Dietary behavior of home-living older adults: the role of environmental factors

by

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Summary

While many home-living older adults seem to consume a nutritionally adequate diet, the prevalence of malnutrition in older people living at home remains high and frequently overlooked. Malnutrition in older adults has been recognized as a challenging health concern associated with a decline in health, reduced physical and cognitive function, increased utilization of health services, slower recovery times, premature institutionalization, and increased mortality. The problems that exist in relation to malnutrition, coupled with the increased proportion of older adults in the population, will affect not only the older adults themselves but also has serious implications on health services, public finances, and welfare systems.

In response to these growing concerns, effort should be made to help older adults maintain their health. Research evidence increasingly supports the idea that an adequately nutritious sound diet is essential to the health of older adults. It is thus important to understand the dietary behavior of home-living older adults, particularly what factors impact this behavior. The recognition of the importance of understanding dietary behavior has sparked interest in research about these factors. That said, it often focuses solely on the individual-level determinants. Research focusing on environmental determinants of dietary behavior, on the other hand, is growing, but much still remains to be explored. For this reason, this dissertation centered on the environmental determinants of dietary behavior.

The main objective of this dissertation is to deepen our understanding of home-living older adults' dietary behavior and advance the current state-of-art literature in this field. This objective is achieved by means of three small interrelated studies. Before proceeding with the studies, I would like to point out the rationale behind them.

Many empirical studies in dietary behavior research use in-depth individual interviews as the data collection method. Despite the benefits of in-depth individual interviews as a data collection method, using a single data source to investigate a complex dietary behavior is perhaps insufficient. Additionally, it can result in mono-method bias. To create a good foundation for the studies and improve the overall validity of the findings, I first draw my attention to the data collection method (study 1) before focusing on identifying the environmental factors that impact dietary behavior (study 2). In terms of study 3, the second study's findings guided this study. The paragraphs below describe the three studies.

The first study explored the suitability of data collection methods for use with home-living older adults in the context of food choice. The second study investigates environmental factors determining home-living older adults' eating behavior. The third study examines the role of situational factors and the extent to which they lead to the adoption of online grocery shopping.

The result of the first study shows that the dyadic interview is a viable method for collecting data from older adults when an alternative interview method is needed. It also indicated that both interview methods generated complementary information. Moreover, using multiple methods has provided greater insights and perspectives about the topic.

The findings of study two suggest that a social environment can help encourage healthy eating among home-living older adults. Additionally, participation in a senior center, ensuring access to food (grocery shopping), transportation and mobility aids can support home-living older adults in maintaining their diet and health.

The third study found that a combination of poor health, loss of mobility, and distance to the grocery store can create a complex process that hinders older adults' endeavors to obtain healthy food. While some older adults have already adopted online grocery shopping as part of their

routines, others are open to the idea as a coping strategy, but some are still hesitant.

Taken together, this dissertation contributes to unique insights into data collection methods for use with older adults when exploring food choice, deepens the knowledge of environmental factors associated with eating behavior, and enriches the understanding of situational factors that lead older adults to buy groceries online. The findings carry implications for methodology, theory, and practice within dietary behavior research of home-living older adults.

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1   Introduction

The world's population is aging rapidly. By 2050, 1 in 5 people will be aged 60 years or over (Kehoe, Walton, & Flynn, 2019). Norway is no exception to this demographic transition. It is anticipated that in 2030 there will be more older adults than children and young people in the country (Statistics Norway, 2020). This demographic shift could put a strain on public finances, the welfare system and increase demand for health services. That said, the resources that will be needed for the aging population depends predominantly on older adults' health and their ability to work and live independently for longer (Keese, Hirsch, & Bednarzik, 2006).

Most older adults prefer to live independently at home because it enables them to maintain a sense of independence, autonomy, identity, and connection to social support (Wiles, Leibing, Guberman, Reeve, & Allen, 2012). Besides older adults' preference, living at home is considered less expensive than nursing home care (Marek, Stetzer, Adams, Popejoy, & Rantz, 2012). Essentially, living at home is seen as a cost-effective solution for the aging population (Sixsmith & Sixsmith, 2008). As would be expected, Norway's current social care policy is also aimed at helping older adults to live at home for as long as possible (Regjeringen, 2022). The aforementioned line of reasoning underlies the need for further research into supporting home-living older adults. A home-living older adult is an older person living independently in their home as opposed to being admitted to a nursing home or other care for the aged (Crichton et al., 2019).

To be able to continue living at home, home-living older adults need to be healthy. One factor that plays an important role in maintaining health and preventing disease is food and nutrition (Lumbers & Raats, 2006). An adequate food intake and a nutritious diet can positively impact the aging process, resulting in improved quality of life, prevention of chronic

disease, and lower mortality rates (Kehoe et al., 2019; Lumbers & Raats, 2006).

While many home-living older adults seem to consume a nutritionally adequate diet, the prevalence of malnutrition among them remains high and often goes undetected (Kozáková & Zeleníková, 2014). Some authors suggest that the prevalence of malnutrition in home-living older adults ranges from 13 to 30% (Kozáková & Zeleníková, 2014; Söderhamn, Dale, Sundsli, & Söderhamn, 2012). Also, a recent study by Payne et al. (2020) concludes that approximately 14% of home-living adults aged 65 and over are at risk of malnutrition. The term "malnutrition" refers to inadequate nutritional status characterized by insufficient dietary intake to meet energy or protein requirements in old age (Posner, Jette, Smigelski, Miller, & Mitchell, 1994; Sullivan, Sun, & Walls, 1999).

Malnutrition in home-living older adults contributes to progressive decline in health, reduced physical and cognitive function, increased utilization of health services, slower recovery times, premature institutionalization, and increased mortality (Evans, 2005). As mentioned earlier, these unfavorable outcomes also have negative consequences on public finances and the welfare system (Dean, Raats, Grunert, & Lumbers, 2009; Poscia et al., 2018). In this regard, efforts should be made to better understand the dietary behavior of home-living older adults. Understanding dietary behavior can help develop effective strategies to promote healthy eating and improve diet quality among home-living older adults (Fostinelli et al., 2020).

Dietary behavior is a complex behavior driven by many interacting factors (Sobal & Bisogni, 2009). Considerable research related to dietary behavior has been conducted to identify these factors, but much of the research focuses on the individual-level determinants such as attitudes, beliefs, and preferences (Bukman, Ronteltap, & Lebrun, 2020; Kremers, De Bruijn, Schaalma, & Brug, 2004). However, the environmental

determinants of dietary behavior are less researched and much remains to be explored (Symmank et al., 2017). Although there has been a growing recognition of the role of the environment in influencing dietary behavior, existing evidence regarding the importance of environmental factors in home-living older adults' dietary behavior remains fragmented. Hence, research centered on environmental factors that impact dietary behavior is warranted.

The primary objective of this dissertation is to deepen our understanding of home-living older adults' dietary behavior and advance the current state-of-art literature in this field. Given the complexity of dietary behavior, unpacking home-living older adults' dietary behavior is not a simple task. Traditionally, dietary behavior as a research field makes use of in-depth individual interviews to collect data about the constructs of interest. Despite the ubiquitous nature and benefits of in-depth individual interviews as an instrument for collecting data on dietary behavior, using one instrument to investigate a complex phenomenon is rarely enough. Moreover, the use of in-depth individual interviews as a single data source can result in mono-method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), which can potentially jeopardize the validity of research findings (Burton-Jones, 2009). Thus, it is important that the instruments used for data collection are subject to careful scrutiny.

Pursuing this knowledge, I started my investigation by contrasting in-depth individual interviews with dyadic interviews. I subsequently point out the environmental factors that play a role in home-living older adults' dietary behavior and further investigate the impact of one of these factors.

The chapter below presents the literature review related to home-living older adults' dietary behavior.

2 Literature review

This section provides an overview of the key concepts used throughout this dissertation. Thereafter, a brief glimpse is given into the underlying factors associated with dietary behavior among older adults. This is followed by a quick look at approaches to study dietary behavior. The literature specific to the individual studies of the project is presented in the respective papers.

2.1 Dietary behavior

After a thorough literature review on different aspects of dietary-related behaviors across different disciplines, it has come to my attention that various labels are used for the construct "dietary behavior." Thus, there is a need to clarify the term "dietary behavior." Although it is common to mix terms and labels in the behavioral literature (Larsen et al., 2017), a lack of clarity, consistency, and consensus in terminology may hinder the aggregation of knowledge and the ability to compare findings among disciplines (Stok et al., 2018).

Commonly, dietary behavior refers to food intake. To facilitate understanding and cooperation between disciplines investigating dietary behavior, Stok et al. (2018) developed three categories that represent various aspects of dietary behavior. The three categories are food choice, eating behavior, and nutrient intake (Stok et al., 2018).

This research project explores two categories of dietary behavior: food choice and eating behavior. Understanding food choice and eating behavior is crucial to changing dietary behavior (Shepherd, 2005). Consequently, the manifold nature of food choice and eating behavior sparked interest in researchers of different research traditions such as psychology, sociology, biology, anthropology, food science, and

marketing. The fact that quite a few disciplines address the issue of food choice and eating behavior demonstrates its complexity and importance (Falk, Bisogni, & Sobal, 1996).

2.2 Food Choice

Food choice represents behaviors and other factors occurring before food reaches the mouth (Stok et al., 2018). This behavior includes, for example, preferences, acquiring food products, and food preparation.

Selecting food seems to be one of the most common and mundane activities. However, food choice is an integral part of our daily lives. Generally, people eat to satisfy their hunger, and other reasons could be maintaining health and wellbeing (Finkelstein & Fishbach, 2010). It was reported in the literature that people are more aware of the connection between food and health nowadays; nevertheless, health is not the key factor in food choice (Sun, 2008). What people eat and why they eat it constitute more than a simple matter of nutritional value (Keane & Willetts, 1994).

Prior research suggests that food choice decisions are frequent, situational, dynamic, and complex (Sobal & Bisogni, 2009). In terms of frequency, a study has estimated that most people make over 220 food choice decisions per day (Wansink & Sobal, 2007). As far as the situation is concerned, food choice involves not only decisions about food but also other aspects of a situation in which the food behavior occurs, such as location and people present at the time (Bisogni et al., 2007). In terms of dynamics, food choice develops over time and changes throughout people's lives (Sobal, Bisogni, Devine, & Jastran, 2006). Furthermore, it is complex because it involves many considerations about what, how, when, where, and with whom we eat (Sobal, Bisogni, Devine, & Jastran, 2006).

The complexity of food choice is apparent. Many researchers have used different theoretical and methodological approaches to understand food choice. Nevertheless, much still needs to be learned about home-living older adults' food choices. Understanding their food choices can help practitioners develop appropriate strategies that focus on their needs (Falk et al., 1996).

2.3   *Eating behavior*

Several studies have proposed definitions of eating behavior. Elsner (2002) suggests that eating behavior includes thoughts, actions, and intentions to ingest solids or liquids. Brombach, Landmann, Ziesemer, Bartsch, and Winkler (2017) described eating behavior as food-related actions, including shopping, storing, preparing, eating food, cleaning up afterward, and planning for the following eating occasions. A recent study suggests that eating behavior is related to the actual act of consumption, such as eating habits, eating occasions, portions, and dieting (Stok et al., 2018). Despite lack of agreement on the definitions, these studies support the notion that eating behavior is a complex behavior driven by many interacting factors (Bukman, Ronteltap, & Lebrun, 2020; Köster, 2009).

Like food choices, people engage in eating behavior every day. Many are able to do this successfully, yet some exhibit poor eating practices resulting in malnutrition (Meule & Vögele, 2013). Simply put, people's eating behavior has a decisive effect on their health (Stroebele & De Castro, 2004). Because of this, investigating determinants of eating behavior is warranted. Moreover, studying factors that impact eating behavior might contribute to understanding the overall dietary behavior of home-living older adults.

2.4   Food access

Literature pertaining to dietary behavior suggests that adequate access to healthy food can contribute to a healthier diet (Huang, Rosenberg, Simonovich, & Belza, 2012; Ishikawa et al., 2016; Wolfson, Ramsing, Richardson, & Palmer, 2019). On this account, older adults who experience difficulties in food access are the ones at nutritional risk (Herne, 1995). In this dissertation, food access refers to the location of the food supply (e.g., grocery stores) and the ease of getting to that location (Caspi, Sorensen, Subramanian, & Kawachi, 2012).

While most older adults have access to the food they need to stay healthy, food access remains a problem for many (Meneely, Strugnell, & Burns, 2009; Wilson, Alexander, & Lumbers, 2004). Changes associated with aging (e.g., reduced mobility) and declining health can make access to food more challenging for some older people (Huang et al., 2012). Aside from these challenges, the in-store environment can be an issue for older food shoppers (Lesakova, 2016). A combination of these barriers can negatively impact dietary behavior among older adults.

To deal with food access barriers, typically, older adults seek help from others (e.g., family, friends) to shop, using more convenient food, meals on wheels, and other home-delivery meal services. These coping strategies work well for some, but most older adults value being active by continuing with a familiar routine such as buying their own food to live independently (Sidenvall, Nydahl, & Fjellström, 2001). Because of this, an alternative strategy is needed. One of the alternatives is online grocery shopping. Online grocery shopping entails older adults purchasing grocery products via a retailer's website and the purchased groceries being delivered directly to their home (Morganosky & Cude, 2000). This can improve access to healthy food for older adults while enabling them to retain independence. To date, little focus has been given to online grocery shopping behavior among older adults in Norway. However, with online grocery services continuing to rise and the focus

on growing older at home, a thorough understanding of online grocery shopping behavior among older adults is needed, more specifically in which situations older adults buy their groceries online.

2.5 Underlying factors associated with dietary behavior among older adults

Factors associated with dietary behavior among older adults can be grouped into three broad domains (Host, McMahon, Walton, & Charlton, 2016). These domains are 1) physiological changes associated with aging, 2) psychosocial aspects, and 3) personal resources. Below is a brief overview of the domain and the factors in each domain.

2.5.1 Physiological changes associated with aging

Aging is a universal occurrence but is not a homogeneous process (Jaul & Barron, 2017; Shatenstein, 2008). That said, physiological changes are an inevitable part of normal aging (Jaul & Barron, 2017; Nigam, Knight, Bhattacharya, & Bayer, 2012). Even well-aging older adults experience age-related physiological changes (Shatenstein, 2008). Physiological changes that can influence older adults' dietary behavior include taste, poor dentition, loss of appetite, mobility, and health.

2.5.1.1 Taste change

A declining sense of taste is a common problem among older adults (Drewnowski, 1997; Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). The changes in taste are typically caused by changes in taste receptor cells, difficulties in maintaining oral health, and reduced olfactory function (Sergi, Bano, Pizzato, Veronese, & Manzato, 2017). Additionally, the use of medications also impairs taste buds (Sergi et al., 2017). To date, in terms of which taste buds decline as a person ages, the

results are inconsistent (Methven, Jiménez-Pranteda, & Lawlor, 2016). Almost 15 years ago, Nordin et al. (2007) reported that acid taste is most affected by age. In contrast, Lampuré et al. (2015) proposed that the liking for savoury food increases with age, whereas the liking for sweet food declines.

2.5.1.2 Poor dentition

Advancing age is also often associated with changes in dentition (Sergi et al., 2017). Poor dentition, dentures, and difficulty chewing and swallowing can cause older adults to restrict their diet and eliminate certain foods. This self-imposed dietary restriction negatively affects older adults' nutritional status (Gil-Montoya, de Mello, Barrios, Gonzalez-Moles, & Bravo, 2015).

2.5.1.3 Loss of appetite

Poor appetite is a common problem in older people (Pilgrim, Robinson, Sayer, & Roberts, 2015). Changes that occur with normal aging, such as sensory changes (smell and taste) and the digestive system function, can make food less appealing for older adults (Amarya, Singh, & Sabharwal, 2015). These changes alter food and nutritional intake, leading to nutritional deficiencies and various health problems (Amarya et al., 2015).

2.5.1.4 Mobility

Mobility is the ability to move independently or by using assistive devices or transportation (Webber, Porter, & Menec, 2010). Age-related loss of muscle strength is a common reason for declining physical mobility in older people (Amarya, Singh, & Sabharwal, 2018). Declining mobility can compromise food choice, access, and preparation (Munoz-Plaza et al., 2013; Wylie, Copeman, & Kirk, 1999).

2.5.1.5 Health

Most older adults know that a healthy diet is critical for their well-being, but compromised health and chronic disease can affect their appetite and change their diet (Falk et al., 1996; Shatenstein, 2008). These dietary changes typically include eating less and making different food choices (Shatenstein, 2008). Furthermore, food-related activities such as grocery shopping, cooking, and eating meals can become burdensome because of health problems (Wolfe, Frongillo, & Valois, 2003).

2.5.2 Psychosocial aspects

In addition to the age-related physiological changes, older adults' dietary behavior is also affected by psychological and social factors (de Boer, Ter Horst, & Lorist, 2013). These factors include life course, living arrangement, motivation, self-perception of health, interest in health and nutrition, and desire to maintain independence.

2.5.2.1 Life course

People's food choices are constructed over time, but their current eating patterns are often attributed to their prior eating experiences (Falk et al., 1996). An example of this is childhood food. For many, childhood food remained important and unchanged for many years (Falk et al., 1996). Because of this, food habits are difficult to change (Amarya et al., 2015). This shows that life course is the backdrop that shapes people's food choices (Furst, Connors, Bisogni, Sobal, & Falk, 1996).

2.5.2.2 Living arrangement

A person's living arrangement can influence the type and variety of food consumed, thereby impacting health (Conklin et al., 2014). Studies have shown that older adults who live alone, have become widowed, or are socially isolated are prone to malnutrition risk (Sidenvall et al., 2001;

Vesnaver, Keller, Sutherland, Maitland, & Locher, 2016). While this is the case, some older adults continue to eat well and maintain their diet despite living alone (Vesnaver, Keller, Payette, & Shatenstein, 2012). It is also important to note that older people who live alone by no means make poorer food choices than those who live with companions; rather, they have a lower food intake (DeBruyne & Pinna, 2018).

With widowhood, losing a partner often leads to fewer regular meals, less enjoyment in mealtimes, and less attention to diet quality (Vesnaver et al., 2016). Social isolation is another factor associated with living alone and widowhood that affects food choices and eating behavior (de Boer et al., 2013). Older people that are socially isolated generally have limited contact or communication with their family, relatives, or friends (Smith, Holt-Lunstad, & Layton, 2010). Social isolation results in more meals eaten alone and a lower food intake, negatively affecting nutritional status (de Boer et al., 2013; Vesnaver et al., 2016). Then again, some older adults prefer to eat alone despite living with family and are comfortable with this practice (Takahashi et al., 2020).

2.5.2.3 Lack of motivation

As previously stated, motivation for food shopping, cooking, and eating meals generally declines among older adults who live alone and have been widowed or become socially isolated (Sidenvall et al., 2001; Vesnaver et al., 2016). These changes lead to a decline in food intake and risk of body weight loss (Donini, Savina, & Cannella, 2003).

2.5.2.4 Self-perception of health

Individuals' own perception of health is an important determinant of dietary behavior in older adults (Lesáková, 2018). An erlier study shows that those with a more positive health perception place more importance on choosing food that makes them physically healthier than those with a less positive view (Lesáková, 2018).

2.5.2.5 *Interest in health and or nutrition*

Similarly, older adults with a greater interest in health and nutrition place more importance on nutrition when choosing food products (Jeruszka-Bielak et al., 2018).

2.5.2.6 *The desire to maintain independence*

Being independent is important to older adults (Payne et al., 2020). However, the effects of aging can make maintaining independence harder as time goes on. Previous studies have established that the desire to maintain independence can affect food choice (Nyberg et al., 2018; Sidenvall et al., 2001). Many are unwilling to accept help from others with food and meals as it indicates losing independence and control (Vesnaver et al., 2012). A strong will to remain independent has created self-imposed dietary restrictions that can compromise nutritional status (Winter, McNaughton, & Nowson, 2016).

2.5.3 *Personal resources*

Personal resources such as transportation, income, support from others, food preparation skills, and dietary resilience are important to achieving healthier diets (Dean et al., 2009; Falk et al., 1996; Radermacher, Feldman, & Bird, 2010).

2.5.3.1 *Transportation*

Transportation is crucial to older adults' independence (Rosenberg & Everitt, 2001). Of all the means of transport, a car is the most commonly used among older adults because it allows them to travel long distances independently (Böcker, van Amen, & Helbich, 2017; Negron-Poblete, Séguin, & Apparicio, 2016). That said, differences exist between older adults and available resources (Rosenberg & Everitt, 2001). Those losing their driving capacity often rely on public transport or being driven by

others (Negron-Poblete et al., 2016). The ability to drive oneself, be driven by others, or use public transport allows older adults to access food stores and other social visits (Negron-Poblete et al., 2016). It has been argued that greater access to transportation contributes to older people having a more varied diet (Dean et al., 2009).

2.5.3.2 Income

Previous studies have explored the relationship between income and diet quality. Having an adequate income ensures a more varied and balanced diet for older people (Drewnowski, Renderson, Driscoll, & Rolls, 1997). A higher income level equates to a greater ability to afford desired or needed food for maintaining a healthy diet (Host et al., 2016). In contrast, low income has been identified as a risk factor for poor diet in older adults (Guthrie & Lin, 2002).

2.5.3.3 Support from others

Support from others can benefit older adults' dietary intake and decrease malnutrition risk (Edfors & Westergren, 2012). Older adults who receive support from others tend to have a more varied diet (Dean et al., 2009) and can live at home for longer (Locher, Burgio, Yoels, & Ritchie, 1998). That said, independence is highly valued among older adults. Perhaps the greatest fear of older adults is becoming dependent on others (Baltes, 1996; Clark, 1991; Portacolone, 2011). This fear can result in a reluctance to ask for assistance from others (Bell & Menec, 2015).

2.5.3.4 Knowledge and skills in food preparation

Cooking skills have been defined as a set of mechanical or physical skills used in meal preparation and conceptual skills related to understanding how food will react when cooked (Short, 2003). Although cooking is a common practice preceding eating daily, it can become harder during older adulthood (Tani, Fujiwara, & Kondo, 2020). Studies show that

cooking skills have an impact on dietary quality (Bostic & McClain, 2017; Tani et al., 2020). Those who lack either ability or desire to prepare and cook for themselves are more prone to nutritional risk (Bostic & McClain, 2017).

2.5.3.5 Dietary resilience

Dietary resiliency is the state of having an adequate diet despite facing dietary challenges (Vesnaver et al., 2012). Previous research suggests that resilient eaters will do everything possible to overcome dietary challenges (Vesnaver et al., 2012). It was reported in the literature that high resilience is associated with positive outcomes (MacLeod, Musich, Hawkins, Alsgaard, & Wicker, 2016). That said, dietary resilience may not always result in resiliency, and efforts to adapt may not always result in successful adaptation (Allen, Haley, Harris, Fowler, & Pruthi, 2011). The ability to adapt often depends on personal resources, willingness to draw on support from others, and available resources in the community (Vesnaver et al., 2012).

2.6 Approaches to studying dietary behavior

Over the past few decades, researchers from multiple disciplines contributed to dietary behavior knowledge. As a result, different psychological theories and models can be used to study dietary-related issues. Theories and models commonly seen in the literature and frequently utilized in present-day research are, for example, the theory of reasoned action, theory of planned behavior, health belief model, social cognitive theory, and socio-ecological model.

Dietary behavior has also been studied from different vantage points. Some disciplines focus on the variables related to the food itself, while others concentrate on the individual or the environmental factors (Edwards, Meiselman, Edwards, & Lesher, 2003). The disciplines contributing to the discussion of the food generally focus on sensory

properties such as texture, taste, odor, and other sensory perceptions. In the discipline that studies individual-related factors, the focus is usually on preferences, beliefs, nutrition knowledge, and attitudes, whereas studies addressing the environmental factors typically include social, physical, and societal factors. Perhaps the main difference between these disciplines is their assumption about the most effective ways to improve dietary quality that lead to better health.

Given this fact, it is hardly surprising that there is no single unified theory or framework to study dietary behavior. In an attempt to capture the complexity of home-living older adults' dietary behavior, I focus on how environmental factors can change dietary behavior in a desirable direction.

2.7 Considerations guiding this research

This dissertation is built on three small interrelated studies. In the following paragraphs, I will describe the two main considerations that inform my decisions about this research and how the three papers are interrelated.

The first consideration concerns the theoretical approaches to studying dietary behavior. Overall, the literature review shows that dietary behavior is complex, dynamic, and diverse among older adults. Various theories and frameworks can be used to study dietary behavior. Combining these approaches into one comprehensive, integrated model is challenging. Such a goal can only be achieved by the joint efforts of the scientific community.

Because no single theory, framework, or model can adequately capture the full complexity of dietary behavior (Sobal & Bisogni, 2009), instead of concentrating on one specific theory to explain dietary behavior, the theories I used in the studies were drawn on in an eclectic manner. As such, the phenomenon drives the research rather than the research being bounded by the limits of a specific theory (Schwarz & Stensaker, 2014). The presumption is that this approach allows me to come closer to the phenomenon and have more connections to the real world. By doing so, I can contribute to advancing knowledge in close relation to the phenomenon. And perhaps, the findings can be used to develop a pragmatic strategy in the real world and guide future theory development.

Apart from suggesting various theoretical lenses that are available to study dietary behavior, the literature review also points out that dietary behavior can be studied from three different vantage points: the food itself, the individual, and the environmental focus. Basically, these approaches attempt to explain dietary behavior by emphasizing one of these perspectives. Although the discussion about the food itself is a critical aspect of dietary behavior, it is beyond the scope of this research.

