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Title

Effectiveness of Australian cooking skill interventions

Abstract

Purpose-The aim of this scoping review was to assess the effectiveness of cooking skill interventions (CSIs) targeting adults to improve dietary intakes in public health nutrition settings.

Design/methodology/approach-A scoping review of the literature was used to identify and assess the quality and effectiveness Australian single strategy CSIs and multi-strategy programs that included cooking for independent healthy people 16 years plus from 1992 to 2015.

Findings-There were only fifteen interventions (n=15) identified for review and included CSIs as single strategies (n=8) or as part of multi-strategy programs (n=7) over 23 years. The majority of the interventions were rated as weak in quality (66%) due to their study design, lack of control groups, lack of validated evaluation measures and small sample sizes. Just over half (53%) of the CSIs reviewed described some measurement related to improved dietary behaviours.

Research implications-There is inconclusive evidence that CSIs are effective in changing dietary behaviours in Australia. However, they are valued by policy makers and practitioners and used in public health nutrition programs, particularly for Indigenous groups.

Originality-This the first time that CSIs have been reviewed in an Australian context and they provide evidence of the critical need to improve the quality CSIs to positively influence dietary behavior change in Australia.

Key words Cooking, skills, interventions, public health nutrition

Paper type Literature review

Introduction

Significant dietary contribution to the burden of disease evidence in Australia indicates a requirement for effective food and nutrition policy responses (Institute for Health Metrics and Evaluation, 2014). Public health nutrition programs are faced with multiple challenges in responding to complex issues such as obesity and food insecurity. Australian food and nutrition policy continues to acknowledge the need for food skills, particularly in vulnerable groups as one strategy to address all of these issues (Commonwealth Department of Health Housing and Community Services, 1992, Department of Health, 2012). The focusing on food skills has resulted from a concern related to deskilling and/or a devaluing of cooking skills and the potential contribution of this to poor diets and health outcomes (Banwell et al., 2005). The drivers for this concern are the perceived decline in cooking being taught within the home, a decline in home economics teaching food skills in schools and the impact of the current food environment with its focus on convenience and eating outside the home (Begley and Gallegos, 2010b).

The health sector has engaged with these concerns regarding the deskilling and/or devaluing of cooking skills by taking responsibility for up skilling populations with practical adjuncts to healthy eating. The recognition of continuing need to improve food skills has more recently steered public health nutrition to use the term food literacy (Murimi, 2013, Vidgen and Gallegos, 2014). Food literacy in the Australian context has been defined as being ‘composed of a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet needs and determine intake (Vidgen and Gallegos, 2014).⁵⁴ General interest in cooking in Australia appears high as an online survey found that two-thirds of adult food preparers wanted to learn more about cooking (Worsley et al., 2014a) and cooking from scratch was practiced (Worsley et al., 2014b) and this also legitimizes the

focus on cooking in policy responses. As a result of these factors, cooking skill interventions (CSIs) are increasingly employed as single strategies or stand alone or part of multi-strategy programs designed to improve dietary intakes. CSIs are defined for the purposes of this research as experiential learning strategies designed to increase the voluntary adoption of cooking from scratch or facilitate an increase in home cooking to improve dietary behaviours (Begley and Gallegos, 2010b). They include strategies such as cookbooks, tasting events, cooking demonstrations and classes and community kitchens as ways to improve attitudes, confidence and dietary behaviours.

The aim of this research was to assess the effectiveness of CSIs targeting adults to improve dietary intakes in public health nutrition settings such as community venues. The objectives were to a) identify the types of CSIs published, b) critique the quality of CSIs and c) assess their impact on confidence and dietary behaviours.

Method

The time frame chosen for this review was from launch of the National Food and Nutrition Policy Australia in 1992 (Commonwealth Department of Health Housing and Community Services, 1992), to programs accepted for publication in 2015. A scoping literature review was carried out to identify and classify the available literature. This type of review was selected as it presents a more narrative review in contrast with systematic reviews which synthesize and weigh evidence. The steps used were a combination of Arksey and O'Malley's methods (Arksey and O'Malley, 2005) in addition to more recent agreement that scoping reviews also need to include an assessment of quality when making comparisons between interventions or programs (Daudt et al., 2013).

