Ageing Research Reviews 77 (2022) 101597

Contents lists available at ScienceDirect

Ageing Research Reviews

journal homepage: www.elsevier.com/locate/arr

Psychosocial factors influencing the eating behaviours of older adults: A systematic review

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ARTICLE INFO

Keywords:
Ageing
Older adults
Eating behaviours
Influences
Dietary outcomes
Psychosocial

ABSTRACT

Our understanding of how eating behaviours change in later life have been dominated by the studies of physiological and biological influences on malnutrition. Insights from these studies were consequently used to develop interventions, which are predominantly aimed at rectifying nutritional deficiencies, as opposed to interventions that may enable older adults to eat well and enjoy their food-related life well into older age. The objective of the present review is to summarise the existing knowledge base on psychosocial influences on eating behaviours in later life. Following comprehensive searches, review, and appraisal, 53 articles were included (22 qualitative and 31 quantitative) to provide a greater understanding of the mechanisms underpinning the psychosocial factors influencing eating behaviours. Our analysis identified eight underpinning psychosocial factors that influences eating behaviours in later life; (1) health awareness & attitudes, (2) food decision making, (3) perceived dietary control, (4) mental health & mood, (5) food emotions & enjoyment, (6) eating arrangements, (7) social facilitation, and (8) social support. The importance and lasting influence of early food experiences were also identified as contributing to eating behaviours in later life. The review concludes with the call for further investigation into specific psychosocial factors that influence eating behaviour, calls for improvements in methodologies, and a summary of psychosocial barriers and enablers to eating well in later life.

1. Introduction

Existing reviews into the eating behaviours of older adults have been predominantly focused on the biological and physiological changes that occur in later life, and how those may affect food intake. This research is particularly concentrated around the physiological causes and treatment of malnutrition (Conte et al., 2009; Fávaro-Moreira et al., 2016; Hickson, 2006), and its impact on health outcomes and overall mortality (Agarwal et al., 2016; Malafarina et al., 2013; Wilson, 2013). Much less consideration has been given to the psychosocial factors (e.g., the interrelation between behavioural and social factors) that may be also at play, even though these are often cited as warranting further investigation. For example, Fávaro-Moreira et al. (2016) reviewed longitudinal data on malnutrition risk factors for the elderly and found that whilst biological/physiological factors were most influential, they also identified further psychological and social factors that were highly associated with developing malnutrition. Similarly, reviews by both Milne et al. (2009) and Volkert et al. (2019) concluded that to develop effective malnutrition interventions for the elderly, the full range of psychosocial determinants that influence eating behaviours must be addressed.

Among the reviews that focus on psychological factors, the emphasis tends to be on the link between poor mental health (e.g., depression, helplessness, and psychological loneliness) and poor nutritional status (Donini et al., 2003; Wysokiński et al., 2015). The focus is placed on the negative consequences , which may neglect to highlight how psychological mechanisms could enable eating well in older age. Three reviews (de Boer et al., 2013; Host et al., 2016; Nieuwenhuizen et al., 2010) have begun to outline the specific psychological components (e.g., apathy, mood/emotional state, motivations to eat, and dietary awareness) as specific contributors to food intake. However, two of these are narrative reviews (de Boer et al., 2013; Nieuwenhuizen et al., 2010) and one (Host et al., 2016) is restricted to community-dwelling individuals, which limits the generalisability of the findings.

Review literature exploring 'social' influences on eating behaviours often focuses on sociodemographic information (i.e., poverty, low education, living alone etc.) (de Boer et al., 2013; Hurree and Jeewon, 2016;

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https://doi.org/10.1016/j.arr.2022.101597
Received 6 August 2021; Received in revised form 25 January 2022; Accepted 21 February 2022
Available online 24 February 2022

Wysokiński et al., 2015). However, the influence of social factors often goes beyond demographic status, and includes how these factors might result in specific social mechanisms that facilitate or impede food intake. For example, living with others could provide opportunities for social modelling at mealtimes and therefore increase food intake (Stroebele--Benschop et al., 2016). A narrative review by Vesnaver and Keller (2011) sought to clarify and differentiate between the different social factors that may influence eating behaviours; such as sociodemographic influences (e.g. marriage status) and opportunities for social influence/facilitation (e.g. commensality). The authors conclude that whilst it is acknowledged that marital status and/or living alone may influence eating behaviours, it is more likely that the frequency of eating alone is a better predictor of dietary risk. The authors call for a greater exploration of how social and living environments might result in specific social facilitation mechanisms that influence eating behaviours in the elderly.

The following review makes a novel contribution to research as, to date, there is no systematic review that attempts to systematically summarise the main psychosocial factors influencing the eating behaviours of older adults. The primary aim of this systematic review is to identify and evaluate the evidence for specific psychological (intrapersonal) and social (interpersonal) factors that result in both positive and negative eating outcomes. By exploring more generalised eating behaviours in older adults (that may precede a state of malnutrition), possible opportunities for early nutritional interventions may be highlighted. In addition, this review will provide a systematic synthesis of the most recent qualitative and quantitative studies exploring psychosocial factors.

2. Methods

For this review, an electronic search of four online databases - ASSIA, CINAHL, PsycINFO and Scopus - was conducted. Following iterations of scoping searches, the search strategy was refined with the assistance of a subject librarian.[1] Search terms focussed on three main themes: older people, eating influences, and eating-related outcomes (see Table A1 for list of search terms), with search limiters including peer-reviewed articles only, 'human only' studies, and studies written in the English language. After an initial scan of the literature content and quality included papers and were restricted to 10 years (2008–2018).

2.1. Eligibility Criteria

For inclusion, papers needed to (1) contain original research, (2) focus on either the eating attitudes/cognitions or behaviours of those aged > 60 (3) include a measure/observation of the influence of social/interpersonal or psychological/intrapersonal factors, and (4) include a measure/observation of an eating/nutritional health outcome (see Table A2 for inclusion criteria).

2.2. Screening strategy

The retrieved records were imported into a reference management system (Endnote) to organise citations. The study screening and selection process is summarized in the appendix (see Fig. A1). These were reviewed by the first author (AWC). At the abstract review stage, 40% of papers were reviewed by a second reviewer for inclusion/exclusion. Where discrepancies arose for inclusion against the eligibility criteria, the paper was considered by both reviewers and discussed until consensus was reached. Where there was uncertainty regarding specific papers, the other authors (CM & LW) were consulted for a final decision. Full texts were then retrieved for full consideration.

[1] A subject librarian with expert knowledge in bibliographic databases and information

2.3. Data Extraction & Analysis/Synthesis

Data for extraction were established in line with the aims and the inclusion/exclusion criteria of the systematic review. Quantitative data extraction captured pertinent information about the aims, methods, sample size, age distribution, setting, country of origin, measures used, reported outcomes, and research limitations. Qualitative data extraction followed a similar format but replaced "measures used" for "phenomena investigated" along with which type of analysis was used.

The review process was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and guidelines (Moher et al., 2009). The principles of thematic analysis (Braun and Clarke, 2006) and narrative synthesis (Popay et al., 2006) were used to analyse and explore relationships within and between studies. The quantitative studies were thematically analysed first, followed by the qualitative studies in a separate thematic analysis. These are then synthesised as part of the discussion.

2.4. Study quality appraisal

A quality assessment of the included studies was conducted using an existing appraisal framework (Littlewood et al., 2017) which enabled a comparative assessment of both qualitative and quantitative papers. For each study, an overall quality assessment score was calculated; 0–3 indicating low quality, 4–6 moderate quality, and 7–9 high quality. Study quality was independently assessed by a second reviewer and then discrepancies were resolved via a discussion (results can be found in Table A3). Studies were generally rated as moderate/high quality.

3. Results

3.1. Synthesis 1: Quantitative Studies

3.1.1. Study Characteristics & Outcome Measures

The search yielded 32 quantitative papers of which five (Durkin et al., 2014; Greene et al., 2008; Markovski et al., 2017; Nakata and Kawai, 2017; van der Meij et al., 2015) reported randomised control trials and 27 were cross-sectional studies (see Table A3 for a summary). Most studies took place in western countries, and community settings. Measures of eating outcomes were thematically categorised to facilitate meaningful analysis (see Fig. A2 for a summary of quantitative themes). Outcome measures included nutritional adequacy/risk (n = 15), food variety/healthiness (n = 15), anthropometric measures (n = 14), and appetite/food perceptions (n = 8). These measured ranged from self-reported measures to objective measures.

3.1.2. Psychological Factors

3.1.2.1. Health-related attitudes & perceptions. Eleven papers reported health-related attitudes/perceptions and their associations with eating outcomes for older adults. Measures of health-related attitudes included attitudes to ageing and health, health self-ratings, health-related Quality of Life (QoL), eating motivations and barriers, and weight perceptions.

Six studies used self-reported health as the main outcome variable (Dean et al., 2009; Greene et al., 2008; Ishikawa et al., 2018; Samieri et al., 2008; Schnettler et al., 2017; Whitehead, 2017). Most employed a single Likert scale style question to assess perceived health (Dean et al., 2009; Greene et al., 2008; Ishikawa et al., 2018; Samieri et al., 2008), whereas two used multiple-choice questions to assess it (Schnettler et al., 2017; Whitehead, 2017). Overall, these studies observed that better subjective health ratings were correlated with both greater food satisfaction (Ishikawa et al., 2018; Schnettler et al., 2017), and with being a healthy/slightly overweight as opposed to underweight (Samieri et al., 2008; Schnettler et al., 2017). Among studies that focused on the food variety/healthiness as an outcome, five found a strong positive

relationship with perceived health (Greene et al., 2008; Ishikawa et al., 2018; Samieri et al., 2008; Schnettler et al., 2017; Whitehead, 2017), but one did not find a significant relationship (Dean et al., 2009). All but one of these studies were cross-sectional studies; only Greene et al. (2008) was experimental in design. In the experimental study, the authors found that perceived health ($p < 0.01$) differentiated between stage-progression groups; with those failing to progress with improving their fruit and vegetable consumption over the 24 months being less likely (39.1%) to perceive their health as very good/excellent.

Five cross-sectional studies (Iizaka et al., 2008; Kim, 2016; Locher et al., 2009; Nuvoli, 2015; Sugisawa et al., 2015) investigated the associations between nutritional health attitudes and eating outcomes. These studies used a variety of measures to determine participants attitudes towards healthiness (Iizaka et al., 2008; Nuvoli, 2015), measuring the strength of the perceived relationship between eating and health (e.g. control expectancy) (Sugisawa et al., 2015), and health motivations and barriers to eating healthily (e.g. Food Choice Questionnaires (FCQ)) (Kim, 2016; Locher et al., 2009). Overall, these studies demonstrated that those whose attitudes were 'healthier' were associated with better nutritional health scores (Iizaka et al., 2008; Sugisawa et al., 2015), and better ability to accurately classify their weight healthiness (Nuvoli, 2015). In addition, those who valued healthiness in their food choices had a higher quality diet (Kim, 2016) but lower diet quality if they perceived food healthiness as a barrier (Locher et al., 2009).

3.1.2.2. Self-efficacy & Health Locus of Control. Four papers (Chen et al., 2010; Greene et al., 2008; Iizaka et al., 2008; Sugisawa et al., 2015) investigated how self-efficacy to eat healthily was correlated with food-related outcomes for the older population. Each study used a different measure, but all were multi-item Likert style scales asking participants to rate their confidence in performing certain health-related behaviours (e.g., reducing cholesterol, increasing fruit & vegetable intake) Self-efficacy to eat well seemed to decrease with age (Chen et al., 2010), but was positively associated with dietary health (Chen et al., 2010; Greene et al., 2008; Iizaka et al., 2008; Sugisawa et al., 2015), particularly fruit and vegetable intake (Greene et al., 2008). Self-efficacy was not only found to have a direct relationship to dietary healthiness, it was also identified as being a significant mediator of the relationship between socio-economic status with dietary habits (Sugisawa et al., 2015).

