



Adolescents' perspectives on food literacy and its impact on their dietary behaviours



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ABSTRACT

Food literacy has been identified as a promising approach to support healthy dietary behaviours in adolescents. However, adolescents' perspectives on food literacy and the impact it could have on their dietary behaviours are not well understood. This study explored adolescents' perspectives on the potential for food literacy to influence their dietary behaviours. Fifteen focus groups were conducted with adolescents aged 12–17 years and encompassed quantitative and qualitative questions. Adolescents were asked to rank 22 aspects of food literacy in order of importance and discuss their responses as a group. Overall, adolescents ranked food and nutrition knowledge as more important than food skills and food capacity. Although adolescents stated that food and nutrition knowledge is important for them to eat well, the majority did not apply their knowledge to practice due to low confidence in food skills. Participants demonstrated very limited knowledge about macro aspects of food literacy such as animal welfare or environmental sustainability. Food skills such as planning and managing budgets for food and time for food shopping were ranked as least important due to being presently irrelevant but recognised as important later in life. Adolescents reported being very interested in developing food skills such as food preparation but they had very limited opportunities due to lack of food literacy education in home and high school settings. The high school setting provides an ideal opportunity for adolescents to improve their food literacy in particular food skills through home economics. Future research should develop and measure adolescents' food literacy and its impact on their dietary behaviours.

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1. Introduction

Dietary habits of adolescents include high consumption of fast-food and sweetened beverages and poor adherence to dietary guidelines (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008; Worsley, 2015). Poor dietary habits have been linked with global overweight and obesity patterns (Dhir & Ryan, 2010). In 2015 the World Health Organization (WHO) estimated that one in every three adolescents worldwide was obese (Dick & Ferguson, 2015). In Australia, one in every four adolescents is estimated to be obese

(ABS, 2015). The importance of preventing poor dietary behaviours during adolescence has been recognised due to its impact on long-term health such as the development of obesity and other non-communicable diseases (Dick & Ferguson, 2015; Lancet, 2012; Worsley, 2015).

A lack of food and nutrition education has been suggested by policy makers and public health professionals as one of the main reasons for poor diet-related health outcomes of adolescents (Kimura, 2011; Silk et al., 2008). Social cognitive theory (SCT) has been widely used in food and nutrition education interventions among children and adolescents to change unhealthy dietary behaviours (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003; Condrasky & Hegler, 2010; Contento, Koch, Lee, & Calabrese-Barton, 2010). However, despite such interventions leading to improved food and nutrition knowledge, translation into healthy dietary behaviours may be limited by an individual's food skills (Worsley, 2015). Therefore, one way to support individuals to

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improve their dietary behaviours could be through facilitation of food and nutrition knowledge as well as food skills (Worsley, 2015).

The concept of food literacy has emerged as a framework to connect food related knowledge, skills, and capacity (Colatruglio & Slater, 2016). Recent definitions of food literacy incorporate food and nutrition knowledge, food skills and behaviours/capacity (Cullen, Hatch, Martin, Higgins, & Sheppard, 2015; Fordyce-Voorham, 2011; Vidgen & Gallegos, 2014) with some including social, environmental, economic, political, and cultural aspects of food systems (Cullen et al., 2015; Sumner, 2013). Food literacy has been described as “the ability of an individual to understand food in a way that they develop a positive relationship with it, including food skills and practices across the lifespan in order to navigate, engage, and participate within a complex food system. It’s the ability to make decisions to support the achievement of personal health and a sustainable food system considering environmental, social, economic, cultural, and political components” (Cullen et al., 2015). A recent systematic review indicated that improving food literacy may have a positive influence on adolescents’ dietary behaviours (Vaitkeviciute, Ball, & Harris, 2015).

High food literacy is associated with increased consumption of fruit and vegetables (Burrows, Lucas, Morgan, Bray, & Collins, 2015; Utter, Denny, Lucassen, & Dyson, 2016), preference for healthy food (Hersch, Perdue, Ambroz, & Boucher, 2014; Robson, Stough, & Stark, 2016), decreased serving sizes including fast food and reduced frequency of consumption of packaged or processed snacks among adolescents (Contento et al., 2010; Robson et al., 2016). In contrast, low food literacy is associated with a lack of food skills such as cooking and confidence in food preparation which are considered to be barriers to healthy dietary behaviours (Condrasky & Hegler, 2010; Fulkerson et al., 2011; Nicklas et al., 2013). This evidence suggests that food literacy is an appropriate means to facilitate healthy dietary behaviours of adolescents. How adolescents become food literate remains a challenge and school curriculum could play a vital role in enhancing adolescents’ food literacy, particularly given the contemporary decline in food and nutrition knowledge and food skills in the home environment (Brooks & Begley, 2014).

A recent study with 205 home economics teachers (HETs) explored the importance for adolescents to learn various aspects of food literacy (Ronto, Ball, Pendergast, & Harris, 2016c). The study found that teachers predominantly focused on micro aspects of food literacy such as food safety and hygiene practices as well as food preparation skills, with less focus on macro aspects of food literacy such as animal welfare and environmental sustainability. In order to inform and increase the effectiveness of future food literacy programme development, it is important to gain adolescents’ perspectives on food literacy, including how it may influence their dietary behaviours. Therefore, this study explored adolescents’ perspectives of the importance of food literacy on their dietary behaviours.