Search strategy

Peer reviewed literature was identified by searching electronic bibliographic databases including key databases for public health research PubMed, Science Direct, ProQuest, Wiley Interscience, Expanded Academic ABI/Inform, OvidSP and Google Scholar) and those known to index Australian research (Informat/Australian Public Affairs). A combination of search terms including MeSH headings and keywords added were used. The advantage of a scoping review includes the use of a broad search strategy to identify all literature that would be useful to inform the research question including stand alone or single strategy CSIs (only cooking used as a strategy) and multi-strategy programs where CSIs was one of a number of strategies used in conjunction with nutrition education, supermarket tours etc. Key words included;

- a) Cook or cooking;
- b) Terms related to food skills such as culinary skills, food preparation, food making, food provisioning, food work and/or food literacy;
- c) Terms describing CSIs including interventions, programs, nutrition education, healthy lifestyle, demonstrations and/or classes;
- d) Australia or Australian.

The search strategy limitations were that cooking is not a term specifically related to health and therefore search strategies produce large results until the additional search terms and inclusion criteria are applied. There is also the consideration that early work may not be electronically indexed, however manual hand searching of reference lists was used to assess past intervention publication.

Eligibility criteria, classification of studies and data extraction

The titles and abstract of all studies were scanned according to the inclusion criteria by a research assistant and confirmed by the primary author. Included articles must have reported original research about a CSI related to improving dietary behaviours as a) a single strategy or b) as part of a multi-strategy program in community/public health settings aimed at independent healthy people over 16 years of age. Articles must have described details about the target groups, type of strategy and evaluation measures and results. Excluded articles included those that focused on a view point, not Australian, grey literature reports, were outside the scope of public health outcomes such as food service or food science, clinical or therapeutic interventions that included cooking. See Figure 1 for a description of the search strategy process. Data on key features of each CSI identified was extracted and summarized in Tables and ordered in date published.

Insert Figure 1

Quality assessment tools

Validated tools were used for assessing and reporting on the quality of CSIs and included an assessment of the intervention type, target groups, study design, evaluation data analysis and interpretation of results (Jackson and Waters, 2005, Armijo-Olivo et al., 2012). Data extraction was carried out according to the headings drawn from the Quality Assessment Tool for quantitative studies developed by the Effective Public Health Practice Project (Canada) (Effective Public Health Practice Project, 2009). For assessing the quality of qualitative studies, the Critical Appraisal Skills Programme (CASP) checklist was used (Better Value Healthcare Ltd, 2013). The primary outcome considered was change in dietary behaviours in the target groups. The primary author applied a quality rating of 1=weak, 2=moderate and 3=strong based on the applied criteria from the validated tools and this rating was then confirmed by the co-authors.

Results

Identification of CSIs

The initial search identified 1128 articles after removing duplicates with 22 articles meeting the inclusion criteria. Most studies were published in the last eight years and were conducted in different Australian states or territories with the exception of Tasmania.

Single strategy CSIs There were eight (n=8) single strategy CSIs identified from 12 articles reporting on this type (Table 1). Three single strategy CSIs including Quick Meals for Koories (Leahy, 2003, Gui and Lau, 2007) and Cooking classes for diabetes (Abbott et al., 2010, Abbott et al., 2012) and Jamie's Ministry of Food(JMoF) (Flego et al., 2013, Flego et al., 2014, Herbert et al., 2014) had multiple papers reporting on different aspects of the intervention and these were combined. The single strategy CSIs generally took the form of cooking demonstrations or cooking classes (n=7) (Ranson, 1995, Leahy, 2003, Gui and Lau, 2007, Moore et al., 2006, Abbott et al., 2010, Abbott et al., 2012, Jamieson and Heron, 2009, Foley et al., 2011, Flego et al., 2013) with one study reporting on community kitchens (Lee et al., 2010). Two of the CSIs incorporated the use of specifically designed cook books and recipes as an adjunct to the cooking class (Leahy, 2003, Gui and Lau, 2007, Jamieson and Heron, 2009). Five of the eight interventions targeted people identifying as Aboriginal and/or Torres Strait Islander.(Leahy, 2003, Gui and Lau, 2007, Moore et al., 2006, Jamieson and Heron, 2009, Abbott et al., 2010, Abbott et al., 2012, Commonwealth Department of Health Housing and Community Services, 1992, Institute for Health Metrics and Evaluation, 2014, Foley et al., 2011), two targeted vulnerable communities (Lee et al., 2010, Flego et al., 2013) with one program specifically targeting men (Ranson, 1995).

