people from CaLD backgrounds have been recognised by the Department of Health WA as a priority group due to disparities in their health outcomes.<sup>8</sup> Language can act as a barrier and hinder access to location-based services, such as antenatal checkups.<sup>12</sup> Future programs can be strengthened by ensuring that messaging and recruitment strategies are tailored to a range of CaLD groups through a co-design approach.

Pre-screening participants to tailor the program to support the needs of the participants could be undertaken, for example, to determine if participants require food relief. Pre-screening participants also allows the content for each session/program to be modified to suit the group; and for recipes to be selected based on food preferences, dietary restrictions and sensory appeal.

Investigating the effectiveness of multi-modal delivery for FSP to provide evidence if the same results could be achieved as a face-to-face program. Covid 19 has accelerated the shift to online learning, which may have enabled some people to participate. There is limited evidence on the differences in results between face-to-face and online programs; however, a recent study from the US found similar learning outcomes in food resources management practices and diet quality between the two delivery modes.<sup>53</sup> Other reported programs that had to pivot delivery modes from face-to-face to online due to the Covid 19 Pandemic reported high participant satisfaction with online learning and high confidence to apply skills learnt online.<sup>54</sup> Although online learning is becoming highly popular, it is also important to recognise the digital divide in Australia, which reduces online participation for people with lower levels of income, employment and education.<sup>55</sup> Further, people living in rural areas have significantly less digital inclusion rates than people living in capital cities. Other socio-demographic groups that are more digitally excluded include people in low-income households, people who did not complete secondary school and who are not in the labour force.<sup>55</sup>

## 4.4 | Limitations

Participants may have been more motivated and interested in nutrition and cooking, as can be reported in such programs.<sup>49</sup> Our program had a much higher rate of females (96%) to males which is consistent with research where fathers are under-represented in child feeding interventions and research.<sup>1</sup> The FSP program was developed to be delivered in person; however, due to COVID-19 restrictions, the program pivoted to only online delivery for short periods, which may have impacted recruitment of participants from low SEIFA areas. Due to the recognised digital divide between socially disadvantaged and advantaged groups,<sup>55</sup> programs that were delivered online may have resulted in participants with a higher SEIFA index being recruited. The absence of a control group and the possibility of response bias were the limitations of this study. Although statistically significant, the associations reported above have wide confidence intervals, as to be expected given the low number of attendees in some categories. In some positive parent feeding practices, a decrease in frequency was noted post program, with the highest decrease occurring in *Allow my child to choose the food they want to eat from food already prepared* and *Model healthy eating for my child by eating healthy food myself*. Research shows that response shift bias or a higher perception of a behaviour and/or practice at the start of the program might lead to a decline in positive change,<sup>56</sup> for example, when respondents overestimate the frequency of a behaviour during the pre-test and then report less at the post-test. This may transpire when they have a greater understanding of a behaviour or practice at the post-test. Since the children's own food intakes were not evaluated, it was unclear whether the program had improved their diets. The impact of COVID-19 meant that some program delivery was moved to online sessions, where the response rate in completing evaluation was low, limiting our ability to draw any conclusions from the data presented in this paper. Owing to the sample size of online participants, a comparative analysis between face-to-face and online program delivery could not be performed. However, considering the changing environment, future research should assess the efficacy of multimodal delivery approaches.

## 5 | CONCLUSIONS

The FSP program has demonstrated encouraging dietary behaviour change resulting from an innovative curriculum that integrates the principles of food literacy and positive parenting feeding practices. To the best of our knowledge, this finding has not been reported in Australia. The program framework and curriculum were found to be an effective model that enabled behaviour change over a relatively short time frame (4 to 5 weeks). These results strengthen the proposition that programs that emphasise parents' own dietary choices while incorporating food literacy and positive parenting feeding practices, such as responsive feeding methods, can be successful in modifying the frequency of behaviours and practices. The success of the FSP program lays the foundation for and supports the continued implementation of the program across WA in a larger and broader sample of parents.

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## CONFLICT OF INTEREST STATEMENT

Professor Jonine Jancey, Curtin University is an Editorial Board member of HPJA and a co-author of this article. To minimise bias, they were excluded from all editorial decision-making related to the acceptance of this article for publication. The other authors declare no conflict of interest. The funders had no role in the design of the program, in the collection of data, writing of the manuscript or in the decision to publish the results.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from Healthway. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the author(s) with the permission of Healthway.

## ETHICS STATEMENT

Approval for the project was granted from the (Curtin University) Human Research Ethics Committee (HREC) from (HRE2019-0167).

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