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HEALTH AND SOCIAL DETERMINANTS AND OUTCOMES OF HOME COOKING: A SYSTEMATIC REVIEW OF OBSERVATIONAL STUDIES.

S. Mills, M. White, H. Brown, W. Wrieden, D. Kwasnicka, J. Halligan, S. Robalino, J. Adams

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Research review

Health and social determinants and outcomes of home cooking: A systematic review of observational studies

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ABSTRACT

Many dietary interventions assume a positive influence of home cooking on diet, health and social outcomes, but evidence remains inconsistent. We aimed to systematically review health and social determinants and outcomes of home cooking. Given the absence of a widely accepted, established definition, we defined home cooking as the actions required for preparing hot or cold foods at home, including combining, mixing and often heating ingredients. Nineteen electronic databases were searched for relevant literature. Peer-reviewed studies in English were included if they focussed mainly on home cooking, and presented post 19th century observational or qualitative data on participants from high/very high human development index countries. Interventional study designs, which have previously been reviewed, were excluded. Themes were summarised using narrative synthesis. From 13,341 unique records, 38 studies – primarily cross-sectional in design – met the inclusion criteria. A conceptual model was developed, mapping determinants of home cooking to layers of influence including non-modifiable, individual, community and cultural factors. Key determinants included female gender, greater time availability and employment, close personal relationships, and culture and ethnic background. Putative outcomes were mostly at an individual level and focused on potential dietary benefits. Findings show that determinants of home cooking are more complex than simply possessing cooking skills, and that potential positive associations between cooking, diet and health require further confirmation. Current evidence is limited by reliance on cross-sectional studies and authors' conceptualisation of determinants and outcomes.
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Abbreviations: ASSIA, Applied Social Science Index and Abstracts; CENTRAL, Cochrane Central Register of Controlled Trials; CINAHL, Cumulative Index for Nursing and Allied Health Literature; DARE, Database of Abstracts of Reviews of Effects; ERIC, Education Resource Information Centre; HMIC, Health Management Information Consortium; IBSS, International Bibliography of the Social Sciences; PAIS, Public Affairs Information Service; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PROSPERO, International Prospective Register of Systematic Reviews; UK, United Kingdom; USA, United States of America.

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1. Introduction

Many governmental and non-governmental organisations across the world promote home cooking as a key component of strategies to tackle obesity and poor quality diets. There is accumulating evidence of relationships between obesity and poor nutritional intake, and consuming convenience foods (Lobato, Costa, & Sichieri, 2009), and away from home food consumption (Beydoun, Powell, & Wang, 2009). There are indications of a range of potential dietary- and obesity-related benefits derived from home food preparation, such as reduced risk of obesity (Kramer et al., 2012) and consumption of a healthful dietary pattern (Simmons & Chapman, 2012). However, these possible advantages have largely been studied in specific sociodemographic subgroups rather than on a larger population scale, and have generally focussed on the shorter term. Establishing the evidence base for health and social outcomes of home food preparation is crucial for informing the likely relative value of home cooking interventions. Domestic cooking incorporates a range of complex behaviours with multiple influences, spanning a broad spectrum of practices (Short, 2003). Since the mid-20th century, people have been cooking less often from basic ingredients in developed countries (Möser, 2010; Smith, Ng, & Popkin, 2013). Furthermore, the typical demographic of those cooking has shifted, such that home food preparation is no longer as dominated by women as it once was (Cutler, Glaeser, & Shapiro, 2003). Developing a clearer understanding of who engages in home food preparation and why, is of importance to inform the rationale for, and targeting and tailoring of, healthy eating and home cooking interventions.

Two recent systematic reviews that appraised evidence on home cooking interventions found that the evidence base was dominated by poor quality studies, making conclusions hard to draw (Rees et al., 2012; Reicks, Trofholz, Stang, & Laska, 2014). Observational research into home food preparation may offer further insights, both regarding the characteristics of those currently participating in home cooking, and the potential outcomes of home cooking practices. However, to date no synthesis of observational research has been conducted. In order to fill this gap, we conducted a systematic review with the aim of assessing the health and social determinants and outcomes of home cooking.

2. Materials and methods

2.1. Protocol and registration

We registered the protocol for this review with PROSPERO International Prospective Register of Systematic Reviews (University of York Centre for Reviews and Dissemination, 2013) reference CRD4201401398 and documented deviations from the original research protocol in the online PROSPERO record. The review is described here according to recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009).

2.2. Search strategy

We searched the following electronic databases from inception through to December 2014: MEDLINE; Scopus; Web of Science; PsycInfo; Applied Social Science Index and Abstracts (ASSIA); Business Source Premier; CAB Abstracts; Cumulative Index to Nursing and Allied Health Literature (CINAHL); Cochrane Central Register of Controlled Trials (CENTRAL); Cochrane Database of Systematic Reviews; Database of Abstracts of Reviews of Effects (DARE); Embase; Education Resource Information Centre (ERIC); Health Management Information Consortium (HMIC); International Bibliography of the Social Sciences (IBSS); PubMed; Public Affairs Information Service (PAIS) International; Social Services Abstracts; and Sociological Abstracts. No language or date limits were used at this stage, and where possible searches were restricted to human studies. A sample search strategy for MEDLINE is shown in Appendix S1, which was adapted for use in other databases. We searched the internet, using the phrases 'home cooking' and 'home food preparation' in Google search engine and assessed the top 50 hits for each phrase. We also hand searched peer-reviewed journal special editions focussing on food preparation.

2.3. Selection criteria

2.3.1. Population

We included studies of children, adolescents, adults and elderly participants living in high/very high human development index countries (United Nations Development Program, 2014). We excluded studies that focussed on home cooking in relation to specific population groups (e.g. professional sportspeople), diseases or physical incapacities not generalizable to the wider population; specific dietary requirements such as those related to food allergies or intolerances; and food safety.

2.3.2. Context

Given the absence of a widely accepted, established definition, we defined 'home cooking' as the practices and skills for preparing hot or cold foods at home, including combining, mixing and often heating ingredients. This definition was developed through discussion between members of the research team, from a range of existing definitions of food preparation (McLaughlin, Tarasuk, & Kreiger, 2003; Winkler & Turrell, 2010), cooking (Chen, Lee, Chang, & Wahlqvist, 2012; Swanson et al., 2011), and home cooked meals (Gustafsson, Andersson, Andersson, Fjellstrom, & Sidenvall, 2003; Yannakoulia, Ntalla, Papoutsakis, Farmaki, & Dedoussis, 2010). For example, food preparation activity has been defined as 'the work performed on one or more foods prior to their consumption' (McLaughlin et al., 2003, p. 1507); cooking from scratch as 'being able to assemble a meal from basic ingredients' (Swanson et al., 2011, p. 2); and homemade meals as 'meals prepared from fresh ingredients, often cooked plain food' (Gustafsson et al., 2003, p. 239). Our definition aimed to highlight a degree of personal engagement with the task, without being too prescriptive to the extent that common home food preparation practices were excluded. The review was divided into two arms, namely the health and social *determinants* of home cooking (factors potentially influencing behaviour), and secondly the health and social *outcomes* of home cooking (possible benefits and disadvantages).

2.3.3. Setting

Our definition of 'home' included self-catered domestic arrangements, such as university accommodation and private households. We excluded studies that focussed on commercial locations such as restaurants; analysed specific dishes or food preparation techniques; or presented data on cooking practices prior to the 20th century.

2.3.4. Study design

We included observational studies presenting quantitative or qualitative data, with home cooking as a key focus. Only peer-reviewed studies published in English were included. Findings from interventional studies have recently been summarised (Rees et al., 2012; Reicks et al., 2014), therefore interventional study designs were excluded. Given that causal relationships could not be established by the included study designs, determinants and outcomes were putative only.

2.4. Study selection

We managed searches in EndNote version X7 and removed duplicate entries. In cases where a study was documented in more than one article, we gave preference to articles using methods higher in the hierarchy of research study design (Preventive Services Task Force, 1996). Titles and abstracts of retrieved articles were screened by the lead reviewer (SM) and 10% of articles were independently double screened by a second reviewer (one of JA, MW, WW, HB, JH and DK). We excluded articles that clearly did not meet the inclusion criteria. Where there was disagreement between reviewers (8.4% of decisions), articles were retained. Full texts of all retained articles were screened independently by the lead reviewer (SM) and one of JA, WW, HB, JH and DK, with disagreements resolved by discussion between the two reviewers, plus a third reviewer where consensus could not easily be reached.

2.5. Data abstraction and quality assessment

We developed a tailored data abstraction tool to record characteristics of included studies, using recommended guidance (Centre for Reviews and Dissemination, 2009; Higgins & Green, 2011) and an example of a previous tool (Community Preventive Services Task Force, 2014). Our tool included details on: study design, location, aims, setting, focus on determinants and/or outcomes of home cooking, time period, participant recruitment and demographics, and conclusions of the study authors. For quantitative studies, we recorded further data on the parameters compared, statistical techniques, and outcomes measured. For qualitative studies, we noted additional information on the study perspective, and the main themes identified. Data were abstracted by the lead reviewer (SM). A second reviewer (one of JA, WW, HB, JH and DK) checked and amended the record as required. The quality of all studies included in the review was appraised independently by two researchers (SM plus one of JA, WW, HB, JH and DK).

We assessed quantitative studies using the Effective Public Health Project tool which is recommended by the Cochrane Public Health Group (Thomas, Ciliska, Dobbins, & Micucci, 2004). Reviewers assessed each study in terms of strong, moderate or weak ratings against domains for selection bias, study design, confounders, blinding, data collection, and withdrawals/dropouts. These domain ratings were used to establish a global rating for the study, according to: no weak ratings plus at least four strong ratings equalled a strong global rating; one weak rating plus less than four strong ratings equalled a moderate global rating; two or more weak ratings equalled a weak global rating. Qualitative studies were assessed using a checklist combining items from a range of previous tools (Smith et al., 2009). Reviewers assessed each study with a yes or no decision for each of ten questions regarding the research question, methodology, recruitment, data collection, data analysis, description of findings, justification of conclusions, limitations, reflexivity and generalisability. Studies with a majority of yes assessments were rated of high quality. For both qualitative and quantitative studies, where discrepancies arose between reviewers' ratings, these were resolved through discussion.

2.6. Data synthesis

Due to high heterogeneity in the included study data, statistical meta-analysis was not appropriate. Guidance from the Economic and Social Research Council (Popay et al., 2005) was used to construct a narrative synthesis. This entailed synthesising the results of included literature; investigating relationships and associations within and between studies; noting the involvement of theory in development and analysis of included studies; analysing the robustness of the data synthesis; and constructing a conceptual model of the health and social determinants and outcomes of home cooking.