A single study investigated the influence of Health Locus of Control (HLC) on dietary health (Chen et al., 2010). The authors concluded that whereas an Internal HLC was positively associated with better nutritional status, there was an inverse relationship between Chance HLC and nutritional risk. There was no relationship between Powerful others HLC and nutritional status.

3.1.2.3. Dietary Control/Decision making. Five studies (Flint et al., 2008; Greene et al., 2008; Nuvoli, 2015; Porter and Johnson, 2011; Starr et al., 2014) looked at aspects of dietary control and decision making on food-related outcomes for older adults. This included measures of dietary restraint, uncontrolled eating, weight management strategies, and decisional balance.

Three studies (Flint et al., 2008; Porter and Johnson, 2011; Starr et al., 2014) used the Three Factor Eating Questionnaire (TFEQ) which assesses the components of dietary/cognitive restraint (CR) and uncontrolled eating (UE). Two studies (Porter and Johnson, 2011; Starr et al., 2014) found that participants with obesity had higher levels of cognitive restraint and uncontrolled eating than participants with healthy weight. Another study compared these traits in older (aged 60–72) versus younger (aged 18–25) healthy weight, weight stable adults. Here, both CR and weight were higher in the older adults even when controlling for nutritional intake, but no association was found for UE (Flint et al., 2008). Similar results were found by Nuvoli (2015), who compared how family commensality may be associated with weight and nutritional health across different age groups. They found that whilst BMI increased with age, dieting or intention to diet significantly decreased with age, with older adults being 8.71 times less likely to attempt weight control to lose/gain weight than either children or younger adults. When considered together, the age comparison results found by Nuvoli (2015) and Flint et al. (2008) could suggest that whilst older adults are not consciously making decisions to 'diet,' cognitive restraint is being used as a mechanism to control weight.

Greene et al. (2008) evaluated a transtheoretical model (see Prochaska et al., 1993) stage-based intervention aimed at increasing older adults' fruit and vegetable intake. This involved assessing participants' progression through the stages of behavioural change, decisional balance, processes of change and self-efficacy (SE; discussed in section 4.1.3.7.) Compared to the control group, the intervention group increased fruit and vegetable portion intake by 0.5–1.0 servings per day at 24 months after baseline. Those demonstrating progress through the stages or those in the maintenance stage had a higher intake of fruit and vegetables compared to those who failed to progress through the stages. The authors concluded that tailoring interventions to an individual's state of change were effective in promoting healthful behaviours. Whilst there was no effect for decisional balance (pros/cons), there was a small/medium effect size for increased use of 'processes' on increased consumption of fruit and vegetables; with the maintenance group demonstrating higher process use than the failure to progress and relapse groups.

3.1.2.4. Mental Health. Eleven studies investigated the associations between mental health measures and eating outcomes amongst older adults (Andre et al., 2017; Bailly et al., 2015; Dean et al., 2009; Engel et al., 2011; Iizaka et al., 2008; Kimura et al., 2012; Locher et al., 2008; Porter and Johnson, 2011; Samieri et al., 2008; Schnettler et al., 2017; Starr et al., 2014). Here, poorer mental health was associated with higher nutritional risk scores (Bailly et al., 2015; Dean et al., 2009; Iizaka et al., 2008), lower dietary healthiness/diversity (Dean et al., 2009; Kimura et al., 2012; Samieri et al., 2008; Schnettler et al., 2017), less eating pleasure (Bailly et al., 2015; Schnettler et al., 2017) and poorer appetite (Engel et al., 2011). In terms of anthropomorphic outcome measures, findings were mixed; one study found that increased levels of stress (but not depression or anxiety) was associated with higher BMI (Porter and Johnson, 2011), whereas another found that higher depression levels were associated with a lower BMI, but no association was found with stress (Starr et al., 2014). Locher et al. (2008) did not find a relationship between depression and undereating. These studies were cross-sectional, therefore it is impossible to derive strong claims about causality between eating behaviours/attitudes and mental health.

3.1.2.5. Personality, Mood & Affect. Four cross-sectional studies looked at the effect of personality traits, mood/affective states on eating outcomes amongst older participants (Engel et al., 2011; Locher et al., 2009; Mõttus et al., 2013; Whitehead, 2017). These include measures of mood, personality type and food choice motivations. Locher et al. (2009) found that older adults did not perceive mood as highly important as a barrier or motivator in making food choices, and neither rating was significantly associated with actual measures of dietary quality. However, actual measures of mood were not used in comparison with measures of dietary quality – only the perceived importance of mood as a motivator or barrier to making food choices. In contrast, Whitehead (2017) found that actual positive affect (as measured by the 'Positive and Negative Affect Schedule') was associated with healthier diets, but negative affect was not significantly related to dietary quality. These results may suggest that while affective states may affect dietary behaviour, older adults are not aware of this influence.

In terms of personality traits, Engel et al. (2011) found that those

who score low on hardiness (as measured by the Dispositional Resilience Scale II) were at greater risk of developing a poor appetite. Mõttus et al. (2013) examined the associations between personality types (Five Factors Model) and dietary quality and found that higher dietary quality was associated with increased 'Openness' (a positive emotional state) concluding that Openness is more associated with curiosity and enjoyment of novelty, and therefore more diverse dietary habits are likely to be tried and adopted.

3.1.2.6. Food-related emotions and satisfaction. The influence of food-related emotions on the eating behaviours of older adults was the focus of seven articles included in this review (Bailly et al., 2015; Ishikawa et al., 2017; Ishikawa et al., 2018; Narchi et al., 2008; Porter and Johnson, 2011; Schnettler et al., 2017; Starr et al., 2014). The outcomes included emotional eating, emotions generated by foods, and food-life related satisfaction.

Four studies investigated the possible influence of eating pleasure/satisfaction on eating behaviours (Bailly et al., 2015; Ishikawa et al., 2017; Ishikawa et al., 2018; Schnettler et al., 2017). Bailly et al. (2015) found a negative association between eating pleasure (as measured by the Health and Taste Attitude Questionnaire) and nutritional risk. The two studies looking at general satisfaction with food (Ishikawa et al., 2017, 2018) did not measure a direct relationship with dietary quality but their findings are suggestive of a relationship mediated by commensality and/or subjective wellbeing measures. Likewise, the study measuring Satisfaction with Food Related Life (SWFL) (Schnettler et al., 2017) did not directly assess the relationship between SWFL and dietary quality but found that older adults could be clustered into heterogeneous groups, each of which demonstrated distinct patterns in terms of dietary quality, mental health, general health perceptions, and SWFL. Those with higher food satisfaction also had better dietary quality and vice versa. One group demonstrated high food satisfaction with slightly poorer dietary quality but these associations, like in the previously mentioned studies, were mediated by the high levels of communal eating.

Two studies investigated how emotions may trigger certain eating behaviours (Porter and Johnson, 2011; Starr et al., 2014); another at how the emotions associated with foods might influence eating outcomes for older adults (Narchi et al., 2008). Narchi et al. (2008) found different food emotion trends between older adults with smaller or larger food intake, with those reporting low food intake ('small eaters'), often reported more negative emotions towards foods (e.g. doubt, unease, disappointment and indifference), whereas 'big eaters' (i.e. those reporting larger food intake) were more likely to report food liking and better nutritional content. The two studies looking at emotional eating (EE); (a 3 item subscale of the reduced Three Factor Eating Questionnaire (TFEQ-R18; Karlsson et al., 2000) found that older adults with obesity were more likely to demonstrate emotional eating than their counterparts with healthy weights (Porter and Johnson, 2011). In addition, there was a 3-fold risk of obesity for those reporting EE behaviours (Starr et al., 2014) even when controlling for mental health and food group intake.

3.1.2.7. Appetite & food selectivity. Appetite and hunger can be both a physiological construct and a psychological one – hence its inclusion as a factor in this review. Five papers (Dean et al., 2009; Flint et al., 2008; Maitre et al., 2014; Nuvoli, 2015; van der Meij et al., 2015) included measures of appetite, hunger or food selectivity for older adults concerning food-related outcomes measures. Measures of appetite ranged from single-item Likert style questions asking participants to self-rate their appetite (Dean et al., 2009; Nuvoli, 2015; van der Meij et al., 2015) to multi-item squestions (Flint et al., 2008; Maitre et al., 2014).

Flint et al. (2008) found that in comparison to younger adults, older adults displayed less susceptibility to hunger, even when controlling for dietary intake and BMI. Similarly, Nuvoli (2015) found that older adults were more likely to rate their appetite as poor in comparison to children or younger adults. In contrast, other studies found little interaction of age on appetite or pickiness but did find that these factors were influenced by increasing levels of food-related dependency (Maitre et al., 2014; van der Meij et al., 2015). This may suggest that appetite is less affected by age but more by age-related changes that reduce autonomy over food choices.

Older adults who rated themselves as having a better appetite were more likely to eat a healthy, varied diet (Dean et al., 2009); whereas a higher risk of malnutrition was positively associated with a poorer appetite (van der Meij et al., 2015) and higher levels of food selectivity (Maitre et al., 2014). Those with poor appetite demonstrated a stronger preference for variety, colour variation, non-dairy high-fibre, and solid texture foods than their counterparts with better appetites (van der Meij et al., 2015), with the authors suggesting increased selectivity could be the result of unmet food needs in later life.

3.1.2.8. Life Satisfaction and Quality of Life. The association of life satisfaction (LS) and/or Quality of Life (QoL) and eating outcomes for the older population were investigated in four articles included in this review (Andre et al., 2017; Engel et al., 2011; Kimura et al., 2012; Schnettler et al., 2017) with each study using different measures.

Although not investigating the direct relationship between LS or QoL with healthier food patterns, Andre et al. (2017) and Schnettler et al., (2017) found that older adults with better LS & QoL scores tended to be clustered into the same groups as those with better dietary patterns and nutritional health. In the latter study, the group with the highest LS scores were not the 'healthiest' cluster but did have the highest levels of eating out with others for lunch, indicating that those eating out might increase calorie intake. Similarly, whilst Kimura et al. (2012) did not explore a direct relationship between QoL and diet healthiness, both factors were significantly negatively associated with eating alone (i.e. those eating alone more frequently had poorer QoL scores and poorer dietary health). Engel et al. (2011) investigated the influence of hardiness on appetites, using the 18-item Dispositional Resilience Scale-II (DRS-II) which is composed of three subscales; control, challenges and commitment (Sinclair and Oliver, 2003). The 'commitment' component of hardiness is defined as the level of involvement that individuals have in their life activities and thus it is comparable to a measure of life satisfaction Whilst overall hardiness scores were significantly positively associated with appetite (OR=2.02, 95% CI51.07– 3.81), the commitment subscale scores were more strongly positively associated with appetite (OR=1.35, 95% CI51.13–1.61). These studies demonstrate the complex relationship that satisfaction levels or life quality may have on eating behaviours, but as all were cross-sectional in design and no assumptions are made regarding the direction of causality.

3.1.3. Social Influence Factors identified

3.1.3.1. Influence of living & eating arrangements. Whilst we did not seek to investigate the influence of the living arrangements of older adults on their eating behaviours in this review (being more related to SES and/or environmental factors than interpersonal) some papers do appear to be using living together/alone as a proxy measure of eating together/alone. Kimura et al. (2012) found that although 81.4% of their 65 + years participants reported living with other people, only 66.8% of their reported eating with others. This discrepancy suggests that studies using living together as a proxy for eating together may be inaccurate by failing to take into account family interaction and support from others (Chen et al., 2010), and that factors like marriage (Samieri et al., 2008) or gender (Tani et al., 2015) might be better predictors than living arrangements. However, it was suggested that living situations could affect whether participants were motivated to eat with others (Dean et al., 2009) or viewed eating alone as a barrier to a healthier diet (Locher et al., 2009).