2. Methods

2.1. Study design and participants

Focus groups were used to explore adolescents’ views and understanding of the importance of food literacy in relation to their dietary behaviours. Focus groups were chosen due to their interactive format and suitability to explore under-researched topics. For this study, participants could build upon what others in the forum say and suggest, discuss emerging issues with each other and explain their views (Neuman, 2011; Swift & Tischler, 2010).

An introductory email was sent to the HETs at 16 schools in South East Queensland after previously providing consent to be

contacted for research on food literacy (Ronto et al., 2016c). Three co-educational schools agreed to participate including one Catholic college, one independent (Christian) college and one public high school with enrolments ≥ 800 , ≥ 400 , ≥ 2000 students respectively. The study was approved by Griffith University, Human Research Ethics Committee (Reference number MED/23/15/HREC).

2.2. Focus group procedure

Adolescents enrolled in years 7–12 at each school (aged 12–17 years) were invited to participate. An information sheet for potential participants and their parents/guardians was distributed through HETs and informed consent was obtained prior to the commencement of focus groups. A total of 15 focus groups with 6–10 participants in each group (total $N = 131$) were conducted between June 2015 and February 2016 (see Table 1). Focus groups were gender and age stratified to facilitate free discussion (Krueger & Casey, 2014) and took place on high school grounds during home economics classes. All focus groups were facilitated by one investigator (RR) and supported by a research assistant. Focus groups were audio-recorded and lasted between 30 and 60 min (average 50 min).

Focus groups consisted of quantitative and qualitative components. First, students were presented with a list of 22 aspects of food literacy which were drawn from previously published literature (Table 2) (Desjardins & Azevedo, 2013, pp. 1–89; Fordyce-Voorham, 2011; Smith, 2009; Vaitkeviciute et al., 2015; Vidgen & Gallegos, 2014). Students were able to ask questions about any aspect of food literacy they did not understand. Partial nominal group technique (NGT) was used to rank the aspects of food literacy according to the importance to adolescents (Gallagher, Hares, Spencer, Bradshaw, & Webb, 1993; McMillan et al., 2014). Participants were asked to choose six aspects of food literacy that they thought were the most important for them in order to eat healthy and rank them from 1 to 6, with 1 being the most important aspect of food literacy (Table 2). According to NGT, the number of aspects for participants to choose from the list can vary from 5, 8, 10 or more (McMillan et al., 2014). Although 10 aspects are commonly used in NGT, adults from an Australian study indicated that it was too difficult to choose 10 aspects (McMillan et al., 2014). Therefore, it was decided that six is the appropriate number of aspects for adolescents to consider in this study. It was explained that there is no right or wrong answer. Then, adolescents were asked to choose six aspects of food literacy from the list provided that they thought were the least important for them in order to eat healthy, no ranking was asked for the least important aspects (Table 3). Each participant was asked to put their answers on an individual answer sheet first and then to transfer these answers on to an A0 sized answer sheet that was positioned in front of the class on a

Table 1
Demographics characteristics of the sample.

	Adolescents N = 131 Number (%)
<i>Gender</i>	
Female	90 (68.7)
Male	41 (31.3)
<i>Years</i>	
Middle (7–9)	40 (30.5)
Senior (10–12)	91 (69.5)
<i>Type of school</i>	
Public	75 (57.2)
Catholic	31 (23.7)
Independent	25 (19.1)

Table 2
Most important aspects of food literacy (separated by gender and year).

Aspects of food literacy	Females (N = 90) M (SD)	Males (N = 41) M (SD)	p value	Middle years (N = 40) M (SD)	Senior years (N = 91) M (SD)	p value	Total (N = 131) M (SD)
Food and nutrition knowledge							
Food safety and hygiene practices	2.7 (2.7)	2.9 (3.0)	0.70	3.6 (2.8)	2.5 (2.7)	0.06	2.8 (2.8)
Healthy and unhealthy foods	2.8 (2.6)	2.0 (2.4)	0.12	2.2 (2.5)	2.7 (2.6)	0.35	2.5 (2.6)
Where to find food and nutrition information	0.8 (1.7)	0.5 (1.2)	0.46	0.4 (1.0)	0.8 (1.7)	0.45	0.7 (1.6)
Appropriate portion sizes for different foods	2.1 (2.2)	0.7 (1.7)	≤0.05	1.4 (2.1)	1.8 (2.1)	0.24	1.7 (2.1)
Dietary guidelines	1.7 (2.1)	1.4 (2.0)	0.42	0.9 (1.6)	1.9 (2.2)	≤0.05	1.6 (2.0)
Where to obtain food from	0.3 (1.1)	0.8 (1.7)	0.12	0.8 (1.6)	0.4 (1.2)	≤0.05	0.5 (1.3)
Environmental sustainability (eg food miles, locally sourced food)	0.8 (1.6)	0.8 (1.4)	0.56	0.5 (1.2)	0.9 (1.7)	0.29	0.8 (1.5)
Where food comes from (food chain)	0.5 (1.3)	1.9 (2.4)	≤0.05	1.5 (2.3)	0.7 (1.5)	0.09	0.9 (1.8)
Animal welfare	1.4 (2.0)	2.0 (2.1)	0.10	1.8 (2.2)	1.4 (2.0)	0.33	1.6 (2.0)
Food skills							
Prepare and cook food from basic/available ingredients	0.9 (1.7)	1.3 (2.0)	0.39	1.2 (1.9)	1.0 (1.7)	0.81	1.1 (1.8)
Use common kitchen equipment, utensils and appliances	0.1 (0.6)	0.1 (0.5)	0.88	0.2 (0.5)	0.1 (0.6)	0.36	0.1 (0.6)
Store food appropriately and safely	1.2 (1.7)	1.2 (2.0)	0.91	1.3 (2.0)	1.2 (1.7)	0.74	1.2 (1.8)
Follow and adapt recipes based on available foods	0.2 (0.8)	0.3 (0.9)	0.41	0.3 (0.8)	0.2 (0.8)	0.41	0.2 (0.8)
Select and prepare food in accordance with dietary guidelines	1.0 (1.7)	0.3 (0.8)	≤0.05	0.4 (1.1)	0.9 (1.6)	0.10	0.8 (1.5)
Plan and manage a budget for food	0.5 (1.1)	1.0 (1.8)	0.12	0.6 (1.4)	0.6 (1.4)	0.77	0.6 (1.4)
Identify and critically analyze food related information	0.1 (0.5)	0.1 (0.3)	0.94	0.1 (0.3)	0.1 (0.5)	0.91	0.1 (0.4)
Plan and manage time for food shopping	0.2 (0.9)	0.4 (0.9)	≤0.05	0.4 (0.9)	0.2 (0.9)	0.17	0.3 (0.9)
Gather food from different sources (eg supermarkets, markets)	0.3 (1.0)	0.5 (1.1)	0.05	0.7 (1.3)	0.2 (0.9)	≤0.05	0.4 (1.1)
Capacity							
Positive attitude towards cooking and healthy eating	2.5 (2.1)	1.9 (2.0)	0.14	2.1 (2.0)	2.4 (2.1)	0.52	2.3 (2.1)
Confidence in skills related to sourcing, preparing and cooking food	0.3 (1.0)	0.1 (0.6)	0.39	0.2 (0.6)	0.3 (1.0)	0.42	0.3 (0.9)
Creativity and ability to improvise with ingredients	0.4 (1.1)	0.4 (0.9)	0.96	0.3 (0.9)	0.4 (1.1)	0.43	0.4 (1.0)
Regular social eating experiences	0.1 (0.6)	0.3 (0.9)	0.39	0.4 (0.9)	0.1 (0.6)	≤0.05	0.2 (0.7)