3. Results

3.1. Study characteristics

In total, 13,341 articles were screened for inclusion; 853 full text

articles were assessed for eligibility; and 38 studies met the inclusion criteria (see Fig. 1) (Moher et al., 2009). Since the majority of studies were cross-sectional, it was not possible to draw definitive conclusions regarding direction of effects. However, papers were classified into 'determinants' and 'outcomes' of home cooking on the basis of the implicit or explicit assumptions of the study authors. The majority (n = 21, 55%) of studies in the review focussed on the determinants of home food preparation only (Arredondo, Elder, Ayala, Slymen, & Campbell, 2006; Caraher, Dixon, Lang, & Carr-Hill, 1999; Costa, Schoolmeester, Dekker, & Jongen, 2007; Craig & Truswell, 1988; Diaz-Mendez & Garcia-Espejo, 2014; Engler-Stringer, 2010; Flagg, Sen, Kilgore, & Locher, 2014; Gatley, Caraher, & Lang, 2014; Harnack, Story, Martinson, Neumark-Sztainer, & Stang, 1998; Jones, Walter, Soliah, & Phifer, 2014; Kemmer, Anderson, & Marshall, 1998; Lo & Tashiro, 2011; Mercille, Receveur, & Potvin, 2012; Sealy, 2010; Slater, Sevenhuysen, Edginton, & O'Neil, 2012; Sliwa, Must, Perea, & Economos, 2015; Smith, Ng, & Popkin, 2014; Storfer-Isser & Musher-Eizenman, 2013; Szabo, 2012; Torp, Berggren, & Erlandsson, 2013; Virudachalam, Long, Harhay, Polsky, & Feudtner, 2014; Wang, Naidoo, Ferzacca, Reddy, & Van Dam, 2014); ten studies (26%) addressed both determinants and outcomes (Blake, Wethington, Farrell, Bisogni, & Devine, 2011; Da Rocha Leal, De Oliveira, & Pereira, 2011; Kramer et al., 2012; Larson, Story, Eisenberg, & Neumark-Sztainer, 2006; Laska, Larson, Neumark-Sztainer, & Story, 2012; Leech et al., 2014; Monsivais, Aggarwal, & Drewnowski, 2014; Smith et al., 2010; Swanson et al., 2011); and seven studies (18%) explored outcomes only (Appelhans et al., 2015; Chen et al., 2012; Chu, Storey, & Veugelers, 2014; Chu et al., 2012; Larson, Perry, Story, & Neumark-Sztainer, 2006; Simmons & Chapman, 2012; Wolfson & Bleich, 2015) (see Table 1).

Eighteen studies (47%) were based on data from the United States of America (USA) (Appelhans et al., 2015; Arredondo et al., 2006; Blake et al., 2011; Flagg et al., 2014; Harnack et al., 1998; Jones et al., 2014; Kramer et al., 2012; Larson, Perry, et al., 2006; Larson, Story, et al., 2006; Laska et al., 2012; Lo & Tashiro, 2011; Monsivais et al., 2014; Sealy, 2010; Sliwa et al., 2015; Smith et al., 2014; Storfer-Isser & Musher-Eizenman, 2013; Virudachalam et al., 2014; Wolfson & Bleich, 2015); seven (18%) from Canada (Chu et al., 2012, 2014; Engler-Stringer, 2010; Mercille et al., 2012; Simmons & Chapman, 2012; Slater et al., 2012; Szabo, 2012); five (13%) from the United Kingdom (UK) (Caraher et al., 1999; Diaz-Mendez & Garcia-Espejo, 2014; Gatley et al., 2014; Kemmer et al., 1998; Swanson et al., 2011) (one study included data from both the UK and France (Gatley et al., 2014), and one study included data from the UK and Spain (Diaz-Mendez & Garcia-Espejo, 2014)). Three studies (8%) were from Australia (Craig & Truswell, 1988; Leech et al., 2014; Smith et al., 2010), and one from each of: the Netherlands (Costa et al., 2007), Portugal (Da Rocha Leal et al., 2011), Singapore (Wang, Naidoo, Ferzacca, Reddy, & Dam, 2014), Sweden (Torp et al., 2013) and Taiwan (Chen et al., 2012) (see Table 1). Studies varied greatly in sample size. Four studies (11%) included in the review were exclusively quantitative longitudinal cohort studies (Appelhans et al., 2015; Chen et al., 2012; Craig & Truswell, 1988; Laska et al., 2012) and 21 (55%) were exclusively quantitative cross-sectional studies (Arredondo et al., 2006; Caraher et al., 1999; Chu et al., 2012, 2014; Da Rocha Leal et al., 2011; Diaz-Mendez & Garcia-Espejo, 2014; Flagg et al., 2014; Harnack et al., 1998; Kramer et al., 2012; Larson, Perry, et al., 2006; Larson, Story, et al., 2006; Lo & Tashiro, 2011; Mercille et al., 2012; Monsivais et al., 2014; Sliwa et al., 2015; Smith et al., 2010, 2014; Storfer-Isser & Musher-Eizenman, 2013; Swanson et al., 2011; Virudachalam et al., 2014; Wolfson & Bleich, 2015). Two quantitative studies (5%) presented both cross-sectional and longitudinal data (Blake et al., 2011; Leech et al., 2014) (see Table 2). Eleven studies in the review (29%) were qualitative, involving interviews and/or focus groups, six of which were cross-sectional (Costa et al., 2007; Engler-Stringer, 2010; Gatley et al., 2014; Sealy, 2010; Szabo, 2012; Wang et al., 2014) and five longitudinal (Jones et al., 2014; Kemmer et al., 1998; Simmons & Chapman, 2012; Slater et al., 2012; Torp et al., 2013) (see Table 3).

Five (13%) studies exclusively involved individuals aged less than 16 years (Chu et al., 2012, 2014; Da Rocha Leal et al., 2011; Kramer et al., 2012; Leech et al., 2014); three (8%) involved adults, and children 16 years and under (Larson, Story, et al., 2006; Laska et al., 2012; Simmons & Chapman, 2012); and 30 (79%) involved only individuals aged at least 16 years (Appelhans et al., 2015; Arredondo et al., 2006; Blake et al., 2011; Caraher et al., 1999; Chen et al., 2012; Costa et al., 2007; Craig & Truswell, 1988; Diaz-Mendez & Garcia-Espejo, 2014; Engler-Stringer, 2010; Flagg et al., 2014; Gatley et al., 2014; Harnack et al., 1998; Jones et al., 2014; Kemmer et al., 1998; Larson, Perry, et al., 2006; Lo & Tashiro, 2011; Mercille et al., 2012; Monsivais et al., 2014; Sealy, 2010; Slater et al., 2012; Sliwa et al., 2015; Smith et al., 2010, 2014; Storfer-Isser & Musher-Eizenman, 2013; Swanson et al., 2011; Szabo, 2012; Torp et al., 2013; Virudachalam et al., 2014; Wang et al., 2014; Wolfson & Bleich, 2015). Beyond the standard qualitative analysis techniques such as Grounded Theory (Glaser & Strauss, 1967), four studies explicitly used theory in the development of their research design or advanced analysis of the data (Costa et al., 2007; Kramer et al., 2012; Swanson et al., 2011; Wang et al., 2014). Overall, qualitative studies included in the review focussed more on the determinants than the outcomes of home cooking, in comparison with quantitative studies. Qualitative studies were also more likely to address the social than the health aspects of home food preparation. However, the main themes identified from both qualitative and quantitative studies were in agreement and drew complementary conclusions.

We developed a conceptual model demonstrating the tentative relationships indicated by studies included in this review, shown in Fig. 2. The model is based upon Dahlgren and Whitehead's Determinants of Health model, showing domains for determinants in terms of: non-modifiable factors; individual factors; social and community networks; and general socio-economic, cultural and environmental conditions (Dahlgren & Whitehead, 1991). Line arrows between themes indicate relationships supported by evidence from studies in the review; thickened arrows have evidence from at least five studies in the review; and dotted arrows show relationships supported by research evidence (referenced), but not specifically from studies in the review.

3.2. Quality appraisal

Quality appraisal of qualitative studies resulted in high ratings for all studies (see Table 4). The criterion least frequently satisfied was reflexivity; this considered whether authors reflected on the relationship between research and participants adequately, and whether ethical issues were addressed. Overall, quality ratings for quantitative studies were uniformly weak (see Table 5). Ratings for study design and blinding were generally weak, and for the majority of studies (which were cross-sectional), the withdrawals/dropouts criterion was not applicable.

3.3. Determinants

Findings from studies addressing the determinants of home food preparation are presented in detail in Table 2 (quantitative data) and Table 3 (qualitative data), and illustrated in the upper half of the conceptual model (see Fig. 2). We identified a large number of inter-related influences on home cooking perceptions and practices, supported by varying levels of research evidence. In