The findings of studies investigating the relationship of living arrangements and eating outcomes were mixed; both Iizaka et al. (2008) and Chen et al. (2010) found no significant association with nutritional status but Dean et al. (2009) did find a positive association between living with others and dietary diversity. Other studies suggest *who* an individual lives with is important; i.e. those living with a spouse/partner had better dietary variety (Dean et al., 2009) and a healthier diet than those living alone or living with others who were not a spouse (Samieri et al., 2008), which suggests that eating habits developed within long-term relationships differ from those developed with other family members.

3.1.3.2. Eating together/Commensality. Nine of the papers included in this review explored the associations between commensality and eating-related outcomes (Ishikawa et al., 2017; Kimura et al., 2012; Markovski et al., 2017; Nuvoli, 2015; Paquet et al., 2008; Rugel and Carpiano, 2015; Schnettler et al., 2017; Tani et al., 2015; Wham and Bowden, 2011). All bar one of these studies were cross-sectional; Markovski et al. (2017) was a non-randomised control study. Here, the authors observed that elderly hospital patients who ate in a communal environment consumed 20% more energy and protein ($P = 0.006$ and 0.01, respectively) compared to patients who ate alone at the bedside. The other cross-sectional studies support the finding that eating alone had a consistent and significant negative association with food intake amount (Paquet et al., 2008; Wham and Bowden, 2011), increased likelihood of a lower BMI (Kimura et al., 2012; Tani et al., 2015; Wham and Bowden, 2011), lower food diversity (Ishikawa et al., 2017; Kimura et al., 2012; Schnettler et al., 2017), decreased consumption of fruit and vegetables (Rugel and Carpiano, 2015; Schnettler et al., 2017; Tani et al., 2015), and a higher likelihood of skipping meals (Tani et al., 2015). In addition, greater commensal frequency was associated with greater levels of food satisfaction (Ishikawa et al., 2017; Schnettler et al., 2017). One of these studies compared the effects of commensal eating behaviours for different age groups; Nuvoli (2015) found that older adults were the age group least likely (21%, compared with 23% of children and 44% of young adults) to eat meals with family, and less likely than any other group to partake in family mid-morning snacks or lunch. Yet, Schnettler et al. (2017) found that a higher incidence of commensality at lunch-times was most associated with better eating-related outcomes and satisfaction measures.

3.1.3.3. Social facilitation of eating. Two papers investigated how others may facilitate eating behaviours outside of commensality. Nakata and Kawai (2017) compared older adults eating in front of stimuli that mimicked the presence of others, i.e., a mirror image (Experiment 1), or static self-image (Experiment 2), as opposed to eating in front of no image. These studies demonstrated that this social facilitation effect increased taste perception, food enjoyment and intake; with the authors concluding that the visual prompt of someone else eating is enough to produce social facilitation effects without requiring the presence of another person. In addition, Sugisawa et al. (2015) found that the social influence of others (i.e., how the participant perceived the dietary behaviours of those around them) has a strong mediating effect between SES and healthy eating behaviours.

3.1.3.4. Mealtime interactions. Durkin et al. (2014) and Paquet et al. (2008) investigated whether the mealtime interactions of hospitalised elderly patients would influence eating behaviours and found conflicting results. Durkin et al. (2014) concluded that regardless of care needs, or whether the person present in mealtimes was family or care staff, the total number of social interactions were greater when someone was present but there were no significant differences in food intake. Paquet et al. (2008) found the opposite, namely that the number and quality of mealtime interactions were positively associated with food intake. One reason for the difference in the results could be the mealtime setting; Durkin was exploring interactions that occurred between non-eating mealtime companions (family or staff), whilst Paquet et al. (2008) was observing the effects of patient-to-patient interactions in a commensal hospital dining room settings. This could indicate that the joint activity of eating exerts a greater effect on eating behaviours than the mere presence of others during mealtimes.

3.1.3.5. Social support & social networks. Six articles (Andre et al., 2017; Kim, 2016; Locher et al., 2008; Rugel and Carpiano, 2015; Schnettler et al., 2017; Sugisawa et al., 2015) studied the influence and perceived importance of social support/networks on older adults. In general, larger social networks are associated with healthier food patterns and dietary quality (Andre et al., 2017; Kim, 2016). This was also true of the perceived importance of social networks, with Schnettler et al., (2017) concluding that perceived family importance was positively associated with healthier dietary patterns and food satisfaction. Lower family importance scores were associated with poorer dietary quality, but were also clustered with poor mental health, reduced quality of life, poorer general health perception, and a reduced likelihood of eating in company. The authors suggest that this could be indicative of the fact that family support only exerts a positive influence on eating behaviours if these relationships are not a source of stress.

The studies focussing on social support find less consistent results. One study concluded that lower levels of tangible social support were associated with a higher likelihood of under-eating (Locher et al., 2008), whereas there was a negative influence for women (but no influence in men) of tangible support on healthy eating habits. In contrast, emotional/informational support had a direct positive association with increased fruit and vegetable consumption. In a study looking at the psychosocial mediators of SES and dietary health, initial analysis showed that social support had a significant direct negative effect on dietary habits (Sugisawa et al., 2015). However, further analyses demonstrated that social support did not have a significant mediation effect between SES and dietary habits. The authors' explanation of this finding was that older adults with poor dietary habits are likely to receive increased support from close others because they are concerned about the person's health and want to help with giving them a healthier diet.

3.2. Synthesis 2: Qualitative Studies

3.2.1. Study Characteristics

The search yielded 22 papers comprising qualitative data; 13 interview-based and 9 focus group-based. All except one study took place in western countries, and most participants lived in their own homes (see Table A3). Articles included in this review were inductively coded in iterations until broad themes emerged. These were then reanalysed once the quantitative analysis had taken place to further develop meaning and definition of themes.

The findings were then further thematically analysed specifically around the psychological and social influences of eating behaviours, using the categorisations of the quantitative analysis as guidance, but adding or removing themes where appropriate. These cross-cutting themes then contributed to the generation of the sub-themes of food-related morality; societal influences; and managing food-related changes.

Despite the breadth of qualitative study focus and findings, consistent themes have emerged between studies (see Fig. A3). The overarching theme of the qualitative synthesis was the overriding importance of early food experiences, and how these transcend not only into older adults' current food attitudes and choices, and their ability to deal with the changes to eating associated with ageing but also considerations of their future eating behaviours.

3.2.2. Food-related morality

Several papers included in this review evaluated food morality among older adults - the attitudes around foods that were deemed as 'good/bad', or seen as being indicative of a persons' ethical code.

3.2.2.1. Wastage & Frugality. The most consistent food-related morality attitudes were around food wastage and frugality (Banwell et al., 2010; Bjørner et al., 2018; Delaney and McCarthy, 2011; King et al., 2017). Participants in these studies grew up in periods of austerity and food scarcity which meant that food wastage was highly disapproved of, with preferences often ignored in favour of sustenance (Banwell et al., 2010; Bjørner et al., 2018; Chen and Shao, 2012; De Morais et al., 2012; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; King et al., 2017).

Older adults continued to shop, cook and eat in a way that reduced food wastage (Cohen and Cribbs, 2017; King et al., 2017; Vesnaver et al., 2015), which sometimes negatively affected their eating behaviours, for example, the lack of availability of fresh produce portioned for a single person (Bloom et al., 2017; Whitelock and Ensaff, 2018), or the avoidance of eating out due to the large portions served (Tyler et al., 2014; Whitelock and Ensaff, 2018).

3.2.2.2. Indulgence. Food indulgence was also considered immoral by many participants (Chen and Shao, 2012; Delaney and McCarthy, 2011; Tyler et al., 2014). Many Chinese older adults followed the philosophy of *'chi fen pao'* which roughly equates to '70% full is enough' as over-indulgence is considered sinful (Chen and Shao, 2012). Indulgent behaviour linked with social occasions lead to some participants avoiding social situations where they would be faced with difficult food choices (Delaney and McCarthy, 2011; Tyler et al., 2014).

3.2.2.3. Generosity, Support & Community Spirit. Food-related generosity centred on the idea that surplus food should be shared with those in need. Participants spoke of how in childhood, foods were swapped and shared between neighbours so no-one went hungry (Banwell et al., 2010; De Morais et al., 2012; Delaney and McCarthy, 2011). This extended into their later lives, whereby if participants knew of an elderly neighbour who was struggling, they would ensure they had enough food (Cohen and Cribbs, 2017; Tyler et al., 2014). Social support with food tended to take the form of tangible support (i.e. shopping, cooking) (Vesnaver et al., 2015; Whitelock and Ensaff, 2018) or emotional support (i.e. encouraging social integration and eating well) (De Morais et al., 2012). Food-related support was generally more acceptable from friends and family (King et al., 2017; Tyler et al., 2014; Vesnaver et al., 2012) but formal support was acceptable when it was seen as means to reducing their nutritional vulnerability rather than removing their food-related independence (Edfors and Westergren, 2012; Mahadevan et al., 2014; Vesnaver et al., 2012; Wham and Bowden, 2011; Whitelock and Ensaff, 2018). In addition, older adults who lived alone reported that although they accepted some level of support with food-related tasks such as shopping or cooking, they wanted to retain autonomy over their food choices and not be dictated over what to eat and when (Whitelock and Ensaff, 2018).

3.2.2.4. Perseverance & Hardiness. Early childhood exposure to the harsh realities of war, austerity, and rationing, resulted in the expectation to demonstrate resilience (Bloom et al., 2017; King et al., 2017). This translated into later life by finding adaptive food behaviours when cooking and eating alone, such as batch cooking or simplifying meals (Banwell et al., 2010), dealing with grief and loneliness by arranging to eat with others or using the television as mealtime 'company' (Vesnaver et al., 2012). Being resilient was linked to overcoming dietary setbacks, and motivation to eat healthily (Bloom et al., 2017; Vesnaver et al., 2012, 2015) reconceptualising food-related 'tasks' as opportunities for enjoyment (Cohen and Cribbs, 2017) and remaining committed to eating well and ageing well (King et al., 2017; Thomas and Emond, 2017; Vesnaver et al., 2012). For some, this might mean simplifying their eating practices to maintain their independence (Cohen and Cribbs, 2017; Delaney and McCarthy, 2011; Vesnaver et al., 2012). Lastly, those who displayed an openness for trying new things and adapted well to novel situations enjoyed a varied diet and a motivation to eat well (King et al., 2017).

3.2.3. Societal expectations around food

Societal expectations were grounded in early life experiences, and the social norms surrounding food consumption and mealtimes. Here we explore four subthemes that emerge on how mealtimes and foods intake is influenced by societal expectations, including gender roles, mealtime structures, eating with others and hospitality.

3.2.3.1. Gender roles. Gender roles were described as almost unchanged from early life compared to later life (King et al., 2017; Philpin et al., 2011). Women were found to take the major role in food preparation, planning and provision, whilst men provided the more logistical support role such as driving to the shops, (Vesnaver et al., 2015, 2016). These roles were consistent across cultures (Chen and Shao, 2012; De Morais et al., 2012; Philpin et al., 2011).

Older women frequently reported putting their dietary health needs and food preferences of their families first (Bloom et al., 2017; Chen and Shao, 2012; Vesnaver et al., 2015) even if this meant sacrificing their health and food preferences (Banwell et al., 2010; Delaney and McCarthy, 2011). They continued to embody the role of 'meal provider' even in the absence of anyone else to cook for (Banwell et al., 2010; Bloom et al., 2017; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; King et al., 2017; Philpin et al., 2011; Vesnaver et al., 2015, 2016) and described enjoying expressing love by providing food for their families (De Morais et al., 2012; Vesnaver et al., 2015, 2016; Whitelock and Ensaff, 2018). They also reported experiencing a loss of motivation to cook and eat well in the absence of others to cook for (Bloom et al., 2017; Brownie and Coutts, 2013; De Morais et al., 2012; Thomas and Emond, 2017; Vesnaver et al., 2016) and expressed feelings of guilt about being 'lazy' as they reduced their meal preparation activities declined with fewer opportunities to cook for others (Banwell et al., 2010; Delaney and McCarthy, 2011; Vesnaver et al., 2016). Often, the experience of losing a partner required a reassessment of their food preferences outside of the marital norms (Vesnaver et al., 2015, 2016).