There were seven (n=7) multi-strategy programs that included CSIs as a strategy (Table 2), identified from 10 articles, however for three of the programs, Foodcent\$® original (Foley et al., 1997, Foley and Pollard, 1998) and Gofor2&5® (Pollard et al., 2009, Pollard et al., 2008) and FOODcents updated (Pettigrew et al., 2016, Pettigrew et al., 2015) there were multiple papers reporting on different aspects and these were combined. Cooking classes were the main type of CSI used as a part of five of the seven programs such as Foodcent\$®original and FOODcents updated which aimed to provide education on the value for money in healthy eating (Foley et al., 1997, Foley and Pollard, 1998, Higginbotham et al., 1999, Rowley et al., 2000, Fredericks et al., 2005). Recipe cards and a cookbook were the CSI used in the two of the programs including the Eat It To Beat It program (Glasson et al., 2012) and the Western Australian Go for 2&5® campaign from 2002-2005, aimed at increasing fruit and vegetable consumption among the general population (Pollard et al., 2008, Pollard et al., 2009). Five of the programs targeted communities in general; one was designed for workplaces (Higginbotham et al., 1999) and one specifically for parents (Glasson et al., 2012). The target groups varied from low income groups (Foley and Pollard, 1998, Foley et al., 2011, Higginbotham et al., 1999, Pettigrew et al., 2016) to the main meal preparer (Pollard et al., 2009, Pollard et al., 2008), and two programs specifically targeted people identifying as Aboriginal and/or Torres Strait Islander (Rowley et al., 2000, Fredericks et al., 2005).

Quality assessment of CSIs

The overall quality assessment of both single and multi-strategy programs incorporating CSIs was two thirds classified as weak quality (66%) and one third moderate quality (33%). None were rated high quality.

Single strategy CSIs Six of the interventions reported used a descriptive study design and three had a pre and post study design (Lee et al., 2010, Flego et al., 2013). None of the studies involved the use of randomized control groups with JMoF reporting using a quasi-experimental design with a non-randomised wait list control group (Flego et al., 2014, Flego et al., 2013). There was limited description of formative research, details on the program design, and use of an underpinning theoretical framework describing cooking skills and their relationship to dietary behaviours, or description of content, implementation fidelity or training and qualifications of facilitators. There was variable dosage of interventions from a single session (Jamieson and Heron, 2009) with several of the more recently published CSIs consisting of at least ten or ongoing sessions (Abbott et al., 2010, Abbott et al., 2012, Flego et al., 2013, Lee et al., 2010). None of the CSIs reported on the sustainability of the intervention.

The majority of the single strategy CSIs (88%) were rated as weak when assessed against the validated quality criteria tools. The main reasons this assessment was assigned was the lack of high quality study designs and use of control groups, insufficient rigorous evaluation processes including the measurement of dietary behaviour change and sample size considerations. In addition, scant description of the fidelity of the implementation of interventions, data collection and analysis methods were common. The exception was the JMoF which demonstrated a more rigorous approach to evaluation design and was rated moderate in quality (Flego et al., 2013, Flego et al., 2014).

Insert Table 1 here

Multi-strategy programs incorporating CSIs Six of the seven programs used a pre and post study design (Foley et al., 1997, Foley and Pollard, 1998, Higginbotham et al., 1999, Rowley et al., 2000, Fredericks et al., 2005, Glasson et al., 2012) and one reported on cross sectional

survey data (Pollard et al., 2009, Pollard et al., 2008) and no control groups were reported for any of the interventions. There was very limited description of formative research, details on the program design, and use of an underpinning theoretical framework to justify the use of cooking skills to improve dietary behaviours, or description of content, implementation fidelity or training and qualifications of facilitators of the cooking component.

In judging the overall quality of the seven multi-strategy programs incorporating CSIs, four were rated as moderate (57%). (Foley and Pollard, 1998, Foley et al., 2011, Pollard et al., 2009, Pollard et al., 2008, Glasson et al., 2012, Pettigrew et al., 2016) and three rated as weak (50%). (Higginbotham et al., 1999, Rowley et al., 2000, Fredericks et al., 2005) Weak ratings were assigned due to the lack of randomization in study design, lack of description about the CSI including the fidelity of implementation and lack of validated dietary assessment tools used or rigorous evaluation processes.