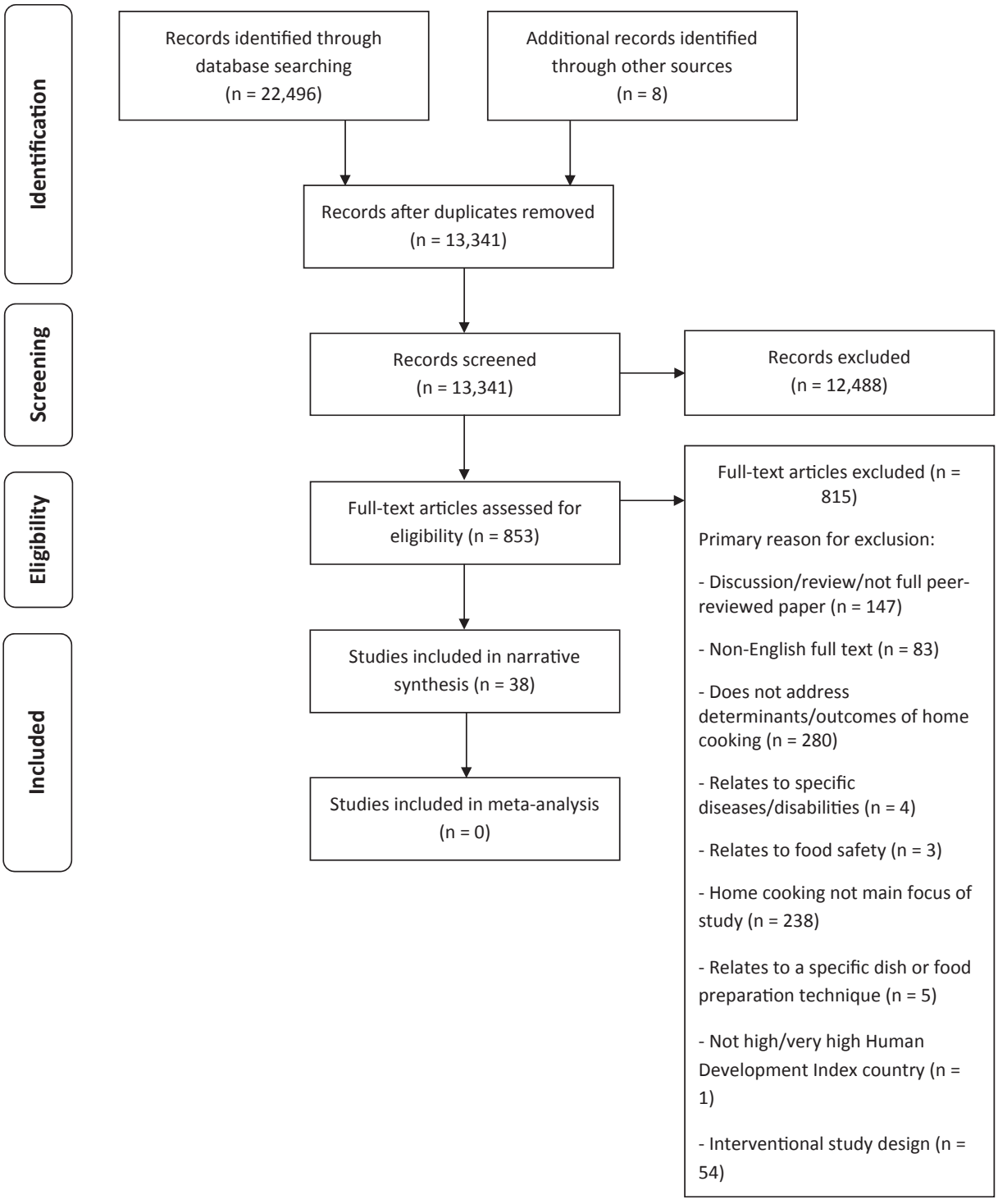


Fig. 1. Search results, reported according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement (Moher et al., 2009).

terms of non-modifiable factors, frequency of home cooking did not increase linearly with age (Larson, Story, et al., 2006). A large body of research focussed on the relationship between gender and home food preparation behaviour. Women and girls were more likely than men and boys to be involved with cooking (Caraher et al., 1999; Da Rocha Leal et al., 2011; Flagg et al., 2014; Harnack et al., 1998; Larson, Story, et al., 2006), feel confident cooking (Caraher et al., 1999; Da Rocha Leal et al., 2011), and to pass on their skills to children (Caraher et al., 1999). A study of male home cooks showed food preparation was often perceived as both a chore and a leisure activity (Szabo, 2012).

With regards to individual factors, self-assessed cooking skills were linked to motivation to cook (Engler-Stringer, 2010; Jones et al., 2014), and being overweight was associated with greater involvement in food preparation (Larson, Story, et al., 2006). Personal aspirations, interests and roles interlinked with several determinants of home cooking: the roles of wife, girlfriend and mother were associated with a perceived responsibility to provide

Table 1
Characteristics of the 38 studies included in this review of observational studies of the determinants and outcomes of home cooking.

Reference, country	Aim of study	Study design	Main focus of study: D and/or O[a]	Recruitment	Characteristics of sample eg age (years), ethnicity, SES, BMI	Sample size (% female)
Arredondo et al., 2006, USA	To examine the influence of meal decision making and preparation on Hispanic women's dietary practices	Cross-sectional survey	D	Random-digit dialing	Mean age approx 40; Hispanic women; 79% married; 49% employed	357 (100%)
Caraher et al., 1999, UK	To identify how, why and when people use cooking skills; where and from whom people learn these skills	Cross-sectional survey	D	1993 Health & Lifestyle Survey: random address sampling throughout England	Age range 16–74; nationally representative	5553 (unknown)
Costa et al., 2007, Netherlands	To conduct an analysis of the motives behind the choice of meal solutions	Qualitative laddering interviews	D	Adverts in newspapers/ supermarkets/students' residences	Age range 20–87; mean 52	50 (80%)
Craig & Truswell, 1988, Australia	To study the food habits of young adults and how they change at the time men and women begin living together after marriage	Longitudinal cohort study	D	List of engagements in Sydney Morning Herald newspaper	Age range 20–33, median 23 females; age range 21–37, median 25 males; mostly Australian born; well educated; relatively high SES occupations	120 (50%)
Diaz-Mendez & Garcia-Espejo, 2014, Spain and UK	To analyse time dedicated to eating and cooking in Spain and UK	Cross-sectional survey	D	Multinational Time Use Study (University of Oxford) and Time Use Survey (Instituto Nacional de Estadistica)	Age >16	Not stated
Engler-Stringer, 2010, Canada	To understand how social and physical food environments (the foodscape) shape daily food and cooking practices	Qualitative focus groups	D	Posters displayed in key neighbourhoods; personal contacts of research team members	Age range 18–35; urban; French-speaking Quebecoise; low-income women	22 (100%)
Flagg et al., 2014, USA	To examine the extent to which gendered division of labour persists within households in USA regarding meal planning, preparation and food shopping	Cross-sectional survey	D	US National Health And Nutrition Examination Survey (NHANES)	Age >20; mean approx 50; married or living with partner	3195 (46%)
Gatley et al., 2014, France and UK	To examine and compare current domestic food practices in Britain and France	Qualitative interviews	D	Personal, employer and institutional contacts; snowball sampling	Age range 23–73; mean 45; 50% participants French, 50% British	27 (44%)
Harnack et al., 1998, USA	To determine the role of men in meal-related tasks in households with both a male and female head; to identify households in which the man is more likely to be involved	Cross-sectional survey	D	US Department of Agriculture 1994 Continuing Survey of Food Intakes of Individuals	Households with both a male and female head	1204 (unknown)
Jones et al., 2014, USA	To identify motivators and barriers to preparing foods at home amongst young adults	Qualitative focus groups	D	Not stated	Age range 18–25; students at Abilene Christian University and Baylor University, Texas	239 (unknown)
Kemmer et al., 1998, UK	To examine the changes that take place in couples' eating habits and food related activities when they begin to live together	Qualitative interviews	D	Not stated	Age range 19–33; married or cohabiting couples	44 (50%)
Lo & Tashiro, 2011, USA	To examine how nutritional concerns, luxurious tastes, and value of time affect time allocation decisions for food preparation	Cross-sectional survey	D	American Time Use Survey (ATUS): random selection from households completing last round of Current Population Survey	Age range 18–65	57,708 (56%)
Mercille et al., 2012, Canada	To examine the determinants of self-efficacy related to food preparation using store-bought food, and whether self-efficacy is associated with household food insecurity	Cross-sectional survey	D	Systematic selection from housing list	Age range 18–64; mean 38; responsible for household food shopping; French-speaking women	107 (100%)
Sealy, 2010, USA	To explore the attitudes and practices of minority parents regarding their food choices for themselves and their children	Qualitative focus groups	D	Flyers posted at large not-for-profit organisations serving minority groups	Age range 26–54; African American, Caribbean and Hispanic parents; children aged 6-12	34 (76.5%)
Slater et al., 2012, Canada	To examine the aetiology of employed mothers' food choice and food provisioning decisions	Qualitative interviews	D	Posters at libraries and community centres	Middle-income; employed; mothers of elementary school-aged children	11 (100%)
Sliwa et al., 2015, USA	To estimate the relationship between employment, acculturation, and time spent in food preparation and family dinner	Cross-sectional survey	D	American Time Use Survey (ATUS): random selection from households completing last round of Current Population Survey	Age range 18–65; at least 1 child <13yrs; Hispanic origin women	3622 (100%)
Smith et al., 2014, USA	To examine the effects of state-level unemployment rates during 2008 recession on patterns of home food preparation and away from home eating among low income and minority populations	Cross-sectional survey	D	American Time Use Survey (ATUS): random selection from households completing last round of Current Population Survey	Age >18 years	118,635 (unknown)
Storfer-Isser & Musher-Eizenman, 2013, USA	To examine the psychometric properties of nine quantitative items that assess time scarcity and fatigue as parent barriers to planning and preparing meals for their children	Cross-sectional survey	D	Email from the National Association of Mothers' Centres; flyers to child care centres; snowball sampling e.g. Facebook and word of mouth	Age range 21–50 years; mean 35; mostly Caucasian; well educated; high SES; children aged 2-6	342 (94%)

(*continued on next page*)

Table 1 (*continued*)