The male role of being the breadwinner continued into older age even when providing financial support to the household ended with retirement (Banwell et al., 2010; Delaney and McCarthy, 2011). Occasionally the male participants did report taking a greater role in food provision tasks in older age due to the opportunities for social involvement that food-related tasks provided (Delaney and McCarthy, 2011; Edfors and Westergren, 2012) or out of necessity through the loss of a spouse (Banwell et al., 2010; Vesnaver et al., 2016).

3.2.3.2. Mealtime structure. Mealtimes routines were shaped by the social norms and structures experienced in childhood and continued to influence mealtime routines, timings and rituals in later life (De Morais et al., 2012; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; King et al., 2017; Thomas and Emond, 2017; Whitelock and Ensaff, 2018). Despite changes to family unit size and structure, having a family meal was still considered the centrepiece of the daily routine (Banwell et al., 2010). Participants often recalled that the routines changed slightly at the weekend to include a greater variety of food and even more during religious festivals where meals and foods formed an important part of celebrations (De Morais et al., 2012; Delaney and McCarthy, 2011; Philpin et al., 2011).

3.2.3.3. Shared Mealtimes. Fourteen studies investigated the preference and importance of shared mealtimes (Bjørner et al., 2018; Bloom et al.,

2017; Cohen and Cribbs, 2017; De Morais et al., 2012; Edfors and Westergren, 2012; Mahadevan et al., 2014; Philpin et al., 2011; Thomas and Emond, 2017; Tyler et al., 2014; Vesnaver et al., 2012; Vesnaver et al., 2015, 2016; Wham and Bowden, 2011; Whitelock and Ensaff, 2018). Commensality was a mechanism for the social facilitation of eating through the opportunity to socialise - which older adults identified as the most important aspects of mealtimes – over and above the quality of the food (Bloom et al., 2017; Thomas and Emond, 2017). Commensality was more likely to occur on special occasions or at weekends (De Morais et al., 2012) but did not always need to constitute a full 'meal;' coffee/tea and cake were also important in maintaining social connections (Bjørner et al., 2018; Edfors and Westergren, 2012; Philpin et al., 2011; Vesnaver et al., 2016).

Loneliness during mealtimes contributed to a lack of enjoyment of food (De Morais et al., 2012; Edfors and Westergren, 2012; Mahadevan et al., 2014; Thomas and Emond, 2017; Vesnaver et al., 2015; Whitelock and Ensaff, 2018); an effect seen more in meals that were previously eaten in company (Vesnaver et al., 2016; Whitelock and Ensaff, 2018). The studies largely demonstrated that consistently eating alone was seen as negative and lonesome by the participants, and was linked both to the loss of motivation to cook and eat, and increased nutritional risk and reduced food intake (Bjørner et al., 2018; Bloom et al., 2017; Cohen and Cribbs, 2017; De Morais et al., 2012; Wham and Bowden, 2011; Whitelock and Ensaff, 2018). Some older adults reported taking steps to lessen the sense of loneliness at mealtimes, either by seeking out others to eat with or using TV/radios to mimic the presence of others (Cohen and Cribbs, 2017; Edfors and Westergren, 2012; Vesnaver et al., 2012, 2015). A minority of studies found that eating some meals alone was not necessarily seen as negative; but comfortable (Bjørner et al., 2018; Edfors and Westergren, 2012; Thomas and Emond, 2017; Vesnaver et al., 2012), especially if the meal had normally been eaten alone (Vesnaver et al., 2016).

Where commensal behaviour did occur, the mealtime participants were important in creating a pleasurable dining experience. Family and close friends were seen as optimal mealtime companions, whereas associates or strangers were less desirable (Bjørner et al., 2018; Bloom et al., 2017; De Morais et al., 2012; Vesnaver et al., 2015). What was important was the quality of the interactions and the shared interests, which tended to increase with closer relationships (Bloom et al., 2017; Philpin et al., 2011; Thomas and Emond, 2017; Vesnaver et al., 2016).

3.2.3.4. Hospitality. Older adults held firm beliefs that hospitality and food were connected; with the expectation that guests should be provided with refreshments (Delaney and McCarthy, 2011; Edfors and Westergren, 2012; Tyler et al., 2014). This belief was so entrenched that some older adults reported concern that their large social networks and active social lives led to overconsumption of sweet foods and unhealthy snacks (Bech-Larsen and Kazbare, 2014; Tyler et al., 2014). Some participants even reported keeping sweet foods in the house for the sole purpose of being able to cater for visitors (Delaney and McCarthy, 2011). No longer being able to provide food-related hospitality, either due to changing social networks or health issues, resulted in a sense of loss, especially for females (Cohen and Cribbs, 2017; De Morais et al., 2012; Edfors and Westergren, 2012).

3.2.4. Temporal changes to food-related life

The final theme includes details of where the participants highlighted that changes over time (e.g., environments, social circles, health, and knowledge) resulted in changing dietary habits and eating behaviours.

3.2.4.1. Greater food availability. Limited food availability in their youth often contributed to a monotonous childhood diet (De Morais et al., 2012; Delaney and McCarthy, 2011; King et al., 2017). However, several studies reported that participants' eating attitudes and behaviours remained unchanged from their early lives, for example, in preferring traditional foods and home cooking over eating out or convenience foods, and plain foods over-rich or highly flavoured foods (Banwell et al., 2010; Bloom et al., 2017; Chen and Shao, 2012; De Morais et al., 2012; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; King et al., 2017; Lundkvist et al., 2010; Philpin et al., 2011; Thomas and Emond, 2017; Vesnaver et al., 2016; Whitelock and Ensaff, 2018). Furthermore, certain food habits were retained regardless of whether the individual now lived in the same environment as in childhood, (Delaney and McCarthy, 2011;Chen and Shao, 2012)

However, greater food availability meant that in later life, food was not restricted to seasonal foods or economic food crises as it was in their youth. Participants often reported eating more of the foods that were limited in their youth (Delaney and McCarthy, 2011; King et al., 2017; Thomas and Emond, 2017; Whitelock and Ensaff, 2018) but did not often extend to incorporating different world cuisines (Delaney and McCarthy, 2011). Convenience foods were not adopted willingly – but were increasingly used as declining health meant individuals were less able to cook (Banwell et al., 2010; Bech-Larsen and Kazbare, 2014; Cohen and Cribbs, 2017; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; Vesnaver et al., 2016; Wham and Bowden, 2011; Whitelock and Ensaff, 2018).

3.2.4.2. Food enjoyment and food apathy. The experience of food enjoyment and food satisfaction were not consistent across the studies but seemed to relate to how the older adults had been raised to view food. Those who regarded food as merely 'fuel' reported less food enjoyment and greater food apathy (Banwell et al., 2010; De Morais et al., 2012) compared with those who associated food with sensory pleasure (Bech-Larsen and Kazbare, 2014; Bloom et al., 2017; Chen and Shao, 2012; Vesnaver et al., 2012; Whitelock and Ensaff, 2018) or enjoyable social occasions (Bjørner et al., 2018; Vesnaver et al., 2016).

Nostalgic childhood memories influenced emotional response to foods. Reminiscence around specific foods centred on treats that were infrequently experienced in childhood or reserved for special occasions (Banwell et al., 2010; Delaney and McCarthy, 2011; King et al., 2017). In later life, these types of foods were still eaten rarely and were considered luxuries (Delaney and McCarthy, 2011; Edfors and Westergren, 2012; King et al., 2017; Philpin et al., 2011; Thomas and Emond, 2017; Whitelock and Ensaff, 2018). Emotional associations with food also reflected the memory of family mealtimes (Banwell et al., 2010; Philpin et al., 2011; Thomas and Emond, 2017; Whitelock and Ensaff, 2018) and their mothers cooking (Cohen and Cribbs, 2017; De Morais et al., 2012; King et al., 2017). Older adults looked back upon their childhood foods as 'purer' than the foods available now, associating childhood foods with positive words such as 'fresh,' 'home-made', 'nourishing' and 'natural' (Chen and Shao, 2012; Delaney and McCarthy, 2011; King et al., 2017; Lundkvist et al., 2010; Philpin et al., 2011).

Older adults recognised the link between poor mental health/mood and negative eating behaviours; with boredom, grief, and low mood all linked to overeating snacks (Delaney and McCarthy, 2011; Edfors and Westergren, 2012; Vesnaver et al., 2015) and reduced appetite (Brownie, 2013; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; Mahadevan et al., 2014). Anxiety about the future and stress-inducing situations such as caring for an ill spouse related could lead to food-related apathy (King et al., 2017; Vesnaver et al., 2015).

Food-related apathy presented in two forms; apathy to food preparation and apathy towards eating. Participants often reported that cooking full meals for just themselves was not worth the effort (Bloom et al., 2017; Brownie, 2013; Brownie and Coutts, 2013; Cohen and Cribbs, 2017; De Morais et al., 2012; Delaney and McCarthy, 2011; Thomas and Emond, 2017; Vesnaver et al., 2012, 2016; Wham and Bowden, 2011; Whitelock and Ensaff, 2018) and resulted in a loss of enjoyment of cooking (Bloom et al., 2017; Thomas and Emond, 2017; Vesnaver et al., 2016). This resulted in increased consumption of

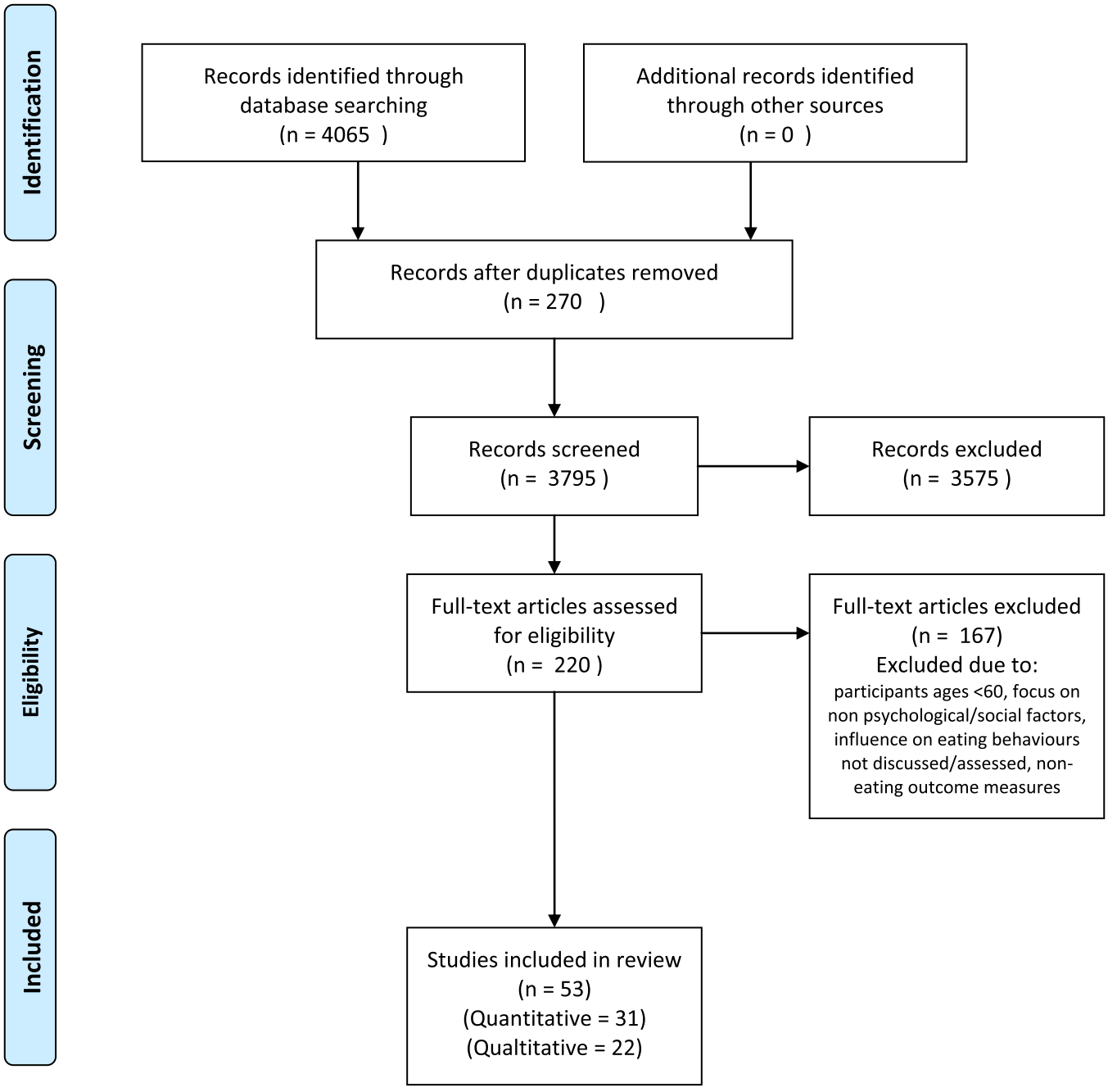

Fig. A1. PRISMA flow diagram

convenience foods or simplified meals. Furthermore, apathy towards eating was associated with reduced food satisfaction, reduced intake and lack of variety (Vesnaver et al., 2012; Whitelock and Ensaff, 2018) with older adults reporting that eating became a means to refuel rather than to enjoy (Banwell et al., 2010; Chen and Shao, 2012). In addition, old age and physical decline frequently led to an inability to eat or appreciate the foods that they had previously enjoyed (Brownie, 2013; De Morais et al., 2012; Delaney and McCarthy, 2011; Mahadevan et al., 2014).