On the question of whether to concentrate on the individual or environmental context, I chose to focus on the environmental context.

Dietary practices involve an individual isolated choice, but what a person decides to eat and how they arrive at a decision are often affected by their environmental context (Delormier, Frohlich, & Potvin, 2009). If we suppose that dietary practices (e.g., food choice, eating) takes place in the environmental context, then it should be easier and more effective to bring about changes in dietary behavior in an environmental context than in an individual context (Belon, Nieuwendyk, Vallianatos, & Nykiforuk, 2016; Lewin, 1951). Furthermore, it has also been suggested that individual change is more likely to be facilitated and sustained if the environment within which choices are made supports healthy options (WHO, 2003). Thereby, it is rational to focus more attention on the environmental context.

At this stage, what to focus on has been decided but not how the data will be collected. Hence, the second consideration pertains to the methodological approach. In the same way as theoretical approaches, various methodological approaches can be employed to study dietary behavior. The challenge, therefore, lies in selecting appropriate data collection methods. One strategy is to rigidly follow a set of methodological prescriptions and ally with specific research customs (Clarke & Visser, 2019). Although this strategy gives researchers a feeling of "security", the particular methodology may not be suitable to answer a given research question (White, 2013). Another strategy is to focus on the research questions. Using this strategy, researchers choose the methods, techniques, and procedures that best meet their needs and purposes (Creswell & Creswell, 2017). In addition to having freedom of choice, this strategy encourages researchers to make deliberate, conscious choices that are not dictated by a set of methodological rules (Clarke & Visser, 2019). Additionally, emphasizing a research question-led approach may help avoid forming "mono-method" identities in the

research community (White, 2013). These lines of reasoning underpin the choice of methods in my studies.

Furthermore, a closer look at the literature on dietary behavior research in which samples are made up of older adults reveals two shortcomings. First, the methods chosen in these studies are simply described in general and indicated at the end of a study as a strength or limitation. Rarely is the chosen method evaluated and reflected from start to finish. Second, within the repertoire of tools that dietary behavior researchers can use, the in-depth individual interview is a commonly used method. Despite the benefits of in-depth individual interviews as a data collection method, using a single data source can result in mono-method bias (Podsakoff et al., 2003). If this design issue is not addressed beforehand, the overall validity of the study will be undermined. Needless to say, before focusing on identifying the environmental factors that impact dietary behavior (study 2), I draw my attention to the methodological tool (study 1). Some researchers, notably Domarad and Buschmann (1995) and Weil (2015), have argued that focusing on the data collection process can lead to better data that accurately represents the views of the study's participants. As far as study 3 is concerned, the second study's guided this study.

3   Objective and research questions

As previously stated, the primary objective of this dissertation is to deepen our understanding of home-living older adults' dietary behavior and advance the current state-of-art literature on this field. To achieve this objective and address the shortcomings within the existing literature, I carried out three empirical studies.

Study 1 focuses on the data collection method. As indicated earlier, various methodological approaches can be employed to study the dietary behavior of home-living older adults. At the same time, the nature of the research topic determines whether or not the use of a method is advisable (Gubrium, Holstein, Marvasti, & McKinney, 2012). Understanding the complexity of home-living older adults' dietary behavior requires home-living older adults' multiple perspectives or viewpoints. Therefore, we need a method that can be used to explore various perspectives. Among the methods available, qualitative interviews allow the exchange of ideas and meanings, exploring multiple perceptions (Gaskell & Bauer, 2000). Thereby, a qualitative interview is likely an appropriate approach.

The most widely used method within the interview approach is the in-depth individual interview. Like any research technique, the in-depth individual interview has merits and demerits. Furthermore, to minimize the potential threat of mono-method bias (Campbell & Fiske, 1959; Podsakoff et al., 2003), I used two interview methods; in-depth individual and dyadic interviews.

The dyadic interview was selected for three reasons. First, the dyadic interview is well suited to eliciting knowledge from individuals who need additional time to process or recall information (Morgan, Ataie, Carder, & Hoffman, 2013). This implies that dyadic interviews allow researchers to explore older adults' perspectives while accounting for the unique characteristics of this population. Second, dyadic interviews can extend the content beyond what might have been possible in individual

interviews (Morgan, 2016). Third, it allows researchers to observe the interactions between the dyad.

Aside from the above considerations, I also took the nature of the research topic into consideration. As previously stated, food choice involves an isolated choice, but what a person decides to eat and how they arrive at a decision is often a form of collaborative decision with others in everyday life, for example, significant others or families (Delormier, Frohlich, & Potvin, 2009). It has been suggested that the use of dyadic interviews in exploring research topics related to collaboration can contribute to the co-creation of new knowledge (Klevan, Jonassen, Sælør, & Borg, 2020).

Considering that little is known about the suitability of dyadic interviews as a data collection method for older adults, I seek to fill this knowledge gap by empirically comparing dyadic interviews with the most commonly used method, which is in-depth individual interviews. This leads to the first research question:

RQ1: Is the dyadic interview a suitable method for collecting data from home-living older adults in the context of food choices?

Study 2 focuses on the construct (dietary behavior) itself. As explained earlier, the approach taken in this research will focus on environmental influences in home-living older adults' dietary behavior. To this end, the endeavor has been made to identify which environmental factors impact home-living older adults. Thus, the following research question was developed:

RQ2: What environmental factors determine the home-living older adults' eating behavior?

Having recognized that various environmental factors (see result from study 2) play a role in home-living older adults' eating behavior, I attempt to further explore one of these factors in my third study. Based on the

existing literature, food access is a promising area to focus on. Providing convenient and adequate access to healthy food can support home-living older adults in maintaining a healthy diet (Huang et al., 2012; Ishikawa et al., 2016). For this reason, in the third study, I focused my attention on food access, specifically online grocery shopping. This leads to the third research question:

RQ3:

a) What situational factors drive older adults to buy groceries online?

b) Which factors are considered most important when older adults are deciding whether to buy groceries online?

4 Methodological considerations

This research project employs various methods. Each method was chosen based on the sample characteristics, nature of the research topic, suitability to meet research objectives, cost, and practicality. The methods applied in each study are described in detail in the corresponding papers. This section focuses on the overall rationale underpinning the methodological choices.

4.1 Research design and approach

To help make sense of the complex social world and predictions based on the findings, I use abductive reasoning. Using this approach allows me to go back and forth between the data and theory, enabling creativity and intuition in understanding the generalizable and the specific characteristics of the observed phenomena (Dubois & Gadde, 2002).

With regards to the research design, the selection of the research design in my studies is based on the nature of the research problem. Study 1 was designed to explore the suitability of dyadic interviews for use with older adult samples. Considering that little is known about the relative merits of dyadic methods for use with older adults, I employed the exploratory design. The exploratory design is necessary when the topic has never been investigated before, never in that particular context, or little is known about the topic (Blaikie & Priest, 2019). The qualitative research approach is applied in this study.

In terms of study 2, the aim was to identify the environmental factors that may influence the eating behavior of home-living older adults. To get a better idea of what is going on and develop an initial understanding, it was also necessary to use the explorative design in this study. For this study, I also employed a qualitative approach.

As far as study 3 is concerned, the aim was twofold. Firstly, it attempts to identify situational factors that drive older adults to buy groceries online. Secondly, it seeks to describe which situational factors are considered most important when older adults are deciding whether to buy groceries online. Given these aims, a sequential design would seem appropriate for this study. Consequently, I used the exploratory design in the first stage to discover how older adults view online grocery shopping. To further refine the understanding obtained in the first stage and describe some patterns of the adoption of online grocery shopping, the descriptive design was employed in the second stage. To help answer the research questions in this study, I used both the qualitative and quantitative approaches.

4.2   Recruitment

Various recruitment strategies were used across the three studies to recruit sufficient participants that adequately represent the target population. These strategies include placing flyers in mailboxes, community outreach (presentation of our project in senior activity centers), street-intercept recruitment, snowball sampling, and online panel. The details of the recruitment strategy employed in each study are described in the corresponding papers. The paragraph below offers reflections on the recruitment process during the time of the three studies.

A considerable amount of time and attention were devoted to the recruitment strategy. Despite that, I had to make a few changes to the recruitment plan throughout the research project. These changes were made because of low participation rates, participants' illness, and the COVID-19 pandemic. Using multi-recruitment strategies, I was able to recruit the sample within a reasonable time and cost. One important lesson learned is that having alternative recruitment strategies helps avoid delays and improves participant recruitment.

4.3 Sample

The sample of the studies is Norwegian older adults living at home in different parts of Norway. The sample characteristics, sampling criteria (inclusion/exclusion), and achieved sample are described in the corresponding papers. Given the fact that the term "older adult" is repeatedly mentioned in this dissertation, I suppose there is a need to be explicit about what I mean by "older adult."

The term "older adult" is used inconsistently in the literature since this group is made up of individuals with different characteristics. The most common way of defining an older person is using chronological age. At the same time, we know that chronological age in itself is an "empty" variable (Settersten Jr & Mayer, 1997). Furthermore, it is rarely assumes that age itself causes behavior (Settersten Jr & Mayer, 1997).

Despite these problems, chronological age is an indispensable index (Neugarten & Hagestad, 1976). Age is often a powerful piece of information about an individual (Schroots & Birren, 1988). In my studies, chronological age is used to indicate the population from which a sample was drawn and set the inclusion criteria. In studies 1 and 2, older adults are defined as people aged 60 and over, whereas, in study 3, an older adult is determined by the retirement age in Norway (age 62+).

4.4 Data collection

Data collection for studies 1 and 2 took place between October 2019 and January 2020 in a district of Western Norway. For study 3, the interviews were conducted in June 2021 with participants from different districts in Norway, and the online survey was launched in August 2021 to reach older adults nationwide.

As for the instrument for data collection, in studies 1 and 2, data were collected using dyadic and in-depth individual interviews. The interview design and details of how the interviews were conducted are described

in detail in studies 1 and 2. With regard to study 3, I used in-depth individual interviews to collect data in the exploratory phase and a conjoint experiment in the descriptive phase. The conjoint design is described in detail in study 3.

4.5 Analytical approaches

The qualitative data collected in my studies were analyzed using content analysis. As such, content analysis is used to make sense of textual data through the systematic classification process of coding and identifying themes or patterns (Hsieh & Shannon, 2005). The goal is to provide new insights, knowledge, and understanding of the phenomenon under study (Downe-Wamboldt, 1992; Krippendorff, 2018).

In terms of analytical method, either an inductive or a deductive approach can be applied to qualitative content analysis (Elo & Kyngäs, 2008). Additionally, both inductive and deductive reasoning modes are also often used simultaneously in qualitative content analysis (Armat, Assarroudi, Rad, Sharifi, & Heydari, 2018). This type of analysis can be seen in studies 1 and 2.

With regards to the conjoint experiment (study 3), the conjoint module SPSS 26.0 was used for all the analyses. A summary of the data analysis approaches for the three studies is presented below in Table 1.

Study	Article	Type of analysis	Phase	Descriptions of the analysis
1	Dyadic Interviews versus In-Depth Individual Interviews in Exploring Food Choices of Norwegian Older Adults: A Comparison of Two Qualitative Methods	Content analysis	Phase 1	A within-study content analysis (inductive mode).
		Content analysis	Phase 2	A within-study content analysis (deductive mode).
		Cross study analysis using four criteria from Steenkamp and Van Trijp (1997)	Phase 3	The comparison of the two methods was divided into two parts. 1)number of attributes elicited and attribute variability. 2) efficiency in data collection and participants' feedback.
2	Environmental factors that impact the eating behavior of home-living older adults	Content analysis	Phase 1	Deductive content analysis
		Content analysis	Phase 2	Inductive content analysis
3	Understanding the role of situational factors on online grocery shopping among older adults	Content analysis	Phase 1	Directed content analysis
		Conjoint analysis	Phase 2	Conjoint module (SPSS 26.0)

Table 1 Data analysis approaches for studies 1, 2, and 3.

4.6   The quality of research

There is widespread agreement that it is necessary to evaluate the quality of research. Additionally, there is an ongoing discussion on how the quality of research can be evaluated. Traditionally, such evaluation centered on assessing reliability and validity (Long & Johnson, 2000). In a broader perspective, reliability describes consistency within the employed analytical procedures, while validity refers to the integrity and application of the methods undertaken and the precision of the findings in reflecting the data (Long & Johnson, 2000).

Since reliability and validity are rooted in positivist perspectives, the use of these terms has been an ongoing debate, and their use in qualitative work has been questioned (Long & Johnson, 2000; Noble & Smith, 2015). Nevertheless, reliability and validity are appropriate concepts for attaining rigor in qualitative research (Morse, Barrett, Mayan, Olson, & Spiers, 2002). On the other hand, if qualitative methods are inherently different from quantitative methods in terms of philosophical positions and purpose, then alternative frameworks for establishing reliability and validity are considered appropriate (Sandelowski, 1993).

For the qualitative studies, I adopted the verification strategies proposed by Lincoln and Guba (1986). These verification strategies are credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1986). It is worth mentioning that these strategies were applied during the study instead of at the end of the study in order to manage the threats to reliability and validity (Morse et al., 2002). The strategies adopted are illustrated in Table 2.

Together, all these verification strategies contribute to and build reliability and validity, thus establishing the rigor of the studies. However, I acknowledge that even though great effort has been made to implement these verification strategies, no knowledge can be counted as certain.

Rigor criteria	Purpose	Original strategies	Strategies applied in our study
Credibility	To establish confidence that the results (from the perspective of the participants) are true, credible and believable.	Prolonged engagement; lengthy and intensive contact with the phenomena (respondents)	Before the scheduled interview, we met or called all of our participants (except street-intercept) to introduce ourselves and engage participants in an informal conversation. We called our participants to verify some things mentioned after the interview to get the correct interpretation if we were unsure about something.
		Triangulation	We used method triangulation, investigator triangulation, and data source triangulation
		Interviewing process and techniques	Interviewing protocol tested at pilot interviews with older adults from a different region of Norway
		Negative case analysis	We include a wheelchair user and parent-child dyad
		Member checks	Member checking was conducting during data collections to check between participants. We asked our participants: "Other people tell me this, how is this for you?"
Dependability and Confirmability	To ensure the findings of this qualitative inquiry are repeatable if the inquiry occurred within the the same cohort of participants, coders and context. To extend the confidence that the results would be confirmed or corroborated by other researchers.	Rich description of the study methods	A detailed description of the research procedures was provided, allowing others to conduct follow-up studies
		Establishing an audit trail	We have a detailed track record of the data collection process and all signed informed consent. Audio files, transcripts, field notes writing, and reflection notes
		Reflexivity	Most of the time, two of the authors present during the interview process We keep reflection notes for each interview, allowing us to reflect not only on what happened at a particular interview but also on how we as researchers feel that day

Rigor criteria	Purpose	Original strategies	Strategies applied in our study
Transferability	The degree to which the results can be generalized or transferred to other contexts or settings.	Sampling	We use maximum variation sampling in terms of participants' characteristics (see Table 1& 2). The result of the study is limited to the selected participants and their experience related to eating practices.
		Data saturation	With dyadic interview, we can learn about individual and collective perspectives, which add dimensions to the data collected. Furthermore, our sampling strategy allows us to identify more perceptions ad variations. This way, the picture becomes broader and deeper to the point of saturation (Patton, 2002).

Table 2 Strategies adopted from Lincoln and Guba (1986)

In terms of validity in a quantitative study, typically, there are four types of validity: statistical conclusion validity, internal validity, construct validity, and external validity (Cook & Campbell, 1979).

Statistical conclusion validity is the degree to which conclusions about the relationship between independent and dependent variables are reasonable. To reduce issues that would threaten statistical conclusion validity, I applied three strategies. Firstly, through the consideration of the experimental design, secondly, by taking into account the cognitive burden of these designs on the respondents, and thirdly by pilot testing the study.

In terms of design, the easiest way to organize the stimuli in a conjoint experiment is with a full factorial design, because this simply requires all possible level and factor combinations (Huertas-García, Nunez-Carballosa, & Miravitlles, 2016). With that said, this statistical design

poses a problem because it can result in an unrealistically high number of profiles (scenarios) that need to be evaluated by respondents.

To remedy this issue, I use an orthogonal design, which contains a fraction of a full factorial design (Huertas-García et al., 2016). Doing so reduces the number of alternatives that each respondent has to assess. Like any design, orthogonal design is not superior to other designs. By using orthogonal design, researchers have to sacrifice the ability to estimate certain interaction effects (Huertas-García et al., 2016). In some cases, interaction effects are essential, but in this case, orthogonal design is ideal because I was interested in the main effects. Another important aspect of my conjoint design is that each level of each factor is repeated the same number of times in the overall experiment, which suggests the design is balanced (Huertas-García et al., 2016). Overall, the experimental design is orthogonal and balance enables valid inferences about the behavior (Vieira Jr, Sanchez, Kienitz, & Belderrain, 2013).

As discussed above, a number of alternatives generated from a full factorial design can overwhelm the cognitive ability of any respondent (Green & Srinivasan, 1990). To reduce the cognitive load for my sample (older adults), attention was also paid to the length of the scenario. Doing this reduces the cognitive demand from the respondent (Wang & Li, 2002), thereby improving the validity of the data (Wang & Li, 2002).

Lastly, before the questionnaire was launched, a pilot study was conducted. The focus of the pilot study was to identify any issues that may arise during the study. Consequently, it enhances the reliability and validity of the study (Malmqvist, Hellberg, Möllås, Rose, & Shevlin, 2019).

Internal validity refers to the degree of confidence that the study findings are the result of an association between treatment (manipulated variables) and outcome and not due to chance or other confounding variables. It is well known that experiments are commonly high in internal validity since researchers are the ones who purposely alter or

manipulate the independent variables and control other confounding variables. One potential source for lower internal validity in my study would be that the sample was drawn exclusively from an online panel. Previous work has suggested that recruitment through panel providers may lead to the over-representation of some groups and under-representation of others (Willems, Brown, Van Ossenbruggen, & Vonk, 2006). For instance, the sample may under-represent the non-internet savvy or less computer literate older adults. With that said, selecting participants with no internet experience may result in a low prevalence of online grocery shopping. All things considered, online recruitment is justifiable.

Another type of threat to internal validity in my study can be derived from common rater bias (Podsakoff, MacKenzie, & Podsakoff, 2012). More specifically, the impact of the task on the respondents. Suppose that the raters are cognitively overwhelmed; they are likely to employ heuristics to answer the questions. To reduce the cognitive load of the raters, a few strategies have been applied in the design phase. Please refer to earlier paragraphs.

A different form of rater bias is social desirability. Respondents may want to please the researcher and tell them what they want to hear and modify their responses to be consistent with their perceptions of the researcher's expectations (Podsakoff et al., 2003). As such social desirability can bias answers and produce spurious relationships between the variables (Podsakoff et al., 2003). To control for social desirability bias, the respondents in the study were recruited using an online panel administrated by a third party via a digital distribution system. This way, respondents can maintain their anonymity.

Construct validity indicates how accurate a measure is; whether it successfully measures what it was designed to measure. Threats to construct validity in conjoint experiments can come from, for example, the inadequate definition of constructs (Cook, Campbell, & Shadish,

2002), however a clear operational definition of the construct consistent with existing literature was provided within the study.

External validity asks the question of generalizability, to what populations, settings, treatment variables, and measurement variables can this effect be generalized? Bracht and Glass (1968) proposed two types of external validity: population validity and ecological validity. Population validity refers to how study results from a sample can be generalized to the population. The degree of confidence an experimenter can generalize to the population is unknown because hardly any experimenter can sample randomly from the true target population (Bracht & Glass, 1968). Thus, generalization is often restricted to a smaller population. Furthermore, how the treatment variables interact in the target population should be considered instead of the absolute differences between target populations (Bracht & Glass, 1968).

Ecological validity refers to the extent to which the findings of a study can be generalized to real-life settings. Firstly, I used a conjoint experiment because it presents a reasonably straightforward task that more closely resembles a real-world decision (Green & Srinivasan, 1978). Also, when designing the scenarios, efforts are made to simulate real-world scenarios. Consequently, the insights gained from this study may be of assistance to online grocery retailers and potentially to other online retailers. Furthermore, replication of the study can update the strength of the external validity.

Turning now to consider reliability. Reliability refers to the accuracy of an instrument. In other words, the extent to which a research instrument consistently has the same results if it is used in the same situation on repeated occasions (Heale & Twycross, 2015). To test the internal consistency of the survey, the same survey was administered twice (2 or 3 days between each time) to 7 respondents in the pilot study. The scenarios tested are the same both times, but the order of the scenarios

presented is changed. The same result was produced both times, thereby demonstrating reliability.

4.7 Ethical considerations

Ethical approval was granted by the Norwegian Centre for Research Data (2019/502106) in May 2019 and updated October 2019. The project protocol also follows the guidelines for research ethics in the social sciences. Written and verbal consent were obtained from the study participants before the start of data collection. Study participants were thoroughly informed about the nature of the research project and their right to withdraw from the study at any time.

5 Results of the empirical studies

This section will briefly present the findings of the three studies included in the dissertation. A more detailed presentation of the findings can be found in the respective papers written for each study.

Study 1: Dyadic interviews versus in-depth individual interviews in exploring food choices of Norwegian older adults: A comparison of two qualitative methods

Aim

The aim of this study was to explore whether a dyadic interview is a viable method for collecting data from home-living older adults by comparing dyadic interviews with in-depth individual interviews in the context of food choice.

Main findings

A direct empirical comparison of these two different interview methods shows that more attributes were elicited from dyadic interviews than from in-depth individual interviews. However, the results also indicated that the content of the two methods overlapped. Additionally, participants were more willing to disclose private information in the in-depth individual interviews than in dyadic interviews. When the same questions were asked in the dyadic interviews, participants would discuss and shift the discussion into broader topics.

Based on these results, we proposed three things. First, the dyadic interview is a viable method for collecting data from older adults when an alternative interview method is needed. Second, the two qualitative interview methods generated complementary, not substitute information. Third, using multiple methods would provide a greater range of insights and perspectives and permit triangulation, improving the overall validity of the results.

Study 2: Environmental factors that impact the eating behavior of home-living older adults

Aim

The aim of this study was to identify the environmental factors that may have the greatest influence on the eating behavior of home-living older adults.

Main findings

The findings from our study suggest that various environmental factors determined the eating behavior of older adults living at home. Those factors can be organized into three levels of influence: interpersonal influence (food habits of significant others, household composition, and social relationships), community influence (senior centers and food access), and public policy influence (health information and transportation/mobility aids). Furthermore, an approach is needed to address these factors in order to bring positive change in the eating behavior of home-living older adults.

Study 3: Understanding the role of situational factors on online grocery shopping among older adults

Aim

The third study aims to identify situational factors that drive older adults to buy groceries online and determine which factors are considered most important when older adults are deciding whether to buy groceries online.

Main findings

The findings of the explorative qualitative study indicate that the situational factors driving the adoption of online grocery shopping among older adults are health, mobility, price, distance to a store, delivery time, and social interaction. Based on the conjoint experiment, of these six situational factors, health, mobility issues, and distance to a store are the most important situational factors driving older adults to buy groceries online. Moreover, the findings confirm that the adoption of online grocery shopping among older adults is a result of a complex trade-off of situational variables.

6 General discussion of the findings

This chapter summarizes and discusses the overall findings. I start by discussing the three research questions, then proceed to research implications and recommendations for future research.

6.1 RQ1: Is dyadic interview a suitable method for collecting data from home-living older adults in the context of food choices?

The goal of study 1 is not to establish that one interview method is superior to another but to start a discussion about the suitability of dyadic interviews for use with the sample of older adults. The aim was also to examine whether dyadic interviews provide us with the information we are searching for in the context of food choice.

Choosing an appropriate research method to collect data is not a simple task. A wide range of approaches and techniques can be used in a study, which means that the researcher is often faced with the challenge of identifying viable tools for data collection and how best to use these tools. All data collection methods have drawbacks, and we should be aware of the methodological and practical concerns associated with the chosen method. It is argued that to make the "right" choice, the researcher needs to make deliberate, conscious choices (Clarke & Visser, 2019), and reflect on and consider the methodological issues that are associated with the chosen method. That said, more often than not, we select the most familiar and widely applied methods in our research field to gather evidence. In doing so, we increase research efficiency, for example, in time and cost (Johnston, 2014). Although improving efficiency is essential, we should choose the research method that can help answer our proposed research question.

The results of study 1 demonstrate that the dyadic interview is a suitable method for collecting data from older adults in the context of food choices. We therefore proposed that the dyadic method can be used as an alternative interview method when the researcher needs another interview method to collect data from older adults. Furthermore, the result also suggests that using the two interview methods allows for a broadened understanding of the topic and the potential use of the findings. Furthermore, it becomes clear that by using multiple methods for exploration, certain things were discovered or noted that would not have been otherwise.

Study 1 provides a glimpse into methodological and practical concerns central to research that is often overlooked. Therefore, it was worth a deep discussion. Undertaking study 1 as a novice has helped me understand the importance of choosing research tools based on what I am trying to accomplish and what benefits can be gained from using multiple methods.

As was pointed out earlier, my goal was to start a discussion about the suitability of a method for use with the sample of older adults. The complexity of other research topics and questions requires different research tools (Alvesson & Sköldberg, 2017). Therefore, we should be open to various research tools and give the research question precedence over one's methods preferences.

6.2 RQ2: What environmental factors determine the home-living older adults' eating behavior?

Literature pertaining to dietary behavior has emphasized that environmental factors influence home-living older adults' dietary behavior. It would thus be reasonable to assume that the degree to which older adults are able to choose a diet with sufficient quality to meet the daily requirement for nutrients is restricted or enhanced by environmental factors. Thus, identifying these factors is pivotal if we are

to help today's home-living older adults establish healthier eating behavior.