Insert table 2 here

Effectiveness of CSIs

Single strategy CSIs All interventions reported positive process evaluation including participant's enjoyment and positive attitudes to cooking. There was some evidence of change in confidence in five of the programs as they reported improved confidence and or motivation to cook at home (Ranson, 1995, Flego et al., 2014, Abbott et al., 2010, Moore et al., 2006), however there was no reporting of pre-intervention confidence in three of these CSIs. (Ranson, 1995, Moore et al., 2006, Foley et al., 2011).

Three CSIs reported on impact evaluation measuring dietary behaviour change. These relied on self-reported dietary behaviour change and sample sizes were small (Moore et al., 2006,

Abbott et al., 2010, Abbott et al., 2012) with the exception of JMoF. Improvements in dietary behaviours post intervention were found to be positive in the Cooking for diabetes classes (Moore et al., 2006) and variable in the other CSI reporting on cooking for diabetes (Abbott et al., 2010, Abbott et al., 2012). Only the Australian version of JMoF specifically measured change in self-reported vegetable intake along with other measures and was able to demonstrate statistically significant changes among a variety of the indicators used include an increase of 0.52 serves of vegetables as a result of the program (Flego et al., 2014). Description of the impact evaluation did not describe the validity and reliability considerations of the evaluation tool development with the exception of JMoF (Flego et al., 2013).

Multi-strategy programs incorporating CSIs There was limited process evaluation related to the CSI component with two programs reporting on improved confidence with cooking by participants in qualitative results (Fredericks et al., 2005, Pettigrew et al., 2016). Impact evaluation measuring dietary behaviour change was measured in five of the programs (83%), specifically by the administration of a questionnaire for self-reported changes in four programs (Foley et al., 1997, Foley and Pollard, 1998, Rowley et al., 2000, Fredericks et al., 2005, Pollard et al., 2009, Pollard et al., 2008). Only one program indicated using a validated dietary assessment tool (Glasson et al., 2012). Two of the programs reported on changes in physiological outcomes including weight and blood pressure (Higginbotham et al., 1999, Fredericks et al., 2005). Positive dietary behaviour change and changes in physiological measurements were reported as a result of the multi-strategy programs where measured, however there was no separate evaluation of the contribution of the CSI component to process evaluation or impact on confidence, cooking skills or changes in dietary behaviours provided.

Discussion

This review found 15 CSIs reported in the literature since the launch of Australia's Food and Nutrition Policy to 2015 conducted in public health settings with the intent of improving dietary behaviours. The evidence for including CSIs as a key strategy in food and nutrition policy is inconclusive because there are so few Australian single strategy CSIs or multi-strategy programs using CSIs reported in the 23 year time period. The lack of published research indicates that past CSIs results have not informed the ongoing improvement of CSIs effectiveness which could potentially lead to duplication of ineffective design and methods.

Quality

The majority of CSIs, both single and multistrategy programs, were rated as weak in quality when compared to known indicators of high quality intervention research (Effective Public Health Practice Project, 2009). Most interventions were generally a cooking class with descriptive or pre and post study design. There are a number of design and implementation factors in addition to the methodological quality of study design and evaluation that require further research to improve the effectiveness of CSIs. Most of the Australian CSIs were delivered for over a short duration (2-4 weeks) so it is difficult to confirm the number and frequency of sessions needed to develop skills and enable dietary behavior change. It would appear there has been insufficient effort in Australia to publish high quality CSI research to inform practitioners using CSIs as a public health nutrition strategy.

CSIs appear to be conflated in many instances as food literacy programs or contribution of cooking in multi-strategy programs are not clear (Cooper and Begley, 2011, Rees et al., 2012). If the focus is only on cooking without considering other food skills this is likely to be problematic as food literacy recognizes the broad range of knowledge and skills required to

plan, select, prepare and eat healthy foods (Vidgen and Gallegos, 2014). Further research is required on how CSIs can be designed to improve food literacy.

Effectiveness

Just over half of the interventions reviewed measured dietary behaviour change (57%). The lack of effectiveness evidence for improving dietary behaviours from Australia CSIs confirms similar results from other countries. Reviews in the UK (Rees et al., 2012) and Canada (Government of Canada, 2010) demonstrate large investment by the health sector in CSIs but these provide patchy evidence on their effectiveness in changing dietary behaviours. A systematic literature review found single strategy CSIs could be considered to be delivering a promising impact on dietary intakes but a number of factors limited a definitive conclusion (Reicks et al., 2014). This current review has provided some evidence that CSIs used in multi-strategy programs may contribute to improved dietary behavior but their level of contribution is not known.