3.2.4.3. Dietary control & food independence. Older adults who were clear about the link between dietary intake and quality and health-related outcomes were more likely to report making conscious dietary changes to ensure future good health (Bloom et al., 2017; Brownie, 2013; Lundkvist et al., 2010; Tyler et al., 2014). Those who were less convinced that their eating behaviours influenced their overall health were more likely to attribute poor health to fate, chance or a god (Banwell et al., 2010; Bech-Larsen and Kazbare, 2014; Bloom et al., 2017; Chen and Shao, 2012; Delaney and McCarthy, 2011; Lundkvist et al., 2010), or other people/external circumstances (Brownie, 2013).

Across studies, participants felt that eating healthily was difficult, requiring willpower and constant consciousness of decision-making (Bech-Larsen and Kazbare, 2014; Lundkvist et al., 2010; Tyler et al., 2014; Vesnaver et al., 2012). Those who reported feeling less capable of eating well as they aged felt they could do little to control their weight, change entrenched eating habits, combat cravings or manage changing dietary circumstances (Banwell et al., 2010; Bech-Larsen and Kazbare, 2014; Brownie, 2013). Moreover, the level of control and independence that the older adult exerted over their food-related life influenced their levels of food enjoyment (Edfors and Westergren, 2012; Mahadevan

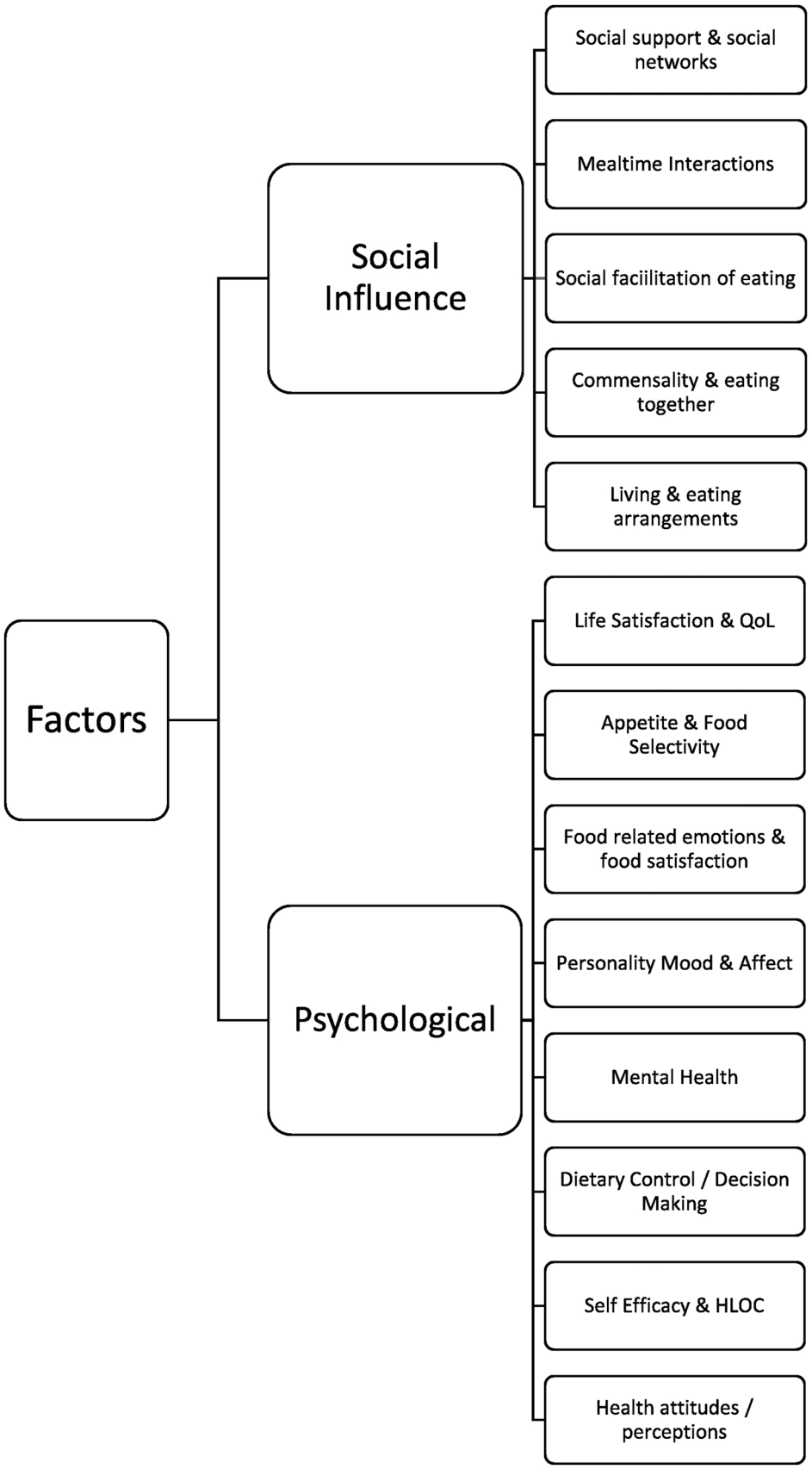

Fig. A2. Synthesis 1: Quantitative Summary

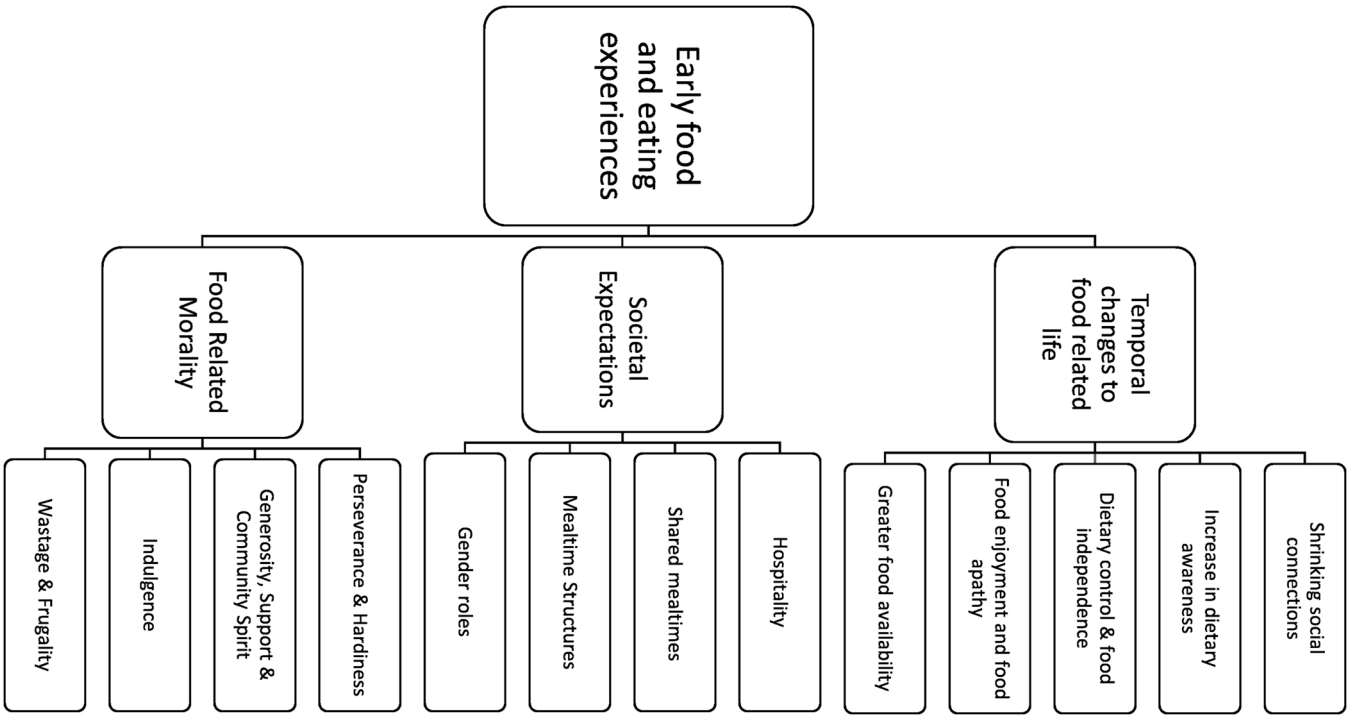

Fig. A3. Synthesis 2: Qualitative Summary

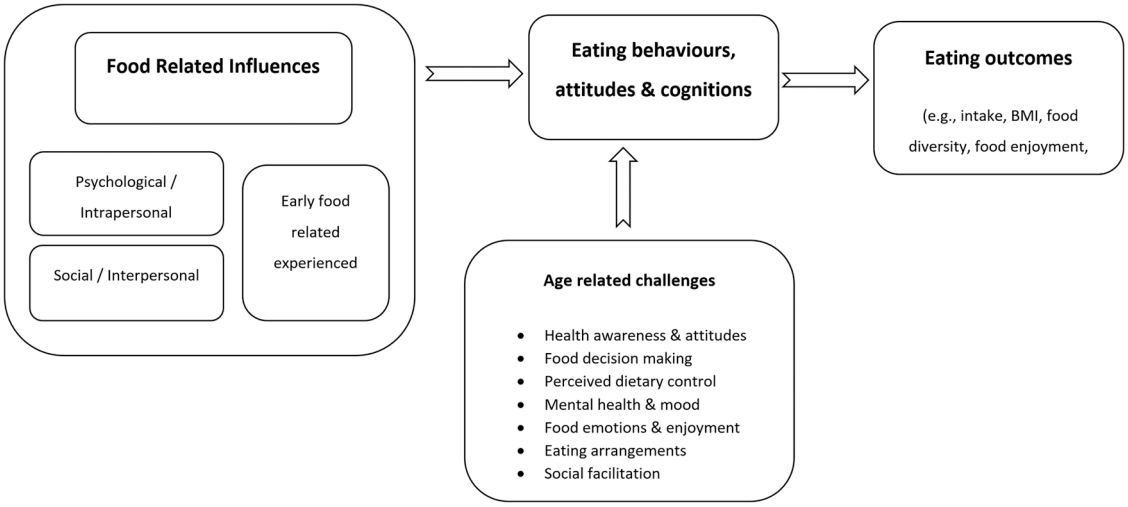

Fig. A4. Qualitative & Quantitative Synthesis Combined

et al., 2014; Thomas and Emond, 2017) with food choice being a primary factor in food satisfaction (Mahadevan et al., 2014).