*N- number of participants, M-mean, SD - standard deviation.

Significance ≤0.05. Top five adolescents' choices of the most important aspects of food literacy are highlighten in bold.

whiteboard. Different colour dot stickers were used for the two categories: yellow colour stickers for the most important aspects and red colour stickers for the least important aspects of food literacy. Then, one investigator (RR) led a group discussion on students' views about the aspects of food literacy. The coloured stickers of group members placed against each aspect of food

literacy were visible to all which allowed the investigator to lead discussion in timely manner. Based on the number of stickers, participants were asked why various aspects of food literacy were the most or least important for them to eat healthy with this setting up opportunities to probe the group views. In exercise two, adolescents were asked to choose six aspects of food literacy from the

Table 3
Least important aspects of food literacy (separated by gender and year).

Aspects of food literacy	Females (N = 80) N (%)	Males (N = 38) N (%)	p value	Middle years (N = 35) N (%)	Senior years (N = 83) N (%)	p value	Total (N = 118) N (%)
Food and nutrition knowledge							
Food safety and hygiene practices	8 (10.0)	0 (0)	≤0.05	0 (0)	8 (9.6)	0.06	8 (6.8)
Healthy and unhealthy foods	3 (3.8)	4 (10.5)	0.15	3 (8.6)	4 (4.8)	0.43	7 (5.9)
Where to find food and nutrition information	10 (12.5)	8 (21.1)	0.23	4 (11.4)	14 (16.9)	0.45	18 (15.3)
Appropriate portion sizes for different foods	8 (10.0)	14 (36.8)	≤0.05	12 (34.3)	10 (12.0)	≤0.05	22 (18.6)
Dietary guidelines	4 (5.0)	5 (13.2)	0.12	6 (17.1)	3 (3.6)	≤0.05	9 (7.6)
Where to obtain food from	26 (32.5)	16 (42.1)	0.31	14 (40.0)	28 (33.7)	0.52	42 (35.6)
Environmental sustainability (eg food miles, locally sourced food)	21 (26.3)	3 (7.9)	≤0.05	6 (17.1)	18 (21.7)	0.58	24 (20.3)
Where food comes from (food chain)	16 (20.0)	13 (34.2)	0.09	11 (31.4)	18 (21.7)	0.26	29 (24.6)
Animal welfare	6 (7.5)	4 (10.5)	0.58	5 (14.3)	5 (6.0)	0.14	10 (8.5)
Food skills							
Prepare and cook food from basic/available ingredients	27 (33.8)	9 (23.7)	0.27	11 (31.4)	25 (30.1)	0.89	36 (30.5)
Use common kitchen equipment, utensils and appliances	45 (56.3)	21 (55.3)	0.92	17 (48.6)	49 (59.0)	0.30	66 (55.9)
Store food appropriately and safely	7 (8.8)	5 (13.2)	0.46	5 (14.3)	7 (8.4)	0.34	12 (10.1)
Follow and adapt recipes based on available foods	29 (36.3)	14 (36.8)	0.95	15 (42.9)	28 (33.7)	0.35	43 (36.4)
Select and prepare food in accordance with dietary guidelines	10 (12.5)	9 (23.7)	0.12	7 (20.0)	12 (14.5)	0.45	19 (16.1)
Plan and manage a budget for food	33 (41.3)	13 (34.2)	0.46	16 (45.7)	30 (36.1)	0.33	46 (39.0)
Identify and critically analyze food related information	20 (25.0)	11 (28.9)	0.65	6 (17.1)	25 (30.1)	0.14	31 (26.3)
Plan and manage time for food shopping	56 (70.0)	14 (36.8)	≤0.05	15 (42.9)	55 (66.3)	≤0.05	70 (59.3)
Gather food from different sources (eg supermarkets, markets)	38 (47.5)	18 (47.4)	0.99	10 (28.6)	46 (55.4)	≤0.05	56 (47.5)
Capacity							
Positive attitude towards cooking and healthy eating	4 (5.0)	3 (7.9)	0.53	3 (8.6)	4 (4.8)	0.43	7 (5.9)
Confidence in skills related to sourcing, preparing and cooking food	28 (35.0)	15 (39.5)	0.64	15 (42.9)	28 (33.7)	0.35	43 (36.4)
Creativity and ability to improvise with ingredients	24 (30.0)	8 (21.1)	0.31	10 (28.6)	22 (26.5)	0.82	32 (27.1)
Regular social eating experiences	57 (71.3)	21 (55.3)	0.09	19 (54.3)	59 (71.1)	0.08	78 (66.1)