The common factors affecting all CSIs in the reviews published to date are: lack of control groups; varying target groups; selection bias in attracting those more interested in cooking; and limited use of validated evaluation tools. (Reicks et al., 2014, Government of Canada, 2010, Rees et al., 2012). Studies identified in this review reported insufficient description of formative research, fidelity of implementation, and impact evaluation to draw on to guide investment decisions for the future. In addition, small sample sizes hampered the ability to draw generalisations based on the evaluations performed. There is previous evidence that health professionals in Australia use CSIs as part of their work activities but the impact on dietary intakes was rarely evaluated as it was often assumed (Cooper and Begley, 2011).

Cooking skills are recognised as a complex set of skills to measure (Short, 2003) so proxy measures are often used such as to measure cooking confidence as part of skill development. Higher confidence has been shown to be associated with liking cooking experiences, ability to cook a range of dishes and dietary behaviours (Stead et al., 2004, Wrieden et al., 2007, Reicks et al., 2014) It is challenging to measure a practical skill like cooking using paper-based questionnaires and there are extensive validity and reliability measures that need to be considered. It is however possible to design robust evaluation correlating changes in cooking skills with positive dietary behaviour change (Condrasky et al., 2011, Townsend et al., 2014, Wrieden et al., 2007). In addition there is a need to know about cost effectiveness of such interventions to compare policy investment options (Baral et al., 2013). Other important measures to consider are outcomes that impact on health such as increased social engagement, improved mental wellbeing and maintaining of food cultures (Stead et al., 2004). For example, community kitchen programs, where people come together to plan, cook and share meals have been developed to engage those more socially isolated and offer support networks (Iacovou et al., 2013). CSIs may have other benefits than just changing dietary behaviours for improved health that are not currently being measured.

Implications

Food skills or food literacy continue to be identified as food and nutrition policy strategies in Australia partly reflecting the ideology for the responsibility for dietary intakes being with the individual (Caraher and Seeley, 2010, Fordyce-Voorham, 2011). However consideration needs to be given to which target groups are more likely to benefit from these interventions. Monitoring data from the Department of Health in Western Australia in 2012 found that respondents reported that knowing more about preparing healthy foods (74.8%) and knowing more about cooking (59.9%) would help them and their families to eat a healthier diet

(Pollard et al., 2016). CSIs are likely to attract those interested in cooking and have resources such as transport to attend venues (Foley et al., 2011, Reicks et al., 2014, Pettigrew et al., 2015). Lessons learnt from others CSIs are that they are often targeted at those with the least resources who may lack the physical and material resources such as cooking tools and equipment. They also are targeted at low socio-economic groups who may not have the money to purchase high cost healthier foods to put into practice the knowledge and skills learned (Wrieden et al., 2007). In addition, the privileging of CSIs that focus on cooking-from-scratch or increasing the preparation of meals in-home may limit their applicability and real world viability without formative research to confirm this way people cook (Szabo, 2011, Vidgen and Gallegos, 2014).

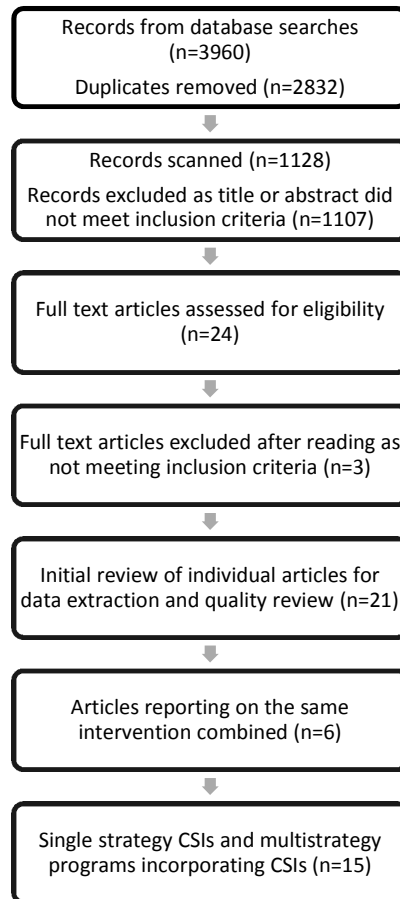
Within the Australian context, the number of programs targeting Aboriginal and/or Torres Strait Islanders reported reflects the need for localized program development where the community itself directs the strategies based on local values and experiences (Leahy, 2003, Gui and Lau, 2007, Fredericks et al., 2005, Rowley et al., 2000, Moore et al., 2006, Abbott et al., 2010, Abbott et al., 2012, Foley et al., 2011, Jamieson and Heron, 2009, Pettigrew et al., 2015). CSIs can provide a bridge over literacy issues, by using methods of observation and participation to deliver health messages aligning with traditional Indigenous learning styles (Main et al., 2000). However, for groups experiencing greater disadvantage such as Indigenous people, CSIs may be a flawed response to obesity and food insecurity concerns by assuming that a lack of skills is a major contributing factor and perpetuate an individual responsibility ideology. CSIs need to be incorporated into multi-strategy policy responses to environmental influences such as improving food accessibility and affordability.