Our findings in study 2 suggest that socio-environmental factors (the food habits of significant others, household composition, and social relationships), community factors (senior centers and food access), and societal factors (health information and transport/mobility aids) play an important role in the eating behavior of home-living older adults. While these environmental influences are perhaps true among the home-living older adults, it is important to note that neither these factors nor home-living older adults are constant. It can also be presumed that the amount of support they need from their environment differs depending on their situation. Those with limited individual resources will probably require more support from their environment than others with enough resources.

The evidence from this study makes clear that certain environmental factors can promote healthier eating behavior among home-living older adults. While these factors are observable, designing environmental interventions and policies that are acceptable and effective is still challenging (Sawyer et al., 2021). Ideally, increasing all types of environmental-based support identified in an empirical study can lead to positive outcomes.

In practice, this recommendation is by no means feasible. Such extensive programs will require relatively many resources, and resources are often scarce. To make the best use of resources, the evidence from empirical studies should therefore be evaluated parallel to real-world programs and policies (Ogilvie et al., 2020).

This study advances our understanding of the role of environmental factors in home-living older adults' dietary behavior. The findings can be used as a sounding board in designing and developing relevant community-level interventions for supporting the adoption of healthy eating behaviors of home-living older adults.

6.3 RQ3: What situational factors drive older adults to buy groceries online? Which of these factors are considered most important when older adults are deciding whether to buy groceries online?

Prior research suggests that adequate access to healthy food can support home-living older adults in maintaining a healthy diet (Huang et al., 2012; Ishikawa et al., 2016; Wolfson et al., 2019). While many older adults continue to visit grocery stores, those in poorer health may experience difficulties accessing grocery stores to meet their nutritional needs. One alternative to improving food access among older adults is online grocery shopping. Therefore, the objective of the third study is to make a preliminary assessment of older adults' online grocery shopping behavior, focusing on situational factors.

The findings of study 3 show that health, mobility, price, distance to a grocery store, delivery time, and social interaction are the situational factors that older adults take into consideration when deciding whether to buy groceries online. Of these situational factors, health, mobility, and distance to a grocery store are indicated to be the most important situational factors driving older adults to buy groceries online. Moreover, the findings confirm that the adoption of online grocery shopping among older adults is a result of a complex trade-off of situational variables.

On the question of online grocery shopping as a possible solution to food access barriers, the result shows that nearly half of the respondents were reluctant to buy groceries online despite circumstances. This discrepancy could be attributed to the habits of shopping in a brick-mortar shop and inexperience with online grocery shopping. On the other hand, some respondents hint that they are open to the idea of buying groceries online or are already incorporating online grocery shopping into their regular shopping routines. Furthermore, those willing to consider online grocery shopping stated they had never shopped for groceries online before.

The evidence from this study suggests two things. First, certain situational factors that disrupt individuals' lives, such as health and mobility, can lead to changes in grocery shopping behavior. Second, people rarely make their shopping decision based on one piece of information (Hansen & Solgaard, 2004). Despite these promising results, questions remain. Whether online grocery shopping has the potential to reduce food access barriers for older adults is still unclear. Further work is required to investigate to what extent online grocery shopping can reduce food access barriers among older adults.

It is worth noting that the study was conducted during the COVID-19 pandemic, during which time, it is anticipated that online grocery purchases among older adults will increase. However, this does not appear to be the case in the current study. As the online grocery market continues to grow, the challenge for retailers is perhaps designing marketing campaigns that appeal to older adults.

6.4   Research implications

The empirical findings from the studies conducted in this PhD project have theoretical, methodological, and practical implications.

6.4.1 Theoretical implications

It is well established that individual factors are not the only factors driving dietary behavior.   Dietary behavior takes place in the environment in which an individual lives (Brug, Kremers, Van Lenthe, Ball, & Crawford, 2008; Delormier et al., 2009; Larson & Story, 2009), and efforts to bring about change must, therefore, take environmental factors into consideration.

Environmental factors have been explored in prior studies; however, findings from other contexts can only be used as a starting point. To shed light on the environmental factors that influence the eating behavior of home-living older adults, I conducted two studies (studies 2 and 3). My studies are conducted with older adults in Norway; doing so offers a new perspective to understanding the environmental factors that impact home-living older adults' dietary behavior in the Norwegian context.

Study 2 was carried out to identify environmental factors that play an important role in home-living older adults' eating behavior. I have identified these factors and carefully described them in detail. Understanding these environmental factors helps us pinpoint current and future measures that are potentially effective in facilitating healthy eating among home-living older adults and what led to their eating behavior in the first place.

Furthermore, to form a more holistic picture of the dietary practices of home-living older adults, I used research methods that involve not only older adults themselves but also their significant others or others connected to them. Consequently, this can also help generate new knowledge.

Study 3 was conducted to identify situational factors that drive the adoption of online grocery shopping among older adults. To the extent of my knowledge, research on online grocery shopping behavior among older adults in the Norwegian context is still limited. Consequently, this study can add perspectives to the existing literature on older adults and online grocery shopping.

The findings of this study provide us with two pieces of information. First, a particular situation leads older adults to use online grocery shopping. This suggests that the adoption of online grocery shopping is perhaps driven by circumstances rather than by a cognitive elaboration and decision process. This finding is in line with findings reported by Hand, Riley, Harris, Singh, and Rettie (2009). Second, the adoption of online grocery shopping is a result of a complex trade-off of situational factors.

Together, the findings from studies 2 and 3 confirm that environmental factors impact the dietary behavior of home-living older adults. It becomes evident that whether it is a decision about what food to eat or where to buy groceries, people's behavior is complex, and their immediate environment often influences how they behave or act. Overall, these studies have provided a deeper insight into the dietary behavior of home-living older adults and advanced the current literature on older adults' dietary behavior.

6.4.2 Methodological implications

A closer look at the literature on dietary behavior research revealed two shortcomings. First, the descriptions of the methods chosen in these studies lack clarity. Second, most studies use mono-method, in-depth individual interviews.

To remedy this shortcoming, I conducted study 1 to investigate whether the dyadic interview is a viable method for collecting data from home-

living older adults when exploring their food choices. To the best of my knowledge, no previous studies have explicitly and empirically compared dyadic and in-depth individual interviews using home-living older adults as a sample.

Although the findings should be interpreted with caution and more empirical research is needed on the dyadic method, study 1 shows concrete methodological implications. This study contributes insight that can guide future exploration of the dyadic method. More importantly, this study extends methodological knowledge for use with older adult samples in dietary behavior context.

6.4.3 Practical implications

The research evidence accumulated in this dissertation has implications for multiple stakeholders. Such stakeholders include policymakers, practitioners, food retailers, and others interested in fostering a healthy diet for home-living older adults. The next part of this section describes the implications contained in each study.

Demographic transition has led to growing interest in research on older adults. To understand the needs and improve the quality of life of this population, researchers and practitioners continuously collect older adults' views, opinions, and standpoints (Doseděl & Vidovićová, 2018). Various methods have been used to collect data from older adults; however, little is known about the suitability of methods for use with this sample.

In an attempt to remedy this shortcoming in the literature, I conducted study 1. This study provides two take-home messages for researchers and practitioners. First, we should be more conscious of the methodological choices in our studies. This includes assessing the suitability of methods to be used with a specific population and to what extent the selected method meets the needs of the research question. Second, as researchers

or practitioners, we should move past the single method philosophy and be open to using multiple methods in performing our research tasks. A simple analogy would be carpenters; they can't only bring a hammer to fix a house because it is their favorite tool. Having more than one tool allows us to be more strategic about our research work (Stoecker & Avila, 2021).

Let us now turn to study 2. The evidence from this study indicates that older adults' social environment influences their eating behavior. This finding is consistent with Higgs and Ruddock (2020), who suggested social influences on eating behavior are powerful and pervasive. Guided by this understanding, socio environmental factors should be used to promote healthy eating in home-living older adults.

The evidence also clearly indicates that senior centers can help reduce older adults' loneliness, develop a social network, and provide access to healthy meals. This finding corroborates the findings reported by Marquet et al. (2020). Accordingly, more resources are needed to support senior centers nationwide. In Norway, care of the elderly is primarily a municipal responsibility (Holm, Mathisen, Sæterstrand, & Brinchmann, 2017). Thus, the local authorities are in charge of senior centers. How each local authority organizes this and the extent of resources available are unclear. As a result, the services provision for older adults in larger municipalities may vary considerably from that of smaller municipalities. The message for the government is that they should support local authorities to maintain operations of senior centers by providing resources that the local authorities are lacking.

Similarly, access to food, transport support, and mobility aids are fundamental elements of home-living older adults' dietary behavior. Again, the local authorities determine the types of support and amount of assistance older adults require (Holm et al., 2017). The participants from the studies stated that the allocation of the aid is insufficient, therefore reducing their ability to access a food supply and have activities

outside of the home (e.g., grocery shopping, trips to doctors, senior centers, and other social activities). The advice is that local authorities should revisit the individual decision of these recipients.

Furthermore, a significant amount of conflicting health information about proper diet and nutrition confuses older adults and undermines the success of the healthy eating promotion. This finding was also reported by Nagler (2014). More effort should be directed toward developing effective strategies to deal with conflicting health information. Sadly, this is a growing problem worldwide, and I am not well-positioned to help with any recommendations on managing this problem.

As a whole, the knowledge about these environmental factors can be used as a sounding board by policymakers in Norway when planning, implementing, following up, and developing programs or measures to promote a healthier diet aimed at home-living older adults.

Moving on now to consider study 3. The findings of study 3 indicate that situational factors influence older adults' adoption of online grocery shopping. Consistent with the work of Hand et al. (2009), I accede that adoption of online grocery shopping among older adults is driven by circumstances rather than by a cognitive elaboration and decision process. Regarding which situational factors are considered important when older adults decide whether to buy groceries online, the findings suggest that health, mobility issues, and distance to a store are the most important situational factors driving older adults to buy groceries online. Moreover, the findings confirm that the adoption of online grocery shopping among older adults is a result of a complex trade-off of situational factors.

Although these situational factors are beyond the control of online grocery retailers, knowledge about such factors can still benefit online grocery retailers. For example, understanding the importance of health and mobility issues when older adults are deciding whether to buy groceries online, would enable online grocery retailers to, for example,

offer a delivery service in which the groceries are delivered to the kitchen counter instead of just to the front door. Also, if online grocery retailers were aware that some older adults are open to online grocery shopping, they could devise marketing campaigns that incentivize online grocery shopping. I am aware that the long-term effect of this kind of sales promotion is ambiguous (Badgaiyan & Verma, 2015).

Ultimately, the suggestion I presented above can be used to inform and develop a practice that can help reduce malnutrition risk in home-living older adults and promote healthier dietary behavior. That said, the suggestions are based on the probabilistic evidence from my studies. Admittedly, the results are informative but not conclusive. There remains a need for more explicit specifications on how to put this newly acquired knowledge to practical use.

6.5   Future directions

This dissertation has contributed to a deeper understanding of home-living older adults' dietary behavior by means of three studies that raise a number of opportunities for future research.

With regard to research topics, I center my attention on three aspects. First, I explored the efficiency and efficacy of the dyadic interview method for home-living older adults in the context of food choice. This study can be used as a point of departure; future studies should scrutinize the efficiency and efficacy of the dyadic interview using a different type of sample in a different context. Additionally, future studies should investigate the benefit of using multiple methods.

Second, I investigated environmental factors that impact the eating behavior of home-living older adults. Identifying these factors is necessary if we are going to make headway in mitigating malnutrition and helping home-living older adults establish healthier eating patterns. The data for this study were collected before the COVID-19 pandemic;

an interesting inquiry would be to reexamine the role of these factors today and post COVID-19. Further research can also be conducted to assess the impact of these factors on the dietary behavior of home-living older adults during the pandemic lockdown.

Third, I looked into situational factors that drive the adoption of online grocery shopping among older adults and went on to test these situational factors. Future studies can extend this study by adding other situational factors to broaden the scope of research. Further research can also be undertaken to assess the impact of these situational factors in different online contexts.

As far as methodological choices are concerned, I argue that the methods and approach chosen are suitable for my studies and adequate to answer the research questions. That said, these studies were limited in terms of design. All the studies included in this dissertation are based on the cross-sectional design. Cross-sectional studies are helpful for establishing preliminary evidence in planning advanced studies (Wang & Cheng, 2020). This design, however, does not allow for causal inferences. Future studies can overcome this shortcoming by adopting the longitudinal design.

Lastly, these studies were conducted in the Norwegian context with Norwegian samples; future studies need to be conducted with home-living older adults in different contexts. In doing so, we can continually share and build our knowledge on dietary-related behavior of home-living older adults and gradually turn research evidence into actionable evidence.

7 Concluding remarks

The main objective of this study was to deepen our understanding of home-living older adults' dietary behavior and advance the current state-of-art literature in this field. This objective was achieved by conducting three studies. The first study explored the suitability of data collection methods for use with home-living older adults in the context of food choice. The second study investigates environmental factors that can influence home-living older adults' eating behavior, and the third study examines the role of situational factors and the extent to which they lead to the adoption of online grocery shopping.

The findings of these studies lead to the following conclusions: a) the dyadic interview is a suitable alternative interview method when collecting data from older adults. Moreover, using multiple methods to study dietary behavior can broaden our understanding of dietary behavior, b) a social environment, such as significant others, family, and others connected to the older adults, can help modify home-living older adults' dietary behavior in a desirable direction through spending meal time together, helping with cooking and support in grocery shopping. The availability of community resources, such as senior centers and grocery stores, improves older adults' access to healthier food. An additional resource that can support older adults in maintaining their diet and health is transportation and mobility aids. And c), a combination of declining health and mobility and the distance to grocery stores can create a complex process for obtaining healthy food that impacts the healthy diet of older adults. Furthermore, some older adults have already incorporated online grocery shopping into their regular shopping routine; others stated they are open to this idea as a coping strategy to obtain healthy food. However, some were still reluctant to buy groceries online despite the circumstances.

Overall, this shows that all home-living older adults have unique needs that must be accommodated by their surrounding environment to maintain their health and remain independent in the community. Thereby, predicting what can change dietary behavior is neither obvious nor common sense. It requires careful, well-conducted research that leads to a deep understanding of what motivates people to change and of how their surrounding environment can support them in achieving the desirable dietary behavior.

Conclusively, this dissertation has advanced our understanding of the dietary behavior of home-living older adults. That said, it only covers a very limited aspect of dietary behavior. Undoubtedly, more research is needed to capture comprehensive knowledge on home-living older adults' dietary behavior. Additionally, the collaborative efforts of colleagues from different disciplines can give us an even broader perspective on this behavior.

Lastly, my ambition in this doctoral journey was to give back to the community and make a difference to the lives of older people in the community. However, after three long years on this journey, the research contribution I made is nothing more than just a small drop in the ocean. Nevertheless, I am hopeful that I have contributed to the research community through my three papers.

8 References

Allen, R. S., Haley, P. P., Harris, G. M., Fowler, S. N., & Pruthi, R. (2011). Resilience: definitions, ambiguities, and applications. *Resilience in Aging*, 1-13.

Alvesson, M., & Sköldberg, K. (2017). *Reflexive Methodology: New Vistas for Qualitative Research* (3ed). Los Angeles, CA: SAGE Publications Ltd.

Amarya, S., Singh, K., & Sabharwal, M. (2015). Changes during aging and their association with malnutrition. *Journal of Clinical Gerontology and Geriatrics, 6*(3), 78-84.

Amarya, S., Singh, K., & Sabharwal, M. (2018). Aging process and physiological changes. *Gerontology*, 3-24.

Armat, M. R., Assarroudi, A., Rad, M., Sharifi, H., & Heydari, A. (2018). Inductive and deductive: ambiguous labels in qualitative content analysis. *The Qualitative Report*, *23*(1), 219-221.

Badgaiyan, A. J., & Verma, A. (2015). Does urge to buy impulsively differ from impulsive buying behaviour? Assessing the impact of situational factors. *Journal of Retailing and Consumer Services*, 22, 145-157.

Baltes, M. M. (1996). *The Many Faces of Dependency in Old Age*: Cambridge University Press.

Bell, S., & Menec, V. (2015). "You don't want to ask for the help" The imperative of independence: is it related to social exclusion? *Journal of Applied Gerontology*, *34*(3), NP1-NP21.

Belon, A. P., Nieuwendyk, L. M., Vallianatos, H., & Nykiforuk, C. I. (2016). Perceived community environmental influences on eating behaviors: a photovoice analysis. *Social Science & Medicine*, 171, 18-29.

Bisogni, C. A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J., & Devine, C. M. (2007). Dimensions of everyday eating and drinking episodes. *Appetite*, *48*(2), 218-231.

Blaikie, N., & Priest, J. (2019). *Designing Social Research: The Logic of Anticipation* (3 ed): Politi Press.

Bostic, S. M., & McClain, A. C. (2017). Older adults' cooking trajectories: shifting skills and strategies. *British Food Journal*, 119, 1102-1115.

Bracht, G. H., & Glass, G. V. (1968). The external validity of experiments. *American Educational Research Journal*, *5*(4), 437-474.

Brombach, C., Landmann, M., Ziesemer, K., Bartsch, S., & Winkler, G. (2017). Healthy food choice and dietary behavior in the elderly. *Nutrition and Functional Foods for Healthy Aging* (pp. 101-110): Elsevier.

Brug, J., Kremers, S. P., Van Lenthe, F., Ball, K., & Crawford, D. (2008). Environmental determinants of healthy eating: in need of theory and evidence: symposium on 'Behavioural nutrition and energy balance in the young'. *Proceedings of the Nutrition Society*, *67*(3), 307-316.

Bukman, A. J., Ronteltap, A., & Lebrun, M. (2020). Interpersonal determinants of eating behaviours in Dutch older adults living independently: a qualitative study. *BMC Nutrition*, 6, 1-12.

Burton-Jones, A. (2009). Minimizing method bias through programmatic research. *MIS Quarterly*, 3, 445-471.

Böcker, L., van Amen, P., & Helbich, M. (2017). Elderly travel frequencies and transport mode choices in Greater Rotterdam, the Netherlands. *Transportation*, *44*(4), 831-852.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, *56*(2), 81-105.

Caspi, C. E., Sorensen, G., Subramanian, S., & Kawachi, I. (2012). The local food environment and diet: a systematic review. *Health & Place*, *18*(5), 1172-1187.

Clark, P. G. (1991). Ethical dimensions of quality of life in aging: autonomy vs. collectivism in the United States and Canada. *The Gerontologist*, *31*(5), 631-639.

Clarke, E., & Visser, J. (2019). Pragmatic research methodology in education: possibilities and pitfalls. *International Journal of Research & Method in Education*, *42*(5), 455-469.

Conklin, A. I., Forouhi, N. G., Surtees, P., Khaw, K.-T., Wareham, N. J., & Monsivais, P. (2014). Social relationships and healthful dietary behaviour: evidence from over-50s in the EPIC cohort, UK. *Social Science & Medicine*, 100, 167-175.

Cook, T. D., & Campbell, D. T. (1979). *Quasi-Experimentation: Design & Analysis Issues for Field Settings*: Chicago: Rand-McNally.

Cook, T. D., Campbell, D. T., & Shadish, W. (2002). *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*: Houghton Mifflin Boston, MA.

Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4ed): Newbury Park, CA, SAGE Publications.

Crichton, M., Craven, D., Mackay, H., Marx, W., de van der Schueren, M., & Marshall, S. (2019). A systematic review, meta-analysis and meta-regression of the prevalence of protein-energy malnutrition: associations with geographical region and sex. *Age and Ageing*, *48*(1), 38-48.

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 Research Reviews*, *12*(1), 316-328.

Dean, M., Raats, M. M., Grunert, K. G., & Lumbers, M. (2009). Factors influencing eating a varied diet in old age. *Public Health Nutrition*, 12, 2421-2427.

DeBruyne, L. K., & Pinna, K. (2018). *Nutrition for Health and Health Care* (7ed): Cengage Learning.

Delormier, T., Frohlich, K. L., & Potvin, L. (2009). Food and eating as social practice–understanding eating patterns as social phenomena and implications for public health. *Sociology of Health & Illness*, *31*(2), 215-228.

Domarad, B. R., & Buschmann, M. T. (1995). *Interviewing Older Adults Increasing the Credibility of Interview Data*. (vol.2 , pp. 14-20): SLACK Incorporated Thorofare, NJ.

Donini, L. M., Savina, C., & Cannella, C. J. (2003). Eating habits and appetite control in the elderly: the anorexia of aging. *International Psychogeriatrics*, *15*(1), 73-87.

Doseděl, T., & Vidovićová, L. (2018). Who should interview older people? The effect of interviewer and interviewee characteristics in surveys of older people and aging topics. *Sociológia*, 6, 760-781.

Downe-Wamboldt, B. (1992). Content analysis: method, applications, and issues. *Health Care for Women International*, *13*(3), 313-321.

Drewnowski, A. (1997). Taste preferences and food intake. *Annual Review of Nutrition*, *17*(1), 237-253.

Dubois, A., & Gadde, L.-E. (2002). Systematic combining: an abductive approach to case research. *Journal of Business Research*, *55*(7), 553-560.

Edfors, E., & Westergren, A. (2012). Home-living elderly people's views on food and meals. *Journal of Aging Research*, 1-10.

Edwards, J. S., Meiselman, H. L., Edwards, A., & Lesher, L. (2003). The influence of eating location on the acceptability of identically prepared foods. *Food Quality and Preference*, *14*(8), 647-652.

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1), 107-115.

Elsner, R. J. (2002). Changes in eating behavior during the aging process. *Eating Behaviors*, *3*(1), 15-43.

Evans, C. (2005). Malnutrition in the elderly: a multifactorial failure to thrive. *The Permanente Journal*, *9*(3), 38-41.

Falk, L. W., Bisogni, C. A., & Sobal, J. (1996). Food choice processes of older adults: a qualitative investigation. *Journal of Nutrition Education*, *28*(5), 257-265.

Finkelstein, S. R., & Fishbach, A. (2010). When healthy food makes you hungry. *Journal of Consumer Research*, *37*(3), 357-367.

Fostinelli, S., De Amicis, R., Leone, A., Giustizieri, V., Binetti, G., Bertoli, S., Battezzati, A., Cappa, S. F. (2020). Eating behavior in aging and dementia: the need for a comprehensive assessment. *Frontiers in Nutrition*, 7, 1-9.

Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: a conceptual model of the process. *Appetite*, *26*(3), 247-266.

Gaskell, G., Bauer, M.W. (2000). *Individual and group interviewing. Qualitative Researching with Text, Image and Sound*. London: SAGE Publications Ltd.

Gil-Montoya, J. A., De Mello, A. L. F., Barrios, R., Gonzalez-Moles, M. A., & Bravo, M. (2015). Oral health in the elderly patient and its impact on general well-being: a nonsystematic review. *Clinical Interventions in Aging*, 10, 461-467.

Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. (1998). Why Americans eat what they do: taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association*, *98*(10), 1118-1126.

Green, P. E., & Srinivasan, V. (1978). Conjoint analysis in consumer research: issues and outlook. *Journal of Consumer Research*, *5*(2), 103-123.

Green, P. E., & Srinivasan, V. (1990). Conjoint analysis in marketing: new developments with implications for research and practice. *Journal of Marketing*, *54*(4), 3-19.

Gubrium, J. F., Holstein, J. A., Marvasti, A. B., & McKinney, K. D. (2012). *The SAGE Handbook of Interview Research: The Complexity of the Craft*. Thousand Oaks, CA: SAGE Publications.

Guthrie, J. F., & Lin, B.-H. (2002). Overview of the diets of lower-and higher-income elderly and their food assistance options. *Journal of Nutrition Education and Behavior*, 34, S31-S41.

Hand, C., Riley, F. D. O., Harris, P., Singh, J., & Rettie, R. (2009). Online grocery shopping: the influence of situational factors. *European Journal of Marketing*, (43), 1205-1219.

Hansen, T., & Solgaard, H. S. (2004). Measuring the effect of distance on consumer patronage behavior: a structural equation model and empirical results. *New Perspectives on Retailing and Store Patronage*

Behavior: *A study of the interface between retailers and consumers*, 67-82.

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-Based Nursing*, *18*(3), 66-67.

Herne, S. (1995). Research on food choice and nutritional status in elderly people: a review. *British Food Journal*, (97), 12-29.

Higgs, S., & Ruddock, H. (2020). *Social influences on eating. Handbook of Eating and Drinking*: Interdisciplinary perspectives, 277-291.

Holm, S. G., Mathisen, T. A., Sæterstrand, T. M., & Brinchmann, B. S. (2017). Allocation of home care services by municipalities in Norway: a document analysis. *BMC Health Services Research*, *17*(1), 1-10.

Host, A., McMahon, A.-T., Walton, K., & Charlton, K. (2016). Factors influencing food choice for independently living older people - a systematic literature review. *Journal of Nutrition in Gerontology and Geriatrics*, *35*(2), 67-94.

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277-1288.

Huang, D. L., Rosenberg, D. E., Simonovich, S. D., & Belza, B. (2012). Food access patterns and barriers among midlife and older adults with mobility disabilities. *Journal of Aging Research*, 1-8.

Huertas-García, R., Nunez-Carballosa, A., & Miravitlles, P. (2016). Statistical and cognitive optimization of experimental designs in conjoint analysis. *European Journal of Management and Business Economics*, *25*(3), 142-149.

Ishikawa, M., Yokoyama, T., Nakaya, T., Fukuda, Y., Takemi, Y., Kusama, K., Yoshiike, N., Nozue, M., Yoshiba, K., & Murayama, N. (2016). Food accessibility and perceptions of shopping difficulty among elderly people living alone in Japan. *The Journal of Nutrition, Health & Aging*, *20*(9), 904-911.