*N- number of participants, %- percentage.

Top five adolescents' choices of the least important aspects of food literacy are highlighted in bold.

same list as in exercise one that they (i) knew the most about; (ii) they knew the least about; and (iii) they wanted to know more about in order to be food literate. Participants were asked to record their answers on a fresh A0 answer sheet positioned in front of the class on a whiteboard by applying different colour stickers for each of the three questions. Finally, one investigator (RR) led a group discussion to better understand participants' knowledge about aspects of food literacy. The investigator asked various questions to explore why they knew, didn't know or wanted to know about various aspects of food literacy.

2.3. Data analysis

Quantitative data analysis was performed using SPSS v22. First, descriptive statistics were used to describe the data. Means and frequencies were calculated for continuous and categorical variables, respectively. Two individual answer sheets were removed from the most important and 13 answer sheets from the least important aspects of food literacy as they were mostly incomplete. The most important aspects of food literacy were reverse scored and summed so that if participants ranked an aspect as 'one', it got a score of 6; if they ranked as their number 'two', it got a score of 5 and so forth. If participants did not choose an aspect it got a score of 0. This variable was analysed as a continuous variable. The least important aspects of food literacy were not ranked, so all aspects of food literacy identified as least important got a score of 1 and it was analysed as a categorical variable. As the data were not normally distributed, Mann-Whitney U tests were used to investigate possible associations in answers based on students' gender and year levels. The data of least important aspects of food literacy were presented as frequencies and percentages. Chi-square tests were used to reflect possible differences between gender and year levels among adolescents. Year levels were recoded into two groups: middle (7–9) and senior (10–12) years. The level of statistical significance for all analyses was set at $p \leq 0.05$.

A content data analysis approach was applied to analyse the qualitative data. Content analysis is considered appropriate for under-researched topics which often benefit from a rich description of the whole dataset and for explaining quantitative results (Fade & Swift, 2011). Theoretical saturation was reached at focus group seven where no new data or constructs of interest emerged (Draper & Swift, 2011). However, due to the quantitative component of the focus groups, researchers conducted 15 focus groups. Focus group recordings were professionally transcribed and one investigator (RR) reviewed transcripts for accuracy against the original audio recordings (Braun & Clarke, 2006). Audio-recordings and transcripts were read and re-read to build familiarity with the data. One investigator (RR) coded data using open coding manually according to content analysis procedures (Miles & Huberman, 1994; Neuman, 2011). Assigned initial codes were collated to condense the data into subcategories and categories (Neuman, 2011). All investigators met on a regular basis to review codes, subcategories and categories in order to increase the trustworthiness of the findings (Elo et al., 2014). Investigators clustered subcategories into categories in accordance with three major components of food literacy: food and nutrition knowledge; food skills; and capacity. Illustrative quotes from adolescents were selected to demonstrate responses which were common, contrasting or representing a summary of a topic, and are provided with focus group number, adolescents' gender and year level.

3. Results

The demographic characteristics of participants are summarised in Table 1. Two thirds of participants were female, 69.5% were

enrolled in senior years (aged 15–17 years), and 57.2% of participants were attending a public high school with the remainder attending either a Catholic or Independent school.

3.1. Understanding of food literacy

Most adolescents did not know what the concept 'food literacy' meant, with some stating it is "information about food", "something about nutrition or food" or "specialised language in food". Participants had variable understanding of some aspects of food literacy. For example, most adolescents understood animal welfare as being "vegetarian" with a minority questioning or having a better understanding such as "[I]s that like the caged thing, non-caged chicken?" (Focus Group (hereafter FG) 9, female, Year 11), "[A]nimal welfare is like treating animals the way they should be treated and not having pig farms and caged eggs" (FG 15, male, Year 7). The investigator explained and/or clarified the following aspects of food literacy before the exercises took place: animal welfare, regular social eating experiences and environmental sustainability.

3.2. Important aspects of food literacy

In general, adolescents ranked aspects of food and nutrition knowledge as most important for them in order to eat healthy (Table 2). The table displays the rankings for all aspects of food literacy with the top 6 ranked most important by gender and years groupings highlighted with bolded text. In contrast, participants displayed an interest in gaining competence in all components of food literacy but they felt that they had more knowledge in food and nutrition. The majority of participants stated that food and nutrition knowledge is more important than having food skills in order for them to eat healthy, with some indicating that both were important.