Facilitator contribution to intervention effectiveness also needs to be considered. Few programs described and/or evaluated the training of the facilitators (Foley et al., 1997, Foley and Pollard, 1998, Lee et al., 2010). Dietitians were involved; however cooking is not an explicit competency in dietetic training in Australia (Begley and Gallegos, 2010a) and other health professionals such as indigenous health workers or peer educators need sufficient training and ongoing mentoring (Foley et al., 2011). Facilitator's knowledge and skills could be a contributing barrier to effectiveness because insufficient consideration is given to the complexity of cooking skills and the contextual influences on dietary intakes for different target groups. The lack of reporting of CSIs may indicate that it is possible that these are not considered legitimate work activity by professionals such as nutritionists and dietitians and problematic for professional identity (Begley and Gallegos, 2010a).

Conclusion

Reigniting interest and improving frequency of use of cooking skills appears relevant for improving dietary behaviours, addressing broader determinants of health and the building of a food culture, thereby ensuring that 'healthy choices are the easy choices'. The content and effectiveness of CSIs needs to be considered within a food literacy framework. Despite the lack of published evidence, policymakers and practitioners continue to invest in and deliver CSIs in Australia. Building an evidence basis is critical to providing evidence for policy makers and to guide health professionals in creating effective programs. It is imperative that evaluation of currently funded CSIs is published and that further research is undertaken to assess the effectiveness of CSIs in the Australian context.

Figure 1 Search strategy outcomes



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Table 1 Single strategy CSIs

Author Date	Program Title	Target Group, Study Design and Sample size	Formative Research	CSI Type Organizational Setting Learning Activities Duration	Facilitator	Theoretical Design	Evaluation Methods	Results Impact on Dietary intakes
Ranson 1995(Ranson, 1995)	Real Men Do Cook	Low SES Men aged 35 to 65 n=60 Descriptive design	Pilot program based on expressed need	Cooking classes- two hour session per week 4 weeks (8 hours) (some theory then demonstration then pairs cooking) Local high school home economics classroom/Community Centre	Dietitian	Not stated	Process- questionnaire at last class and group discussion Impact- telephone call 4 to 6 weeks after course	Increased confidence 95% cooked at least once since start of course, using one of the recipes regularly Ongoing networks of participants Dietary behaviours not evaluated
Leahy 2003(Leahy, 2003) Gui and Lau 2007(Gui and Lau, 2007)	Quick Meals for Kooris 2003	Urban Indigenous people n = 59 Descriptive design	Not stated	Cooking Demonstration & Class; meal shared and eaten (2 x 3 hour sessions) Family meals- fast and easy Feeding children and filling teenagers Budgeting and nutrition information covered	Variety	Not stated	Process- Phone-administered survey with those who had purchased resource	Resource seen as flexible & adaptable Dietary behaviours not evaluated
Moore et al. 2006(Moore et al., 2006)	Cooking Classes for Diabetes 2006	Indigenous people with diabetes & their families aged 20 to 79 n=44 (20% males) Descriptive design	Not stated	Cooking classes, assisting with catering for large events Duration not stated Technical college	Aboriginal teacher and diabetes health worker	Not stated	Process ('yarn up' held with participants) Impact- Questionnaires at end of course to assess knowledge	Enhanced motivation and confidence Enjoyment of social nature of classes, supportive group environment, classes fun Knowledge change not reported Self-reported increased consumption of healthy food Engagement seen as
Jamieson	Healthy	Indigenous males	Steering	Culturally appropriate	Aboriginal	Not stated	Process and Impact-	