Jaul, E., & Barron, J. (2017). Age-related diseases and clinical and public health implications for the 85 years old and over population. *Frontiers in Public Health*, 5, 335, 1-7.

Jeruszka-Bielak, M., Kollajtis-Dolowy, A., Santoro, A., Ostan, R., Berendsen, A. A., Jennings, A., Meunier, N., Marseglia, A., Caumon, Elodie., Gillings, R., De Groot, L., Franceschi, C., Hieke, S., & Pietruzka, B. (2018). Are nutrition-related knowledge and attitudes reflected in lifestyle and health among elderly people? A study across five European countries. *Frontiers in Physiology*, *9*(994), 1-13.

Johnston, B. D. (2014). *Sharing data collection instruments*. In (20), pp.73: BMJ Publishing Group Ltd.

Keane, A., & Willetts, A. (1994). Factors that affect food choice. *Nutrition & Food Science*, (94), pp.15-17.

Keese, M., Hirsch, D., & Bednarzik, R. (2006). Live longer, work longer: OECD, 3-150. Retrieved from https://read.oecd-ilibrary.org/employment/live-longer-work-longer_9789264035881-en#page1

Kehoe, L., Walton, J., & Flynn, A. (2019). Nutritional challenges for older adults in Europe: current status and future directions. *Proceedings of the Nutrition Society*, *78*(2), 221-233.

Klevan, T., Jonassen, R., Sælør, K. T., & Borg, M. (2020). Using dyadic interviews to explore recovery as collaborative practices: challenging the epistemic norm of the single person perspective. *International Journal of Qualitative Methods*, 19,1-9.

Kozáková, R., & Zeleníková, R. (2014). Assessing the nutritional status of the elderly living at home. *European Geriatric Medicine*, *5*(6), 377-381.

Kremers, S. P., De Bruijn, G.-J., Schaalma, H., & Brug, J. (2004). Clustering of energy balance-related behaviours and their intrapersonal determinants. *Psychology & Health*, *19*(5), 595-606.

Krippendorff, K. (2018). *Content analysis: An Introduction to its Methodology*. Thousand Oaks, CA: SAGE Publications.

Köster, E. P. (2009). Diversity in the determinants of food choice: a psychological perspective. *Food Quality and Preference*, *20*(2), 70-82.

Lampuré, A., Schlich, P., Deglaire, A., Castetbon, K., Péneau, S., Hercberg, S., & Méjean, C. (2015). Sociodemographic, psychological, and lifestyle characteristics are associated with a liking for salty and sweet tastes in French adults. *The Journal of Nutrition*, *145*(3), 587-594.

Larsen, K. R., Michie, S., Hekler, E. B., Gibson, B., Spruijt-Metz, D., Ahern, D., Cole-Lewis, H., Bartlett Ellis, R., Hesse, B., Moser, R. P., & Yi, J. (2017). Behavior change interventions: the potential of ontologies for advancing science and practice. *Journal of Behavioral Medicine*, *40*(1), 6-22.

Larson, & Story. (2009). A review of environmental influences on food choices. *Annals of Behavioral Medicine*, *38*(1), 56-73.

Lesakova, D. (2016). Seniors and their food shopping behavior: an empirical analysis. *Procedia Social and Behavioral Sciences*, 220, 243-250.

Lesáková, D. (2018). Health perception and food choice factors in predicting healthy consumption among elderly. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 66, 1527-1534.

Lewin, K. (1951). *Field Theory of Social Science: Selected Theoretical Papers* (Edited by Dorwin Cartwright.). New York: Harper & Brothers.

Lincoln, Y. S., & Guba, E. G. (1986). But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New Directions for Program Evaluation*, *1986*(30), 73-84.

Locher, J. L., Burgio, K. L., Yoels, W. C., & Ritchie, C. S. (1998). The social significance of food and eating in the lives of older recipients of meals on wheels. *Journal of Nutrition for the Elderly*, *17*(2), 15-33.

Long, T., & Johnson, M. (2000). Rigour, reliability and validity in qualitative research. *Clinical Effectiveness in Nursing*, *4*(1), 30-37.

Lumbers, M., & Raats, M. (2006). Food choices in later life. *Frontiers in Nutritional Science*, 3, 289- 310.

MacLeod, S., Musich, S., Hawkins, K., Alsgaard, K., & Wicker, E. R. (2016). The impact of resilience among older adults. *Geriatric Nursing*, *37*(4), 266-272.

Malmqvist, J., Hellberg, K., Möllås, G., Rose, R., & Shevlin, M. (2019). Conducting the pilot study: a neglected part of the research process? Methodological findings supporting the importance of piloting in qualitative research studies. *International Journal of Qualitative Methods*,18, 1-11.

Marek, K. D., Stetzer, F., Adams, S. J., Popejoy, L. L., & Rantz, M. (2012). Aging in place versus nursing home care: comparison of costs to Medicare and Medicaid. *Research in Gerontological Nursing*, *5*(2), 123-129.

Marquet, O., Maciejewska, M., Delclòs-Alió, X., Vich, G., Schipperijn, J., & Miralles-Guasch, C. (2020). Physical activity benefits of attending a senior center depend largely on age and gender: a study using GPS and accelerometry data. *BMC Geriatrics*, 20, 1-10.

Meneely, L., Strugnell, C., & Burns, A. (2009). Elderly consumers and their food store experiences. *Journal of Retailing and Consumer Services*, *16*(6), 458-465.

Methven, L., Jiménez-Pranteda, M. L., & Lawlor, J. B. (2016). Sensory and consumer science methods used with older adults: a review of current methods and recommendations for the future. *Food Quality and Preference*, 48, 333-344.

Meule, A., & Vögele, C. (2013). The psychology of eating. In (Vol. 4, pp. 215): *Frontiers in Psychology*.

Morgan, D. L. (2016). *Essentials of Dyadic Interviewing* (1ed). New York: Routledge.

Morgan, D. L., Ataie, J., Carder, P., & Hoffman, K. (2013). Introducing dyadic interviews as a method for collecting qualitative data. *Qualitative Health Research*, *23*(9), 1276-1284.

Morganosky, M. A., & Cude, B. J. (2000). Consumer response to online grocery shopping. *International Journal of Retail & Distribution Management*, (28), pp.17-26.

Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods*, *1*(2), 13-22.

Munoz-Plaza, C. E., Morland, K. B., Pierre, J. A., Spark, A., Filomena, S. E., & Noyes, P. (2013). Navigating the urban food environment: challenges and resilience of community-dwelling older adults. *Journal of Nutrition Education and Behavior*, *45*(4), 322-331.

Nagler, R. H. (2014). Adverse outcomes associated with media exposure to contradictory nutrition messages. *Journal of Health Communication*, *19*(1), 24-40.

Negron-Poblete, P., Séguin, A.-M., & Apparicio, P. (2016). Improving walkability for seniors through accessibility to food stores: a study of three areas of Greater Montreal. Journal of Urbanism: *International Research on Placemaking and Urban Sustainability*, *9*(1), 51-72.

Neugarten, B. L., & Hagestad, G. (1976). *Age and the life course*. Handbook of Aging and the Social Sciences, 35-55.

Nigam, Y., Knight, J., Bhattacharya, S., & Bayer, A. (2012). Physiological changes associated with aging and immobility. *Journal of Aging Research*, 1-2.

Noble, H., & Smith, J. (2015). Issues of validity and reliability in qualitative research. *Evidence-Based Nursing*, *18*(2), 34-35.

Nordin, S., Brämerson, A., Bringlöv, E., Kobal, G., Hummel, T., & Bende, M. (2007). Substance and tongue-region specific loss in basic taste-quality identification in elderly adults. *European Archives of Oto-Rhino-Laryngology*, *264*(3), 285-289.

Nyberg, M., Olsson, V., Örtman, G., Pajalic, Z., Andersson, H. S., Blücher, A., Lindborg, A.-L., Wendin, K., & Westergren, A. (2018). The meal as a performance: food and meal practices beyond health and nutrition. *Ageing & Society*, *38*(1), 83-107.

Ogilvie, D., Adams, J., Bauman, A., Gregg, E. W., Panter, J., Siegel, K. R., Wareham, N. J., & White, M. (2020). Using natural experimental studies to guide public health action: turning the evidence-based medicine paradigm on its head. *Journal of Epidemiology Community Health*, *74*(2), 203-208.

Payne, L., Harris, P., Ghio, D., Slodkowska-Barabasz, J., Sutcliffe, M., Kelly, J., Stroud, M., Little, P., Yardley, L.,Morrison, L. (2020). Beliefs about inevitable decline among home-living older adults at risk of malnutrition: a qualitative study. *Journal of Human Nutrition and Dietetics*, *33*(6), 841-851.

Pilgrim, A., Robinson, S., Sayer, A. A., & Roberts, H. (2015). An overview of appetite decline in older people. *Nursing Older People, 27*(5), 29-35.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879-903.

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*(1), 539-569.

Portacolone, E. (2011). The myth of independence for older Americans living alone in the Bay Area of San Francisco: a critical reflection. *Ageing & Society*, *31*(5), 803-828.

Poscia, A., Milovanovic, S., La Milia, D. I., Duplaga, M., Grysztar, M., Landi, F., Moscato, U., Magnavita, N., Callamati, A., Ricciardi, W. (2018). Effectiveness of nutritional interventions addressed to elderly persons: umbrella systematic review with meta-analysis. *The European Journal of Public Health*, *28*(2), 275-283.

Posner, B. M., Jette, A., Smigelski, C., Miller, D., & Mitchell, P. (1994). Nutritional risk in New England elders. *Journal of Gerontology*, *49*(3), M123-M132.

Radermacher, H., Feldman, S., & Bird, S. (2010). Food security in older Australians from different cultural backgrounds. *Journal of Nutrition Education and Behavior*, *42*(5), 328-336.

Regjeringen. (25.03.2022). Ny reform skal gjøre det trygt for eldre å bo lenger hjemme. Retrieved from https://www.regjeringen.no/no/aktuelt/ny-reform-for-eldre/id2905812/

Rosenberg, M., & Everitt, J. (2001). Planning for aging populations: inside or outside the walls. *Progress in Planning*, *56*(3), 119-168.

Sandelowski, M. (1993). Rigor or rigor mortis: the problem of rigor in qualitative research. *Advances in Nursing Science*, *16*(2), 1-8.

Sawyer, A. D., Van Lenthe, F., Kamphuis, C. B., Terragni, L., Roos, G., Poelman, M. P., Nicolaou, M., Waterlander, W., Djojosoeparto, S.K., Scheidmeir, M., Neuman-Podczaska, A., & Stronks, K. (2021). Dynamics of the complex food environment underlying dietary intake in low-income groups: a systems map of associations extracted from a

systematic umbrella literature review. *International Journal of Behavioral Nutrition and Physical Activity*, *18*(1), 1-21.

Schroots, J., & Birren, J. E. (1988). The nature of time: implications for research on aging. *Comprehensive Gerontology*. Section C, Interdisciplinary topics, *2*(1), 1-29.

Schwarz, G., & Stensaker, I. (2014). Time to take off the theoretical straightjacket and (re-) introduce phenomenon-driven research. *The Journal of Applied Behavioral Science*, *50*(4), 478-501.

Sergi, G., Bano, G., Pizzato, S., Veronese, N., & Manzato, E. (2017). Taste loss in the elderly: possible implications for dietary habits. *Critical Reviews in Food Science and Nutrition*, *57*(17), 3684-3689.

Settersten Jr, R. A., & Mayer, K. U. (1997). The measurement of age, age structuring, and the life course. *Annual Review of Sociology*, *23*(1), 233-261.

Shatenstein, B. (2008). Impact of health conditions on food intakes among older adults. *Journal of Nutrition for the Elderly*, *27*(3-4), 333-361.

Shepherd, R. (2005). Influences on food choice and dietary behavior. *Diet Diversification and Health Promotion*, 57, 36-43.

Short, F. (2003). Domestic cooking skills: what are they? *Journal of the Home Economics Institute of Australia*, *10*(3), 13-22.

Sidenvall, B., Nydahl, M., & Fjellström, C. (2001). Managing food shopping and cooking: the experiences of older Swedish women. *Ageing & Society*, *21*(2), 151-168.

Sixsmith, A., & Sixsmith, J. (2008). Ageing in place in the United Kingdom. *Ageing International*, *32*(3), 219-235.

Smith, T. B., Holt-Lunstad, J., & Layton, J. B. (2010). Social relationships and mortality risk: a meta-analytic review. *PLOS Medicine*, (7)1-20.

Sobal, J., & Bisogni, C. A. (2009). Constructing food choice decisions. *Annals of Behavioral Medicine*, 38, 37-46.

Sobal, J., Bisogni, C. A., Devine, C. M., & Jastran, M. (2006). *A Conceptual Model of the Food Choice Process over the Life Course*. CABI, (vol 3), 1-18.

Statistics Norway. (03.06.2020). A historic shift: soon more older people than children and young people. Retrieved from https://www.ssb.no/befolkning/artikler-og-publikasjoner/et-historisk-skifte-flere-eldre-enn

Steenkamp, J.-B., & Van Trijp, H. (1997). Attribute elicitation in marketing research: a comparison of three procedures. *Marketing Letters*, *8*(2), 153-165.

Stoecker, R., & Avila, E. (2021). From mixed methods to strategic research design. *International Journal of Social Research Methodology*, *24*(6), 627-640.

Stok, M. F., Renner, B., Allan, J., Boeing, H., Ensenauer, R., Issanchou, S., Kiesswetter, E., Lien, N., Mazzocchi, M., Monsivais, P., Stelmach-Mardas, M., Volkert, D., & Hoffmann, S. (2018). Dietary behavior: an interdisciplinary conceptual analysis and taxonomy. *Frontiers in Psychology*, *9*(689), 1-13.

Stroebele, N., & De Castro, J. M. (2004). Effect of ambience on food intake and food choice. *Nutrition*, *20*(9), 821-838.

Sullivan, D. H., Sun, S., & Walls, R. C. (1999). Protein-energy undernutrition among elderly hospitalized patients: a prospective study. *JAMA*, *281*(21), 2013-2019.

Sun, Y.-H. C. (2008). Health concern, food choice motives, and attitudes toward healthy eating: the mediating role of food choice motives. *Appetite*, *51*(1), 42-49.

Symmank, C., Mai, R., Hoffmann, S., Stok, F. M., Renner, B., Lien, N., & Rohm, H. (2017). Predictors of food decision making: a systematic interdisciplinary mapping (SIM) review. *Appetite*, 110, 25-35.

Söderhamn, U., Dale, B., Sundsli, K., & Söderhamn, O. (2012). Nutritional screening of older home-dwelling Norwegians: a comparison between two instruments. *Clinical Interventions in Aging*, 7, 383-391.

Takahashi, K., Murayama, H., Tanaka, T., Takase, M., Suthutvoravut, U., & Iijima, K. (2020). A qualitative study on the reasons for solitary eating habits of older adults living with family. *PLOS ONE*, *15*(6), 1-10.

Tani, Y., Fujiwara, T., & Kondo, K. (2020). Cooking skills related to potential benefits for dietary behaviors and weight status among older Japanese men and women: a cross-sectional study from the JAGES. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1), 1-12.

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*(2), 730-738.

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. *Journals of Gerontology*, *71*(6), 1059-1069.

Vieira Jr, H., Sanchez, S. M., Kienitz, K. H., & Belderrain, M. C. N. (2013). Efficient, nearly orthogonal-and-balanced, mixed designs: an

effective way to conduct trade-off analyses via simulation. *Journal of Simulation*, *7*(4), 264-275.

Wang, & Cheng. (2020). Cross-sectional studies: strengths, weaknesses, and recommendations. *CHEST*, *158*(1), S65-S71.

Wang, & Li. (2002). Handling large numbers of attributes and/or levels in conjoint experiments. *Geographical Analysis*, *34*(4), 350-362.

Wansink, B., & Sobal, J. (2007). Mindless eating: the 200 daily food decisions we overlook. *Environment and Behavior*, *39*(1), 106-123.

Webber, S. C., Porter, M. M., & Menec, V. H. (2010). Mobility in older adults: a comprehensive framework. *The Gerontologist*, *50*(4), 443-450.

Weil, J. (2015). Applying research methods to a gerontological population: matching data collection to characteristics of older persons. *Educational Gerontology*, *41*(10), 723-742.

White, P. (2013). Who's afraid of research questions? The neglect of research questions in the methods literature and a call for question-led methods teaching. *International Journal of Research & Method in Education*, *36*(3), 213-227.

WHO. (2003). Diet, nutrition, and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation (Vol. 916): World Health Organization. Retrieved from http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf

Wiles, J. L., Leibing, A., Guberman, N., Reeve, J., & Allen, R. E. (2012). The meaning of "aging in place" to older people. *The Gerontologist*, *52*(3), 357-366.

Willems, P., Brown, M., Van Ossenbruggen, R., & Vonk, T. (2006). *The effects of panel recruitment and management on research results*. Paper presented at the ESOMAR Panel Research Conference, Barcelona, Spain. Retrieved from https://tinyurl.com/y9uye4vx

Wilson, L. C., Alexander, A., & Lumbers, M. (2004). Food access and dietary variety among older people. *International Journal of Retail & Distribution Management*, (32), pp.109-122.

Winter, J., McNaughton, S., & Nowson, C. (2016). Older adults' attitudes to food and nutrition: a qualitative study. *The Journal of Aging Research and Clinical Practice*, *5*(2), 114-119.

Wolfe, W. S., Frongillo, E. A., & Valois, P. (2003). Understanding the experience of food insecurity by elders suggests ways to improve its measurement. *The Journal of Nutrition*, *133*(9), 2762-2769.

Wolfson, J. A., Ramsing, R., Richardson, C. R., & Palmer, A. (2019). Barriers to healthy food access: associations with household income and cooking behavior. *Preventive Medicine Reports*, 13, 298-305.

Wylie, C., Copeman, J., & Kirk, S. (1999). Health and social factors affecting the food choice and nutritional intake of elderly people with restricted mobility. *Journal of Human Nutrition and Dietetics*, *12*(5), 375-380.

List of papers

Paper 1

Kvalsvik, F., & Øgaard, T. (2021). Dyadic interviews versus in-depth individual interviews in exploring food choices of Norwegian older adults: A comparison of two qualitative methods. *Foods, 10*(6), 1199.

Paper 2

Kvalsvik, F., Øgaard, T., & Jensen, Ø. (2021). Environmental factors that impact the eating behavior of home-living older adults. *International Journal of Nursing Studies Advances, 3*, 100046.

Paper 3

Kvalsvik, F. (2022). Understanding the role of situational factors on online grocery shopping among older adults. *Journal of Retailing and Consumer Services, 68*, 103009.

Paper 1

Dyadic interviews versus in-depth individual interviews in exploring food choices of Norwegian older adults: A comparison of two qualitative methods.

foods

Article

Dyadic Interviews versus In-Depth Individual Interviews in Exploring Food Choices of Norwegian Older Adults: A Comparison of Two Qualitative Methods

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Abstract: The term "dyadic interview" refers to interviewing two participants together. Although there has been an increase in the use of dyadic interviews as a data collection method in qualitative studies, the literature on the use of this method with older adults is limited. This study was designed to explore the suitability of dyadic interviews as a method of data collection among older adults living at home. The study involved a direct comparison of the data obtained from dyadic interviews and in-depth individual interviews concerning older adults' food choices. The study sample consisted of eight dyads for the dyadic interviews and six participants for the in-depth individual interviews. The dyads were composed of pairs who share a pre-existing relationship as well as pairs of strangers. We also discussed the role of participant selection and pairing in dyadic interviewing and how the interactions between the dyads may affect the result. Our results indicated that dyadic interviews can be used as an important data collection tool for home-living older adults, particularly when exploring a topic that often involves a dyadic decision. Our findings can be useful for researchers to make a more informed choice when choosing qualitative data collection methods, particularly when interviewing older people.

Keywords: dyadic; in-depth individual; interviews; qualitative method; older adult; food choices

1. Introduction

As a result of demographic changes, research involving older adults is becoming more important. While research carried out on older adults is feasible, it also presents many challenges. Features of old age, such as physical and cognitive characteristics, often influence the process and outcome of interview data [1,2] and can pose a threat to the validity of a study [1,2].

Interviews are typically seen as the "gold standard" in qualitative research [3]. Today, the most commonly used interviewing methods are in-depth individual and focus group interviews [4,5]. In reality, these two methods seem to be the default choice when setting up qualitative studies.

Due to the unique characteristics of an older population, special attention should be paid to data collection methodologies [6]. Even though there is comprehensive literature on how to conduct interviews with older adults [7], little is known about the relative merits of alternative data collection methods for older adults [8]. Therefore, research exploring data collection methods beyond the simple traditional approach is needed.

Multiple authors have discussed the potential advantage of dyadic interviews; for example, dyadic interviews allow participants to stimulate ideas that might not have been either recognized or remembered [9,10]. A number of studies employing dyadic interviews have been published in health studies and family research. However, little attention has been paid to the dyadic interview as an alternative data collection method for older adults. Hence, more research is needed to yield structured knowledge of the merits of dyadic

interviews as a data collection method with older participants. Our study seeks to fill this knowledge gap by empirically comparing dyadic interviews with the most commonly used method, which is in-depth individual interviews.

Aside from the above consideration of the sample characteristics', we took the nature of the research topic into consideration. Food choice involves an isolated choice, but what a person decides to eat and how they arrive at a decision is often a form of collaborative decision with others in everyday life, for example, significant others, family members, or work [11]. It has been suggested that the use of dyadic interviews in exploring research topics related to collaboration can contribute to the co-creation of new knowledge [12].

The aim of this study is to explore whether a dyadic interview is a viable method for collecting data from home-living older adults when exploring their food choices. This study draws on a subset of data collected as part of an exploratory investigation into home-living older adult's food choices.

The study was not set out to establish the optimum research method. Instead, we are interested in comparing the ability of the two methods to elicit information in the context of food choice and analyzing each method's benefits and drawbacks. To the best of our knowledge, there are no prior studies reporting findings on food choice with older adults as a sample that uses the dyadic interview as a data collection method.

2. Background

The growth of the older population worldwide is inevitable. There are about one billion people aged 60 and over today, and this will double by 2050 [13]. This rapid growth of the older population will have profound implications for each of us and the communities we live in [14].

Much has been written about how the aging population will put a strain on public finances and the welfare system. The main concern is the increasing demands placed on the healthcare system to care for this aging section of the population.

It is common knowledge that most older adults prefer to continue living independently in their own homes [15]. For example, more than 75 percent of older adults in Australia, New Zealand, Europe, and Northern America live independently at home [16]. Having older adults remain in their own homes for as long as possible has a positive effect on public finances, welfare systems, and older people themselves [17].

Most older adults can continue to live independently in their own homes as long as they stay healthy. An important factor in improving healthy aging is adequate food and a nutritionally sound diet [18,19]. Thus, the role of food in maintaining health in older adults living at home is an important area of concern in today's research.

Older adults may view food, nutrition, and health very differently from experts in food and nutrition [20]. Understanding how older adults choose foods and conceptualize a healthy diet offers important perspectives that can inform public policy makers and practitioners to support home-living older adults in healthy aging through their food intake.

The research in this area has shown that multiple factors influence why older adults choose one food type over another [21,22]. In this study, we will use a framework proposed by Host, McMahon, Walton and Charlton [22] to evaluate the attribute variability between the dyadic and in-depth individual methods. Based on this framework, three domains influence the food choice of older adults. These domains are the changes associated with aging, psychosocial aspects, and personal resources.

The changes associated with aging refers to the physiological changes related to age, including taste, poor dentition, loss of appetite, mobility or functional limitations, and illness or medical conditions. The psychosocial aspects refer to life course, living arrangement, self-perception of health status, desire for independence, lack of motivation or energy, and interest in health or nutrition. Personal resources are listed as transportation, income, personal support, food preparation skills, access to quality products, and dietary resilience to overcome barriers.

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As described above, food choice is a multi-faceted phenomenon; therefore, we chose two interview methods to explore and shed light on this phenomenon. In the section below, we will present the two data collection approaches.

2.1. Data Collection Approaches

For this exploratory study, we chose to apply two data collection approaches, the dyadic [9] and in-depth individual [23] interview.

The first approach is the dyadic interview [9]. The term dyadic interview refers to interviewing two participants together to collect useful data for a research project [9]. Although the dyadic interview has appeared in studies since the 1970s under the label "joint interview" [24], the current literature on the dyadic interview is still fragmented and incomplete. Typically, in dyadic interviews, a researcher is primarily interested in the interaction between the two participants because the interaction in the dyadic interview is what produces the data [25].

Dyadic interviews commonly involve two participants that share a pre-existing relationship, such as married couples and caregivers–patient relationships [10,26]. Very little has been written to date about dyadic interviewing with pairs of strangers [9]. There is, however, reason to believe that a similar result may be yielded from strangers who share a common experience [27]. We, therefore, decided to include stranger pairs in this study.

Prior research has described the unique advantages of the dyadic interview as a tool for collecting data from a specific group of people, for example, people with early-stage dementia. It has been suggested that people with dementia are often overwhelmed when facing new groups of people. Dyadic interviews can eliminate this drawback by carefully pairing two participants, which promotes a sense of safety [9]. Dyadic interviews also allow participants to have more time to formulate their responses. [9]. This claim, however, has not been tested empirically with older adults living at home.

We chose the dyadic interview method for three reasons. First, it allows the researchers to observe interactions between the pair of interests [24]. Second, dyadic interviews allow the content to be extended beyond what might have been possible in individual interviews [25].