Reference, country	Aim of study	Study design	Main focus of study: D and/or O[a]	Recruitment	Characteristics of sample eg age (years), ethnicity, SES, BMI	Sample size (% female)
Szabo, 2012, Canada	To investigate the relationship between cooking and leisure among Canadian men with significant household cooking responsibilities	Qualitative interviews	D	Not stated	Age range 26–58; men; mostly high SES; 50% white and 50% other ethnicities	30 (0%)
Torp et al., 2013, Sweden	To identify Somali women's experiences of cooking and meals after immigration to Sweden	Qualitative focus groups	D	Invitation letter sent to purposefully sampled individuals	Age range 25–36; mothers; immigrated to Sweden	6 (100%)
Virudachalam et al., 2014, USA	To measure the prevalence of cooking dinner at home in USA and test whether home dinner preparation habits are associated with SES, race/ethnicity, country of birth and family structure	Cross-sectional survey	D	US National Health And Nutrition Examination Survey (NHANES)	Age >18	10,149 (55%)
Wang, Naidoo, Ferzacca, Reddy, & Van Dam, 2014, Singapore	To understand how food-related decisions are made by women of varying educational levels from the major ethnic groups in Singapore	Qualitative focus groups	D	Telephone invitation to participants of the Singapore Consortium of Cohort Studies	Age range 30–55; mean 46; Chinese, Indian, or Malay women; varying educational level	130 (100%)
Appelhans et al., 2015, USA	To determine whether baseline levels and longitudinal changes in meal preparation and clean-up time are associated with changes in cardio-metabolic risk factors in midlife women	Longitudinal cohort study	O	Women enrolled in Study of Women's Health Across the Nation (SWAN)	Age baseline 42–52; mean 46; women; range of ethnicities	2755 (100%)
Chen et al., 2012, Taiwan	To investigate the association between cooking behaviour and long-term survival among elderly Taiwanese	Longitudinal cohort study	O	Elderly Nutrition and Health Survey in Taiwan, 1999–2000	Age >65; free-living; nationally representative	1888 (unknown)
Chu et al., 2012, Canada	To examine the association between frequency of assisting with home meal preparation and fruit and vegetable preference and self-efficacy for making healthier food choices among children in Canada	Cross-sectional survey	O	Stratified random sampling of elementary schools with grade 5 students	Age 10–11; representative across SES spectrum	3398 (51%)
Chu et al., 2014, Canada	To examine the associations between home meal preparation involvement, and diet quality and food group intake among children in Canada	Cross-sectional survey	O	Stratified random sampling of elementary schools with grade 5 students	Age 10–11; representative across SES spectrum	3398 (51%)
Larson, Perry, et al., 2006, USA	To describe food-preparation behaviours, cooking skills, resources for preparing food, and associations with diet quality among young adults	Cross-sectional survey	O	Second wave of the longitudinal Project Eating Among Teens (EAT)	Age range 18–23; mean 20	1710 (55.3%)
Simmons & Chapman, 2012, Canada	To explore parents' and teens' perspectives on the significance of being able to cook	Qualitative interviews	O	Posters; pamphlets; referrals; advert in a local weekly paper; key informant; part of larger multi-site project	Age range teens 13–18 and adults 30–59; diverse range in SES	22 families (unknown)
Wolfson & Bleich, 2015, USA	To examine national patterns in cooking frequency and diet quality among US adults, overall and by weight loss intention	Cross-sectional survey	O	US National Health And Nutrition Examination Survey (NHANES)	Age >20 years	9569 (51%)
Blake et al., 2011, USA	To investigate how the food choice coping strategies of employed parents are related to their behavioural contexts and dietary intake	Cross-sectional survey and cohort study	D & O	Random-digit dialing	Age range 23–56; mean approx 37; range of ethnicities; low/moderate income urban; working >2 h/week; children <17yrs; income <$60,000	56 (55%)
Da Rocha Leal et al., 2011, Portugal	To assess the cooking habits and skills of adolescents and the association with adherence to Mediterranean diet	Cross-sectional survey	D & O	7th, 8th and 9th grade school students in a village school	Age mean 13.5; public school; semi-urban	390 (55.1%)
Kramer et al., 2012, USA	To investigate the relationships between home food preparation/environment and adolescent BMI in African American youth	Cross-sectional survey	D & O	14 recreational centres as part of the Baltimore Healthy Eating Zones study	Age range 10–15; mean 11; African American; low SES; mean BMI percentile 70.4	240 (55.8%)
Larson, Story, et al., 2006, USA	To describe adolescent involvement in preparing and shopping for food and examine if extent or involvement is related to food quality	Cross-sectional survey	D & O	Longitudinal Project Eating Among Teens (EAT)	Age range 11–18; mean 15; range of ethnicities; 34.3% middle school, 65.7% high school	4746 (49.8%)
Laska et al., 2012, USA	To examine whether involvement in food preparation tracks over time, and 10-year longitudinal associations between home food preparation, dietary quality and meal planning	Longitudinal cohort study	D & O	Three waves of the Project Eating Among Teens (EAT)	Age range 15–28; mean I 16, mean II 20 and mean III 26; range of ethnicities and SES	1312 (57.6%)
Leech et al., 2014, Australia	To examine cross-sectional and longitudinal associations between family food involvement, family dinner meal	Cross-sectional survey and cohort study	D & O	Health, Eating and Play Study (HEAPS)	Age baseline mean 11, follow-up mean 14; range of SES; mostly English-speaking	Baseline 947; follow-up

Table 1 (*continued*)

Reference, country	Aim of study	Study design	Main focus of study: D and/or O[a]	Recruitment	Characteristics of sample eg age (years), ethnicity, SES, BMI	Sample size (% female)
	frequency and dietary patterns during late childhood					188 (unknown)
Monsivais et al., 2014, USA	To quantitatively assess associations among amount of time habitually spent on food preparation and patterns of self-reported food consumption, food spending, and frequency of restaurant use	Cross-sectional survey	D & O	Seattle Obesity Study: random sample of households	Age mean 54; majority white (81%)	1319 (67.4%)
Smith et al., 2010, Australia	To describe the involvement of young adults in meal preparation; to determine characteristics of young adults involved in meal preparation; to investigate whether this impacts on diet quality	Cross-sectional survey	D & O	Childhood Determinants of Adult Health study	Age range 26–36; mean 31 males and 32 females	2814 (55.5%)
Swanson et al., 2011, UK	To investigate which socio-cognitive determinants in the Theory of Planned Behaviour predict maternal feeding motivations to carry out behaviours, and which behaviours relate to children's dietary quality	Cross-sectional survey	D & O	10 General Practice lists from the two most deprived deciles in two Scottish NHS Health Board areas	Age range 18–34; mean 25; mothers of children aged 2	300 (100%)

BMI, body mass index; D, determinant of home cooking; NHS, National Health Service; O, outcomes of home cooking; SES, socio-economic status.
[a] Studies presented by determinants (D) in author alphabetical order, then outcomes (O), then both determinants and outcomes (D & O).

enjoyable, nutritious meals for the household (Engler-Stringer, 2010), and could cause conflict with personal growth and satisfaction (Slater et al., 2012). In contrast, home cooking was also linked with an aspiration to achieve personal goals (Costa et al., 2007), and interest in both learning cooking skills (Da Rocha Leal et al., 2011), and nutrition and food prices (Lo & Tashiro, 2011). Previous experience of home food preparation showed an inconsistent relationship with cooking later in life (Laska et al., 2012; Leech et al., 2014). The role of financial resources in home cooking behaviour and desire to save money was explored in several studies, which indicated the importance of affordability (Engler-Stringer, 2010; Jones et al., 2014; Mercille et al., 2012). Time was also found to be an important resource – constraints encouraged shortcuts in food choice decisions, and created a barrier to meal planning and preparation (Gatley et al., 2014; Jones et al., 2014; Sealy, 2010; Storfer-Isser & Musher-Eizenman, 2013). Employment and children's after-school activities were also shown to present a potential obstacle to home cooking (Sliwa et al., 2015; Smith et al., 2010; Wang et al., 2014), with personal prioritisation of convenience associated with less time spent in home food preparation (Monsivais et al., 2014).

With regards to social and community networks, personal relationships showed a strong impact on home cooking practices. Being married was found to be associated with greater food preparation at home (Blake et al., 2011), although the relative contributions of wives and husbands varied between studies (Craig & Truswell, 1988; Kemmer et al., 1998), and single men and women were more likely than those married to have sole responsibility for meal preparation (Smith et al., 2010). Learning to cook from caregivers or personal role models was an important determinant of behaviour (Da Rocha Leal et al., 2011; Jones et al., 2014), especially for healthy food preparation techniques (Kramer et al., 2012). In terms of household composition, having dependents at home was linked with increased home cooking (Blake et al., 2011; Virudachalam et al., 2014) and higher frequency of participating in family meals was associated with greater adolescent participation in food preparation (Larson, Story, et al., 2006).

Regarding general socio-economic, cultural and environmental conditions, potential relationships between socio-economic status (SES) and home food preparation behaviour varied between studies, with both lower (Larson, Story, et al., 2006; Virudachalam et al., 2014) and higher (Smith et al., 2010) SES associated with greater involvement in home cooking. Culture and ethnicity were identified as strong influences on food choices (Sealy, 2010), with both immigrants (Virudachalam et al., 2014), and Asian Americans (Larson, Story, et al., 2006), living in the USA more likely to be engaged in home cooking than other Americans. Social transformation over time, such as economic recession, may also have resulted in a differential impact on meal sourcing decisions according to cultural background (Diaz-Mendez & Garcia-Espejo, 2014).

3.4. Outcomes

Evidence from studies included in the review regarding potential outcomes of home cooking is shown in the lower half of the conceptual model (see Fig. 2). The majority of findings were at the level of the individual, and most studies focussed on putative dietary benefits of home cooking (Blake et al., 2011; Chu et al., 2012, 2014; Da Rocha Leal et al., 2011; Larson, Perry, et al., 2006; Larson, Story, et al., 2006; Laska et al., 2012; Leech et al., 2014; Monsivais et al., 2014; Smith et al., 2010; Swanson et al., 2011; Wolfson & Bleich, 2015). These included a trend towards higher Healthy Eating Index score (Blake et al., 2011); greater fruit and vegetable preference and healthy eating self-efficacy (Chu et al., 2012); higher Diet Quality Index-International score and intake from healthier food groups (Chu et al., 2014); improved adherence to a Mediterranean diet using the KIDMED index (Da Rocha Leal et al., 2011); improved adherence to Healthy People 2010 dietary intake objectives (Larson, Perry, et al., 2006); enhanced nutrient intake (Larson, Story, et al., 2006; Wolfson & Bleich, 2015); intake from healthier food groups (Laska et al., 2012; Monsivais et al., 2014; Smith et al., 2010); consumption of a healthful dietary pattern (Leech et al., 2014); and improved adherence to Balance of Good Health (now Eatwell Guide) criteria (Swanson et al., 2011).

Potential advantages in terms of greater control over the food supply were also noted (Simmons & Chapman, 2012). However, caveats included inconsistent tracking of associations between home cooking and putative dietary benefits over time (Laska et al., 2012; Leech et al., 2014), and more favourable associations for men

Table 2
Summary of the 27 quantitative studies included in this review of observational studies of the determinants and outcomes of home cooking.