"You know what to eat and what not to eat and skills are just how you cook" (FG 14, male, Year 7);

"If you have skills, then you know knowledge. If you can chop with a knife faster, then you've got the knowledge of knowing how to do knifing" (FG 7, male, Year 9)

3.3. Food and nutrition knowledge

Five of the six most important aspects of food literacy related to food and nutrition knowledge; including knowledge about food safety and hygiene practices, healthy and unhealthy foods, appropriate portion sizes for different foods, dietary guidelines and animal welfare (Table 2). Adolescents stated that knowledge about food safety and hygiene practices and healthy and unhealthy foods was very important for them so they knew which foods were healthy to consume and to stay healthy.

"So you know what - you eat the healthy ones" (FG 4, female, Year 11).

"You could have something that's really healthy and then if it's stored not properly, it could go off and you could still eat it and get sick and everything" (FG 5, female, Year 11).

Adolescents indicated that they had a sufficient amount of knowledge about these two aspects gained mostly through home economics and other food-related classes, as well as parents.

"From hospitality and home economics. Occasionally from parents" (FG 4, females, Year 11).

The importance of some aspects of food literacy varied between genders and year levels. Although the difference was not statistically significant, females and students from senior years ranked knowledge about appropriate portion sizes for different foods and dietary guidelines as the most important aspects for them in order to eat healthy. In contrast, males and adolescents from middle years ranked knowledge about where food comes from and animal welfare as most important aspects (Table 2). Adolescents from senior years ($M = 1.9, SD = 2.2$) ranked dietary guidelines as significantly more important aspect of food literacy than middle year students ($M = 0.9, SD = 1.6$) ($p \leq 0.05$) (Table 2). Adolescents indicated that it is very important to know and follow dietary guidelines for several reasons: “follow healthier lifestyle”, “to make informed decisions”, “keep in shape” and/or “not to get fat”. Most adolescents gained knowledge about dietary guidelines from school, but did not apply this knowledge on a daily basis due to beliefs that it was hard to apply and remember all guidelines; it was suitable only for people who want to follow a ‘strict’ diet; and it was not suitable for a “growing body” such as in adolescence.

The majority of students reported that knowledge about appropriate portion sizes for different foods was very important as it helped them not to over or under eat different foods. They specified that portion sizes did not matter for healthy foods but it was definitely important when it came to unhealthy foods. Females ranked this aspect as significantly more important than males ($p < 0.05$) (Table 2). Some participants, in particular males, indicated that they did not care about portion sizes at all and stated they ate until they felt full, as one adolescent stated: “[J]ust eat until you get full, pretty much” (FG 12, male, Year 12).

Many adolescents referred to vegetarianism when they discussed animal welfare. They reported that they wanted to know more about how animals were handled before consumption.

“So we know a lot more about what’s happening to animals and stuff like that before we eat it. How they’re being treated before we eat them” (FG 8, female, Year 12).

Also, they indicated that it was important for them to know what meat producers used to feed animals, for example “hormones”, “steroids”, “pills to grow animals fatter or breasts bigger”, “inject stuff”. However, some students were not interested in these issues at all and some were influenced by other family members.

“I get free range eggs because my mum does. She tells me to, “Go get free range eggs.”” (FG 7, male, Year 9).

“Because it doesn’t really affect us directly. Like, animal welfare, we don’t see it, we don’t know about it. If we don’t see it, it doesn’t happen” (FG 5, female, Year 11).

Most adolescents referred to food miles or locally grown produce when discussing the importance of where food comes from. Some students had very limited understanding of this aspect of food literacy as one student stated: “[I]t just all comes from Woolies [Woolworths, a National supermarket chain]” (FG 4, female, Year 11). Males ranked this aspect of food literacy as significantly more important in order for them to eat healthy than females ($p \leq 0.05$) (Table 2).

3.4. Food skills

None of the aspects of food literacy listed in food skills were selected by adolescents in their top 6 of the most important aspects in order for them to eat healthy (Table 2). However, adolescents

selected five aspects listed in food skills as the least important aspects for them to eat healthy including: using common kitchen equipment, utensils and appliances; follow and adapt recipes based on available foods; planning and managing a budget for food; planning and managing time for food shopping; and gathering food from different sources (Table 3).

The majority of students indicated that to be able to use common kitchen equipment, utensils and appliances were not important for them as either they were confident in using kitchen equipment; did not believe it had an influence on their dietary behaviours; or they improvised and used the equipment that they were familiar with when needed. Adolescents indicated that being able to prepare and cook food from basic/available ingredients was important mainly due to avoiding take-away and pre-packed foods. Some reported that food preparation skills such as cooking were not the most important aspect for them to eat healthy as they could buy healthy foods and/or they believed that it was sufficient to have food and nutrition knowledge to be able to prepare and cook food. However, the majority of students indicated that they wanted to be able to cook as those skills will be needed in the future.

“So you can prepare for yourself and for your children and wife and cook dinners” (FG 2, males, Year 7).

Most students indicated that they did not prepare or cook food at home as it was mainly the responsibility of parents and/or parents did not want to involve them in family meal preparation as one adolescent stated: “[M]um gets angry if I stuff something up, just to get out of the kitchen” (FG 4, female, Year 11). Some adolescents stated that their parents taught them how to cook and were happy when adolescents cooked their family’s dinner. Most adolescents reported that they ate or prepared food after school that was quick and easy to make, namely muesli bars, fruit, yoghurt, crackers, reheated foods such as pizza or last night’s dinner, spaghetti bolognese, fried rice, toast, sandwiches, two-minute noodles, “things that can’t go wrong, like, something that can’t explode or something like that” (FG 15, male, Year 7), “something not advanced, something basic” (FG 4, female, Year 11). Adolescents believed that it was schools’ and parents’ responsibility to teach them food preparation and cooking skills. They stated that they gained some cooking experience through home economics classes, parents and/or some popular TV shows such as *Everyday Gourmet* with Justine Schofield, *Bad Chef* and *MasterChef*. Although these TV shows increased their interest in cooking, very few had cooked the same recipes seen on TV because the recipes were too complicated or involved ingredients that were not available at home.