2009(Jamison and Heron, 2009)	Cooking for Indigenous Youth 2009	(<i>n</i> = 6) aged 17-20 years Descriptive design	committee consultation, Youth Program Officers	healthy cooking Class (single session) to increase knowledge, confidence & skills. Go for 2&5 resources and Deadly Tucker cookbook used	Health Workers	Colour coded scoresheet questionnaire completed after the session assessing, rating of session, understanding of cooking methods, confidence to cook healthy meals	successful Dietary behaviors not evaluated Other results not stated
Abbott et al. 2010(Abott et al., 2010) and Abbott et al. 2012(Abott et al., 2012)	Cooking Classes for Diabetes 2010	Indigenous people with diabetes & their families (<i>n</i> = 73 attending ≥ 1 class) Descriptive design	Not stated	Cooking classes- 18 weeks for 4 hours duration 11 courses run between 2002-2008 Used technical college hospitality cooking skills curriculum- healthy eating on a budget Attendance ranged from 2 classes to 9 courses	Aboriginal teacher and diabetes health worker	Process and Impact- Qualitative interviews purposively sampled <i>n</i> =23	Self-reported improvements in nutrition knowledge and cooking skills but varied improvements in dietary behaviours. Confidence gained in cooking healthier meals and understanding of healthier cooking methods
Lee et al. 2010(Lee et al., 2010)	Frankston Mornington Peninsula Community Kitchens Project (2004 – 2009)	Vulnerable groups 62% on government welfare main income, 46% disability, 6% Aboriginal or Torres Strait Islander or South Sea Islander Pre and post study design	Not stated	17 community kitchens in local government areas	Trained facilitators with background in nutrition and/or cooking	Process evaluation Participants invited to participate in written survey and focus group before or after cooking sessions (<i>n</i> =63)	Able to engage vulnerable groups, flexibility important, enthusiasm for cooking developed Dietary behaviours not evaluated
Foley et al.	Workshop	Ten practical		Cooking workshops 3 times	Dietitians	Process- Qualitative	Strong process

2011 (Foley et al., 2011)	names not stated; funded by Pathways to Prevention Project of Mission Australia	cooking workshops for 3 existing ATSI community groups, including a young mothers group and 2 men's groups $n = 8-16$ (average 11 participants) Descriptive design	x 3-hour workshops or 4 times x 2-hour workshops <i>Deadly Tucker</i> recipe book provided to participants and supplemented with additional recipes Each workshop cost \$68 for food in addition to staff time	modelling healthy food preparation and eating mentioned	group discussion at final workshop facilitated by group leader	evaluation, enjoyed tasting and cooking new foods and recipes, learning new techniques, High motivation to cook at home Dietary behaviours not evaluated
Flego et al. 2013 (Flego et al., 2014, Herbert et al., 2014)	Jamie Oliver Ministry of Food Program, Australia 2011-2014	Program open to general public (> 12 years); evaluation will target > 18 years only Ipswich selected given significant low SES population and increasing levels of overweight and obesity. Non-randomised pre and post design (wait-list control group)	Cooking classes of 1.5 hour classes weekly over 10 week period Shop front building \$10 cost per class cost to participants	Program Logic Model focused on self-esteem, self-efficacy and experiential learning	Process and Impact- Quantitative measures- collected at baseline, program completion (10 weeks) and 6 months follow up using questionnaires. Non-randomised, pre-post design (wait-list control group) Qualitative – semi-structured interviews with 10-15 participants at successive time points	Primary outcome measures-statistically significant change in cooking confidence ($p < 0.001$) self-reported mean vegetable intake increase of 0.52 serves per day ($P < 0.0001$) Secondary outcome measures- change in individual cooking and eating behaviours were also statistically significant change in psychosocial measure e.g. cooking enjoyment