Third, the dyadic interview is well suited to eliciting knowledge from individuals who need additional time to process or recall information [9]. The literature shows that changes in cognition often occur with normal aging [8]. Thus, dyadic interviews allow researchers to explore older adults' perspectives while accounting for the older population's unique characteristics.

While there are many advantages, there are some drawbacks to using the dyadic interview. One potential drawback is the problem of domination [24]. Within a dyad, one person might dominate the interview by constantly talking and dismissing the other participant [24,28]. Other drawbacks reported are potential conflicts triggered within a dyad [29] and acquiescence bias in a relationship where power is not distributed equally within a dyad [30].

In the in-depth individual interview, the second approach, the dynamic within the interview is fundamentally different. The in-depth individual interview typically involves one on one interaction between a participant and a researcher [23]. Unlike the dyadic interview, the interaction in the in-depth individual interview is a way of building rapport between the participant and the researcher rather than being part of the data itself [25]. This approach requires a researcher to engage with a participant in seeking "deep" information and knowledge [31].

The in-depth individual interview was selected because it represents the most widely used data collection method in qualitative studies [5]. In addition, the in-depth individual interview permits and encourages the participant to tell his or her own story, which allows researchers to explore a phenomenon from an individualistic perspective [32]. Therefore, this method enables us to grasp and articulate individual participants' multiple views [23].

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In-depth individual and dyadic interviews each have their own merits and drawbacks. Nevertheless, it has often been argued that individual interviews tend to reveal more detailed information than other methods [33].

2.2. Comparison Framework

To compare the two data collection methods, we draw on four criteria from Steenkamp and Van Trijp [34]. These criteria are the number of attributes elicited, the variety of attributes elicited, the efficiency of data collection, and the participants' reactions to elicitation methods.

The purpose of attribute elicitation is to uncover attributes; a data collection method that elicits more attributes may, therefore, be considered better [35]. However, the attributes need to represent unique pieces of information [35]. This leads to our first research question, which is as follows:

RQ1: Which methods generate a higher number of unique attributes?

In addition to the number of attributes, we focus on the type of information the methods produce. This shapes our second research question, which is as follows:

RQ2a: Do the methods produce different types of information and, if so, what types of information?

RQ2b: Which attributes and how many are captured based on the three domains for the determinants of food choice in older adults [22]?

From a practical standpoint, the ability to effectively collect and analyze data is increasingly important, especially in a study where speed and cost are a priority, for example, marketing research [34]. This leads to our third question, which is as follows:

RQ3: How demanding is each data collection method in terms of the time needed to collect and analyze the data?

One other key aspect to consider in attribute elicitation is the participant. A failure to give consideration to the participants may reduce the accuracy of the responses [34], which results in a less valid response [36]. This leads to the final research questions, which are as follows:

RQ4: How suitable are the applied methods for the target sample?

RQ5: How do participants respond to and perceive the interview methods?

3. Materials and Methods

3.1. Participants

The term "older adults" has been defined differently in the literature. One way of measuring old age is using a fixed chronological age without regarding how healthy a person is, how a person functions, or whether a person is actively working or retired [37]. For the purpose of this study, we have defined an older adult as a person aged 60 and over. Although we agree that chronological age is not the best predictor variable, it is the most common way to measure age [38].

With that said, we also consider "older adults" based on their characteristics, for example, health and physical strength [37]. In this respect, one wheelchair user (58 years old) who is a member of the senior activity center was included in the study sample.

What follows is the nature of the research topic. Food choice is a complex construct that often involves other people connected to us [39]. To examine food choice as a construct and its variation, we also included younger participants in our parent–child dyad.

3.2. Interview Design

For the purpose of this study, we used the general interview guide approach [40] to gather data from all the participants. With this approach, we can ask or change questions based on participant responses to previous questions [40]. Both the dyadic and in-depth individual interviews were identical in terms of the topics and questions. The purpose of making the topics and questions identical was to ensure the comparability of the data [41,42].

In terms of the questions' sequence, we organized the interview questions by following the "funnel" format [42], moving from broad to specific areas. Furthermore, the types of questions asked were based on the guidelines proposed by Billups [43]. These questions include, for example, (a) what a person is doing/has done, (b) what a person thinks, (c) establishing the facts, and (d) how they feel [43]. With this as a guideline, the participants were instructed to describe (1) their daily eating practices, (2) their knowledge of a healthy diet, (3) identification factors in an older person's life that can affect food choices, and (4) self-efficacy in dietary behavior.

3.3. Sampling Method

Our initial recruitment strategy entailed placing flyers in the mailboxes of senior housing complexes. The gatekeepers were informed of the study, and interested participants were instructed to contact the researchers by phone. We were, however, unable to recruit enough participants within the expected time frame using only this strategy. To overcome this issue, we adopted a more proactive recruitment strategy, in which we recruited participants from senior activity centers in the district. This approach involved a 30-minute presentation of our project to the members of activity centers. Subsequently, those interested in participating were asked to set up a time and place for an interview. As time progressed, we employed street-intercept recruitment strategies in public places, such as public libraries, coffee shops, and shopping centers, to increase the number of participants. Those who agreed to participate were given the option of an individual interview or to be paired up with someone else.

To gain as broad understanding as possible of older adults' food choices and perceptions of a healthy diet, we deliberately sampled for heterogeneity [44]. We chose a sample of older adults who varied in age, gender, occupation, employment status, marital status, and living situation. In addition, for the dyadic interviews, the participants were paired together based on different types of relationships (see Table 1). We expected the variety of participants to enable us to capture varying perspectives on the phenomenon being studied [45].

Table 1. Description of participant characteristics from dyadic interviews.

Dyad Pairs	Gender	Age	Occupation	Employment Status	Marital Status	Living Situation
Married couple 1	Female	64	Teacher & counselor	Full-time	Married	Living with a spouse
	Male	66	Engineer	Retired		
Married couple 2	Female	62	Manager at kindergarten	Part-time	Married	Living with a spouse
	Male	65	Substance abuse-related psychiatrist	Full-time		
Father-Son	Male	60	Counselor in an office	Full-time	Divorced	Living alone
	Male	28	Teacher	Full-time	In a relationship	Living with a partner
Mother-Daughter	Female	86	Shopkeeper	Retired	Widow	Living alone
	Female	58	Teacher	Full-time	Divorced	Living alone
Friends pair 1	Female	88	Tour guide	Retired	Widow	Living alone
	Female	83	Travel agency	Retired	Widow	Living alone
Friends pair 2	Male	80	Engineer	Retired	Married	Living with a spouse
	Male	76	Engineer	Retired	Divorced	Living alone
Strangers pair 1	Male	72	Civil engineer	Retired	Married	Living with a spous
	Male	69	Engineer	Retired	Single	Living alone
Strangers pair 2	Female	63	Housewife	Unemployed	Married	Living with a spouse
	Male	60	Teacher	Full-time	Married	Living with a spouse

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As a result, we recruited 22 participants. Of those, 16 completed a dyadic interview and 6 completed an in-depth individual interview. Of the 16 participants in the dyadic group, the following 8 dyads were established: 2 married couple dyads, 2 parent–child dyads, 2 friend dyads, and 2 stranger dyads.

The participants' characteristics are presented in Tables 1 and 2.

Table 2. Description of participant characteristics from in-depth individual interviews.

Participants	Gender	Age	Occupation	Employment Status	Marital Status	Living Situation
Participant 3	Female	82	Housewife	Unemployed	Widow	Alone
Participant 8	Female	58	Housewife	Unemployed	Married	With spouse
Participant 13	Female	92	Housekeeper	Retired	Widow	Alone
Participant 16	Male	88	Businessman	Retired	Widow	Alone
Participant 17	Male	71	Skipper	Retired	Widow	Alone
Participant 20	Male	71	Petroleum engineer	Retired	Single	Alone

3.4. Data Collection

The data collection was carried out in a district of western Norway. The study was reviewed and approved by the Norwegian Centre for Research Data (2019/502106), and written informed consent was obtained from all the participants individually before the data collection was initiated. The interviews were held at a time and place of the participants' choice, including participants' homes, cafeterias at senior centers, libraries, and coffee shops.

3.4.1. Dyadic Interview Implementation

Each dyadic interview started with the participants introducing themselves and continued with a discussion of their favorite food. This eventually progressed into a dialogue around food choices and healthy diets. Each interview session lasted between 50 min and 1.5 h. Once the interview started flowing like a conversation, we focused on observation and taking field notes. This, however, was not the case with all the dyads in the study; some required more probing to keep the conversation flowing. All the interviews were audio-taped and subsequently transcribed verbatim.

3.4.2. In-Depth Individual Implementation

Participants in the in-depth individual interview started with the same study protocol as the dyadic interview did. After introducing themselves, participants were asked to describe their favorite food, "Tell me about your favorite food". We continued the interview by asking participants open-ended questions and, depending on their response, we continued with questions that sought to obtain clarification. Each interview lasted between 40 min and 1 h. Field notes were taken while conducting the interviews. All the interviews were audio-taped and subsequently transcribed verbatim.

3.5. Data Analysis

Our data analysis of the studies consisted of three phases.

First, we conducted a within-study content analysis for the dataset produced using each data collection method. Content analysis examines data in order to understand what it means to people [46]. Upon completion of each interview, the audio files were listened to several times, and verbatim transcriptions were prepared for each interview. To ensure the accuracy of the transcriptions, the same datasets were transcribed by a transcriber who was not involved in the data collection.

In an attempt to become familiar with the "voices" of participants, the transcript was read thoroughly several times by one or two authors, after which the units of meaning

were identified. These units were then abstracted and labeled with a code separately by each author. Any disagreement in the code description was resolved through discussions among the authors during project meetings.

The coding process was iterative, and the categories evolved as the analyses progressed. After careful analysis, the codes were then grouped into categories and subcategories [47].

In the second round of the analysis, we evaluated differences in the types of information elicited between the two data collection methods. We followed the deductive content analysis approach [47], where attributes were assessed based on the three key domains proposed by Host, McMahon, Walton and Charlton [22].

Third, a cross-study analysis was conducted to compare the responses elicited in the dyadic interviews and the in-depth individual interviews. The comparison of the two elicitation methods was divided into two parts. The first part included the result for the information elicited (number of attributes elicited and attribute variability), while the second part contained the result for the procedural dimensions (efficiency in data collection and participants' feedback).

The number of attributes elicited was established through a simple count of the attributes elicited in each interview. The attribute variability was analyzed based on the type of information that was elicited across the two methods. With regard to the efficiency of data collection, we took the time spent on conducting the interviews, transcription, and analyzing the data into consideration. For the participants' feedback on the methods applied, we ascertained this by asking the following questions after each interview: "How do you feel about our discussion?", "How do you feel about this interview?", "Do you have any other comments?"

3.6. Trustworthiness of Data

To verify the accuracy and trustworthiness of the present study, we used the criteria established by Lincoln and Guba [48], as follows: credibility, transferability, dependability, and confirmability. Credibility was achieved through prolonged engagement with the participants, field note writing, and the use of triangulation. For this study, we used the following three types of triangulation: (1) method triangulation, (2) investigator triangulation, and (3) data source triangulation [49,50].

With regard to transferability, the participants' demographics and context were described in detail to allow the reader to decide whether the result was transferable. Furthermore, to improve the dependability and confirmability, a detailed description of the research procedure was provided, allowing others to conduct follow-up studies.

4. Results

The results are divided into three sections. We first present how each method elicited attributes within the three key domains that determine food choice (the changes associated with aging, psychosocial aspects, and personal resources). Comparisons are then made between the dyadic interviews and the in-depth individual interviews. Finally, we focus on the merits and drawbacks of each method.

4.1. Dyadic Interview

The dyadic interviews generated a rich and broad range of data, as it facilitated the participants to share their perspectives and experiences and allowed for comparisons to be made with the other participant in the dyad. Participants' clarifications of their food choices and perceptions of a healthy diet in the discussion covered gender perspectives on food, food politics, and self-construal.

Furthermore, this approach allowed us to elicit factors within the three key domains identified as influencing home-living older adults in relation to food choices and a healthy diet.

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When asked about everyday food choices, some participants reported that they had changed their diet because of health-related issues, while others mentioned that their diet had remained the same. This response implies that changes associated with the aging domain can be captured using the dyadic interview method with home-living older adults. An example is offered by the following comment:

Wife: "We mostly eat seafood, things that come from the ocean. In a period of our life, we have a very different diet; we always have meat in the freezer (looking at her husband), meat from the wild from hunting".

Husband: "Yes, we have an issue with our stomach, so we go a bit from meat and eat more seafood. We have a cabin next to the ocean, so we eat more fish. In addition, diabetes in the family, so we need to be careful with sweet things". (Married couple 2).

The dyadic interviews also captured psychosocial aspects, since all participants reported that changes in their food choices were affected by life stages, for example, family formation, children moving away, and spousal negotiations around food choice. A few participants also attributed the changes in their food intake to living alone after separation or the passing of a spouse. Despite this, all the participants reported feeling positive about their health, and few had a personal interest in food and nutrition.

Father: "My diet is a bit different now that I live alone. I am divorced. Before I eat a lot of pasta and salad. My ex-wife cook, so I eat whatever she puts on the table (laugh)."

Son: "My mom, she loves pasta. For me, I eat differently when my girlfriend is here; she is vegetarian. I am not vegetarian when she is not here (laugh)."

Father: "I often eat green vegetables with my girlfriend." (Father–son).

Regarding the domain of personal resources, the participants described family members and friends as the primary source of support in food-related activities. Furthermore, the participants generally believed that they have adequate nutrition-related knowledge and are aware that certain foods are associated with a healthier diet. An example is offered by the following comment:

Mother: "No sweet things, I need to be careful with milk, no lamb ribs. Lots of vegetables and fruit is good for me."

Daughter: "I'm very focused on getting enough nutritious things in me . . . that's the reason I don't take any supplements, rather the thing that I get it naturally from food, for example, the green in the green vegetable, like spinach, something like that iron." (Mother–daughter).

This articulation suggests that dyadic interviews can be used to capture the domain of personal resources in older adults living at home.

4.2. In-Depth Individual Interview

The in-depth individual interviews captured an overall picture of older adults' attitudes towards healthy diet behavior and their food choice determinants. The participants reflected on their food choices and diet through their own experiences by describing past and present experiences related to food and a healthy diet in a home setting.

The in-depth individual interview method captured the full range of changes associated with the aging domain. All of the participants reported that they experience one or more challenges related to maintaining a "healthy" diet, such as compromised senses (taste and/or smell), a reduced appetite, poor dentition, and digestive conditions. Additionally, two of the participants reported problems with mobility. Consequently, the participants chose to stick to their current diet. They felt that their everyday diet worked well for them and, most importantly, was manageable.

"I am not sure, but I think it started when I started going to the senior activity center. I have diarrhea every time I come home. I thought maybe is the bread, so I stop eating that. I then started to eat different bread. It was better. I know it is not the food there; it is my stomach. I can't drink some of the juices in the store too; it is too strong for my stomach, so it starts hurting." (P3).

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Concerning psychosocial aspects, participants reported that living alone after the loss of a spouse had a negative effect on their food intake. The examples given included not having a motivation to prepare food for one person, only eating pre-prepared food from a store, and skipping meals. Of these participants, one did actually live with a spouse but stated that they did not have any interest or the energy to prepare food. Despite the changes in food consumption, all the participants believed that their diet was healthy enough. This result suggests that in-depth individual interviews are well-suited for capturing the psychosocial aspects of older adults' food choices.

"When my wife was still alive, it was me who makes dinner sometimes. I like making dinner because she appreciates it, but now, nah . . . (thinking), I don't want to stand in the kitchen to make food. I used to make cucumber salad; I make it for years but no, standing there and make dressing for one person. I don't bother, and I just buy that ready-made food from the stores." (P17).

With regard to the domain of personal resources, the participants expressed that a lack of access to personal support was due to families living far away and having almost no contact with relatives or friends. Collectively, the participants stated that access to the senior activity center has a positive effect on maintaining a healthy diet. Furthermore, participants reported a drop in income, expensive healthy food, and transport to be factors in their food choices. Thus, the domain of personal resources was captured using in-depth individual interviews.

"I've been here for two years. I'm here because if I am not here, I will be alone in my apartment staring out the window while my husband is at work. I need some social because I'm home, no job, so I have no contact with other people, no siblings, and very little contact with my family." (P8).

4.3. Dyadic Interviews vs. In-Depth Individual Interviews Comparison

The performance of the two interviewing methods is compared in terms of the information elicited (the number of attributes elicited and the attribute variability) and the procedural dimensions (efficiency of data collection and participants' feedback).

To address RQ1, we identified the number of attributes that each method elicited. Dyadic interviews generated a higher number of attributes (52 attributes) than the in-depth individual method (37 attributes). The dyadic method yielded data related to both the individual and the collective experience of the two members in the dyad, providing insight into why older adults choose or avoid certain foods. In contrast, the in-depth individual interviews only provided rich data on individuals' views about what constitutes a healthy diet and how they maintain this in their daily lives.

In addition to eliciting a larger number of attributes, dyadic interviews generated a greater variability of themes. A possible explanation for this might be that more participants were involved in dyadic interviews. This probability, however, is difficult to determine as the equivalent comparison between dyadic and in-depth individual interviews is still unclear [28].

In contrast, in-depth individual interviews yielded fewer themes, but more "deep" personal information, such as health conditions, medical procedures, personal economy, and social isolation. This result helps answer RQ2a. Figure 1 shows the extent to which the two methods tap into the specific themes and to what degree the content overlaps. The 52 and 37 attributes elicited in each method, respectively, resulted in a total of 58 different attributes. Of these, 31 emerged in both methods, while 21 were unique to the dyadic method and 6 to the in-depth individual method.
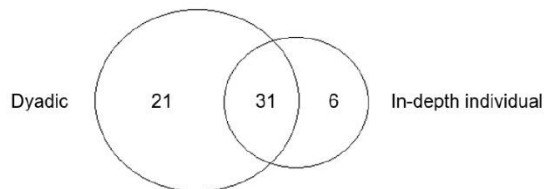
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Figure 1. Overlap of attributes retrieved using each method.

To address RQ2b, we identified the attributes that were captured based on the three domains for the determinants of the food choice of older adults. These are discussed below and summarized in Table 3.

- *Changes Associated with Aging*

The two methods captured age-related changes that influence the food choices of home-living older adults. The in-depth individual interviews yielded a different type of information than dyadic interviews. In the in-depth individual interviews, many of the participants disclosed that physiological changes have affected their past and current food choices. Meanwhile, the data collected from the dyadic interviews concentrated mainly on past challenges, providing little information on the current issues encountered by the participants.

- *Psychosocial Aspects*

Life stage and living arrangement were recognized as the most important social determinants affecting home-living older adults' food consumption. Our data comparison indicates that the two methods yield generally comparable information. Thus, researchers can use either method to capture the psychosocial aspects.

- *Personal Resources*

Both methods almost fully captured the personal variables that affect older adults' food choices. These variables are mostly related to the special challenges of maintaining a healthy diet. Participants in the in-depth individual method tend to be more focused on the challenges within themselves, while in the dyadic method, the challenges discussed were based on the participants' perspectives on understanding other people.

Table 3. Factors contributing to or impeding the food choices of older adults living at home.

Domains of Food Choice		Dyadic Interviews	In-Depth Individual Interviews
Changes associated with aging	Taste		x
	Poor dentition		x
	Loss of appetite	x	x
	Mobility or functional limitations	x	x
	Illness or medical conditions	x	x
Psychosocial aspects	Life-course	x	
	Living arrangement	x	
	Self-perception of health status	x	x
	Desire for independence	x	
	Lack of motivation or energy	x	x
	Personal interest in health/nutrition	x	
Personal resources	Transportation issues		x
	Income/food costs	x	x
	Access to personal support	x	x
	Knowledge/skills in food preparation	x	x
	Access to quality products	x	x
	Dietary resilience to overcome barriers encountered	x	

In response to RQ3, we took into account the time spent conducting the interviews, transcribing, and analyzing data. It took between 50 min and 1.5 h to complete a dyadic interview and between 40 min and 1 h to complete an in-depth individual interview.

What follows is the time it took to transcribe and analyze the data. The data collected from the in-depth individual interviews took less time to transcribe and analyze in comparison to the data from the dyadic interviews. Therefore, although there was no significant difference in the amount of time it took to complete interviews for both methods, the data collected from the in-depth individual interviews required much less time to transcribe and analyze.

We will now respond to RQ4 and RQ5. The participants' reactions to the elicitation method suggest that the dyadic interviews allowed participants to express their opinions with greater ease and to a greater extent than the in-depth individual interviews. It is likely that the broader discussion is a result of the interaction between two people having a shared conversation when responding to interview questions. In contrast, the in-depth individual interviews allowed the participants to open up and share deeper personal feelings. A possible explanation for this might be a reluctance to share their feelings to the fullest extent in the presence of another participant.

Overall, participants found dyadic and in-depth individual interviewing to be a positive experience; however, a few commented on the extensive time investment required by the researchers and the participants to complete the dyadic interviews. In this study, the dyadic interview was clearly not a well-known data collection method among older adults living at home.

4.4. Merits and Drawbacks of Using Each Method

In the following section, we will discuss the merits and drawbacks of each method.

4.4.1. Dyadic Interview

As mentioned earlier, it is the interaction in the dyadic interview that produces data [25]. Understanding a pair's interaction can help us to identify potential merits and drawbacks of the dyadic method, and to further examine these, we include a brief discussion on some pairs' interactions in our study.

Of the eight pairs of dyads in this study, six pairs shared a pre-existing relationship; thus, establishing pairwise rapport was not a challenge. However, when using the dyadic approach, we have little control over how the participant interaction plays out in the dyads and how the relationship in a dyad may influence the result.

It has been reported that within a dyad, one member of the dyad could dominate by constantly talking and dismissing other opinions [24]. In this study, the evidence of domination can be seen in a married couple and a friend pair. This point is clearly illustrated below.

- *Married Couple*

Of the two married couple dyads we interviewed, domination occurred in one of the couples. Such was the case with Participant 5 (P5), who dismissed his wife's (P4) statement and continued to cut her off repeatedly, eventually silencing her in the following:

(P5) "I have a strong connection practically and emotionally to local food. For example, the Cider House located in the West. Its cider made from apple and berries, both drinkable and edible."

(P4) "But cider is made of . . . (interrupted by P5)

(P5) "Yes yes yes yes yes, they make it from berries as well."

(P4) "No, they add an extract" (P5 interrupted)

(P5) "Yes yes yes it's not that but that's fine"

(P4) "(taking a deep breath), sure"

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- *Friend Pair*

In some instances, domination may also operate in a friend pair. Here, one participant (P19) often interrupted and forbade his friend (P18) to disclose more information to the researcher:

(P19) "We are elderly; we don't need so much food."

(P18) "I like a big variation, meat and fish, not fatty food and . . . (interrupted by P19)"

(P19) "Ok, that is enough, I think. Can you just continue with your next question?"

While domination tends to be a concern when conducting dyadic interviews [24], in our case, it provided us with a richer background of how lifestyle and family affected food choices.

What follows is a brief outline of the power relationships that might present between two members of a dyad. It is widely acknowledged that one possible way to neutralize the power dynamic is by asking the participant to identify and invite the person they considered most helpful [12,30]. At the same time, power relationships within families (parent and child) seem inevitable. Given the role that social relationships play in food choices [51], we presume that a dyad between parents and children can provide researchers with richer data.

- *Parent–Child*

It was observed that (P12) seemed to be concerned with her self-image and searched for the "right answer". Such circumstances can lead to respondent bias, where participants provide socially desirable answers. This can be illustrated briefly by a mother (P12) who is trying to reassure her daughter (P11) that she does not skip her meals, as follows:

(P11) "you eat dinner every day, right, mom (look concerned)?"

(P12) "(look down . . . sigh) Yes, can't be full before you eat, so it's good with dinner."

(P11) "It is good that you eat dinner; I was worried."

Lastly, in a setting where two strangers were interviewed together, the participants typically took turns in responding to the interview questions. Throughout the interview, the participants seemed to focus much more on their differences rather than their similarities when answering questions. Although this resulted in a more passive conversation, the stranger' pairs provided us with a valuable insight into the phenomenon.

When we review all of our dyad pairs, the married couples and friend (female) dyads generated the broadest categories of information. This suggests that pairing a composition with a prior relationship is the more effective form of pairing. Surprisingly, the stranger pairs were found to produce more attributes than the father–son and friend (male) dyad. A likely explanation is that the latter pair of dyads had less interest in the research topic.

Overall, the participants who participated in the homogeneous (two male or two female) or heterogeneous dyad exhibited no meaningful differences. The results show, however, that the female participants had a greater interest in the topic and gained more self-confidence throughout the discussion than the male participants. It can be argued that the positive result for the female participants was due to their higher level of interest in the topic.

4.4.2. In-Depth Individual Interview

The following section discusses the merits and drawbacks of the in-depth individual interview method.

While the relationship between the two participants receives the most attention in dyadic interviews, the researcher–participant relationship is vital in in-depth individual interviews. Researchers using this method tend to establish a closer connection with the participants, which fosters emotions that facilitate a rich interview experience [23]. Hence, a participant's willingness to share sensitive information is likely to happen in this type of interview.

Furthermore, the participants in the in-depth individual method often took the interview in a different direction [23]. In our case, we followed the participant out of concern and interest. The following is an example:

(P13) "Some circumstances where I eat more than normal, of course, would be if I am at a restaurant and get good food, I eat more of course. So, then you get home, now how much can you ... But now Christmas is coming, so now."

(Researcher): "Yes, any plans for Christmas?"