“If they use common kitchen equipment, like, I can do that too. If they use an ingredient that I’ve never heard of or it’s hard to get, I won’t. Sometimes you can improvise it, but sometimes it’s hard to improvise with certain foods that they use” (FG 5, female, Year 11).

Many students did not review or critically analyse food related information. They identified several resources where they could access food related information when needed, namely the internet and applications, home economics or other teachers for health-related subjects, parents and supermarkets. Most students trusted the information provided by teachers, but only those who taught food or health related subjects.

“Depends what they teach. Home economics, sport teachers, then yes” (FG 5, female, Year 11),

“I wouldn’t trust my maths teacher. Fat teachers” (FG 5, female, Year 11).

A few adolescents understood that not all information on the internet was reliable. These students only trusted food-related information provided by government agencies. Interestingly, some indicated they trusted supermarkets in terms of nutrition information.

"I'd trust supermarkets more than teachers. Supermarkets way more. They know what they put on the shelf. They look at their stuff before they put it on the shelves" (FG 2, male, Year 7).

Most adolescents did not read food labels due to not understanding what the information meant, not knowing what information to look for, believing that food labels were only for those who have special dietary requirements, being not interested, and/or being too hungry at the time of purchase. For those adolescents who read food labels they looked for information on sugar, carbohydrates, calories or kilojoules, servings, saturated fats and/or total fat.

Most adolescents reported not selecting or preparing foods in accordance with dietary guidelines due to lack of knowledge on how to apply it. Females ranked this aspect of food literacy as important for them in order to eat healthy significantly higher than males ($p \leq 0.05$) (Table 2). Some participants indicated they wanted to know how to apply dietary guidelines in food preparation and identified school, the internet and research as the main resources for increasing their knowledge.

The majority of participants stated that aspects of food literacy such as planning and managing a budget for food and planning and managing time for food shopping were not presently very important. This was because they did not have control over the home food budget. However, students indicated that these aspects will be important in the future when they live independently.

"Because when we have to - like, we go out on our own and we have our own family, we have to pay for it, not mum and dad" (FG 5, females, Year 11).

Males ranked planning and managing time for food shopping as more important than females did ($p \leq 0.05$). Most students indicated it was important to manage a budget due to a belief that healthy foods were more expensive than unhealthy foods such as take-away. But, they stated that with good budgeting skills it was possible to buy healthy foods.

"So you don't go over your money so you can feed your whole family for under \$10 and stuff like that. And also you can make a good feed with just a limited amount of money" (FG 13, male, Year 10).

Many students indicated that their families had a budget for food and compared product prices. Some adolescents reported being involved in their family's food shopping but not many were interested unless they were allowed to choose the foods they wanted.

"But when you go shopping you can get what you want" (FG 7, male, Year 9).

3.5. Capacity

Having a positive attitude towards cooking and healthy eating was one of the most important aspects of food literacy identified by

students (Table 2). Most adolescents stated that having a positive attitude towards healthy eating and cooking was very important as this could lead to healthier dietary behaviours, cooking or cooking more often, and overall health and wellbeing.

"Because if you have a negative attitude towards it [healthy eating], then you're never going to do it [eat healthy]. You're not going to eat healthy if you have a negative attitude towards it" (FG 4, female, Year 11).

Students reported that negative attitudes towards healthy eating could lead to unhealthy dietary behaviours such as consumption of take-away foods. But, some adolescents believed that positive attitudes were not important for healthy eating: *"[W]ell, I don't think it matters what attitude you have. You can still eat healthy and not have a positive attitude"* (FG 3, female, year 10).

Regular social eating experiences were ranked as the least important aspect by many adolescents (Table 3). Some adolescents did not know what regular social eating experiences meant and after explanation some changed their opinion and stated that it was an important aspect, as one student stated: *"Now I think it is important. I couldn't work out what it actually meant"* (FG 1, females, Year 7). Social eating experiences were perceived as influential to adolescents' dietary behaviours in positive and negative ways.

"I was eating heaps of unhealthy food then and I'd see people, like, bring in heaps of fruit and then I noticed that I was eating unhealthy, so I changed to their foods" (FG 1, females, Year 7).

There were mixed experiences in regard to dietary behaviours during family dinner. Some adolescents reported consuming healthier foods when eating with family; some had an influence on what family ate for dinner; and some had no control over food choices during dinner and ate what parents gave them even though they knew it was unhealthy.

"Sometimes you can, but most of the time you just eat what you're given" (FG 5, female, Year 11),

"[I]f they want to cook a really fattening dish and you want to eat healthy, you can't really say, 'I'm not eating that.' You have to eat what they have to eat" (FG 6, female, Year 9),

"I normally make my own meals. I mean, we still eat together but I do something separate" (FG 12, male, Year 12).

Some adolescents stated they did not have regular family dinners due to different schedules, as one student stated:

"I'm not really at home, so - but if I was home, then probably, because they do that. It's hard to get everybody together as well" (FG 8, female, Year 12).