Reference	Parameters compared	Statistical techniques	Outcomes measured	Reported results	Authors' conclusions
Appelhans et al., 2015	Meal preparation/clean-up time; odds of meeting criteria for metabolic syndrome and its individual diagnostic components	Mixed-effects logistic and ordered logistic models	Metabolic syndrome status, IFG, abdominal obesity, hypertriglyceridemia, low HDL, hypertension	Adjusted OR: time × change in meal preparation/clean-up for no. metabolic syndrome diagnostic components = 1.409, for metabolic syndrome status = 1.608	Women who spent more time preparing and cleaning up meals at baseline, or showed greater increases in this activity, had greater increases over time in odds of metabolic syndrome and odds of meeting individual diagnostic components
Arredondo et al., 2006	Household decision-making style (alone 'traditional' vs. Family 'shared') and household activity (decides meals, prepares meals, decides snacks)	Multiple logistic regressions	Household decision-making style, dietary intake, height, weight, BMI, outcome expectancies for eating a healthful diet, barriers to low fat and high fibre intake, behavioural strategies to reduce fat and increase fibre, types of meals eaten, acculturation	Shared vs. traditional decision-making for meal preparation: employment = X^2 7.29, $p < 0.006$, increasing age = t −1.99, $p < 0.04$ and shared vs. traditional decision-making for meal decision-making: acculturation = t −2.70, $p < 0.007$	Women who were employed, and older, were more likely to be in shared decision-making households for meal preparation; women who were more acculturated were more likely to be in shared decision-making households for meal decision-making; women in shared decision-making households faced greater psychosocial barriers to healthful eating and reported less healthy eating
Blake et al., 2011	Work and family conditions, socio-demographics, eating behaviour, dietary intake	Chi squared, Fisher's exact tests, ANOVA, hierarchical cluster analysis (Ward's method)	Clusters of food choice coping strategies: Individualised Eating; Missing Meals; Home Cooking	Home Cooking cluster vs. Individualised Eating cluster or Missing Meals cluster: more married $p < 0.05$, fewer with partner working >20 h/week $p < 0.01$, more children at home $p < 0.01$, trend towards higher HEI	Individualised Eating and Missing Meals clusters were characterised by non-standard work hours, a working partner, single parenthood, family meals out of home, quick food rather than a meal, convenience entrees, missing meals and individualised eating. Home Cooking cluster had more married fathers with non-employed spouses and more home cooked family meals
Caraher et al., 1999	Gender, SES, income group, level of qualifications	Chi squared	Source of learning to cook, frequency of cooking, application and confidence with cooking techniques, barriers to food choices	76% women and 58% men learned to cook from their mother; 68% women cook every day and 18% men; in single person households 74% cook most/nearly every day; 94% women and 80% men feel fairly/very confident to cook from basic ingredients	A widespread lack of confidence exists to cook certain foods and apply techniques. Women are most often the source of learning to cook; they cook more frequently and with greater confidence; and generally bear the burden of cooking for the household
Chen et al., 2012	Gender, age, marital status, education, lifestyle factors, frequency of cooking	Chi squared, Cox proportional hazards ratio	Lifespan (survivorship)	Cooking >5 times/week vs. never adjusted HR 0.59; women benefitted more than men with decreased HR 51% vs. 24% when most compared to least cooking	Cooking frequently favourably predicted survivorship; highly frequent cooking may favour women more than men
Chu et al., 2012	Frequency of home meal preparation, fruit and vegetable preference, healthy eating self-efficacy, socio-demographics	Random effects regression	Frequency of home meal preparation, fruit and vegetable preference, healthy eating self-efficacy	30% children helped with meal preparation at least daily; fruit preference β0.74 and vegetable preference β1.02 and self-efficacy β2.88 for cooking several times per day vs. never cooking	Fruit and vegetable preference and healthy eating self-efficacy increased with increasing frequency of helping to cook at home; teaching children how to prepare simple and healthy meals in health promotion programmes could potentially improve dietary habits
Chu et al., 2014	Frequency of home meal preparation, energy intake, dietary indicators	Random effects regression	Frequency of home meal preparation, DQI-I, servings of fruit and vegetables, grain products, milk, and meat	Children involved in meal preparation at least daily ate one more serving per day of fruit and vegetables; showed higher intakes of grain/milk/meat food groups; and consumed an additional 245 kcal compared with those who never helped	Higher frequency involvement in home meal preparation was associated with healthier diets, with higher DQI-I scores, and greater intake of healthy food groups; encouraging parents to involve their children in meal preparation could be a viable health promotion strategy
Craig & Truswell, 1988	Frequency of preparing any meal, frequency of preparing meal for both spouses, frequency of preparing meal for	Descriptive statistics	Self-report of food purchasing after marriage, food prep after marriage, food consumption, preferred foods, concerns about foods	After 2.5 years of marriage, the number of shared meals was reduced, except for the evening meal which remained the focus	Wives prepared meals more frequently than their husbands, and the difference increased over time married; wives used recipes more frequently than

Table 2 (*continued*)

Reference	Parameters compared	Statistical techniques	Outcomes measured	Reported results	Authors' conclusions
	self, use of recipes, how learned to cook			meal at which to influence a spouse's eating habits	their husbands; overall wives took the major responsibility for food purchasing and preparation, although husbands also played a significant role
Da Rocha Leal et al., 2011	Socio-demographics, Mediterranean diet adherence (KIDMED score), cooking knowledge, enjoyment, frequency and aspirations	Student's t-test, Mann-Whitney test, Pearson's and Spearman's correlation coefficients, Chi squared	Mediterranean diet index (KIDMED score)	Adolescents who cooked did so 1–4 times/month and learned mainly from family (87.9%) or by themselves (7.9%); girls were more likely to have cooked foods listed in the questionnaire	Adolescents with higher KIDMED scores were younger, knew how to cook better, cooked more often, enjoyed cooking, would like to cook more frequently, and would like to learn how to cook better
Diaz-Mendez & Garcia-Espejo, 2014	Gender, age, marital status, education, employment, area of residence, age of youngest child, time spent eating at home, in food preparation and eating outside the home	Multiple linear regression; logistic regression	Association between socio-demographic variables and time spent eating at home, in food preparation, and eating outside the home	Spain: decrease in population proportion preparing food, from 66% in 2003 to 61% in 2010, and decrease in time spent cooking from 78 to 49 min/day UK: static population involvement at 75% and approximately stable amount of time spent cooking at 61 min/day	Changes in eating habits were not linear over time and were affected by moments of intense social transformation e.g. economic recession; this imposed specific eating habit trends and generated new forms of social differentiation; in both countries involvement in home food preparation was associated with being female, older, physically inactive, living with a partner, having children at home, and low level of education
Flagg et al., 2014	Socio-demographics, household and family structure	Multinomial logistic regression	Meal planning/preparing and food shopping	6% men and 40% women, and 7% men and 36% women reported main responsibility for meal planning/preparing and food shopping respectively; 68% those reporting main meal planning/preparation status also reported main food shopping status	Women were more likely to take primary responsibility than to share, and less likely to have no responsibility, in meal planning/preparing and food shopping; the majority of women and men reported sharing in both meal planning/preparing and food shopping
Harnack et al., 1998	Age of male head of household, household income, employment status of female head of household, household size	Frequency distributions; logistic regression analyses	Odds of male head of household being involved in meal planning, shopping or preparation	For men, 23%, 36% and 27% men were involved in meal planning, shopping and preparation respectively; equivalent proportions for women were 93%, 88% and 90%	Men in lower income and smaller households were more likely to be involved in each of the meal activities; younger men and those in households with a female head in full-time work were more likely to be involved in meal planning and preparation; targeting the female head in dual-headed households may be the most effective nutrition education strategy
Kramer et al., 2012	Psycho-social characteristics, household factors, adolescent and caregiver food preparation behaviours	Multiple linear regression	Adolescent BMI; food preparation behaviour	Adolescent children of caregivers using healthier cooking methods were more likely to use healthy cooking methods themselves, and less likely to be overweight/obese; more meals prepared by a caregiver was predictive of higher BMI in adolescents	Meals prepared at home in African American households did not necessarily promote healthy BMI in youth; both frequency and healthfulness of meals are important for effective health promotion
Larson, Perry, et al., 2006	Food preparation, skills/resources for preparing foods, socio-demographics	Chi squared, mixed regression models	Probability of meeting Healthy People 2010 dietary objectives	Lack of time was most common barrier to food preparation (36%); those reporting frequent food preparation ate less fast food and were more likely to meet guidelines for fat, calcium, fruit, vegetables and whole-grain consumption	Food preparation was not performed by the majority of young adults even weekly; men, African Americans, and those living in campus housing were significantly less likely to prepare food frequently; lower perceived adequacy of skills and resources for food preparation was related to race (African American/Hispanic) and student status (part-time/not in education)
Larson, Story, et al., 2006	Socio-demographics, weight status	General linear modelling;	Frequency of involvement in shopping/preparing food and dietary intake	Many adolescents helped prepare dinner (68.6%) and shopped for groceries (49.8%) at	Higher frequency of preparing food was related to lower intakes of fat, and higher intakes

(*continued on next page*)

Table 2 (*continued*)

Reference	Parameters compared	Statistical techniques	Outcomes measured	Reported results	Authors' conclusions
		Spearman correlation		least once during the past week; greater involvement was related to being female, middle school education level, Asian American race, low SES, high family meal frequency and being overweight	of fruit and vegetables, fibre, folate and vitamin A; adolescents may benefit from interventions that teach skills for cooking and making healthful purchases
Laska et al., 2012	Food preparation, socio-demographics, dietary quality	Descriptive statistics, linear regression	Food preparation practices, dietary behaviours	Most women (80%) and men (73%) in their mid-late 20 s enjoyed cooking, and they were more likely to have prepared food as 'adolescents' and 'emerging adults'	Emerging adult (but not adolescent) food preparation predicted better dietary quality in mid-late 20 s with higher intakes of fruit and vegetables, dark green/orange veg, and less sugar-sweetener beverages and fast-food
Leech et al., 2014	Family food involvement, frequency of family dinner meals	Factor analysis (PCA), multiple linear regression, paired and independent t-tests, Pearson's chi squared	Dietary patterns	In cross-sectional analyses for boys, family food involvement score ($\beta = 0.55$), and eating family dinner meals daily vs. less than daily ($\beta = 1.11$), during late childhood were positively associated with a healthful dietary pattern; eating family dinner meals daily vs. less than daily was inversely associated with an energy-dense pattern ($\beta = -0.56$)	No evidence of effects of involvement in family food or eating dinner with the family in cross-sectional analyses for girls, or persisting longitudinally into adolescence for either gender
Lo & Tashiro, 2011	Education, income, household size, ethnicity	Tobit & Heckman's sample selection models controlling for zero time spent on food preparation	Time spent preparing food at home, time spent obtaining food away from home	High family income and long hours worked increased time allocation to food away from home (luxury and opportunity cost of time outweighed nutritional concerns); high education reduced time spent preparing food at home, yet increased participation in this activity and time spent obtaining food away from home (luxury and opportunity cost of time outweigh nutritional concerns)	Older age, being female and larger household size were positively associated with time spent cooking at home; time allocation decisions varied greatly by race and ethnicity; individuals concerned more with nutrition or price than luxury devoted more time to preparing food cooked at home
Mercille et al., 2012	Household food insecurity, household composition, food supplies, lifestyle characteristics and socio-demographics	Multiple linear regression	Self-efficacy in healthy, and general, food preparation	Regression models accounted for 31% self-efficacy in healthy food preparation and 15% general food preparation; severe household food insecurity was inversely associated with both self-efficacy scores	Lower self-efficacy in food preparation was linked to food insecurity and obesity, particularly in more severe cases
Monsivais et al., 2014	Socio-demographics, food consumption, food spending, restaurant use	Descriptive statistics; multivariable regression, Pearsons chi squared, ANOVA, general linear modelling	Time spent on food preparation, cooking and clearing up	Greater amount of time spent on home food preparation was associated with indicators of higher diet quality including increased intake of fruit and vegetables, salads and fruit juices; spending less than 1hourr/day on food preparation was associated with significantly higher spending on food away from home and more regular use of fast food restaurants	People spending the least amount of time on food preparation were usually working adults with high priority on convenience; time may be an essential ingredient in the production of healthier eating habits among adults
Sliwa et al., 2015	Time spent in food-related behaviours	Regression models; chi squared; adjusted Wald tests; pairwise t-tests	Food preparation time, family dinner eating time	Working for 8 h/day was associated with spending 38 fewer minutes in food preparation; this relationship was not modified by acculturation	Length of time spent in food preparation varied by ethnic origin group, and being US-born was associated with spending less time; mothers with longer work days spent less time on food preparation but not less time sharing family dinners
Smith et al., 2010	Socio-demographics, physical activity, time spent television viewing	ANOVA; Chi squared; log multinomial regression	Involvement in meal preparation; diet quality	65% women had sole responsibility for meal preparation and 23% shared, for males this was 29% and 27%; men with sole responsibility had higher intake of lean meat and	A higher level of involvement in meal preparation was not consistently associated with improved diet quality; differences in dietary quality by meal preparation were only