(P13) "We are going to the diner... the one out there. There will be a lot of ribs and stuff, so then I'll bring home ribs that I can eat on Christmas Eve because I am alone."

Although the detailed information can sharpen our ability to understand the complexities of the phenomenon, participants' privacy and confidentiality must be safeguarded and respected.

More to the point, it is not our intention in this study to probe for sensitive information but to demonstrate the usefulness of this interviewing method and what type of information can be elicited.

It is worth noting that many older adults who participated in the in-depth individual interview experienced loneliness and social isolation. These experiences may have led to a stronger urge to share and confide in others.

5. Discussion

Different methods of collecting data from a population of older adults have been used in the literature. However, the suitability of the methods used for this population is rarely studied. In some cases, the pressure to publish could be a reason why researchers tend to choose the most familiar method. In other cases, once the design is matched to the initial research question, the assumption is that the chosen method is flawless [8].

In this study, we examined whether the dyadic interview is a suitable method for use with home-living older adults and whether there are differences in eliciting information between a dyadic method and an in-depth individual method in the context of food choice and healthy diets.

The result of this study shows that more attributes were elicited from the dyadic interviews than the in-depth individual interviews. However, the result also indicated that the content of the two methods overlapped. When we compared the two methods with a specific focus on the type of information that emerged from the interviews, the in-depth individual interviews revealed more personal and sensitive data. In contrast, the dyadic interviews covered a broader area related to the topic of food and healthy diets. The results thus support the findings reported in a previous study [9].

While the study by Morgan, Ataie, Carder and Hoffman [9] was conducted to illustrate some methodological aspects of the dyadic interview, our study extends these findings by systematically comparing dyadic interviews with in-depth individual interviews. Contrary to findings in previous research [28], this study reveals that recruiting participants for dyadic interviews took as much time as recruiting participants for in-depth individual interviews. This rather contradictory result may be due to the gatekeeper permission required to access participants and the unique characteristics of an older population. However, it is worth noting that it took considerably longer to transcribe and analyze the dyadic interviews than the in-depth individual interviews.

When evaluating the participants' reactions to the interview methods, both methods yielded positive feedback. The fact that participants expressed positive feelings suggests that the dyadic interview is a viable method for collecting qualitative data from a sample of older adults.

The findings also highlight the importance of participant selection when pairing a dyad, an area of inquiry that has been relatively under-studied in the qualitative literature. By pairing participants based on different relationships, we provide insight into selecting a dyad pair.

Regarding knowledge production, we initially thought that people would merely share information about their own food choices in the in-depth individual interviews. It turns out that the participants occasionally represent themselves and their partners even though they were interviewed alone. As such, the approach allows one voice to represent

two people. In contrast, the dyadic interviews allow two participants to present their perspectives individually alongside the dyadic perspective created by the participants together. Thus, dyadic interviews open up for more voices to be heard in knowledge production [10].

Having applied the two interview methods, this study improved our understanding of choosing the "right" tools for data collection that enable researchers to find answers to research problems.

To the best of our knowledge, this is the first study that explicitly and empirically compares dyadic interviews and in-depth individual interviews using home-living older adults as a sample. Our findings suggest that the dyadic interview is an appropriate method for collecting data from home-living older adults. Therefore, we would encourage researchers in qualitative studies to adopt the dyadic method when interviewing older adults in a food-related context and beyond.

6. Limitations and Future Direction

Our research design enables us to evaluate two different methods of eliciting factors in food choice domains and to examine what information can be captured through deliberate heterogeneous sampling. Thus, this study went beyond simple method comparison to the higher research design level.

This being said, this study was an attempt to expand our understanding of data collection methods in qualitative research. The limitations of the study, which included sampling and inherent methodological issues, must be delineated.

The study involved only a small sample of older adults in one region of Norway who were native Norwegian. As such, the result of the study is limited to the selected participants and their experience related to food choices. To reduce this challenge, we applied deliberate sampling for heterogeneity. Deliberate sampling for heterogeneity is recommended as the best alternative when random sampling cannot be used [52,53]. As a result, it allowed us to look at sample members from all available angles, thereby achieving depth understanding of the phenomenon.

In addition, the setting, and the cultural and societal differences of the study may also limit the transferability of the results to other contexts and situations beyond the scope of this study. Therefore, the findings presented in this article should be interpreted with caution.

What follows is the influence of researcher bias. We sought to reduce these biases by actively thinking reflexively throughout the research process and adopting different types of triangulation (method triangulation, investigator triangulation, and data source triangulation).

Moreover, in terms of sample size, our intention was to have an adequate sample size. However, the adequate sample size needed for qualitative research findings to have some validity is difficult to estimate [54]. One way to increase the validity of our findings would have been to increase the number of participants to reach theoretical saturation [55]. In the case of the dyadic interviews, this would have involved arranging for more pairs to be interviewed.

However, due to limited resources and time, we chose to sample heterogeneity instead of increasing the sample size. We postulated that such sampling would yield a sufficient breadth and depth of the phenomenon being studied.

In spite of these limitations, this study does provide insights that can guide future exploration of the dyadic method. This study is a good starting point, but far more empirical research is needed on the dyadic method. Finally, we used food choice as a context in the present study. Further research in a different context is recommended as a means to determine the efficacy and efficiency of the dyadic method.

References

1. West, M.; Bondy, E.; Hutchinson, S. Interviewing institutionalized elders: Threats to validity. *Image J. Nurs. Scholarsh.* **1991**, *23*, 171–176. [CrossRef]
2. Domarad, B.R.; Buschmann, M.T. Interviewing Older Adults Increasing the Credibility of Interview Data. *J. Gerontol. Nurs.* **1995**, *21*, 14–20. [CrossRef] [PubMed]
3. Silverman, D. *Doing Qualitative Research: A Practical Handbook*; SAGE Publications: London, UK, 2013.
4. Randle, M.; Mackay, H.; Dudley, D. A comparison of group-based research methods. *Mark. Soc. Res.* **2014**, *22*, 22–35.
5. Wilson, A.D.; Onwuegbuzie, A.J.; Manning, L.P. Using paired depth interviews to collect qualitative data. *Qual. Rep.* **2016**, *21*, 1549.
6. Russell, C. Interviewing vulnerable old people: Ethical and methodological implications of imagining our subjects. *J. Aging Stud.* **1999**, *13*, 403–417. [CrossRef]
7. Wenger, G.C. Interviewing older people. In *Handbook of Interview Research: Context and Method*; SAGE Publications: London, UK, 2002; pp. 259–278.
8. Weil, J. Applying research methods to a gerontological population: Matching data collection to characteristics of older persons. *Educ. Gerontol.* **2015**, *41*, 723–742. [CrossRef]
9. Morgan, D.L.; Ataie, J.; Carder, P.; Hoffman, K. Introducing dyadic interviews as a method for collecting qualitative data. *Qual. Health Res.* **2013**, *23*, 1276–1284. [CrossRef] [PubMed]
10. Eisikovits, Z.; Koren, C. Approaches to and outcomes of dyadic interview analysis. *Qual. Health Res.* **2010**, *20*, 1642–1655. [CrossRef] [PubMed]
11. Delormier, T.; Frohlich, K.L.; Potvin, L. Food and eating as social practice–understanding eating patterns as social phenomena and implications for public health. *Sociol. Health Illn.* **2009**, *31*, 215–228. [CrossRef]
12. Klevan, T.; Jonassen, R.; Sælør, K.T.; Borg, M. Using Dyadic Interviews to Explore Recovery as Collaborative Practices: Challenging the Epistemic Norm of the Single Person Perspective. *Int. J. Qual. Methods* **2020**, *19*, 1609406920967868. [CrossRef]
13. World Health Organization. World Report on Ageing and Health. Available online: http://apps.who.int/iris/bitstream/handle/10665/186463/9789240694811eng.pdf;jsessionid=DE1D1F8988CD5E2F8562AE8DC916ED43?sequence=1 (accessed on 1 September 2020).
14. World Health Organization (WHO). Multisectoral action for a life course approach to healthy ageing: Draft global strategy and plan of action on ageing and health: Report by the Secretariat. In Proceedings of the 69th World Health Assembly, Geneva, Switzerland, 23–28 May 2016.
15. Stones, D.; Gullifer, J. 'At home it's just so much easier to be yourself': Older adults' perceptions of ageing in place. *Ageing Soc.* **2016**, *36*, 449–481. [CrossRef]
16. United Nations. Government Policies to Address Population Ageing. Available online: https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2020/Oct/undesa_pd_2020_pf_government_policies_population_ageing.pdf (accessed on 29 March 2020).
17. World Health Organization. Global Age-Friendly Cities Project. Available online: https://www.who.int/ageing/publications/Global_age_friendly_cities_Guide_English.pdf (accessed on 29 March 2020).
18. Lumbers, M.; Raats, M. Food choices in later life. *Front. Nutr. Sci.* **2006**, *3*, 289.

19. Ahmed, T.; Haboubi, N. Assessment and management of nutrition in older people and its importance to health. *Clin. Interv. Aging* **2010**, *5*, 207. [PubMed]
20. Bisogni, C.A.; Jastran, M.; Seligson, M.; Thompson, A. How people interpret healthy eating: Contributions of qualitative research. *J. Nutr. Educ. Behav.* **2012**, *44*, 282–301. [CrossRef]
21. Sobal, J.; Bisogni, C.A. Constructing food choice decisions. *Ann. Behav. Med.* **2009**, *38*, S37–S46. [CrossRef]
22. Host, A.; McMahon, A.-T.; Walton, K.; Charlton, K. Factors influencing food choice for independently living older people—A systematic literature review. *J. Nutr. Gerontol. Geriatr.* **2016**, *35*, 67–94. [CrossRef]
23. Johnson, J.M. In-depth interviewing. In *Handbook of Interview Research: Context and Method*; SAGE Publishing: London, UK, 2002.
24. Arksey, H. Collecting data through joint interviews. *Soc. Res. Update* **1996**, *15*, 15.
25. Morgan, D.L. *Essentials of Dyadic Interviewing*; Routledge: London, UK, 2016.
26. Stockwell-Smith, G.; Moyle, W.; Kellett, U. The impact of early-stage dementia on community-dwelling care recipient/carer dyads' capacity to self-manage. *J. Clin. Nurs.* **2019**, *28*, 629–640. [CrossRef]
27. Kenny, D.A.; Kashy, D.A.; Cook, W.L. *Dyadic Data Analysis*; Guilford Press: New York, NY, USA, 2006.
28. Morgan, D.L.; Eliot, S.; Lowe, R.A.; Gorman, P. Dyadic interviews as a tool for qualitative evaluation. *Am. J. Eval.* **2016**, *37*, 109–117. [CrossRef]
29. Zarhin, D. Conducting joint interviews with couples: Ethical and methodological challenges. *Qual. Health Res.* **2018**, *28*, 844–854. [CrossRef]
30. Caldwell, K. Dyadic interviewing: A technique valuing interdependence in interviews with individuals with intellectual disabilities. *Qual. Res.* **2014**, *14*, 488–507. [CrossRef]
31. Hofisi, C.; Hofisi, M.; Mago, S.J.M.J.O.S.S. Critiquing interviewing as a data collection method. *Mediterr. J. Soc. Sci.* **2014**, *5*, 60. [CrossRef]
32. Ryan, F.; Coughlan, M.; Cronin, P. Interviewing in qualitative research: The one-to-one interview. *Int. J. Ther. Rehabil.* **2009**, *16*, 309–314. [CrossRef]
33. Agar, M.; MacDonald, J. Focus groups and ethnography. *Hum. Organ.* **1995**, *54*, 78–86. [CrossRef]
34. Steenkamp, J.-B.; Van Trijp, H. Attribute elicitation in marketing research: A comparison of three procedures. *Mark. Lett.* **1997**, *8*, 153–165. [CrossRef]
35. Breivik, E.; Supphellen, M. Elicitation of product attributes in an evaluation context: A comparison of three elicitation techniques. *J. Econ. Psychol.* **2003**, *24*, 77–98. [CrossRef]
36. Chelune, G.J. *Self-Disclosure: Origins, Patterns and Implications of Openness in Interpersonal Relationships*; Jossey-Bass: San Francisco, CA, USA, 1979.
37. Scherbov, S.; Sanderson, W.C. New approaches to the conceptualization and measurement of age and aging. *J. Aging Health* **2016**, *28*, 1159–1177. [CrossRef] [PubMed]
38. Skirbekk, V.F.; Staudinger, U.M.; Cohen, J.E. How to measure population aging? The answer is less than obvious: A review. *Gerontology* **2019**, *65*, 136–144. [CrossRef]
39. Higgs, S.; Ruddock, H. Social influences on eating. In *Handbook of Eating and Drinking: Interdisciplinary Perspectives*; Springer: Berlin/Heidelberg, Germany, 2020; pp. 277–291.
40. Turner, D.W., III. Qualitative interview design: A practical guide for novice investigators. *Qual. Rep.* **2010**, *15*, 754.
41. Kvale, S.; Brinkmann, S. *Interviews: Learning the Craft of Qualitative Research Interviewing*; SAGE Publishing: London, UK, 2009.
42. Rubin, H.J.; Rubin, I.S. *Qualitative Interviewing: The Art of Hearing Data*; SAGE Publishing: London, UK, 2011.
43. Billups, F.D. *Qualitative Data Collection Tools: Design, Development, and Applications*; SAGE Publishing: London, UK, 2019; Volume 55.
44. Blankertz, L. The value and practicality of deliberate sampling for heterogeneity: A critical multiplist perspective. *Am. J. Eval.* **1998**, *19*, 307–324. [CrossRef]
45. Suri, H. Purposeful sampling in qualitative research synthesis. *Qual. Res. J.* **2011**, *11*, 63. [CrossRef]
46. Krippendorff, K. *Content Analysis: An Introduction to Its Methodology*; SAGE Publishing: London, UK, 2018.
47. Elo, S.; Kyngäs, H. The qualitative content analysis process. *J. Adv. Nurs.* **2008**, *62*, 107–115. [CrossRef] [PubMed]
48. Lincoln, Y.S.; Guba, E.G. Establishing trustworthiness. *Nat. Inq.* **1985**, *289*, 289–327.
49. Denzin, N.K. *Sociological Methods: A Sourcebook*; Routledge: London, UK, 2017.
50. Patton, M.Q. Enhancing the quality and credibility of qualitative analysis. *Health Serv. Res.* **1999**, *34*, 1189. [PubMed]
51. Paisley, J.; Beanlands, H.; Goldman, J.; Evers, S.; Chappell, J. Dietary change: What are the responses and roles of significant others? *J. Nutr. Educ. Behav.* **2008**, *40*, 80–88. [CrossRef]
52. Cook, T.D.; Campbell, D.T.; Day, A. *Quasi-Experimentation: Design & Analysis Issues for Field Settings*; Houghton Mifflin: Boston, MA, USA, 1979; Volume 351.
53. Shadish, W.R. Critical multiplism: A research strategy and its attendant tactics. *New Dir. Program Eval.* **1993**, *1993*, 13–57. [CrossRef]
54. Vasileiou, K.; Barnett, J.; Thorpe, S.; Young, T. Characterising and justifying sample size sufficiency in interview-based studies: Systematic analysis of qualitative health research over a 15-year period. *BMC Med. Res. Methodol.* **2018**, *18*, 148. [CrossRef] [PubMed]
55. Strauss, A.; Corbin, J. *Basics of Qualitative Research Techniques*; Sage publications: Thousand Oaks, CA, USA, 1998.

Paper 2

Environmental factors that impact the eating behavior of home-living older adults.

Environmental factors that impact the eating behavior of home-living older adults

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A B S T R A C T

Objective: To identify environmental factors that influence the eating behavior of home-living older adults.
Design: Qualitative study with two interview methods, dyadic and in-depth individual interviews.
Setting: The study was conducted in a western district of Norway.
Participants: A total of 22 participants. The study sample consisted of 8 dyads for the dyadic interviews and 6 participants for the in-depth individual interviews. The dyads were composed of pairs who share a pre-existing relationship as well as pairs of strangers.
Method: The qualitative study uses deductive and inductive content analysis.
Results: Seven environmental factors that play a role in older adults' eating behavior were organized into three levels of influence: interpersonal influence (food habits of significant others, household composition, and social relationship), community influence (senior centers and food access), and public policy influence (health information and transportation/mobility aids).
Conclusion: Various environmental factors determine the eating behavior of older adults living at home. An approach is needed to address these factors in order to bring positive change in the eating behavior of home-living older adults. The findings suggest that a social environment may be used to encourage healthy eating. Furthermore, increasing participation in a senior center, ensuring access to food, reducing ambiguity in diet and nutrition information, and increasing mobility support can help older adults maintain or develop healthy eating behavior.

What is already known about the topic?

- An important factor in improving healthy aging is adequate food and a nutritionally sound diet.
- Interventions designed to promote healthy eating yielded minor improvement or inconsistent results.
- The aging population will increase the strain on public finances and the welfare system.

What this paper adds

- This study demonstrates that the social environment and community have the potential to change older adults' eating behavior in a desirable direction.

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- Consistent health information conveyed through various media or health professionals may encourage older adults to change their eating behavior.

1. Introduction

Older adults constitute a growing proportion of the global population. There are about 1 billion people aged 60 and over today, and this will be doubled by 2050 (World Health Organization, 2018). The annual population statistics for 2018 show that in Norway, the number of people in the age group 67–79 years has increased by 42%, and for those aged 90 and older the increase is 29% (The Norwegian Directorate of Health, 2018). Norway's population is aging rapidly, and it is anticipated that there will be more older adults than children in 2030 (Statistics Norway, 2020). This demographic shift means a greater burden of chronic disease, disabilities, and frailty for older people themselves, and also adds to the challenges in health care and other social resources (Dean et al., 2009; Poscia et al., 2018).

Given this situation, it is hardly surprising that a range of health promotion approaches are designed to support healthy eating in home-living older adults. Despite the importance of healthy eating and nutrition for aging adults, changes associated with aging and eating habits in early life (Elsner, 2002; Lumbers and Raats, 2006) may not be conducive to encouraging older adults to eat in a manner that meets the energy or protein requirement for older adults. Furthermore, most older adults consider their diet to be sufficiently healthy, and thus not requiring any changes (De Almeida et al., 2001).

Although many older adults consume a nutritionally adequate diet, there is mounting evidence of malnutrition risk in home-living older adults (Kozáková and Zeleníková, 2014; Söderhamn et al., 2012). The term "malnutrition" in this paper refers to insufficient dietary intake to meet energy or protein requirements in old age (Roy, 1994). Previous studies reported that the prevalence of malnutrition among European older adults living at home ranges from 13% to 30% (Kozáková and Zeleníková, 2014; Söderhamn et al., 2012). The Norwegian Directorate of Health (2020) stated that in 2018, 15.8% of older adults receiving health care at home are at nutritional risk, compared to 19.2% in 2019 and 18% in 2020. With just a 1% decrease in the rate of nutritional risk, coupled with the current demographic transition, malnutrition can become a pressing concern for society (ESPEN, 2019).

Although nutrition and healthier diets for older adults are currently on the agenda of policymakers in Norway, a significant gap still exists between recommendations by healthcare professionals and the services offered to many older adults (Norwegian Ministry of Health and Care Services, 2018). One of the main challenges related to nutrition is the lack of systematic nutritional measures. Systematic nutritional measures refer to the follow-up on individual nutritional needs in order to prevent malnutrition (Norwegian Ministry of Health and Care Services, 2018). In Norway, only 16% of older adults receive systematic nutritional screening; therefore, malnutrition is often both underdiagnosed and undertreated (Ihle-Hansen et al., 2011).

Malnutrition is a multifactorial problem, and effective intervention measures are needed (Ihle-Hansen et al., 2011). However, despite all efforts, interventions aimed at modifying older adults' eating behavior have yielded little improvement or inconsistent results (Poscia et al., 2018). This may be partly due to an inadequate understanding of the factors associated with eating behavior among older adults that need to be addressed in the interventions. Research has been conducted to identify these factors, but such research often focuses solely on the individual determinants of eating behavior, such as attitudes, beliefs, and preferences (Bukman et al., 2020; Kremers et al., 2004). Furthermore, interventions to change eating behavior also often focus on individual-level influences (Brug et al., 2008). The focus on changes at the individual level is an important step in changing behavior. However, eating behavior is not an individual choice that is disconnected from the environment in which an individual lives (Brug et al., 2008). Rather, the environment is a critical force that plays a role in enabling or limiting people's ability to make dietary choices that support their health and well-being (Belon et al., 2016). Research on the complex dynamic of the environmental factors that impact on eating behavior is therefore warranted (Belon et al., 2016).

The importance of environmental factors' contribution to healthier eating behavior has been described in previous studies, such as the study on the vital role family plays in eating behavior (Brijnath, 2011) and the study on health professionals' role in guiding the eating behavior of their patients (Team et al., 2017). With that said, findings from other contexts can only be used as a starting point. When it comes to eating behavior, cultural background plays an important role; people tend to stick to what they know, and tradition rather than choice dominates a person's food world (Rozin, 2007).

Our study seeks to fill this knowledge gap by identifying environmental determinants of home-living older adults' eating behavior. The term "environment" describes a range of contextual factors influencing home-living older adults' eating behavior (Raine, 2005). The aim is to identify the environmental factors that may have the greatest influence on the eating behavior of home-living older adults. This study contributes to the existing literature on the importance of healthy eating for older adults. The findings can also be used as a sound basis for public decision-making.

2. Conceptual framework

Research in this area has shown that multiple environmental and individual factors impact older adults' eating behavior and, ultimately, health outcomes (Story et al., 2002). In this study, we use the ecological model proposed by McLeroy et al. (1988) to highlight the environmental factors that may affect the eating behavior of home-living older adults.

This model assumes that appropriate changes in the environment will produce changes in individuals (McLeroy et al., 1988). Moreover, the ecological model has been used extensively to determine factors that influence eating and other food-related behavior (Holsten et al., 2012; Story et al., 2002). We therefore consider it a suitable framework for exploring the environmental determinants of

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the eating behavior of home-living older adults.

Based on this framework, five broad levels are considered to influence behavior: intrapersonal (individual) factors, interpersonal (social) factors, institutional factors, community factors, and public policy (societal) (McLeroy et al., 1988).

Intrapersonal factors refer to individual characteristics that influence behavior, such as knowledge, attitudes, skills, beliefs, and preferences, while interpersonal factors are related to formal and informal social networks, including family, friends, and peers. Institutional aspects include social institutions with organizational characteristics, and community factors concern relationships among organizations, institutions, and formal networks within defined boundaries. Finally, public policy refers to local, state, national laws, policies.

3. Methods

Eating behavior is often influenced by a complex interaction of different factors (Bukman et al., 2020). To unlock the complexity of the eating behavior among home-living older adults, we chose to explore this phenomenon using two interview methods. The section below presents the two data collection approaches.

3.1. Data collection approaches

The first approach is the dyadic interview (Morgan et al., 2013). The term "dyadic interview" refers to interviewing two participants together to collect valuable data for a research project (Morgan et al., 2013). We chose the dyadic method for two reasons. First, it takes into account the characteristics of old age that could threaten the validity of the data. A classic example of such characteristics is normal cognitive changes (Harada et al., 2013). As a result of changes in cognition, older adults may have a decline in processing speed, memory, and attention span (Harada et al., 2013). Dyadic interviews allow participants to have more time to process what has been said and formulate their responses (Morgan et al., 2013).

The second reason we chose the dyadic method was the nature of the research topic. Eating behavior is viewed as a complex phenomenon influenced by social context (Higgs and Ruddock, 2020). What we decide to eat and how we arrive at a decision is often a form of collaboration with others connected to us (Delormier et al., 2009; Higgs and Ruddock, 2020). Using dyadic interviews to explore a research topic related to collaboration can therefore contribute to the co-creation of new knowledge (Klevan et al., 2020). In other words, using dyadic interviews allows the content to be extended beyond what might have been possible in individual interviews (Morgan, 2016). Thus, the dyadic interview is likely a suitable method for collecting data from home-living older adults.

The second approach is the in-depth individual interview. The in-depth individual interview was selected because it represented the most widely used data collection method in qualitative studies (Wilson et al., 2016). The in-depth individual interview allows a researcher to explore a phenomenon from an individualistic perspective (Ryan et al., 2009). Moreover, it has often been argued that in-depth individual interviews tend to reveal more detailed information than other methods (Agar and MacDonald, 1995).

3.2. Participants

Definitions of the term "older adult" differ in the literature. One way of measuring old age is using a fixed chronological age without regarding how healthy a person is, how a person functions, or whether a person is actively working or retired (Scherbov and Sanderson, 2016). For the purpose of this study, we defined an older adult as a person aged 60 and over. Although we agree that chronological age is not the best predictor variable, it is the most common way to measure age (Skirbekk et al., 2019).

With that said, the older population comprises older adults with considerably different characteristics, so it is likely that people with certain characteristics, for example in relation to health and physical strength, are being excluded from research. People with a

Table 1
Description of participant characteristics from dyadic interviews.

Dyad pairs	Gender	Age	Occupation	Employment status	Marital status	Living situation
Married couple 1	Female	64	Teacher & counselor	Full-time	Married	Living with a spouse
	Male	66	Engineer	Retired		
Married couple 2	Female	62	Manager at a kindergarten	Part-time	Married	Living with a spouse
	Male	65	Substance abuse-related psychiatrist	Full-time		
Father-Son	Male	60	Counselor in an office	Full-time	Divorced	Living alone
	Male	28	Teacher	Full-time	In a relationship	Living with a partner
Mother-Daughter	Female	86	Shopkeeper	Retired	Widow	Living alone
	Female	58	Teacher	Full-time	Divorced	Living alone
Friends pair 1	Female	88	Tour guide	Retired	Widow	Living alone
	Female	83	Travel agency	Retired	Widow	Living alone
Friends pair 2	Male	80	Engineer	Retired	Married	Living with a spouse
	Male	76	Engineer	Retired	Divorced	Living alone
Strangers pair 1	Male	72	Civil engineer	Retired	Married	Living with a spouse
	Male	69	Engineer	Retired	Single	Living alone
Strangers pair 2	Female	63	Housewife	Unemployed	Married	Living with a spouse
	Male	60	Teacher	Full-time	Married	Living with a spouse

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specific characteristic, however, are often the ones in most need of research to improve their condition (Sin, 2005). On this basis, we included a wheelchair user (58 years old) who is a member of a senior center in the study sample.