Table 2 Multi-strategy Interventions that include CSIs

Author Date	Program Title	Target Group, Study Design, sample size	Formative Research	CSI Type	Facilitator	Theoretical Design	Evaluation Methods	Results
Foley 1997(Foley et al., 1997); Foley 1998(Foley and Pollard, 1998)	Foodcents® Original 1992	Low income Pre and post study design (n=118)	Pilot program	Organisational Setting Learning Activities Duration Recipes & cooking classes included as one of three sessions (budgeting and shopping). Community setting 1Session for 2hours	Dietitians, trained Foodcents\$ Advisors	PRECEDE- predisposing, reinforcing and motivating factors Social cognitive theory self-efficacy	Process, Impact and Outcome	Six week impact- 35% of those attending budgeting and cooking session reported making dietary changes and 28% reported making spending changes, Questionnaire showed significant reduction in use of spread on bread and consumption of cakes.
Higginbotham et al. 1999(Higginbotham et al., 1999)	Coalfields Healthy Heartbeat (1990)	Low-income community Pre and post design study (n=200)	Mail administered survey of community needs	Cooking classes part of the Promoting healthy lifestyles component. Community Resources produced Healthy Budget Bites cookbook; Healthy Money Planner Duration unknown	Not stated	Not stated	Process and outcome	No specific evaluation of cooking classes Dietary behaviours not evaluated Reductions in mean diastolic BP and serum cholesterol; increases in mean BMI

Rowley et al. 2000(Rowley et al., 2000)	Looma Healthy Lifestyle (originally Looma Diabetes Program)	Target groups High-risk overweight and diabetic people (n=32 invention group) b) Wider community program (n=199 at baseline) Pre and post study design	Based on community self-identified needs	Healthy cooking classes Duration and hours not stated	Aboriginal Health Worker	Not stated	Process, impact and outcome evaluation over 4 years Self-reported dietary intakes, Measured body weight	No specific evaluation of cooking classes Significantly fewer persons reporting no attempts to lower intake of fat and/or sugar at two year and four year follow up (p<0.001)
Fredericks, Row Row and Weazel 2005(Fredericks et al., 2005)	Healthy Weight Program	Indigenous (n=13) Pre and post study design		Low fat cooking class including healthy and budget recipes Hours not stated All participant attended all sessions	Aboriginal Health Worker	Not stated	Process Impact- Questionnaire and anthropometric measurements (assessing food choices and activity levels)	Cooking component most enjoyable Self-reported increase in healthier food choices and general cooking confidence All participants lost some weight over the course of the program
Pollard et al 2008(Pollard et al., 2008); Pollard Lewis and Binns 2009(Pollard et al., 2009)	Go for 2&5® Campaign WA 2002-2005	Main meal preparer & household grocery shopper Cross-sectional CATI survey 2002-2005 2002/03 n=360 2005/06 n=1439	Pre campaign focus group research	Recipes cards at point of sale & point of sale promotion and Healthy Food Fast Cookbook	Developed by Dietitians	Adapted from Fishbein & Ajzen	Impact	Awareness and use of recipe cards & cookbook unknown. 90.2% aware of campaign in 2005 0.2 servings increase in fruit (NS) & 0.6 servings increase in vegetables (p<0.05)

	Eat It To Beat It Program	Parent of primary school aged children responsible for meal preparation Fruit & Veg \$ense Session Newsletters 2 and 5 weeks post session Pre and post study design (n=292)	Not stated	Recipe modification activity and cookbook included in 90 minute session	Peers	Combination of Social Cognitive Theory, PRECEED-PROCEED model, Stages of Change	Process and Impact using previously validated dietary assessment tool	Intervention group significantly increased knowledge of recommendations, serve sizes, reduced barriers to consumption and mean consumption of fruits and vegetables (p<0.001)
Glasson et al 2012(Glasson et al., 2012)								
Pettigrew et al 2014, 2015(Pettigrew et al., 2015)	FOODcents Updated 2011-2013	Low income and food secure groups Pre, post and follow-up study design (n=927) with n= 169 identifying as Aboriginal or Torres Strait Islander	Principles based on Foodcents® Original 1992 focusing on food budgeting and basic cooking skills as limitations	Variable single session 1-2 hours or multi-session up to eight sessions of 2 hours duration weekly basis including diet-disease relationship, healthy eating, food label reading, food budgeting, healthy lunchboxes and/or health cooking class	Health professionals	PRECEED-PROCEED model	Process, Impact and Outcome using a variety of survey instruments dependent on the duration and topics covered	Improved confidence to purchase healthy foods on a budget and improved dietary behaviours including increased serves of fruits and vegetables