Table 2 (*continued*)

Reference	Parameters compared	Statistical techniques	Outcomes measured	Reported results	Authors' conclusions
				alternatives; women with shared responsibility had higher intake of vegetables and dairy	small; strategies to increase involvement in meal preparation may not be sufficient to markedly improve diet
Smith et al., 2014	State-level unemployment, poverty, ethnicity, age, education, household composition, individual employment status, time pre/post-recession	Multinomial logistic regression; log binomial regression	Time spent cooking, away from home consumption patterns	High state-level unemployment was associated with only trivial increases in cooking patterns and virtually no change in away from home consumption patterns; low income and ethnic minority groups were not disproportionately affected	Recession-related unemployment did not have a strong influence on food preparation and eating practices; even during a major economic downturn, food-related behaviours were resistant to change
Storfer-Isser & Musher-Eizenman, 2013	No Time to Eat Healthy scale, Fatigue scale, Role Overload scale, Healthy Environment/Availability subscale, food frequency, BMI	Descriptive statistics; Spearman's correlation	Exploratory factor analysis and principal axis factoring for parent time scarcity and fatigue as barriers	Internal consistency was acceptable for both time and energy for meals ($\alpha = 0.82$) and meal planning ($\alpha = 0.90$) scales	Time and energy for food-related activities appeared to be a unique and distinct construct from general fatigue and time scarcity; this may be more important than meal planning for child nutrition
Swanson et al., 2011	Balance of Good Health plate score, TPB items, parental smoking, breastfeeding, television-viewing, playing outside	Descriptive statistics, regression analyses, Pearson's r, Mann-Whitney U	Intended/actual/recommended provision of breakfast, cooking from scratch, and providing proper sit down meals	TPB socio-cognitive factors (intentions, perceived behavioural control) significantly predicted provision of breakfast, cooking from scratch and providing proper sit down meals	Mothers of children with poorer quality diets were less likely to provide breakfast, cook from scratch and provide proper sit down meals; modifying maternal motivations and attitudes could help to improve feeding behaviours
Virudachalam et al., 2014	Poverty level, education, gender, age, race/ethnicity, country of birth, household composition	Bivariable and multivariable regression	Frequency of cooking dinner at home	8% population never, 43% sometimes and 49% always cooked; lower household wealth and educational attainment were associated with a higher likelihood of either always or never cooking; 5 dinners were cooked per week on average	Black households cooked the fewest dinners; foreign-born households cooked more frequently than US-born; households with dependents cooked more frequently than those without
Wolfson & Bleich, 2015	Cooking frequency, weight loss intention, socio-demographics	Multivariable regression	Total kJ/day, grams of fat, sugar and carbs/day, fast-food meals/week, frozen meals or pizza and ready meals in past 30 days	8% households cooked 0–1 times/week, 44% 2–5 times/week, 48% 6–7 times/week; compared with low cookers (0–1 times/week), more frequent dinner cookers (6–7 times/week) had lower daily energy consumption (9054 vs. 9627 kJ), lower fat (81 vs. 86 g) and lower sugar (119 vs. 135 g) intake	Cooking dinner frequently at home was associated with consumption of a healthier diet, whether or not trying to lose weight; individuals trying to lose weight consumed fewer kJ than those not seeking weight loss, regardless of household cooking frequency

ANOVA, analysis of variance; BMI, body mass index; DQI-I, diet quality index-International; HDL, high density lipoprotein; HEI, healthy eating index; HR, hazard ratio; IFG, impaired fasting glucose; kcal, kilocalories; kJ, kilojoules; OR, odds ratio; PCA, principal components analysis; SES, socio-economic status; TPB, theory of planned behaviour; US, United States.

compared to women (Leech et al., 2014). Furthermore, correlations between potential advantages arising from involvement in home cooking may not have been of sufficient magnitude to generate clinically important dietary benefits for health (Smith et al., 2010).

In terms of health outcomes, greater home cooking frequency amongst the Taiwanese was associated with longer lifespan, particularly for women (Chen et al., 2012). In contrast, amongst US women more time spent on home food preparation and associated clean-up at baseline, or increased involvement over time, was linked with an adverse cardio-metabolic profile (Appelhans et al., 2015). Healthier cooking practices employed by a caregiver were linked with reduced risk of overweight or obese body mass index (BMI) in adolescents (Kramer et al., 2012).

Regarding gender and cultural identities, home cooking was found to confer the possibility of exploring current and new food cultures (Simmons & Chapman, 2012). Gender identity and ethnic and cultural belonging were also influenced by cooking and eating patterns, and acculturation potentially led to perceived loss of cultural roles and traditions (Torp et al., 2013). In terms of personal relationships, evidence suggested home food preparation may have helped to assist connections with others, and increased independence amongst adolescents (Simmons & Chapman, 2012).

4. Discussion

To our knowledge, this is the first study to systematically review evidence regarding the putative determinants and outcomes of home food preparation, unrelated to a specific intervention. The proposed conceptual model in Fig. 2 shows the multiple, interacting relationships involved in home cooking, and the variable strength of supporting evidence. A range of themes that may contribute to determining home food preparation practices were identified, at the level of non-modifiable factors; individual factors; social and community networks; and general SES, cultural and environmental conditions. The evidence base was strongest for potential associations between each of gender; time availability and employment; personal relationships; and culture and ethnicity, with home food preparation. Women and girls were more likely

Table 3
Summary of the 11 qualitative studies included in this review of observational studies of the determinants and outcomes of home cooking.

Reference	Main study focus	Authors' reported themes
Costa et al., 2007	Motives behind choice of meal solutions	Made by me; fresh; daily task; low cost; shared; simple – concrete attributes of homemade meals Good health; pleasure; be active; self-esteem; do my duty; achievement; care for others; harmony; belonging; freedom; performance – self-relevant values influencing meal choice
Engler-Stringer, 2010	Cooking practices and the influence of social and physical food contexts	Gender roles – according to position in the household Planning and organising food preparation – requirements and differences by type of meal Foods, food choice and skill – including traditional foods, experimentation and using different cooking skills Learning – acquiring cooking skills from individuals, and use of media and technology Cooking and health – importance and challenges of nutrition and healthy eating Grocery shopping – priorities including price, quality and availability; patterns of shopping and challenges
Gatley et al., 2014	Comparison of domestic food practices	Remembrance of meals past – childhood food and meals, and differences from current meals Cooking as a significant activity – potential importance of home cooking and other possible meal solutions Cooking skills and confidence – learning to cook and confidence to prepare a meal Contemporary domestic cooking practices – foods cooked regularly Everyday scheduling of modern life – influences on choice of foods to cook at home Cooking and gender –household cook and any sharing of responsibilities Cooking for social occasions – role and involvement in social eating Cooking traditions: change and continuity – usual practices and international cooking styles
Jones et al., 2014	Motivators and barriers to preparing foods at home	Desire to save money – conserving finances Positive model in food preparation – parental role model Familiarity with cooking techniques – confidence in food preparation Time to shop, cook and clean up after meals – impact on practices
Kemmer et al., 1998	Eating habits and food related activities before and after marriage/cohabitation	Continuities and changes – food shopping, cooking and eating patterns Food preparation and purchase: responsibility and control – individual and shared responsibilities Food choice: negotiating and deciding – providing and accounting for preferences Effects of living together – weight, health and alcohol intake
Sealy, 2010	Attitudes and practices regarding food choices	Ethnicity and culture – childhood eating habits; influence on food, cooking methods and meals Time constraints – impact on food shopping, preparing food, and meals
Simmons & Chapman, 2012	Perspectives on food in the family and significance of being able to cook	Control and self-reliance – autonomy in food selection and providing in the face of scarce resources Connecting to others – considering family's preferences, learning to cook with family, and socialising Family culinary continuity and departure – maintaining family food habits and breaking with traditions Independence – adolescents gaining autonomy and responsibility for their own food preparation
Slater et al., 2012	Food choices and food provisioning	Preparing good, healthy food consistently takes more time than is available – negative impact on ability to cook It is important to accommodate family members' likes and dislikes when planning and preparing food – compromises to feed the family Families should eat together – importance and challenges of shared mealtimes Food choices can have an important effect on personal health – challenges to consuming a healthy diet The good mother – providing food for and promoting the nutritional health of the family Independent self – women coping with time commitments away from family food provisioning Busy, cohesive family – managing time demands of employment and children's extra-curricular activities
Szabo, 2012	Relationship between cooking and leisure	Creating a gustatory and auditory leisure space – combining cooking with symbols of leisure Combining the domestic and the social – sharing the cooking process with others Taking one's time – benefits of leisurely cooking Childcare and leisurely cooking – challenges of combining food preparation with responsibility for children Gender/class/ethno-racial background and family approach to cooking – intersection of background characteristics and influence on cooking
Torp et al., 2013	Experiences of cooking and meals after immigration	Change in routines and content of daily meals – differences in cooking routines, meal content and regularities Changed experiences related to cooking and shopping for groceries – differences in ingredients, taste and pace of food shopping and cooking Social dimensions in food related occupations – missing interaction with family and neighbours through food Loss of identity and change of roles – reduction in Somali culture and changing gender roles
Wang, Naidoo, Ferzacca, Reddy, & Van Dam, 2014	Food provision and food choice decision-making	Employment presents a barrier to cooking – inverse association between women working and cooking Children's after school activities limit time for meal preparation – activities as a deterrent to cooking Ready availability of cheap, affordable prepared food provides an alternative to cooking – food available at hawker centres and food courts