Some participants resented feeling dictated to about what they should or should not eat, and used food as a way of asserting their independence, which sometimes resulted in unhealthy dietary choices being made (Cohen and Cribbs, 2017; King et al., 2017; Mahadevan et al., 2014; Thomas and Emond, 2017; Whitelock and Ensaff, 2018). Expressions of food satisfaction were greatest whereby participants' sense of dietary control allowed for a degree of experimentation, not just with flavours and cuisines (Brownie, 2013; Cohen and Cribbs, 2017; King et al., 2017), but also with timings and routines. For example, in one study, although widows reported missing the commensal element of mealtimes with their spouse, they were enjoying discovering their preferences now that they did not have to give way to another's needs and preferences (Vesnaver et al., 2015, 2016).

3.2.4.4. Increase in dietary awareness. Age or health-related issues frequently prompted changes in eating habits. For example, participants cited the need to eat less in order to better suit their energy outputs for this stage of life (Bjørner et al., 2018; Delaney and McCarthy, 2011) including reducing portion sizes (Delaney and McCarthy, 2011) or substituting a 'proper meal' for a snack (Edfors and Westergren, 2012).

Healthiness was considered the primary motivator when making food choices (Banwell et al., 2010; De Morais et al., 2012; Thomas and Emond, 2017; Vesnaver et al., 2012) and the majority of studies cited that older adults recognised the need for dietary moderation (Brownie and Coutts, 2013; Delaney and McCarthy, 2011; Lundkvist et al., 2010; Whitelock and Ensaff, 2018). Others felt that being 'overly' health-conscious with food was negative and egocentric (Bech-Larsen and Kazbare, 2014) and that focussing too much on healthy eating at the expense of pleasure may improve health but would diminish quality of

life (Bech-Larsen and Kazbare, 2014; Bloom et al., 2017; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; Mahadevan et al., 2014). Others suggested that after a lifetime of healthy eating and/or deprivation in their early years, they now had the 'right' to indulge themselves in later life (Bech-Larsen and Kazbare, 2014; Chen and Shao, 2012; Whitelock and Ensaff, 2018).

Findings from several studies demonstrated that older adults had a good understanding of the link between diet and health, although the depth of nutritional knowledge and extent to which this understanding was put into practice varied. Foods were often dichotomised into 'good' or 'bad' foods (Lundkvist et al., 2010; Mahadevan et al., 2014; Whitelock and Ensaff, 2018). Most participants could demonstrate knowledge of general nutritional recommendations, but few were able to evidence an understanding of how these were adapted for the dietary requirements of older adults, for example, the increased need for protein, dairy and certain vitamins. (Brownie and Coutts, 2013; Delaney and McCarthy, 2011; Lundkvist et al., 2010; Mahadevan et al., 2014).

Some older adults indicated that they only made dietary changes as the result of a negative health diagnosis (Banwell et al., 2010; Bech-Larsen and Kazbare, 2014; Bjørner et al., 2018; Brownie, 2013; Chen and Shao, 2012; De Morais et al., 2012; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; Mahadevan et al., 2014; Vesnaver et al., 2012). Ironically, diet was better understood by those living with a health condition that was partly managed through diet – presumably because of the additional support and guidance, and self-interest associated with a diagnosis (Lundkvist et al., 2010; Mahadevan et al., 2014; Vesnaver et al., 2012; Wham and Bowden, 2011). In contrast, older adults with no diagnosis of diet-related health conditions demonstrated resistance to the assertion that their diet was unhealthy, citing the absence of diagnosed health issues as evidence for their beliefs (Banwell et al., 2010; Delaney and McCarthy, 2011; Wham and Bowden, 2011).

Older people saw diet and eating well as a means of maintaining good health and wellbeing in later life (Chen and Shao, 2012; Delaney and McCarthy, 2011; Edfors and Westergren, 2012; King et al., 2017; Lundkvist et al., 2010; Wham and Bowden, 2011) linking eating healthily as both a sign of and insurance against independence in later life (Delaney and McCarthy, 2011; King et al., 2017; Lundkvist et al., 2010; Vesnaver et al., 2012). Some participants suggested that they maintained healthy eating practices so as not to become a 'burden' on their family (Chen and Shao, 2012). Those who demonstrated greater commitment to remain engaged in activities seemed to experience both better levels of life satisfaction, but also better diets and relationships with food (Bjørner et al., 2018; Bloom et al., 2017; Cohen and Cribbs, 2017; King et al., 2017; Vesnaver et al., 2012; Vesnaver et al., 2015, 2016; Whitelock and Ensaff, 2018).

Participants recognised that much of their dietary health information and attitudes arose from the media and public health campaigns (Banwell et al., 2010; Bloom et al., 2017; Lundkvist et al., 2010) yet they frequently voiced confusion at both the amount and the seeming changeability of dietary health information. This was identified as a cause of distrust of public health messages (Brownie, 2013; Delaney and McCarthy, 2011; Lundkvist et al., 2010; Mahadevan et al., 2014; Tyler et al., 2014). Instead, older adults favoured heuristic 'measures' to understand healthiness; such as fruit and vegetable intake as a proxy measure for healthiness (Bech-Larsen and Kazbare, 2014; Brownie, 2013; Brownie and Coutts, 2013). Others used anecdotal personal experience (Delaney and McCarthy, 2011; Mahadevan et al., 2014; Tyler et al., 2014), 'listening to their bodies' (Lundkvist et al., 2010; Vesnaver et al., 2015), social comparisons and the absence of disease (Bech-Larsen and Kazbare, 2014), as measures of a healthy diet.

3.2.4.5. Shrinking social connections. As previously covered, social networks facilitated eating by providing motivations and opportunities for eating and to model eating behaviours (Bloom et al., 2017; Philpin et al., 2011; Tyler et al., 2014; Vesnaver et al., 2015), in addition to providing opportunities for social interaction (De Morais et al., 2012; Thomas and Emond, 2017) and mealtime enjoyment (Bjørner et al., 2018; Delaney and McCarthy, 2011; Mahadevan et al., 2014). However, most participants acknowledged with sadness, that their social networks had shrunk over time, which lessened the opportunity for shared mealtimes. Lack of social eating occasions was associated with simplified cooking and eating behaviours (Cohen and Cribbs, 2017; Edfors and Westergren, 2012) and had the potential to reduce variety of diet and interest in food-related life (Bjørner et al., 2018; Brownie, 2013; Brownie and Coutts, 2013).

The most frequently cited changes to immediate social connections occurred upon the death of a spouse and/or moving in with other family members (i.e., grown children). Generally, living with others resulted in a greater commitment to food-related life and a greater chance of commensal opportunities, although living with others did not always translate into eating with others (Bjørner et al., 2018; De Morais et al., 2012). Some older adults suggested that living with others was not necessarily protective because they were either not in control of the food provision (Brownie, 2013; Brownie and Coutts, 2013) or that they would put the dietary needs and preferences of their family members ahead of their own (Chen and Shao, 2012; Cohen and Cribbs, 2017). However, it can also support dietary health outcomes by providing regulation for dietary behaviours (Vesnaver et al., 2015).

4. Discussion

This review summarises the psychological factors and social influences that may contribute to changes in eating behaviours in later life. There is a significant overlap in terms of themes that were identified in quantitative and qualitative studies with older adults. In the following section, these themes are further synthesised into eight distinct categories of psychosocial factors that influence eating behaviours (see Fig. A4).

Firstly, *'Health awareness and attitudes'* is the recognition of the interaction between food intake and health/wellbeing. In line with other research, our synthesis demonstrates that whilst there is a general acceptance of the link between food and health, there is a knowledge-behaviour gap in terms of what a healthy diet looks like for older adults (e.g. Gille et al., 2016) and that there is a lack of awareness of dietary risks associated with ageing (e.g. Reimer et al., 2012). For example, a recent study concluded that older adults were likely to miss signs of malnutrition such as low weight and lack of appetite as they associated these with the idea of thinness being indicative of good health (Chatindiara et al., 2020). Similarly, our synthesis supports the need for the presence of a health issue to instigate dietary change as opposed to older adults taking a preventative approach (Dijkstra et al., 2014). This might suggest that simply providing nutritional information to older adults is not enough, and more guidence is needed in the way of risk perception and preventative nutritional support.

There was also some evidence that for older adults, *'Food decision making'* was a constant balancing of pleasure vs healthiness or convenience over quality. Further investigation is warranted in determining how older people are making healthiness judgements in terms of their overall nutritional health (i.e. using 'thinness' or fruit and vegetable consumption as a proxy measure of health) or in their own food choice decision making (i.e. healthiness over taste etc). Food choice may also be one of the last vestiges of control that older people can exert as their health deteriorates – which could cause some to become resistant to adapting food habits for healthier options. Indeed, our results demonstrate that *'perceived dietary control'* can influence food satisfaction, appetite, and dietary quality. Internal locus of control and high sense of self-efficacy to eat well were linked to better eating outcomes, demonstrating that maintaining a sense of control over food – even as physical capability of managing food intake declines – is important for maintain dietary health and food enjoyment. Control of food intake through restrained eating may be a particular issue for older adults who dislike

food wastage or overindulgence.

In our review, *'Mental health and mood'* were also significant correlates to dietary outcomes. In general, poorer mood and mental health were associated with poorer eating outcomes, whereas better mental health and mood were associated with healthier eating outcomes. Further exploration of the relationship between food, mood/mental health and living situation/bereavement is warranted. In addition, our results support other literature that demonstrates that the psychological components of hardiness and openness are protective in terms of mental health and managing life changes. This could indicate that interventions that increase hardiness/openness may support eating well for longer (e.g., Aggarwal et al., 2016; Pfeiler and Egloff, 2020; Yin et al., 2019).

Additionally, the qualitative research shows *'food emotions and enjoyment'* are highly linked to early food and mealtime experiences – and are dependent on whether food(s) were seen as functional or for sensory pleasure. This suggests that tailoring meals towards foods that generate positive associations (i.e. nostalgic foods from childhood) may help to increase food intake through food-specific reminiscence or life-review therapies to encourage positive eating behaviours (Hanssen and Kuven, 2016).

The review demonstrated compelling evidence for the importance of *'Eating arrangements'*. Eating alone had a consistent and significant influence on insufficient food intake, unhealthy BMI, lower food diversity, decreased consumption of fruit and vegetables, and higher likelihood of skipping meals. In contrast, commensal eating tended to increase dietary diversity and mealtime regularity, and food satisfaction. However, our findings indicate that it is the nature of the relationship with the commensal participants that are important in exerting the positive effects, with sharing meals with those closest to you cited as being key to mealtime enjoyment. A recent study by Saeed et al. (2019) exploring the psychosocial barriers around commensal eating found that current interventions to encourage social mealtimes in the community often caused conflict with older adults sense of identity and could cause embarrassment - therefore interventions that merely bring 'strangers' together to eat may be less effective. Future research should include how to reduce barriers to commensality, determining optimal (or at least, minimal) levels of commensal behaviours for good nutritional health, and/or whether commensality at specific meals produce more effect than others.

Utilising *'social facilitation'* may be more effective at encouraging positive eating behaviours (Herman, 2015) – and the larger the social network, the greater the opportunities for shared mealtimes and modelling eating behaviours. It is clear from our results that the quality of the mealtime interactions facilitates food intake, yet less is understood about what constitutes a high-quality interaction. Additionally, whilst research demonstrates that mimicked mealtime companionship or interactions are influential, and in some cases sought (i.e. use of radio, television etc.), use of such technologies are also in the early stages of research (Korsgaard et al., 2019; Spence et al., 2019), and may warrant further investigation to review the acceptability of future technologies (e.g. AI, VR, virtual mealtimes) to support commensality and social facilitation at mealtimes.