What follows is the nature of the research topic. Food choice is a complex construct that often involves other people connected to us (Higgs and Ruddock, 2020). To examine food choice as a construct and its variation, we therefore included younger participants in our parent-child dyad.

3.3. Sampling method

Our initial recruitment strategy entailed placing flyers in the mailboxes at senior housing complexes. The gatekeepers were informed of the study, and interested participants were instructed to contact the researchers by phone. We were, however, unable to recruit enough participants within the expected time frame using only this strategy. To overcome this issue, we adopted a more proactive recruitment strategy, in which we recruited participants from senior centers in the district. This approach involved a 30-minute presentation of our project to the members of activity centers. Subsequently, those interested in participating were asked to arrange a time and place for an interview. As time progressed, we employed street-intercept recruitment strategies in public places such as public libraries, coffee shops, and shopping centers to increase the number of participants. Those who agreed to participate were given the option of an individual interview or to be paired up with someone else.

To gain as broad understanding as possible into home-living older adults' eating behavior, we chose a sample of older adults who varied in age, gender, occupation, employment status, marital status, and living situation. In addition, for dyadic interviews, participants were paired together based on different types of relationships (see Table 1). We expected the variety of participants to enable us to capture variable perspectives of the phenomenon being studied (Suri, 2011).

As a result, we recruited 22 participants, all of whom were Norwegian. Of these, 16 completed a dyadic interview, and 6 completed an in-depth individual interview. Of the 16 participants in the dyadic group, 8 dyads were established; 2 married couple dyads, 2 parent-child dyads, 2 friend dyads, and 2 stranger dyads.

The participants' characteristics are presented in Tables 1 and 2.

3.4. Data collection

The data collection took place between October 2019 and January 2020 in a district of Western Norway with approximately 482,000 inhabitants, including 100,100 older adults aged 60 and over (Statistics Norway, 2020). The study was reviewed and approved by the Norwegian centre for Research Data (2019/ 502,106), and written informed consent was obtained from all the participants individually before initiating the data collection. The interviews were held at a time and place of the participants' choice, including participants' homes, cafeterias at senior centers, libraries, and coffee shops. Each dyadic interview session lasted between 50 min to 1.5 h, while each session in an in-depth individual interview lasted about 40 min to 1 hour. Field notes were taken while conducting the interviews and all the interviews were audio-taped.

3.5. Data analysis

Upon completion of each interview, the audio files were listened to several times, and verbatim transcriptions were prepared for each interview. To ensure the accuracy of the transcriptions, the same datasets were also transcribed by a transcriber who was not involved in the data collection.

The data collected were analyzed using content analysis. Content analysis examines data with a view to understanding the meaning behind it (Krippendorff, 2018). As a research technique, it enables researchers to organize and elicit meanings from the data collected and draw a realistic conclusion (Bengtsson, 2016). Furthermore, content analysis offers the potential for making replicable and valid inferences of the data based on the overall context (Krippendorff, 2018).

The content analysis was inspired by method descriptions, primarily that of Elo and Kyngäs (2008) but also Hsieh and Shannon (2005). The data analysis was conducted in two distinct phases: deductive and inductive. This integrative methodological approach has so far not been extensively described in the nursing literature (Sandström et al., 2015). However, this approach is useful when a prior theory exists (here the ecological model) about a phenomenon (Hsieh and Shannon, 2005) and when knowledge about the phenomenon is still fragmented (Elo and Kyngäs, 2008).

Table 2
Description of participant characteristics from in-depth individual interviews.

Participants	Gender	Age	Occupation	Employment status	Marital status	Living situation
Participant 3	Female	82	Housewife	Unemployed	Widow	Alone
Participant 8	Female	58	Housewife	Unemployed	Married	With spouse
Participant 13	Female	92	Housekeeper	Retired	Widow	Alone
Participant 16	Male	88	Businessman	Retired	Widow	Alone
Participant 17	Male	71	Skipper	Retired	Widow	Alone
Participant 20	Male	71	Petroleum engineer	Retired	Single	Alone

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3.5.1. The deductive content analysis

We started this phase by selecting the unit of analysis. The unit of analysis in this study was a sentence that could be used to answer the research question ("what environmental factors may have the greatest influence on the eating behavior of home-living older adults?"). The next step in the analytical process was to make sense of the data collected. Here, each transcript was read several times thoroughly. Our aim is to become immersed in the data (Polit and Beck, 2004) and obtain a sense of whole (Burnard, 1991).

In the next phase, we developed a structured categorization matrix (Elo and Kyngäs, 2008) based on the ecological framework for health promotion (McLeroy et al., 1988). This categorization matrix was structured according to the different levels of influence considered to impact eating behavior. The categorization matrix was then used as a lens to analyze the data when we read through it

Table 3
Strategies adopted from Lincoln and Guba (1986).

Rigor criteria	Purpose	Original strategies	Strategies applied in our study
Credibility	To establish confidence that the results (from the perspective of the participants) are true, credible and believable.	Prolonged engagement; lengthy and intensive contact with the phenomena (respondents)	• Before the scheduled interview, we met or called all of our participants (except street-intercept) to introduce ourselves and engage participants in an informal conversation. • If we were unsure about something, we called our participants after the interview to get clarity on some thing they had mentioned in order to get the correct interpretation.
		Triangulation	• We applied two data collection approaches (dyadic and in-depth individual interview). • We used method triangulation, investigator triangulation, and data source triangulation.
		Peer debriefing	• We discussed the interview questions with nutritionists from three different regions of Norway. • Interviewing protocol reviews by academic and colleagues. • We had a regular project meeting with members of the project.
		Interviewing process and techniques	• Interviewing protocol tested at pilot interviews with older adults from a different region of Norway.
		Negative case analysis	• We include a wheelchair user and parent-child dyad.
Dependability and confirmability	To ensure the findings of this qualitative inquiry can be replicate if the inquiry occurred within the the same cohort of participants, coders and context. To increase the confidence that the results would be confirmed or corroborated by other researchers.	Rich description of the study methods	• A detailed description of the research procedures was provided, allowing others to conduct follow-up studies.
		Establishing an audit trail	• We have a detailed track record of the data collection process and all signed informed consent. • Audio files, transcripts, field notes writing, and reflection notes.
		Reflexivity	• Most of the time, two of the authors present during the interview process. • We keep reflection notes for each interview, allowing us to reflect not only on what happened at a particular interview but also on how we as researchers felt that day.
Transferability	The degree to which the results can be generalized or transferred to other contexts or settings.	Sampling	• We use maximum variation sampling in terms of participants' characteristics (see Tables 1 & 2).
		Data saturation	• With dyadic interviews, we can learn about individual and collective perspectives, which adds dimension to the data collected. Furthermore, our sampling strategy allows us to identify more perceptions and variations. In doing so, the picture becomes broader and deeper to the point of saturation (Patton, 2002).

again. The text corresponding to the categorization matrix was highlighted, coded, and transferred into the relevant categories in the matrix by the first author. The codes and their definitions were derived from previous qualitative food studies conducted with older adults, for example, food-related habits, food environment, and health information-seeking behavior (Bloom et al., 2017; Shim et al., 2019; Turner et al., 2018).

The texts that were considered not to fit into the matrix were saved in a separate document. Finally, when this was done for all the transcripts, the co-authors appraised the matrix, and all three authors appraised the document containing the "non-fitting" texts. This appraisal involved excluding the "non-fitting" texts that were deemed not relevant to the study (e.g., a participant's holiday plan) and transferring the remaining undecided texts to the matching category.

3.5.2. Inductive content analysis

The aim in this phase is to gain a comprehensive understanding beyond the earlier categorization. To allow the participants' perspectives, experiences, and interpretations to emerge, we employed a qualitative approach inspired by grounded theory (Strauss and Corbin, 1990). With that said, the present study does not follow the pure inductive form as it begins with a pre-determined category derived from existing theory.

The transcripts were reread, and then texts were abstracted into codes. We used in vivo codes as much as possible to highlight the voices of our participants (Manning, 2017). The codes were developed separately by two authors to increase the comprehensivity and ensure sound interpretation (Schreier, 2012). Any disagreements on code descriptions were resolved through discussions among the authors during project meetings. Thereafter, the codes were structured into sub-categories based on their similarities and differences. Through the identification and interpretation of similarities and differences, further abstraction was achieved, resulting in 3 main categories and 7 sub-categories. While presented here sequentially, the coding process was circular, and emergent codes and sub-categories were compared in order to refine and re-code existing codes, in line with the principles of grounded theory analysis (Blaikie and Priest, 2019).

Two of the authors took the lead in the analysis (FK, ØJ), while the other author (TØ) acted as a co-analyzers of the coding and abstractions.

3.6. Strategies to achieve rigor in the study

We are aware of the potential researcher bias that could influence data collection and interpretation. We sought to reduce this bias by actively thinking reflexively throughout the research process and adopting different types of triangulation (method triangulation, investigator triangulation, and data source triangulation) (Denzin, 2017; Patton, 1999). To establish trustworthiness, we adopted the criteria created by Lincoln and Guba (1986). These criteria are credibility, transferability, dependability, and confirmability (Lincoln and Guba, 1986). Table 3 illustrates the strategies that were adopted in our study.
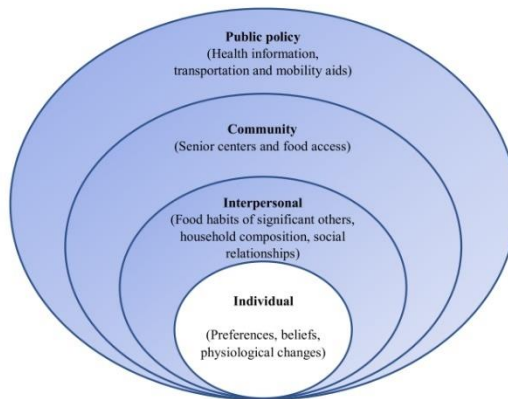

Fig. 1. Environmental influences of eating behavior in home-living older adults. The ecological framework was adapted from McLeroy et al. (McLeroy et al., 1988). This study focuses on identifying specific environmental factors as depicted in the colored round figure.

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4. Results

The content analysis process described above resulted in three categories and seven sub-categories that play roles in older adult's eating behavior. Each of these categories and sub-categories is presented in more detail in the following section. An overview of the different categories and sub-categories is presented in Fig. 1, and examples of participants' quotes under each sub-category are given in Table 4.

Category 1: Interpersonal influences (social environment)

In terms of *interpersonal factors*, participants considered significant others' food habits and household size to be factors that affect the type and quantity of food they eat. Furthermore, support from relatives improves access to healthy food, and the interaction with their friends influences their eating habits when they are together.

4.1. Food habits of significant others

Most participants said they eat what they eat because of the people in their lives, and some discussed how they modified their diets in response to changes in the family.

> "When the kids moved out, we never again ate tacos, pizza, tomato soup, fish sticks, or lasagna (laugh). We'd had enough of those dishes. When you have kids, you have little time available, so you tend to choose the safe choice so everyone can eat. But when they move out, we can choose freely. It becomes more varied and healthier (laugh)." (P1)

One participant mentioned that they converted to a vegan diet because of their daughter.

> "What has affected our diet most in recent years is our daughter. Over the last few years, she has changed to a vegan diet, and that has affected me. Her partner is a vegan cook in a restaurant, so we learn a lot from them." (P5)

Others claimed that they have a vegetarian diet only when they are together with their partner.

> "My girlfriend is vegetarian, but I don't eat vegetarian when she is not here. When she is here, we make dinner together." (P7)

4.2. Household composition

Participants talked about household composition as one factor that affects the portion size of food purchased and prepared at home.

Table 4
Example of supporting quotes.

Category	Sub-category	Examples of quotes
Interpersonal influences	Food habits of significant others	"It's just the two of us now, so we decide what we want to eat by looking in the fridge or freezer. My wife has control over that. First she asks me what I want to eat, and then she says she'd already decided, so I eat what she eats (laugh)." (P22)
		"I took great care of what my husband liked. I eat most things, but it often ended up with meat and potatoes. So I ate meat and potatoes too. Now that he is gone, I don't eat so much meat or potatoes. I eat more vegetables." (P3)
		"My ex-wife cooked, so I ate whatever she put on the table. Usually pasta or salad. Now I live alone most of the time, so I eat dinner at the cafeteria at work most of the time." (P6)
	Household composition	"I always make more, but then I freeze it. I have three in my family." (P14)
	Social relationship (friends and other relatives)	"I have almost no contact, but I have some girlfriends. We meet once a month at my place, and have dinner in an Indian restaurant, our neighbor. I don't go to the city center." (P8)
		" I have two daughters, one lives nearby, and one lives far away. She lives far away, but she comes and visits now and then and stays with me for one month. She helps me with the food shopping and takes care of everything else. At other times, some relatives nearby help when I need it." (P16)
Community influences	Senior Centers	"I've been here for two years. I am here because if I am not, I will be alone in my apartment looking at the wall. I need some social interaction with other people; I have no job, so I have no contact with other people. I have no siblings and very little contact with my family. The age difference is quite high here, but I don't mind because the people here are nice." (P8)
		"I'm here Monday and Tuesday, so the rest of the week, I make my food at home." (P13)
	Food access	" I decide what to eat by going to the shop because the shop is right under my place. I often go to the store, just buy different things I feel like eating, variations of what I feel like." (P6)
		"I have a cabin on an island, so I fish a lot. I prepare it as best I can." (P15)
		"Before they started building oil rigs in this fjord, the fjord was very clean. We eat a lot of fish; we eat whatever we catch." (P16).
Public policy	Health information	"I just heard about fat; they talked about it today, apparently now it is okay. It used to be a no-not, not okay, but now it is obviously okay. It's confusing." (P15)
		"I listen to the radio and talk to people, and everyone seems to be different, lots of information." (P13)
		"There is so much information about food and nutrition, but no one explains what information is correct." (P8)
	Transport and mobility aids	"I have rheumatism, so I can't walk so far, it's exhausting. I don't have a heavy-duty rollator, so I can't eat in that cafeteria" (P17)

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For participants living alone, they prefer to buy single-serving packages and smaller portions. In contrast, participants with two or more people in their households do not seem concerned with the portion size of food purchased or prepared at home.

> "I chose the single-serving food because I am single. If I buy something with a bigger portion, I tend to eat more than I should." (P15)

> "We bought so much food; our freezer is full. We haven't bought any food since Christmas." (P22)

Others living alone also mentioned preparing single-serving dinner because they don't like to eat the same leftovers for a few days.

> "I only make my dinner for the day, one portion. I don't like to eat the same thing every day." (P12)

One other participant mentioned that he prefers to buy one-portion meals to avoid food waste.

> "I used to make cucumber salad, but now if I make it, the rest goes in the garbage. I buy one portion if I want it instead." (P17)

4.3. Social relationship (friends and other relatives)

Social relationships are another essential factor that can influence the eating behavior of participants. Two social relationships that participants identified as conducive to a good diet were the relationships with friends and relatives. Participants reported that eating together with friends helps them establish connections and gives them a chance to learn more about food, and support from relatives ensures access to healthy food.

> "Every week for almost 40 years, we have had a dinner club with the same people. It started before I had children, focus on good food. When the kid was small it was once a week. Lots of good food and exciting, we became very familiar with Italian cuisine." (P4)

Other participants mentioned how relatives help them with the grocery shopping make sure they have the food they need to stay well, and offer companionship regularly.

> ``Every Friday, me, my son, and his sons have coffee together, and then we shop for groceries. We buy enough food to set me up for one week, maybe even a little longer.'' (P10)

Category 2: community influences (physical environment)

The community where people live affects their access to healthy food and opportunities for engaging in healthy behavior (Brug et al., 2008). Participants described senior centers as a place that provides access to social interaction and nutritious food. Access to food is also considered to be an important contributor to maintaining a healthy diet.

4.4. Senior centers

The interviews revealed that older adults go to senior centers because they provide them with social interaction and food.

> "Every Thursday, I go to the senior center. It's nice there, and there are so many people my age; we have been through the same things in life, so we talk and enjoy ourselves. They have concerts sometimes and there's lots to do when we are there. I look forward to it every week." (P3)

> "The reason why I go to the senior center is because I get some food, food for three days. I deal with it the rest of the time on my own. It's not difficult. I buy ready-made food." (P16)

4.5. Food access

Participants reported that their food choice is often dependent on what is accessible. Some said they eat based on what is available in the season and the grocery store in their immediate neighborhood.

> "What we eat is dependent a lot on the time of year, for example, barbecue food in the summer. We eat *Lutefisk* (a seafood dish) when it's that time of year. So, we eat according to the season." (P2)

> "This time of year, my favorite is sheep with cabbage because lamb is in the shops at this time of year. Good lamb is available from the store nearby." (P10)

Others stated that they eat what they have grown in their garden due to convenient access and taste.

> "We grow our vegetables in the garden, for example, Brussel sprouts. We can pick this up even in the winter when we want to cook dinner. Also, tomatoes, compared to the ones in the stores, they taste better." (P1)

Another participant mentioned that he has a farm, so he has access to meat.

"We have a farm, and we keep sheep, so we use lamb meat and don't have to buy it." (P14)

Furthermore, a few participants described how proximity to the sea allows them to enjoy more seafood.

``We have a cabin next to the sea, so we eat more fish and other seafood. We don't catch it ourselves; we buy it from the nearby fisherman.'' (P4)

Category 3: Public policy (societal influences)

When the participants were asked about government measures to support healthy eating among older people, most commented on health information while others discussed transport and mobility aids.

4.6. Health information

In all interviews, the participants were unanimous in the view that they were bombarded with health information. Participants reported confusion about what foods are healthy or what foods they should not eat, and anticipate that health advice will change.

"We read a lot. For example, we learn to cut out butter, then coffee is dangerous, and then coffee is no longer dangerous (laugh). We don't take it very seriously." (P2)

"So much information and alternative this and that, if you don't know what you need, how can you eat healthier, and why do you need to eat better." (P12)

4.7. Transport and mobility aids

One participant who has access to a facilitated transport card subsidized by the government raised an issue about the limited sum available on the card. The participant described difficulty getting to food shops and medical appointments due to transportation. Participants also expressed concern about mobility aids that help them move from place to place, such as from home to the grocery store or home to a cafeteria.

"We get very little on the transport card. You have to think about what you have to do all the time, like if you need to go to the shops to buy food, to the doctor, you have to use it. I have to go to the eye specialist sometimes, so I have to use that too. I have to calculate the little I have for transport, so I can't go out so much. It just doesn't help, you know." (P13)

"I try to pull myself together and walk down to the grocery store. Occasionally, the weather is awful, so you can't go. Going back home is even harder, up the hill. Soon I will have a heavy-duty rollator so that I can walk around. They have ordered it from the state welfare service, but I don't know when it will get here." (P3)

5. Discussion

The objective of this study was to explore environmental factors that influence home-living older adults' eating behavior. Discussions with participants led to the identification of environmental factors that facilitate and hinder healthy eating. Participants identified their significant others and the community where they live as the factors that have the greatest impact on their eating behavior and, to a lesser extent, their friends.

When asked about selecting what to eat, participants reported that their eating choices are often influenced by their significant others or people connected to them. In other words, who they dine with affects how they choose what to eat. This finding is supported by existing literature on the importance of social influences on eating behaviors (Higgs and Ruddock, 2020). Participants also reported help with food shopping from their relatives as an important aspect of healthy eating. As reported elsewhere, the household composition also affects older adults' food selection and purchasing decisions (Lesakova, 2016). For participants living alone, a smaller portion or single-serving packed food products is the preferred choice.

Outside of family, friends have some influence on the older adults' eating behavior. Although participants discussed their friends' role in impacting their eating behavior, it was not discussed as deeply as family influences. This finding likely reflects the study sample, which included more older adults living alone with a smaller social network than those living with a spouse, who have a more extensive social network. An older person's social network generally declines with age; this alteration could be because of the loss of a partner, retirement, failing health, cognitive impairment, or family members moving away or leaving home (McLaughlin et al., 2010). Having a good time and eating good food together was reported as the main reason for older adults having meals with friends.

Quite clearly, social aspects have a positive impact on eating behavior in older adults. Unfortunately, social contact and engagement often become less frequent with age (Stroebele-Benschop et al., 2016). Social facilitation of eating, such as having meals with others, may help older adults increase food intake and eat healthier.

In terms of the community where the participants live, senior centers emerged as an important physical environment that affects older adults' eating behavior. Participants described the senior center as a place where they can meet others to socialize, carry out some activities, and have a meal. As discussed above, older adults tend to have less social interaction than others. By offering opportunities for social interaction, senior centers can help reduce loneliness among older adults (Marquet et al., 2020). Participants also discussed how senior centers allow them to maintain their independence by providing food a few days a week. This finding would suggest that senior centers are one of the most important resources for the aging community. However, it is not necessarily the case that going to a senior center has positive benefits for all older adults. Senior centers serve diverse populations of older adults, which vary in age, health, and support needs. Also, the services offered at senior centers differ greatly, from social events to health services, so some

programs are likely to only appeal to certain groups of the local older adults. One potential strategy to increase participation in senior centers is to offer a wide variety of leisure and social activities, as well as programs and services that promote healthy eating.

An additional factor influencing the food choice of older adults is access to food. For some participants, this includes convenient access to a grocery store, growing produce in the garden, farming, and living near the ocean. This finding suggests that food accessibility is a fundamental element of older adults' health (Kortright and Wakefield, 2011). Based on this, a community-driven program aimed at increasing access to affordable and nutritious food may help older adults improve their diet. Such programs can include special financing or tax incentives for grocery stores in rural areas, establishing farmers markets, food pantries, or meals on wheels.

What follows are the societal factors that influence the eating behavior of older adults. Societal influences seem to be more distal to older adults but can substantially affect them, their significant others, friends, and the community where they live. Factors within the societal level that can affect older adults' eating behavior are health information, transport support, and mobility aids.

Overall, our findings show that most older adults in this study reported confusion about health information and coming across conflicting information about proper diet and nutrition from different sources. This finding is consistent with the finding of Le et al. (2021), which showed that a significant proportion of the Norwegian population faces various challenges in dealing with health information. Furthermore, contradictory diet and nutrition information can undermine the success of the healthy eating promotion (Nagler, 2014). Thus, serious consideration should be given to reducing the ambiguity of diet and nutrition information. Ideally, scientists should create quality information, and the media then communicate it accurately to the public (Swire-Thompson and Lazer, 2020). Unfortunately, as well as providing opportunities for people to improve their eating behavior, the media also allows misinformation to flourish (Wang et al., 2019). Conflicting health information is a growing problem worldwide, and we are not well-positioned to help information seekers and healthcare professionals to manage this growing problem (Carpenter et al., 2016). Moving forward, we believe more research is needed to develop effective strategies to deal with conflicting health information.

As indicated previously, access to food is essential for older adults maintaining a healthy diet. Lack of access to transportation and mobility aids can in turn limit older adults' access to healthy food (Walker et al., 2010). Based on this finding, government support to increase subsidized transport and mobility aids can help improve older adults' dietary behavior. That said, this approach is likely to be more effective when integrated with other measures designed to promote healthy eating.

The environmental factors that affect the eating behavior of home-living older adults can be categorized into various levels of influence, as conceptualized by the ecological model: interpersonal (food habits of significant others, household composition, social relationships), community (senior centers and food access), and public policy (health information and transportation/mobility aids). The ecological model provides a useful framework for better understanding the multiple environmental factors that impact the eating behavior of home-living older adults. This model can therefore be used to guide research and can be applied in a study that focuses on modifying eating behavior. While the ecological model makes it possible to categorize the environmental factors that influence older adults' eating behavior, it lacks interaction within and between the different levels of influence (Sallis et al., 2015). Nevertheless, application of the ecological model looks promising for moving the field of health promotion closer to attaining the goal of improving the eating behavior of home-living older adults.

6. Limitations and future direction

Our study has successfully explored the influence of environmental factors on the eating behavior of home-living older adults. However, the limitations of the study, which included sample, findings, and scope, must be delineated.

The study involved only a small sample of Norwegian older adults. As such, the result of the study is limited to the selected participants and their eating behavior experiences. To reduce this challenge, we applied deliberate sampling for heterogeneity. Deliberate sampling for heterogeneity is recommended as the best alternative when random sampling cannot be used (Campbell, 1979; Shadish, 1993). This allowed us to look at sample members from all available angles, thereby achieving an in-depth understanding of the phenomenon. Additionally, the setting and cultural differences may also limit the transferability of the findings to a different context.

In terms of sample size, our intention was to have an adequate sample size. However, the adequate sample size needed for qualitative research findings to have some validity is difficult to estimate (Vasileiou et al., 2018). One way to improve the validity of our findings would have been to increase the number of participants. In the case of the dyadic interviews, this would have involved arranging more pairs to be interviewed. However, due to limited resources and time, we chose sample heterogeneity instead of increasing the sample size. We postulated that such sampling would yield sufficient breadth and depth of the phenomenon being studied.