Acknowledgement that eating at home is healthier and more hygienic – preferences for home-prepared food
Affordable domestic workers support women with children – domestic workers and responsibility for cooking
Ethnic differences in women's attitude towards cooking – expectations particularly of Malay women
Children's preferences influence their mother's food decisions – satisfying children's like and dislikes
Women try to meet the food preferences of all members of the family – rotating favourite dishes across meals
The ready availability of affordable prepared food provides a convenient way for women to meet the diverse food preferences of all family members – an option instead of women cooking
Some women recognise the need for providing healthy foods to children – provision of healthy foods as a mother's responsibility
Schools, through nutrition education, can potentially influence mothers' food decisions – children as a conduit for nutrition guidance
Not wasting food: a value – strategies to minimise food waste

than men and boys to be involved in home cooking (Caraher et al., 1999; Da Rocha Leal et al., 2011; Flagg et al., 2014; Harnack et al., 1998; Larson, Story, et al., 2006); people with restrictions on time or working longer hours cooked less frequently than those with greater leisure time availability (Sliwa et al., 2015; Smith et al., 2010; Wang et al., 2014); and those cohabiting with a partner or children were more likely to prepare food at home (Blake et al., 2011; Virudachalam et al., 2014). Home cooking was also found to be intimately linked with cultural background and identity. Evidence also supported a putative association between female gender and personal aspirations, interest, and role in domestic food preparation (Engler-Stringer, 2010; Kemmer et al., 1998; Slater et al., 2012).

Overall, studies included in the review suggested that home cooking may be linked with positive outcomes, including the development of personal relationships, establishing stronger gender or cultural identities, and enhanced diet and health indicators. The volume of evidence was greatest at the level of the individual, and in support of potential associations between home food preparation and positive dietary markers. Due to the generally low strength of evidence, combination of findings from quantitative and qualitative studies, and exclusion of interventional studies, causal relationships cannot be established.

Our finding of limited evidence in terms of the potential outcomes of home cooking is consistent with that of a recent systematic review of UK adult home cooking interventions (Rees et al., 2012). Although the majority of evidence from the interventions review was inconclusive, due to a lack of high quality evaluations, the single well-conducted evaluation showed minimal dietary improvements, and no benefits to cooking knowledge, attitudes or physical health. However, participants did enjoy the cooking intervention, mostly for social reasons (Moynihan, Zohoori, Seal, Hyland, & Wood, 2006). A second systematic review, including both UK and non-UK adult cooking interventions, suggested a positive impact on main outcomes for health, diet, and cooking knowledge/skills, confidence and attitudes (Reicks et al., 2014). However, rigorous evaluation was again lacking, and in common with our review, outcome measures were often studied only in the short term (Reicks et al., 2014).

4.1. Strengths and limitations of studies included in the review

The cross-sectional design of the majority of included studies prevented inference of cause and effect, thereby limiting the conclusions drawn regarding determinants and outcomes of home cooking. Most of the outcome measurements used, such as dietary indicators, were undertaken as short term assessments, whereas longitudinal studies with extended assessments would provide more information on potential associations over time.

Only five included studies provided an explicit definition of home cooking (Chen et al., 2012; Da Rocha Leal et al., 2011; Diaz-Mendez & Garcia-Espejo, 2014; Gatley et al., 2014; Swanson et al., 2011), hence the same behaviours were not necessarily compared between studies. The putative determinants and outcomes selected for study were also disparate, emphasising the importance of clearer theories to inform hypothesis testing for future studies.

The examination of extensive national datasets in a number of included studies (Appelhans et al., 2015; Caraher et al., 1999; Chen et al., 2012; Diaz-Mendez & Garcia-Espejo, 2014; Flagg et al., 2014; Harnack et al., 1998; Lo & Tashiro, 2011; Sliwa et al., 2015; Smith et al., 2010, 2014; Virudachalam et al., 2014; Wolfson & Bleich, 2015) provided the opportunity to explore a range of potential determinants and outcomes related to home food preparation. Several other studies also benefited from large participant sample

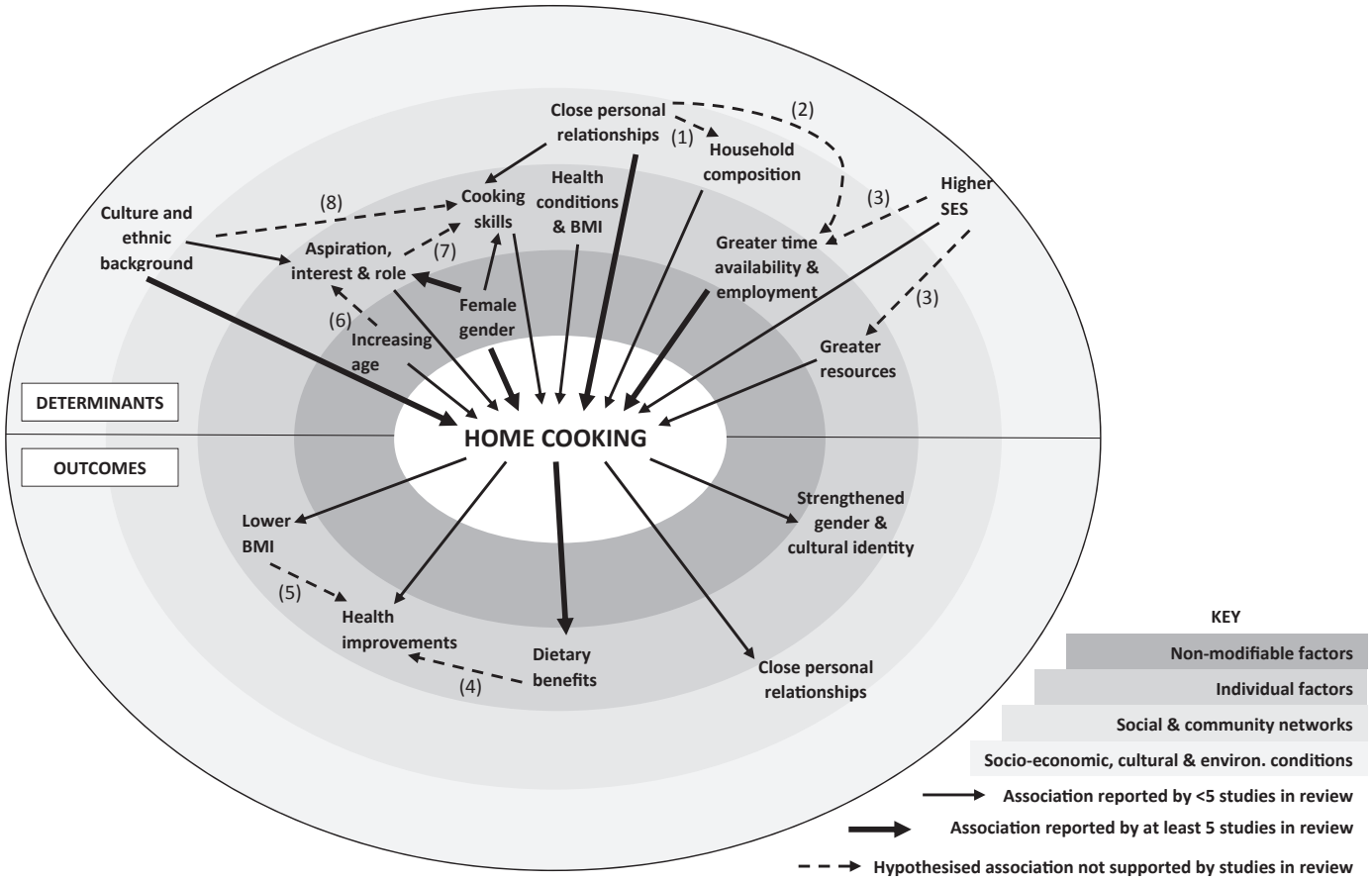


Fig. 2. Conceptual model of the 38 studies included in this review of observational studies of the determinants and outcomes of home cooking. 1. Office for National Statistics, 2014, 2. Wepfer, Brauchli, Jenny, Hämmig, & Bauer, 2015, 3. Galobardes, Lynch, & Smith, 2007, 4. World Health Organization, 2003, 5. World Health Organization, 2015, 6. Macmillan & Eliason, 2003, 7. Caraher & Lang, 1999, 8. Jaffe & Gertler, 2006.

Table 4
Quality appraisal of the 11 qualitative studies included in this review of observational studies of the determinants and outcomes of home cooking (Smith et al., 2009).

Reference	1	2	3	4	5	6	7	8	9	10
Costa et al., 2007	Y	Y	N	Y	Y	N	Y	Y	N	Y
Craig & Truswell, 1988	Y	Y	N	Y	N	Y	Y	N	N	N
Engler-Stringer, 2010	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Gatley et al., 2014	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Jones et al., 2014	Y	Y	N	Y	N	N	Y	Y	N	Y
Kemmer et al., 1998	Y	Y	N	Y	Y	Y	Y	N	N	N
Sealy, 2010	Y	Y	Y	Y	Y	N	Y	Y	N	Y
Simmons & Chapman, 2012	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Slater et al., 2012	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Szabo, 2012	Y	Y	N	Y	Y	Y	Y	N	N	N
Torp et al., 2013	Y	Y	N	Y	Y	Y	Y	Y	N	Y
Wang, Naidoo, Ferzacca, Reddy, & Van Dam, 2014	Y	Y	Y	Y	Y	Y	Y	N	N	Y

1 Is there a clear statement of the research question and aims?
2 Was the methodology appropriate for addressing the stated aims of the study?
3 Was the recruitment strategy appropriate and was an adequate sample obtained to support the claims being made?
4 Were the data collected in a way that addressed the research issue?
5 Are the methods of data analysis appropriate to the subject matter?
6 Is the description of the findings provided in enough detail and depth to allow interpretation of the meanings and context of what is being studied? (Are data presented to support interpretations etc?)
7 Are the conclusions/theoretical developments justified by the results?
8 Have the limitations of the study and their impact on the findings been considered?
9 Is the study reflexive? (Do authors consider the relationship between research and participants adequately and are ethical issues considered?)
10 Do researchers discuss whether or how the findings can be transferred to other contexts or consider other ways in which the research may be used?

sizes and hence strong statistical power to identify associations within their data (Chu et al., 2012, 2014; Larson, Perry, et al., 2006; Larson, Story, et al., 2006; Laska et al., 2012; Monsivais et al., 2014). The aim of qualitative research is not necessarily to achieve population representative samples. However, the generally smaller sample sizes used in included qualitative studies may mean that

Table 5
Quality appraisal of the 27 quantitative studies included in this review of observational studies of the determinants and outcomes of home cooking (Thomas, Ciliska, et al., 2004).