Lastly, the influence of *'social support'* on eating behaviours seem to hinge on the acceptability of that support; depending on how much autonomy over food choices older adults were given, and whether the older person perceived the support as either keeping or detracting from their independence. In line with other research findings (e.g. Bloom et al., 2016), lower levels of tangible support were associated with undereating but increased levels were associated with a negative effect on dietary habits. Therefore, lack of support might be associated with undereating because older adults are not getting support with preparing sufficient meals; then when support increases dietary habits decrease further due to the sense of lack of control.

Our focus on psychosocial factors is in no way intended to exclude or diminish the importance of other factors, namely biological, physiological, pharmacological, socio-economic, or environmental, on the eating behaviour of older adults. Without a doubt, a complete and testable model of eating behaviours must account for these important factors. The goal of the present review is to highlight the importance of psychosocial factors that tend to be overshadowed and receive less attention in the literature. In addition, although we have sought to extract psychosocial factor from the wider spectrum of influences on eating behaviours, it must be acknowledged that these factors will undoubtedly interact and create new mechanisms and bidirectional pathways. For example, loss of taste/smell (physiological) could reduce food enjoyment (psychological) with the effect that food intake is lower (eating outcome); or reduced mobility (physical) and low income (economical) could reduce the likelihood of meeting friends for meals (social facilitation) and perhaps resulting in a lack of dietary diversity (e.g., Björnwall et al., 2021; Chae et al., 2018). Investigation of these interactions, mechanisms and pathways warrant further research, but we hope that our systematic review will encourage researchers to consider the role of psychosocial factors. Indeed, our results align with the growing consensus that in order to support eating behaviours in later life, a multifaceted and targeted approach including psychosocial interventions as well as traditional physical and pharmacological therapies is needed (Cox et al., 2020; Maître et al., 2021; O'Keeffe et al., 2019).

A meta-analysis was not performed due to the heterogeneity of the outcome variables studies and diversity of methodologies. In addition, most studies used a cross-sectional design, which precluded making conclusions regarding causality. Ideal research would be longitudinal but this in most cases would be impractical. However, more studies may consider comparing older and younger age groups (as a minority of our selected studies did). In this review, by combining the largely cross-sectional research with the themes derived from the qualitative data we provide insights into how factors may be influencing eating over time. This is especially evident given how readily older adults can link their current behaviours to childhood practices. The psychosocial influences identified in this review can be categorised into enablers and barriers to eating well in later life, and also which remain unclear and would benefit from further investigation (see Table A4).

5. Conclusion

The strength of this review lies in how qualitative studies reveal richer data that quantitative research finds difficult to capture i.e., how the early habits and experiences influence eating when people get older, and the importance of how people manage age-related changes and challenges to their food life status quo. Further research should include the investigation of adaptive coping mechanisms to age-related changes to food-related life, as well as interactions with bio/physiological mechanisms. Our findings also support the need for a more holistic approach to dietary interventions over and above the use of nutritional supplements or educational interventions.

In conclusion, this paper supports the need for further research into and development of psychosocial interventions for older adults that provide a more holistic approach to eating well.

Funding

This work was supported by the Engineering and Physical Science Research Council (EPSRC) UK (grant EP/N509796/1 and EP/R513374/1; project reference number 1941962).

CRediT authorship contribution statement

Aimee Walker-Clarke: Conceptualization; Formal analysis; Investigation; Methodology; Project administration; Writing - original draft; Writing - review & editing. **Lukasz Walasek:** Supervision; Validation; Writing - review & editing. **Caroline Meyer:** Funding acquisition; Supervision; Validation; Writing - review & editing.

Acknowledgements

We would like to thank Sophie Tyerman for her assistance during the screening process and Sophie Clohessy for her assistance during the quality assessment process.

Appendix A

See appendix Figs. A1-A4

Appendix B. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.arr.2022.101597.

References

Agarwal, E., Marshall, S., Miller, M., Isenring, E., 2016. Optimising nutrition in residential aged care: A narrative review. Maturitas 92, 70–78.
Aggarwal, A., Rehm, C.D., Monsivais, P., Drewnowski, A., 2016. Importance of taste, nutrition, cost and convenience in relation to diet quality: Evidence of nutrition resilience among US adults using National Health and Nutrition Examination Survey (NHANES) 2007–2010. Prev. Med. 90, 184–192.
Andre, B., Canhao, H., Espnes, G.A., Ferreira Rodrigues, A.M., Gregorio, M.J., Nguyen, C., Sousa, R., Gronning, K., 2017. Is there an association between food patterns and life satisfaction among Norway's inhabitants ages 65 years and older? Appetite 110, 108–115.
Bailly, N., Maitre, I., Van Wymelbeke, V., 2015. Relationships between nutritional status, depression and pleasure of eating in aging men and women. Arch. Gerontol. Geriatr. 61, 330–336.
Banwell, C., Dixon, J., Broom, D., Davies, A., 2010. Habits of a lifetime: Family dining patterns over the lifecourse of older Australians. Health Sociol. Rev. 19, 343–355.
Bech-Larsen, T., Kazbare, L., 2014. Perceptions of healthy eating in transitional phases of life: Results of four focus groups with adolescents and older adults. Br. Food J. 116, 570–584.
Bjørner, T., Korsgaard, D., Christine Reinbach, H., Perez-Cueto, F.J.A., 2018. A contextual identification of home-living older adults' positive mealtime practices: A honeycomb model as a framework for joyful aging and the importance of social factors. Appetite 129, 125–134.
Björnwall, A., Mattsson Sydner, Y., Koochek, A., Neuman, N., 2021. Eating Alone or Together among Community-Living Older People—A Scoping Review. Int. J. Environ. Res. Public Health 18, 3495.
Bloom, I., Edwards, M., Jameson, K.A., Syddall, H.E., Dennison, E., Gale, C.R., Baird, J., Cooper, C., Aihie Sayer, A., Robinson, S., 2016. Influences on diet quality in older age: the importance of social factors. Age Ageing 46, 277–283.
Bloom, I., Lawrence, W., Barker, M., Baird, J., Dennison, E., Sayer, A.A., Cooper, C., Robinson, S., 2017. What influences diet quality in older people? A qualitative study among community-dwelling older adults from the Hertfordshire Cohort Study, UK. Public Health Nutr. 20, 2685–2693.
Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3, 77–101.
Brownie, S., 2013. Older Australians' views about the impact of ageing on their nutritional practices: Findings from a qualitative study. Australas. J. Ageing 32, 86–90.
Brownie, S., Coutts, R., 2013. Older Australians' perceptions and practices in relation to a healthy diet for old age: A qualitative study. J. Nutr., Health Aging 17, 125–129.
Chae, W., Ju, Y.J., Shin, J., Jang, S.-I., Park, E.-C., 2018. Association between eating behaviour and diet quality: eating alone vs. eating with others. Nutr. J. 17, 117.
Chatindiara, I., Sheridan, N., Kruger, M., Wham, C., 2020. Eating less the logical thing to do? Vulnerability to malnutrition with advancing age: A qualitative study. Appetite 146, 104502.
Chen, S.-H., Shao, J.-h, 2012. 'Have you had your bowl of rice?': A qualitative study of eating patterns in older Taiwanese adults. J. Clin. Nurs. 21, 2–10.
Chen, S., Acton, G., Shao, J.H., 2010. Relationships among nutritional self-efficacy, health locus of control and nutritional status in older Taiwanese adults. J. Clin. Nurs. 19, 2117–2127.
Cohen, N., Cribbs, K., 2017. The everyday food practices of community-dwelling Lesbian, Gay, Bisexual, and Transgender (LGBT) older adults. J. Aging Stud. 41, 75–83.
Conte, C., Cascino, A., Bartali, B., Donini, L.M., Rossi-Fanelli, F., Laviano, A., 2009. Anorexia of aging. Curr. Nutr. Food Sci. 5, 9–12.
Cox, Natalie, Morrison, Leanne, Ibrahim, Kinda, Robinson, Sian, Sayer, Avan, Roberts, Helen, 2020. New horizons in appetite and the anorexia of ageing. Age and ageing 49 (4), 526–534.
de Boer, A., Ter Horst, G.J., Lorist, M.M., 2013. Physiological and psychosocial age-related changes associated with reduced food intake in older persons. Ageing Res. Rev. 12, 316–328.
De Morais, C., Afonso, C., Lumbers, M., Raats, M., De Almeida, M.D.V., 2012. From childhood to old age: A qualitative approach to the study of portuguese elderly's perception of meals across the life cycle. Rev. De. Aliment. Hum. 18, 8–18.
Dean, M., Raats, M.M., Grunert, K.G., Lumbers, M., 2009. Factors influencing eating a varied diet in old age. Public Health Nutr. 12, 2421–2427.
Delaney, M., McCarthy, M., 2011. Food choice and health across the life course: A qualitative study examining food choice in older irish adults. J. Food Prod. Mark. 17, 114–140.
Dijkstra, S.C., Neter, J.E., Brouwer, I.A., Huisman, M., Visser, M., 2014. Motivations to eat healthily in older Dutch adults-a cross sectional study. Int. J. Behav. Nutr. Phys. Act. 11, 141.
Donini, L.M., Savina, C., Cannella, C., 2003. Eating habits and appetite control in the elderly: The anorexia of aging. Int. Psychogeriatr. 15, 73–87.
Durkin, D.W., Shotwell, M.S., Simmons, S.F., 2014. The impact of family visitation on feeding assistance quality in nursing homes. J. Appl. Gerontol. 33, 586–602.
Edfors, E., Westergren, A., 2012. Home-living elderly people's views on food and meals. J. Aging Res. 2012.
Engel, J.H., Siewerdt, F., Jackson, R., Akobundu, U., Wait, C., Sahyoun, N., 2011. Hardiness, depression, and emotional well-being and their association with appetite in older adults. J. Am. Geriatr. Soc. 59, 482–487.
Fávaro-Moreira, N.C., Krausch-Hofmann, S., Matthys, C., Vereecken, C., Vanhauwaert, E., Declercq, A., Bekkering, G.E., Duyck, J., 2016. Risk factors for malnutrition in older adults: a systematic review of the literature based on longitudinal data. Adv. Nutr.: Int. Rev. J. 7, 507–522.
Flint, K.M., Walleghen, E.L., Kealey, E.H., VonKaenel, S., Bessesen, D.H., Davy, B.M., 2008. Differences in eating behaviors between nonobese, weight stable young and older adults. Eat. Behav. 9, 370–375.
Gille, D., Bütikofer, U., Chollet, M., Schmid, A., Altintzoglou, T., Honkanen, P., Stoffers, H., Walther, B., Piccinali, P., 2016. Nutrition behavior of the middle-aged and elderly: Compliance with dietary recommendations of the food pyramid. Clin. Nutr. 35, 638–644.
Greene, G.W., Fey-Yensan, N., Padula, C., Rossi, S.R., Rossi, J.S., Clark, P.G., 2008. Change in fruit and vegetable intake over 24 months in older adults: Results of the SENIOR project intervention. Gerontologist 48, 378–387.
Hanssen, I., Kuven, B.M., 2016. Moments of joy and delight: The meaning of traditional food in dementia care. J. Clin. Nurs. 25, 866–874.
Herman, C.P., 2015. The social facilitation of eating. A review. Appetite 86, 61–73.
Hickson, M., 2006. Malnutrition and ageing. Postgrad. Med. J. 82, 2–8.
Host, A., McMahon, A.-T., Walton, K., Charlton, K., 2016. Factors influencing food choice for independently living older people-A systematic literature review. J. Nutr. Gerontol. Geriatr. 35, 67–94.
Hurree, N., Jeewon, R., 2016. An analysis of contributors to energy intake among middle aged and elderly adults. Curr. Res. Nutr. Food Sci. 4, 8–18.
Iizaka, S., Tadaka, E., Sanada, H., 2008. Comprehensive assessment of nutritional status and associated factors in the healthy, community-dwelling elderly. Geriatr. Gerontol. Int. 8, 24–31.
Ishikawa, M., Takemi, Y., Yokoyama, T., Kusama, K., Fukuda, Y., Nakaya, T., Nozue, M., Yoshiike, N., Yoshiba, K., Hayashi, F., Murayama, N., 2017. "Eating together" is associated with food behaviors and demographic factors of older Japanese people who live alone. J. Nutr., Health Aging 21, 662–672.
Ishikawa, M., Yokoyama, T., Hayashi, F., Takemi, Y., Nakaya, T., Fukuda, Y., Kusama, K., Nozue, M., Yoshiike, N., Murayama, N., 2018. Subjective Well-Being Is Associated with Food Behavior and Demographic Factors in Chronically Ill Older Japanese People Living Alone. J. Nutr., Health Aging 22, 341–353.
Karlsson, J., Persson, L.-O., Sjöström, L., Sullivan, M., 2000. Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. Int. J. Obes. 24, 1715.
Kim, C.-O., 2016. Food choice patterns among frail older adults: The associations between social network, food choice values, and diet quality. Appetite 96, 116–121.
Kimura, Y., Wada, T., OkumiYa, K., Ishimoto, Y., FuKuTomi, E., Kasahara, Y., ChEn, W., Sakamoto, R., FujisaWa, M., OtsuKa, K., Matsubayashi, K., 2012. Eating alone among community-dwelling japanese elderly: Association with depression and food diversity. J. Nutr., Health Aging 16, 728–731.
King, A.C., Orpin, P., Woodroffe, J., Boyer, K., 2017. Eating and ageing in rural Australia: Applying temporal perspectives from phenomenology to uncover meanings in older adults' experiences. Ageing Soc. 37, 753–776.
Korsgaard, D., Bjøner, T., Nilsson, N.C., 2019. Where would you like to eat? A formative evaluation of mixed-reality solitary meals in virtual environments for older adults with mobility impairments who live alone. Food Res. Int. 117, 30–39.
Littlewood, D., Kyle, S., Pratt, D., Peters, S., Gooding, P., 2017. Examining the role of psychological factors in the relationship between sleep problems and suicide. Clin. Psychol. Rev. 54, 1–16.
Locher, J.L., Ritchie, C.S., Robinson, C.O., Roth, D.L., West, D.S., Burgio, K.L., 2008. A multidimensional approach to understanding under-eating in homebound older adults: The importance of social factors. Gerontologist 48, 223–234.
Locher, J.L., Ritchie, C.S., Roth, D.L., Sen, B., Vickers, K.S., Vailas, L.I., 2009. Food choice among homebound older adults: motivations and perceived barriers. J. Nutr. Health Aging 13, 659–664.
Lundkvist, P., Fjellstrom, C., Sidenvall, B., Lumbers, M., Raats, M., 2010. Management of healthy eating in everyday life among senior Europeans. Appetite 55, 616–622.
Mahadevan, M., Hartwell, H., Feldman, C., Ruzsilla, J., Raines, E., 2014. Assisted-living elderly and the mealtime experience. J. Hum. Nutr. Diet. 27, 152–161.
Maître, Isabelle, Sulmont-Rossé, Claire, Van Wymelbeke, Virginie, Cariou, Véronique, Bailly, Nathalie, Ferrandi, Jean-Marc, Salle, Agnès, Cardon, Philippe, Amand, Marion, Manckoundia, Patrick, 2021. Food perception, lifestyle, nutritional and health status in the older people: Typologies and factors associated with aging well. Appetite 164, 105223.
Maitre, I., Wymelbeke, Van, Amand, V., Vigneau, M., Issanchou, E., Sulmont-Rosse, C, S., 2014. Food pickiness in the elderly: Relationship with dependency and malnutrition. Food Qual. Prefer. 32, 145–151.