Most adolescents believed that they were "sort of" confident in cooking. Most students indicated they cooked very basic meals when needed. Some stated that confidence in preparing foods was important in order to be able to cook and not to "burn yourself". A few students indicated that low confidence in cooking could lead to unhealthy and take-away food consumption. Most students wanted to gain confidence in food skills as they had low confidence in their skills due to setting too high expectations for themselves, not getting high marks in cooking assignments, belief that they would "muck it up" and minimal cooking opportunities at home and school, the following comment as an example of this:

"[B]elieve in yourself. Complete an excellent dish. Cooking more. Get an A. Set your goals. Except the teacher never gives us As. We're the best group" (FG 13, male, Year 10).

4. Discussion

This study explored adolescents' perspectives on the importance of various aspects of food literacy on their dietary behaviours. Nearly all participants had not heard of the concept 'food literacy'. It is not surprising as the concept is relatively recent with the definition of food literacy still emerging (Vidgen & Gallegos, 2014; Worsley, 2015). However, participants were aware and knew the meaning of most aspects of food literacy. But, they had very limited understanding of macro aspects of food literacy such as animal welfare and environmental sustainability. A study conducted with HETs found that food and nutrition knowledge and basic food skills were the main focus in Australian high schools due to home economics classes being compulsory for only one year and teachers having limited time to introduce macro aspects of food literacy (Ronto, Ball, Pendergast, & Harris, under review; Ronto et al., 2016c). Bellotti (2010) stated that most consumers are passive in their food choices as their food purchasing decisions do not include ethical considerations such as animal welfare. Some adolescents indicated wanting to know about ethical issues and were concerned that some food producers may use unhealthy substances to make products more appealing for consumers. This aligns with another Australian study which showed a strong level of support from consumers for environmental food policies and food purchasing (Worsley, Wang, & Burton, 2015).

The adolescents stated that food and nutrition knowledge was most important in regard to their dietary behaviours in particular the aspects of food safety and hygiene practices, dietary guidelines and appropriate portion sizes. This finding is consistent with other studies that have indicated the importance of food safety (Ronto et al., 2016c; Worsley et al., 2015). Adolescents emphasised the importance of dietary guidelines to their dietary behaviours with females ranking this aspect significantly more important which aligns with other studies stating that females are more conscious about food-related topics and having higher food and nutrition knowledge (Gracey, Stanley, Burke, Corti, & Beilin, 1996; Mirmiran, Azadbakht, & Azizi, 2007; Pirouznia, 2001). However, many participants did not apply dietary guidelines on a daily basis due to a lack of capabilities and/or beliefs that it is important for adulthood. Worsley (2002) indicated that nutrition knowledge may play a small but pivotal role in the adoption of healthier dietary behaviours but indicated that food skills are important to enable knowledge to be put into practice.

Although adolescents ranked food skills as less important in comparison to the knowledge component of food literacy, they did recognise that food skills will be very important when they live independently which aligns with findings of another study (Colatruglio & Slater, 2016). Several participants stated that food skills were important in order to avoid the consumption of unhealthy foods such as take-away and prepacked foods. They believed that healthy foods cost much more than unhealthy but with good budgeting and cooking skills it was possible to consume healthy diets. A few studies have found that healthier eating habits do not cost more (Katz et al., 2011; Lee, Kane, Ramsey, Good, & Dick, 2016). Several reasons have been identified to explain the less importance of food skills attributed by adolescents.

Many participants indicated having low confidence in food preparation. Their food preparation practices were limited to simple, quick foods prepared mainly in the microwave or toaster which

aligns with another study (Sattler et al., 2015). It has been identified that cooking confidence has a significant influence on food preparation practices as well as increased purchasing of fresh foods, increased use of food labels when selecting foods, increased use of planned meals and fewer perceived time constraints (Ensaff, Canavon, Crawford, & Barker, 2015; Reid, Worsley, & Mavondo, 2015; Utter et al., 2016). However, lower cooking confidence and less food preparation frequency have been found to be associated with higher BMI (Utter et al., 2016) and poorer diet quality (Sattler et al., 2015). This could be due to adolescents having basic food skills such as baking (Ronto, Ball, Pendergast, & Harris, 2016b) and also preparing foods such as pancakes, cereal and other unhealthy foods rather than preparing nutritious meals (Sattler et al., 2015). Therefore, food and nutrition knowledge about dietary guidelines, adequate portion sizes and developing higher order food skills are important in order to develop healthy dietary behaviours in adolescents.

Many participants stated having not many food-related domestic responsibilities at home such as food purchasing, budgeting and food preparation. In contrast, a Canadian study showed that 63% of adolescents helped with meal preparation and 42% prepared and cooked meals by themselves (Slater & Mudryj, 2016). But it did not specify what 'meal preparation' meant as it could require basic food skills or more complex higher order skills. Many adolescents stated their parents did not involve them in family meal preparation due to time constraints and because of the mess they can make, the same reasons have been identified in other studies (Ensaff et al., 2015; Fulkerson et al., 2011). It has been stated that teaching adolescents food skills such as cooking and/or the importance of helping out in the kitchen can lead to increased self-efficacy in cooking and food preparation frequency and consequently reduced time in the kitchen for parents (Laska, Larson, Neumark-Sztainer, & Story, 2012; Santarossa, Ciccone, & Woodruff, 2015). A fear of failure also discouraged adolescents to prepare food at home which aligns with observations from HETs (Ronto et al., 2016a, b, c). Therefore, it is important that parents support and encourage adolescents in food preparation (Stephens, McNaughton, Crawford, & Ball, 2015).