Reference	Selection bias	Design	Confounders	Blinding	Data collection	Withdrawals	Overall rating
Appelhans et al., 2015	strong	moderate	strong	weak	moderate	weak	weak
Arredondo et al., 2006	weak	weak	strong	weak	moderate	NA	weak
Blake et al., 2011	moderate	weak	weak	weak	moderate	moderate	weak
Caraher et al., 1999	weak	weak	weak	weak	weak	NA	weak
Chen et al., 2012	weak	moderate	strong	weak	moderate	strong	weak
Chu et al., 2012	moderate	weak	moderate	weak	moderate	NA	weak
Chu et al., 2014	moderate	weak	moderate	weak	moderate	NA	weak
Craig & Truswell, 1988	weak	moderate	weak	weak	weak	weak	weak
Da Rocha Leal et al., 2011	moderate	weak	weak	weak	weak	NA	weak
Diaz-Mendez & Garcia-Espejo, 2014	weak	weak	strong	weak	weak	NA	weak
Flagg et al., 2014	weak	weak	strong	weak	weak	NA	weak
Harnack et al., 1998	strong	weak	strong	weak	weak	NA	weak
Kramer et al., 2012	weak	weak	moderate	weak	weak	NA	weak
Larson, Perry, et al., 2006	weak	weak	strong	weak	moderate	NA	weak
Larson, Story, et al., 2006	moderate	weak	strong	weak	moderate	NA	weak
Laska et al., 2012	weak	moderate	moderate	weak	moderate	weak	weak
Leech et al., 2014	weak	moderate	moderate	weak	moderate	weak	weak
Lo & Tashiro, 2011	strong	weak	strong	weak	weak	NA	weak
Mercille et al., 2012	moderate	weak	moderate	weak	moderate	NA	weak
Monsivais et al., 2014	moderate	weak	moderate	weak	moderate	NA	weak
Sliwa et al., 2015	strong	weak	strong	weak	weak	NA	weak
Smith et al., 2010	weak	weak	moderate	weak	moderate	NA	weak
Smith et al., 2014	strong	weak	strong	weak	weak	NA	weak
Storfer-Isser & Musher-Eizenman, 2013	weak	weak	weak	weak	moderate	NA	weak
Swanson et al., 2011	strong	weak	weak	weak	weak	NA	weak
Virudachalam et al., 2014	strong	weak	strong	weak	weak	NA	weak
Wolfson & Bleich, 2015	strong	weak	strong	weak	weak	NA	weak

Overall rating: Strong: no weak and at least 4 strong ratings; Moderate: less than 4 strong and 1 weak rating; Weak: 2 or more weak ratings.

their findings are not more widely generalisable (Costa et al., 2007; Engler-Stringer, 2010; Gatley et al., 2014; Jones et al., 2014; Kemmer et al., 1998; Sealy, 2010; Simmons & Chapman, 2012; Slater et al., 2012; Szabo, 2012; Torp et al., 2013; Wang et al., 2014).

4.2. Strengths and limitations of the review

In this review we addressed issues of international importance, namely obesity and dietary-related diseases, and undertook a comprehensive approach, including a broad range of determinants and outcomes relating to home cooking. We excluded interventional study designs because such studies have been recently reviewed by other authors (Rees et al., 2012; Reicks et al., 2014), generating inconclusive results which would be unlikely to modify the conclusions drawn here. Furthermore, the impact of an external intervention may generate different implications for policy and practice compared with naturally occurring home cooking behaviour.

As with all systematic reviews, we cannot be certain that we identified all relevant literature. Due to resource constraints, and the very large volume of articles retrieved from electronic databases, we did not undertake exhaustive literature searches. However, at the later stages of data extraction similar themes were identified from studies, indicating that thematic saturation had been reached.

We employed recommended and validated methods (Centre for Reviews and Dissemination, 2009; Gough, Oliver, & Thomas, 2012; Higgins & Green, 2011) to conduct this review, using a systematic and transparent approach. The validity of the conclusions was strengthened by including only peer-reviewed articles, and the reliability was improved by involving two independent researchers for articles at each stage in the process of literature screening, data abstraction, and quality appraisal. A number of different tools were considered to assess the quality of studies included in the review (Alberta Heritage Foundation for Medical Research, Kmet, Lee, & Cook, 2004; Critical Appraisal Skills Programme (CASP), 2016; Joanna Briggs Institute, 2016; National Institutes of Health National Heart Lung and Blood Institute, 2014; Quirk et al., 2013). However, as previously noted (Sanderson, Tatt, & Higgins, 2007), the broad range of observational study designs meant that there was no single suitable quantitative tool for the task. All tools had shortcomings, and we selected the Effective Public Health Project tool because this is recommended by the Cochrane Public Health Group; is applicable across a range of quantitative study types; and has demonstrated validity and good inter-rater reliability (B. H. Thomas et al., 2004). Nonetheless, the quality of quantitative studies was uniformly rated as weak. Ratings for study design were generally weak, given that the majority of studies were cross-sectional, and blinding was consistently weak, in view of the study designs and nature of the exposure of interest. Additionally, the withdrawals/dropouts criterion was not applicable to cross-sectional study designs.

We presented findings from quantitative and qualitative studies together in the main text, given the potential to enhance interpretation (Onwuegbuzie & Leech, 2004; Pope & Mays, 1995). Guidance is available on combining quantitative and qualitative research in systematic reviews, which has become accepted practice (Heyvaert, Hannes, & Onghena, 2016; J. Thomas et al., 2004). However, the aims, design and conduct of quantitative and qualitative research frequently differ, and may not always be appropriate to combine. Hence we reported the findings from quantitative studies and qualitative studies separately in Tables 2 and 3 respectively, and presented the quality appraisals separately in Tables 4 and 5

4.3. Implications for research, policy and practice

The evidence summarised in this review suggests that home cooking is likely to be associated with short term, individual dietary benefits, although the longer term implications, and potential

impacts on health, remain under-researched. In agreement with two recent reviews of cooking interventions (Rees et al., 2012; Reicks et al., 2014), this review has identified a clear need for further longitudinal studies with capacity to help identify causal relationships, particularly to establish whether home cooking leads to clinically relevant health benefits compared with other food sources. Additional rigorous qualitative studies exploring the rationale for inter- and intra-participant variation in home food preparation behaviours could also prove insightful.

The conceptual model developed from the review findings in Fig. 2 illustrates the complex, inter-linked relationships between potential determinants and outcomes of home cooking. More research is needed to understand the relative importance of these themes, and their interconnections. This will help to establish the necessary and sufficient influences on home food preparation, and the role of mediators and moderators of effects. In particular, research on less frequently studied age groups, for example those in middle age, would prove insightful, as would addressing potential social effects, such as economic impacts, of home cooking.

The complexity of home cooking as a topic creates challenges in developing conclusions and clear policy recommendations, since there is no universally accepted definition of home cooking (Short, 2006), and research largely focusses on specific themes, rather than complex interacting domains. Our working definition of home cooking for this review was broad in scope, and consensus on a clearer definition or framework of key issues related to home cooking would help inform future research.

If home food preparation is deemed to confer health and/or social advantages, effective strategies to promote this behaviour will be needed. Evidence identified in this review indicating the relevance of personal aspirations, interests and roles, and culture and ethnicity, to home cooking implies that simplistic provision of information and resources may be insufficient to modify behaviour. More effective avenues could involve widening aspirations for home food preparation to groups such as men; developing behavioural norms around cooking early in life; integrating cooking skills more fully into children's education; and undertaking culturally tailored interventions. Targeted training could build on existing national programmes (Cooking Matters, 2016; Public Health England, 2016; United States Department of Agriculture, 2016) to encourage related skills such as cost-effective food shopping; time- and resource-efficient cooking; and menu planning. The large body of research indicating long-standing associations between women and home food preparation implies both that interventions targeted at women may have greatest impact, but great potential exists to engage boys and men further in culinary activities.

This review has shown that cooking skills are not a dominant theme in the published literature regarding observational studies of home cooking. This may be a result of conceptual misunderstanding, in that researchers conflate ‘cooking skills’ and ‘cooking’, and hence do not explicitly state and/or measure both concepts because they assume the two to be interchangeable. Although cooking skills have been incorporated into other themes identified in this review, such as female gender, and close personal relationships, and may be expected to feature more centrally in interventional studies, the importance of other factors beyond skills illustrates the complexity of cooking. This also highlights the potential to modify cooking behaviour through routes other than skill acquisition. Studies included in this review exploring the role of resources in home food preparation suggested that financial assistance may be beneficial in overcoming economic disadvantage as a barrier to home cooking and purchasing healthy basic ingredients. Furthermore, time constraints, both within and outside paid employment, indicated the potential value of support to establish cooking as a priority amongst other competing time demands.

5. Conclusions

This systematic review of the health and social determinants and outcomes of home food preparation identified putative determinants at the level of non-modifiable factors, and individual, community and cultural influences. Determinants of home cooking were more complex than simply possessing cooking skills, and key themes affecting behaviour emerged as: gender, personal relationships, time availability and employment, and ethnicity and culture. The majority of potential outcomes of home cooking were at an individual level and largely focussed on short-term dietary benefits. Other possible consequences involved generally positive effects on health and BMI, gender and cultural identity, and personal relationships. The current evidence base is limited by reliance primarily on cross-sectional studies; high risk of bias; and authors' conceptualisation of potential determinants and outcomes of home cooking. Synthesising observational research provided the opportunity to investigate people's perceptions and experiences of home cooking, however the research field would benefit from further well -designed longitudinal studies.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.appet.2016.12.022.

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