Malafarina, V., Uriz-Otano, F., Gil-Guerrero, L., Iniesta, R., 2013. The anorexia of ageing: physiopathology, prevalence, associated comorbidity and mortality. A systematic review. Maturitas 74, 293–302.
Markovski, K., Nenov, A., Ottaway, A., Skinner, E., 2017. Does eating environment have an impact on the protein and energy intake in the hospitalised elderly? Nutr. Diet. 74, 224–228.
Milne, A.C., Potter, J., Vivanti, A., Avenell, A., 2009. Protein and energy supplementation in elderly people at risk from malnutrition. Cochrane Database Syst. Rev.
Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Ann. Intern. Med. 151, 264–269.
Mõttus, R., McNeill, G., Jia, X., Craig, L.C.A., Starr, J.M., Deary, I.J., 2013. The Associations Between Personality, Diet and Body Mass Index in Older People. Health Psychol. 32, 353–360.
Nakata, R., Kawai, N., 2017. The "social" facilitation of eating without the presence of others: Self-reflection on eating makes food taste better and people eat more. Physiol. Behav. 179, 23–29.
Narchi, I., Walrand, S., Boirie, Y., Rousset, S., 2008. Emotions generated by food in elderly french people. J. Nutr., Health Aging 12, 626–633.
Nieuwenhuizen, W.F., Weenen, H., Rigby, P., Hetherington, M.M., 2010. Older adults and patients in need of nutritional support: review of current treatment options and factors influencing nutritional intake. Clin. Nutr. 29, 160–169.
Nuvoli, G., 2015. Family meal frequency, weight status and healthy management in children, young adults and seniors. A study in Sardinia, Italy. Appetite 89, 160–166.
O'Keeffe, M., Kelly, M., O'Herlihy, E., O'Toole, P.W., Kearney, P.M., et al., 2019. Potentially modifiable determinants of malnutrition in older adults: A systematic review. Clinical Nutrition 38 (6), 2477–2498.
Paquet, C., St-Arnaud-McKenzie, D., Ma, Z., Kergoat, M.-J., Ferland, G., Dube, L., 2008. More than just not being alone: the number, nature, and complementarity of meal-time social interactions influence food intake in hospitalized elderly patients. Gerontologist 48, 603–611.
Pfeiler, T.M., Egloff, B., 2020. Personality and eating habits revisited: Associations between the big five, food choices, and Body Mass Index in a representative Australian sample. Appetite, 104607.
Philpin, S., Merrell, J., Warring, J., Gregory, V., Hobby, D., 2011. Sociocultural context of nutrition in care homes. Nurs. older People 23, 24–30.
Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten, N., Roen, K., Duffy, S., 2006. Guidance on the conduct of narrative synthesis in systematic reviews. A Prod. ESRC Methods Program. Version 1, b92.
Porter, K.N., Johnson, M.A., 2011. Obesity is more strongly associated with inappropriate eating behaviors than with mental health in older adults receiving congregate meals. J. Nutr. Gerontol. Geriatr. 30, 403–415.
Prochaska, J.O., DiClemente, C.C., Norcross, J.C., 1993. In search of how people change: Applications to addictive behaviors. Addictions Nursing. Network 5, 2–16.
Reimer, H., Keller, H., Tindale, J., 2012. Learning you are "at risk": Seniors' experiences of nutrition risk screening. Eur. J. Ageing 9, 81–89.
Rugel, E.J., Carpiano, R.M., 2015. Gender differences in the roles for social support in ensuring adequate fruit and vegetable consumption among older adult Canadians. Appetite 92, 102–109.
Saeed, A., Fisher, J., Holmes, L., 2019. 'You've got to be old to go there': psychosocial barriers and facilitators to social eating in older adults. Gerontologist.
Samieri, C., Jutand, M., Féart, C., Capuron, L., Letenneur, L., Barberger-Gateau, P., 2008. Dietary patterns derived by hybrid clustering method in older people: association with cognition, mood, and self-rated health. J. Am. Diet. Assoc. 108, 1461–1471.
Schnettler, B., Lobos, G., Del Carmen Lapo, M., Adasme-Berríos, C., Hueche, C., 2017. Satisfaction with life and food-related life in ecuadorian older adults. Nutr. Hosp. 34, 65–72.
Sinclair, R.R., Oliver, C.M., 2003. Development and validation of a short measure of hardiness. PORTLAND STATE UNIV OR DEPT OF PSYCHOLOGY.
Spence, C., Mancini, M., Huisman, G., 2019. Digital commensality: Eating and drinking in the company of technology. Front. Psychol. 10, 2252.
Starr, K.P., Fischer, J.G., Johnson, M.A., 2014. Eating behaviors, mental health, and food intake are associated with obesity in older congregate meal participants. J. Nutr. Gerontol. Geriatr. 33, 340–356.
Stroebele-Benschop, N., Depa, J., de Castro, J.M., 2016. Environmental strategies to promote food intake in older adults: A narrative review. J. Nutr. Gerontol. Geriatr. 35, 95–112.
Sugisawa, H., Nomura, T., Tomonaga, M., 2015. Psychosocial mediators between socioeconomic status and dietary habits among Japanese older adults. J. Nutr., Health Aging 19, 130–136.
Tani, Y., Kondo, N., Takagi, D., Saito, M., Hikichi, H., Ojima, T., Kondo, K., 2015. Combined effects of eating alone and living alone on unhealthy dietary behaviors, obesity and underweight in older Japanese adults: Results of the JAGES. Appetite 95, 1–8.
Thomas, N., Emond, R., 2017. Living alone but eating together: Exploring lunch clubs as a dining out experience. Appetite 119, 34–40.
Tyler, S., Corvin, J., McNab, P., Fishleder, S., Blunt, H., VandeWeerd, C., 2014. "You can't get a side of willpower": Nutritional supports and barriers in The Villages, Florida. J. Nutr. Gerontol. Geriatr. 33, 108–125.
van der Meij, B.S., Wijnhoven, H.A., Finlayson, G.S., Oosten, B.S., Visser, M., 2015. Specific food preferences of older adults with a poor appetite. A forced-choice test conducted in various care settings. Appetite 90, 168–175.
Vesnaver, E., Keller, H.H., 2011. Social influences and eating behavior in later life: A review. J. Nutr. Gerontol. Geriatr. 30, 2–23.
Vesnaver, E., Keller, H.H., Payette, H., Shatenstein, B., 2012. Dietary resilience as described by older community-dwelling adults from the NuAge study "If there is a will - there is a way!". Appetite 58, 730–738.
Vesnaver, E., Keller, H.H., Sutherland, O., Maitland, S.B., Locher, J.L., 2015. Food behavior change in late-life widowhood: A two-stage process. Appetite 95, 399–407.
Vesnaver, E., Keller, H.H., Sutherland, O., Maitland, S.B., Locher, J.L., 2016. Alone at the Table: Food Behavior and the Loss of Commensality in Widowhood. J. Gerontol. - Ser. B Psychol. Sci. Soc. Sci. 71, 1059–1069.
Volkert, D., Beck, A.M., Cederholm, T., Cereda, E., Cruz-Jentoft, A., Goisser, S., de Groot, L., Großhauser, F., Kiesswetter, E., Norman, K., 2019. Management of Malnutrition in Older Patients—Current Approaches. Evid. Open Quest. J. Clin. Med. 8, 974.
Wham, C.A., Bowden, J.A., 2011. Eating for health: Perspectives of older men who live alone. Nutr. Diet. 68, 221–226.
Whitehead, B.R., 2017. Health behaviors in older adults: Considering age, affect, and attitudes. J. Health Psychol. 22, 1652–1657.
Whitelock, E., Ensaff, H., 2018. On Your Own: Older Adults' Food Choice and Dietary Habits. Nutrients 10, 413.
Wilson, L., 2013. A review and summary of the impact of malnutrition in older people and the reported costs and benefits of interventions, Malnutrition Task Force.
Wysokiński, A., Sobów, T., Kłoszewska, I., Kostka, T., 2015. Mechanisms of the anorexia of aging—a review. Age 37.
Yin, Z., Brasher, M.S., Kraus, V.B., Lv, Y., Shi, X., Zeng, Y., 2019. Dietary Diversity Was Positively Associated with Psychological Resilience among Elders: A Population-Based Study. Nutrients 11, 650.