A few adolescents critically analysed nutrition related information. But most students recognised that not all food and nutrition related sources are reliable. Adolescents stated they mostly trusted their parents and teachers in regard to nutrition information but only those teachers who taught food and nutrition related subjects. HETs stated that role modelling is very important for adolescents in regard to healthy dietary behaviours (Ronto, Ball, Pendergast, & Harris, 2016a) but only 25.8% of HETs agreed that teachers were role models in Australian high schools (Ronto et al., 2016c). Not many adolescents reported reading food labels with the main reasons being lack of knowledge on what information to look for and food labels being too complicated to understand. It has been found that nutrition knowledge relates to understanding of food labels (Grunert, Wills, & Fernández-Celemín, 2010) and has a strong influence on food label use (Drichoutis, Lazaridis, & Nayga, 2005). A systematic review found a consistent link between the use of nutrition labels and healthier diets (Campos, Doxey, & Hammond, 2011). Those students who did read food labels focused on information of fat, sugar, calories and serving sizes which aligns with another study indicating this was the main criteria when adolescents judged the healthiness of snacks (Bucher, Collins, Diem, & Siegrist, 2016). Food labels are a highly credible information source available to help adolescents select healthy foods therefore it is important to increase adolescents' knowledge and skills in food label reading and understanding.

Many participants ranked regular social eating experiences as a least important aspect, but they indicated that family and peers influenced their dietary behaviours in both negative and positive

ways. Most adolescents reported consuming healthier foods during family meals which aligns with other findings (Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000). It has been found that adolescents who shared family meals at least 3 or more times per week were more likely to have healthier dietary behaviours (Hammons & Fiese, 2011). Family meals have decreased in recent decades in particular among low socioeconomic backgrounds (Neumark-Sztainer, Wall, Fulkerson, & Larson, 2013). However, some adolescents reported that their parents were not encouraging healthy eating. Also, adolescents stated that their peers influenced their dietary behaviours mostly in a negative way. Adolescents indicated that positive attitude towards food preparation and healthy eating was very important in regard to their dietary behaviours. They stated that negative attitudes towards cooking and healthy eating leads to unhealthy dietary behaviours such as consumption of take-away and processed foods which aligns with other research (Colatruglio & Slater, 2016; Ronto et al., 2016c). Public health initiatives should focus more on improving the home food environment including positive role modelling by parents and peers (Reid et al., 2015; Stephens et al., 2015).

The findings showed that the home environment could play an important role in adolescents' dietary behaviours. However, several limitations within this setting have been identified, including an unsupportive environment for developing food skills such as cooking and confidence; some families influence adolescents' dietary behaviours in a negative way; and lack of regular social eating experiences. These results are consistent with existing literature that links a decrease of food literacy education in the home environment and parents becoming “de-skilled” regarding food preparation skills (Colatruglio & Slater, 2016; Larson, Perry, Story, & Neumark-Sztainer, 2006). Schools could play a vital role in filling this gap by ‘up-skilling’ adolescents (Lichtenstein & Ludwig, 2010). Also, this would enable adolescents to act as agents of change in the home environment (Ensaff et al., 2015; Hyland, Stacy, Adamson, & Moynihan, 2006). Adolescents indicated they would like to increase their food literacy through home economics which aligns with other studies (Stephens et al., 2015). Participation in home economics classes or similar has been associated with higher levels of food knowledge in adults suggesting that it could bring lasting learning and application of food literacy (Worsley, Wang, Yeatman, Byrne, & Wijayarathne, 2015).

5. Limitations

While this qualitative study has contributed to better understanding of adolescents' views on the importance of various aspects of food literacy that could influence their dietary behaviours, the study has some important limitations that should be acknowledged. First, adolescents were presented with 22 aspects of food literacy. There might be more aspects of food literacy that were not included in the present study. However, all investigators conceptualised food literacy to identify food literacy aspects based on current published literature (Fordyce-Voorham, 2011; Ronto et al., 2016c; Smith, 2009; Vaitkeviciute et al., 2015; Vidgen & Gallegos, 2014) and it was tested for face validity with experts from public health, nutrition and dietetics, and education. Second, adolescents were asked to choose only the six most and least important aspects of food literacy that could influence their dietary behaviours. However, a facilitator (RR) discussed most of the aspects in the qualitative component of the focus groups. Third, some aspects of food literacy have been explained to participants such as animal welfare and environmental sustainability. Most adolescents did not know what animal welfare was at the beginning of the focus group, but then they rated this aspect as very important for them in order to eat healthy. Fourth, only one investigator (RR) coded the data, so

a potential bias in identification of the codes may exist. To minimise this, the co-authors met on a regular basis to review codes and categories.

6. Conclusions

Food literacy education could play a critical role in enhancing adolescents' food literacy which consequently could influence their dietary behaviours and long-term health. Adolescents ranked food and nutrition knowledge aspects and positive attitude towards healthy eating as most important for them in order to eat healthy but most of them did not apply their knowledge due to lack of food skills. They emphasised the importance of food skills later in life when they live independently. Participants reported having limited opportunities to increase their food literacy. Due to lack of support in developing food literacy in particular food skills in the home environment, high schools could fill this gap and provide adolescents with an opportunity to increase their food literacy. Findings suggest that food literacy educators should focus more on application of food and nutrition knowledge. Future research could develop and quantitatively measure adolescents' food literacy and its impact on their dietary behaviours.

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Conflict of interest

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