What follows is a description of the scope of this study. The study is limited in scope as the data were collected before the COVID-19 pandemic and does not therefore reflect the eating behavior of the participants during the pandemic. Prior to the pandemic, the vast majority of home-living older adults participated in social activities, such as attending senior centers and other community programs. However, all these services and programs were curtailed due to lockdown, quarantine, and social distancing measures. These public health measures related to COVID-19 are essential; however, these restrictions increase social isolation and the feeling of loneliness among older adults, which negatively impacts on the eating behavior of many older adults (Wu, 2020).

Despite these limitations, this study helps us understand the environmental factors that impact on home-living older adults' eating behavior and thus, contribute to the existing literature on eating behavior. This research has thrown up many questions awaiting further investigation. Further research should be undertaken to explore how COVID-19 has affected home-living older adults' eating behavior and the role of environmental factors in promoting or hindering healthy eating.

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7. Conclusion

Improving dietary behavior and promoting healthier eating practices among home-living older adults will require a prolonged and more sustained effort that addresses not only individual influence but also environmental factors. The findings suggest that multiple social relationships influence older adults' eating behavior. Thus, the social environment of eating is likely an important factor in promoting healthy eating among home-living older adults. This study has also shown that several aspects of the local community need to be considered to improve the eating behavior of home-living older adults. Senior centers and accessibility to food are the main aspects of community influence that can affect home-living older adults' eating behavior. Continued efforts are needed to maintain well-being and promote healthy eating among the home-living older adults. At the societal level, strategies are required to reduce ambiguity in diet and nutrition information for older adults. There is also a need to ensure adequate mobility support for older adults living at home in order for them to maintain their independence and a healthy diet. Finally, adopting a single model as a basis for study and for developing strategies in promoting healthy eating is not considered optimal. Further research should incorporate ecological models with other modeling or theories.

Finally, as noted earlier, the data in this study were collected before the COVID-19 pandemic. This prevents us from drawing a conclusion about the role of environmental influences on eating behavior during the pandemic.

Declaration of Competing Interest

The authors declare no potential conflicts of interest with respect to the research, the authorship, and/ or publication of this article.

References

Agar, M., MacDonald, J., 1995. Focus groups and ethnography. Hum. Organ. 78–86.
Belon, A.P., Nieuwendyk, L.M., Vallianatos, H., Nykiforuk, C.I., 2016. Perceived community environmental influences on eating behaviors: a Photovoice analysis. Soc. Sci. Med. 171, 18–29.
Bengtsson, M., 2016. How to plan and perform a qualitative study using content analysis. NursingPlus Open 2, 8–14.
Blaikie, N., Priest, J., 2019. Designing Social research: The logic of Anticipation. John Wiley & Sons.
Bloom, I., Lawrence, W., Barker, M., Baird, J., Dennison, E., Sayer, A.A., …, 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 (15), 2685–2693.
Brijnath, B., 2011. Alzheimer's and the Indian appetite. Med. Anthropol. 30 (6), 610–628.
Brug, J., Kremers, S.P., Van Lenthe, F., Ball, K., Crawford, D., 2008. Environmental determinants of healthy eating: in need of theory and evidence: symposium on 'Behavioural nutrition and energy balance in the young. Proc. Nutr. Soc. 67 (3), 307–316.
Bukman, A.J., Ronteltap, A., Lebrun, M., 2020. Interpersonal determinants of eating behaviours in Dutch older adults living independently: a qualitative study. BMC Nutr. 6 (1), 1–12.
Burnard, P., 1991. A method of analysing interview transcripts in qualitative research. Nurse Educ. Today 11 (6), 461–466.
Campbell, D.T., 1979. In: Quasi-experimentation: Design & analysis issues for field settings. Boston.
Carpenter, D.M., Geryk, L.L., Chen, A.T., Nagler, R.H., Dieckmann, N.F., Han, P.K., 2016. Conflicting health information: a critical research need. Health Expect. 19 (6), 1173–1182.
De Almeida, M., Graca, P., Afonso, C., Kearney, J., Gibney, M., 2001. Healthy eating in European elderly: concepts, barriers and benefits. J. Nutr., Health Aging 5 (4), 217–219.
Dean, M., Raats, M.M., Grunert, K.G., Lumbers, M., 2009. Factors influencing eating a varied diet in old age. Public Health Nutr. 12 (12), 2421–2427.
Delormier, T., Frohlich, K.L., Potvin, L., 2009. Food and eating as social practice–understanding eating patterns as social phenomena and implications for public health. Sociol. Health Illn. 31 (2), 215–228.
Denzin, N.K. (2017). *Sociological methods: a sourcebook*: routledge.
Elo, S., Kyngäs, H., 2008. The qualitative content analysis process. J. Adv. Nurs. 62 (1), 107–115.
Elsner, R.J., 2002. Changes in eating behavior during the aging process. Eat. Behav. 3 (1), 15–43.
ESPEN. (2019). PRevention Of Malnutrition In Senior Subjects in the EU. Retrieved from https://www.espen.org/component/content/article/30-news/264-promiss-prevention-of-malnutrition-in-senior-subjects-in-the-eu?Itemid=104.
Harada, C.N., Love, M.C.N., Triebel, K.L., 2013. Normal cognitive aging. Clin. Geriatr. Med. 29 (4), 737–752.
Higgs, S., Ruddock, H., 2020. Social influences on eating. Handbook of Eating and Drinking: Interdisciplinary Perspectives, pp. 277–291.
Holsten, J.E., Deatrick, J.A., Kumanyika, S., Pinto-Martin, J., Compher, C.W., 2012. Children's food choice process in the home environment. A qualitative descriptive study. Appetite 58 (1), 64–73.
Hsieh, H.-F., Shannon, S.E., 2005. Three approaches to qualitative content analysis. Qual. Health Res. 15 (9), 1277–1288.
Ihle-Hansen, H., Mowe, H., Fure, B., 2011. Malnutrition in Norway. Eur. Geriatr. Med. 2 (2), 115–116.
Klevan, T., Jonassen, R., Sælør, K.T., Borg, M., 2020. Using dyadic interviews to explore recovery as collaborative practices: challenging the epistemic norm of the single person perspective. Int. J. Qual. Methods 19, 1609406920967868.
Kortright, R., Wakefield, S., 2011. Edible backyards: a qualitative study of household food growing and its contributions to food security. Agric. Human Values 28 (1), 39–53.
Kozáková, R., Zeleníková, R., 2014. Assessing the nutritional status of the elderly living at home. Eur. Geriatr. Med. 5 (6), 377–381.
Kremers, S.P., De Bruijn, G.-J., Schaalma, H., Brug, J., 2004. Clustering of energy balance-related behaviours and their intrapersonal determinants. Psychol. Health 19 (5), 595–606.
Krippendorff, K., 2018. Content analysis: an Introduction to Its Methodology. Sage publications.
Le, C., Finbråten, H.S., Pettersen, K.S., Joranger, P., & Guttersrud, Ø. (2021). Befolkningens helsekompetanse, del I. The International Health Literacy Population Survey 2019–2021 (HLS19)–et samarbeidsprosjekt med nettverket M-POHL tilknyttet WHO-EHII. Rapport IS-2959.
Lesakova, D., 2016. Seniors and their food shopping behavior: an empirical analysis. Procedia-Soc. Behav. Sci. 220, 243–250.
Lincoln, Y.S., Guba, E.G., 1986. But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. New Direct. Prog. Eval. 1986 (30), 73–84.

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Lumbers, M., Raats, M., 2006. Food choices in later life. Front. Nutr. Sci. 3, 289.

Manning, J., 2017. In vivo coding. Int. Encycloped. Commun. Res. Methods 24, 1–2.

Marquet, O., Maciejewska, M., Delclòs-Alió, X., Vich, G., Schipperijn, J., Miralles-Guasch, C., 2020. Physical activity benefits of attending a senior center depend largely on age and gender: a study using GPS and accelerometry data. BMC Geriatr. 20, 1–10.

McLaughlin, D., Vagenas, D., Pachana, N.A., Begum, N., Dobson, A., 2010. Gender differences in social network size and satisfaction in adults in their 70s. J. Health Psychol. 15 (5), 671–679.

McLeroy, K.R., Bibeau, D., Steckler, A., Glanz, K., 1988. An ecological perspective on health promotion programs. Health Educ. Q. 15 (4), 351–377.

Morgan, D.L., 2016. Essentials of Dyadic Interviewing. Routledge.

Morgan, D.L., Ataie, J., Carder, P., Hoffman, K., 2013. Introducing dyadic interviews as a method for collecting qualitative data. Qual. Health Res 23 (9), 1276–1284.

Nagler, R.H., 2014. Adverse outcomes associated with media exposure to contradictory nutrition messages. J. Health Commun. 19 (1), 24–40.

Norwegian Ministry of Health and Care Services. (2018). LIVE YOUR WHOLE LIFE. Retrieved from https://www.regjeringen.no/contentassets/196f99e63aa14f849c4e4b9b9906a3f8/en-gb/pdfs/stm201720180015000engpdfs.pdf.

Patton, M.Q., 1999. Enhancing the quality and credibility of qualitative analysis. Health Serv. Res. 34 (5 Pt 2), 1189.

Polit, D.F., Beck, C.T., 2004. Nursing Research: Principles and Methods. Lippincott Williams & Wilkins.

Poscia, A., Milovanovic, S., La Milia, D.I., Duplaga, M., Grysztar, M., Landi, F., ..., Ricciardi, W., 2018. Effectiveness of nutritional interventions addressed to elderly persons: umbrella systematic review with meta-analysis. Eur. J. Public Health 28 (2), 275–283.

Raine, K.D., 2005. Determinants of healthy eating in Canada: an overview and synthesis. Can. J. Public Health/Revue Canadienne De Sante'e Publique S8–S14.

Roy, B., 1994. The Role of Malnutrition in the Failure to Thrive syndrome. Handbook of Nutrition in the Aged. CRC Press, Boca Raton, FL, pp. 303–308.

Rozin, P., 2007. Food and eating. Handbook of Cultural Psychology, pp. 391–416.

Ryan, F., Coughlan, M., Cronin, P., 2009. Interviewing in qualitative research: the one-to-one interview. Int. J. Ther. Rehabil. 16 (6), 309–314.

Sallis, J.F., Owen, N., Fisher, E., 2015. Ecological models of health behavior. Health Behav. 5 (43–64).

Sandström, B., Willman, A., Svensson, B., Borglin, G., 2015. Perceptions of national guidelines and their (non) implementation in mental healthcare: a deductive and inductive content analysis. Implement. Sci. 10 (1), 1–13.

Scherbov, S., Sanderson, W.C., 2016. New approaches to the conceptualization and measurement of age and aging. J. Aging Health 28 (7), 1159–1177.

Schreier, M., 2012. Qualitative Content Analysis in Practice. Sage publications.

Shadish, W.R., 1993. Critical multiplism: a research strategy and its attendant tactics. New Direct. Program Eval. 1993 (60), 13–57.

Shim, J.E., Hwang, J.-.Y., Kim, K., 2019. Objective and perceived food environment and household economic resources related to food insecurity in older adults living alone in rural areas. BMC Geriatr. 19 (1), 1–8.

Sin, C.H., 2005. Seeking informed consent: reflections on research practice. Sociology 39 (2), 277–294.

Skirbekk, V.F., Staudinger, U.M., Cohen, J.E., 2019. How to measure population aging? The answer is less than obvious: a review. Gerontology 65 (2), 136–144.

Statistics Norway. (2020, 03.06.2020). A historic shift: soon more older people than children and young people. Retrieved from https://www.ssb.no/befolkning/artikler-og-publikasjoner/et-historisk-skifte-flere-eldre-enn.

Story, M., Neumark-Sztainer, D., French, S., 2002. Individual and environmental influences on adolescent eating behaviors. J. Am. Diet. Assoc. 102 (3), S40–S51.

Strauss, A., Corbin, J., 1990. Basics of Qualitative Research. Sage publications.

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 (2), 95–112.

Suri, H., 2011. Purposeful sampling in qualitative research synthesis. Qual. Res. J.

Swire-Thompson, B., Lazer, D., 2020. Public health and online misinformation: challenges and recommendations. Annu. Rev. Public Health 41, 433–451.

Söderhamn, U., Dale, B., Sundsli, K., Söderhamn, O., 2012. Nutritional screening of older home-dwelling Norwegians: a comparison between two instruments. Clin. Interv. Aging 7, 383.

Team, V., Manderson, L., Markovic, M., 2017. Cultural competence in health: understanding the food choices of older Ukrainian Australians. Culture, Migration, and Health Communication in a Global Context. Routledge, pp. 87–104.

The Norwegian Directorate of Health. (2018, 03.12.2020). Demographic change. Retrieved from https://www.helsedirektoratet.no/rapporter/omsorg-2020-arsrapport/statistikk.

The Norwegian Directorate of Health. (2020). Nutritional follow-up for home residents. Retrieved from https://www.helsedirektoratet.no/statistikk/kvalitetsindikatorer/kommunale-helse-og-omsorgstjenester/oppf%C3%B8lging-av-ern%C3%A6ring-hos-hjemmeboende.

Turner, A.M., Osterhage, K.P., Taylor, J.O., Hartzler, A.L., & Demiris, G. (2018). A closer look at health information seeking by older adults and involved family and friends: design considerations for health information technologies.Paper presented at the AMIA annual symposium proceedings.

Vasileiou, K., Barnett, J., Thorpe, S., Young, T., 2018. Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. BMC Med. Res. Methodol. 18 (1), 1–18.

Walker, R.E., Keane, C.R., Burke, J.G., 2010. Disparities and access to healthy food in the United States: a review of food deserts literature. Health Place 16 (5), 876–884.

Wang, Y., McKee, M., Torbica, A., Stuckler, D., 2019. Systematic literature review on the spread of health-related misinformation on social media. Soc. Sci. Med. 240, 112552.

Wilson, A.D., Onwuegbuzie, A.J., Manning, L.P., 2016. Using paired depth interviews to collect qualitative data. Qual. Report 21 (9), 1549.

World Health Organization. (2018). Ageing and Health. Retrieved from https://www.who.int/news-room/fact-sheets/detail/ageing-and-health.

Wu, B., 2020. Social isolation and loneliness among older adults in the context of COVID-19: a global challenge. Global Health Res. Policy 5 (1), 1–3.

Paper 3

Understanding the role of situational factors on online grocery shopping among older adults.

Understanding the role of situational factors on online grocery shopping among older adults

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ABSTRACT

This paper seeks to identify the situational factors that drive the adoption of online grocery shopping among older adults. A two-step research process is employed. First, exploratory qualitative research is carried out to identify situational factors that older adults take into account when deciding whether to buy groceries online. This is followed by a conjoint experiment to determine which situational factors are considered most important when making such a decision. The sample consisted of 9 participants in the in-depth individual interviews and 206 respondents in the conjoint experiment. The findings indicate that health, mobility issues, and distance to a store are the most important situational factors driving older adults to buy groceries online. Moreover, the findings confirm that the adoption of online grocery shopping among older adults is a result of a complex trade-off of situational variables. The findings contribute to managerial practice by providing online grocery retailers with insight that can be applied when designing promotional programs targeted at older adults.

1. Introduction

Advancing age brings about changes in people's needs, wants, and abilities (Meneely et al., 2009). One basic need that is common to everyone regardless of age is food. The importance of food is evident at any age but becomes even more so as people get older. Food has been identified as an important factor in healthy aging (Bernstein and Munoz, 2012). Ensuring access to food that contributes to a healthy diet among older adults is therefore crucial (Huang et al., 2012; Ishikawa et al., 2016). Food access refers to the location of the food supply (e.g., grocery stores) and the ease of getting to that location (Caspi et al., 2012).

While many older adults continue to visit grocery stores, those in poorer health may experience difficulties accessing grocery stores with a view to meeting their nutritional needs. Age-related physiological changes and declining health (e.g., walking difficulties, poor eyesight) make grocery shopping more challenging for some older adults (Huang et al., 2012; Thompson et al., 2011). In addition to these obstacles, the store environment may also create barriers to older adults' ability to access food (Kohijoki, 2011; Yin et al., 2013). Some of the barriers in the store environment that have been reported are a large shopping cart, small label displays, shelf height (too high or too low), and carrying a heavy basket (Kohijoki, 2011; Yin et al., 2013). Furthermore, not driving a car, distance from home to a grocery store, and not having anyone to help with food shopping are also reported as challenges among older adults (Ishikawa et al., 2016). A combination of these barriers can create a negative impact on the diets and health of older adults. Hence, older adults who experience the greatest difficulties in grocery shopping are more prone to nutritional risk (Herne, 1995).

Alternatives to in-store grocery shopping are clearly needed to improve food access among older adults. One of the alternatives is online grocery shopping. Online grocery shopping entails a consumer purchasing grocery products via a retailer's website and the purchased groceries being delivered directly to the buyer's home (Morganosky and Cude, 2000). This enables older adults to shop at any time without leaving their homes and have the groceries delivered to their door. Online grocery shopping can therefore contribute to healthier diets since it eliminates or reduces the physical effort that is often associated with in-store shopping (Seitz et al., 2017).

The online grocery market in European countries continues to grow (Seitz et al., 2017). Nevertheless, the market share of online grocery shopping in Norway is limited. A survey from 2009 to 2019 shows that

only 14% of Norwegians purchased groceries online (Statista, 2021b). Furthermore, the online grocery figures for 2020 show substantial differences across age groups. The most active online grocery buyers are those aged 35–44 (25%), followed by the age group 25–34 (19%), while older adults make up a relatively small share; ages 55–64 (7%), followed by age group 65–74 (4%) (Statista, 2021a).

Given that online grocery shopping can reduce food access barriers for older adults, it would be reasonable to expect older adults to eagerly embrace online grocery shopping. Surprisingly, only a small percentage of Norwegian older adults buy groceries online. To increase online grocery shopping among older adults, it is important for online grocers to understand in which situations older adults buy their groceries online.

Previous research shows that the factors influencing the adoption and non-adoption of online grocery shopping are related to perceived benefits, barriers, risks, and trust (Bezirgani and Lachapelle, 2021b; Mortimer, Fazal e Hasan, Andrews, & Martin, 2016; Verhoef and Langerak, 2001). While these factors can help explain why consumers are buying or not buying groceries online, they do not explain variations in consumer behavior (sometimes buying in-store, other times at online groceries). One type of factor that can explain variance in consumer behavior is situational factors (Belk, 1975).

Situational factors are highly relevant in shopping as buying behavior occurs within a specific context (Chocarro et al., 2013). The importance of situational factors in the decision to buy groceries online has been described in previous studies (Hand et al., 2009; Robinson et al., 2007), but findings from other contexts can only be used as a starting point. As with any other type of behavior, shopping behavior can be influenced by social norms and cultural background (Ackerman and Tellis, 2001).

Based on the aforementioned reasons, the purpose of this paper is to address the gap in the literature by exploring older adults' online grocery shopping behavior. Specifically, we focus on situational factors. The objectives of this study were: 1) to identify situational factors that drive older adults to buy groceries online, 2) to determine which situational factors are considered important when older adults are deciding whether to buy groceries online.

The paper is structured as follows. First, I present the conceptual framework. In the next section, I describe the method and findings of theexploratory study (qualitative), followed by the method and results of the conjoint experiment (quantitative). Finally, I present the main findings, discussion, limitations, and implications of the study.

2. Conceptual framework

Research in this area has shown that situational factors may be important in shaping and reinforcing online shopping motivations (Hand et al., 2009). This study uses the taxonomy of situational characteristics proposed by Belk (1975) to highlight situational factors that may explain older adults' online grocery shopping behavior. Situational factors refer to "all those factors particular to a time and place of observation which do not follow from a knowledge of personal (intra-individual) and stimulus (choice alternative) attributes" (Belk, 1975).

Based on this framework, situational factors can be categorized into five distinct groups: physical surroundings, social surroundings, temporal perspective, task definition, and antecedent states (Belk, 1975). The *physical surroundings* include geographical and institutional locations in which the choice process occurs. These include distance to store, access to grocery websites, crowdedness, weather, and in-store environment variables (the prices at a nearby store, tidiness, lighting, etc.). The factors related to *social surroundings* include the presence or absence of others at the time of the decision-making and the opportunity for social interaction. The *temporal perspective* refers to the time of day or day of the week, the urgency of purchase, product availability, and time pressures. *Task definition* variables are related to cognitive and motivational elements of the shopping situation. For example, whether consumers are shopping for personal use or buying a gift for someone else.

Antecedent states are temporary conditions such as physical or mental states, mood-related effects (anxiety, pleasure, depression), fatigue, and temporary illness.

The above categorization seems to cover the vast majority of situational factors typically explored within consumer research (Nicholson et al., 2002). Moreover, the Belk (1975) categorization has been used extensively in studies within the context of retail, product choice, and shopping pattern (Chocarro et al., 2013; Hand et al., 2009; Nicholson et al., 2002). I therefore consider it a suitable framework for exploring the situational factors of online grocery shopping in relation to older adults.

3. Methodology

This study was conducted in two phases. In phase 1, Icarried out exploratory qualitative research to identify situational factors considered by older adults when deciding whether to buy groceries online. Following the qualitative research, I designed and executed a conjoint experiment (phase 2) to estimate the value that older adults place on the situational factors (based on findings from phase 1) that drive the adoption of online grocery shopping.

3.1. Phase 1: qualitative study (what situational factors drive the adoption of online grocery shopping among older adults?)

3.1.1. Participants

The term "older adult" is used inconsistently in the literature since this group is made up of individuals with different characteristics and preferences. Conventionally, the older adult has been defined by chronological age, but there is no clear consensus on the age ranges (Ahmad, 2002; Moschis et al., 1997). In this paper, An older adult is defined based on the retirement age in Norway. The retirement age is defined here as the minimum age for claiming a state pension (age 62+) (Government. no, 2021). Thus, study eligibility criteria were: participants had to be aged 62 or older and capable of making decisions related to grocery shopping.

3.1.2. Sampling method

Participants were recruited through snowball sampling, starting with a participant close to the researcher. To enhance sample diversity, I began with a set of sufficiently varied respondents so that the sample is not skewed excessively in a particular direction (Morgan, 2008). Following this rationale, I recruited 9 older adults who varied in age, gender, living situation, and geographical area (urban, rural, and islander). The 9 in-depth individual interviews produced an adequate amount of data to study older adults' online grocery shopping behavior in depth. It can thus be suggested that the sample is sufficient to study a phenomenon (online grocery shopping) (Vasileiou et al., 2018). The participants' characteristics are presented in Table 1.

3.1.3. Data collection

Due to the COVID-19 pandemic, I used remote data collection instead of standard face-to-face interviews. Remote data collection is defined as

Table 1
Description of participants' characteristics from in-depth individual interviews.

Participants	Age	Gender	Living situation	Geographical area
Participant 1	74	Female	Alone	Urban
Participant 2	72	Male	Alone	Urban
Participant 3	70	Female	With a spouse	Rural
Participant 4	70	Female	Alone	Rural
Participant 5	73	Female	With a spouse	Islander
Participant 6	69	Male	With a spouse	Urban
Participant 7	70	Female	Alone	Rural
Participant 8	82	Male	With a spouse	Rural
Participant 9	65	Female	With a spouse	Urban

data collection via telephone, online, or other virtual platforms where participants and researchers are physically distanced (Hensen et al., 2021). For this study, we conducted semi-structured, in-depth individual interviews using telephone and video calls in June 2021. The study was reviewed and approved by the Norwegian Centre for Research Data (2019/502106), and oral informed consent was obtained from all participants before the interview. The giving of consent was audio-taped as part of the interview process. On average, the interviews lasted approximately 30–40 min. Notes were taken during the interviews, and all the interviews were audio-taped.

3.1.4. Data analysis

The audio files from the interviews were listened to several times, and all interviews were transcribed verbatim. The data collected were analyzed using content analysis. Content analysis examines data with a view to understanding the meaning behind it (Krippendorff, 2018). As a research technique, it enables researchers to organize and elicit meanings from the data collected and draw a realistic conclusion (Bengtsson, 2016).

The content analysis employed in this study was directed content analysis, inspired by Hsieh and Shannon (2005). Directed content analysis starts with an existing theory or prior research about a phenomenon (Hsieh and Shannon, 2005). With this approach, codes are developed from relevant theory, and defined before and during data analysis (Hsieh and Shannon, 2005). I started the coding process by thoroughly reading the transcripts several times. The aim is to become immersed in the data (Polit and Beck, 2004) and obtain a sense of the whole (Burnard, 1991).

In the next step of the analysis, all the texts that represent situational factors were highlighted.I then coded all the highlighted text using predetermined codes. The code descriptions were discussed during project meetings. Thereafter, the codes were transferred into relevant categories (Belk's taxonomy of situational variables).

3.1.5. Study 1 findings

The content analysis process described above resulted in a number of unique situational factors. Each of the situational factors was organized based on Belk's taxonomy (1975).

3.1.5.1. Category 1: Antecedent states.
Participants' conditions such as health, physical states, and fatigue appeared to be the key triggers for initiating online grocery shopping. These included being sick, not being able to walk far, no longer driving, and having trouble carrying heavy or large amounts of groceries.

"There is a service I can call to get food delivered to the door. It costs a little extra, but I do that when I'm sick. Also, there is an app I can order from, and it costs about NOK60." (P1)

"I can no longer walk too far; I get very tired. I have to have a break every 50m, so it's too much. I can't take a bus. I don't know. It's difficult for me. If I order my groceries, they help me bring them to my kitchen table, so I don't have to go up and down the stairs. I usually order enough food for a couple of weeks." (P2)

"I buy my groceries once a week, but most of the time, I only buy vegetables. They're just too heavy to carry." (P7)

3.1.5.2. Category 2: physical surroundings.
In terms of physical surroundings, participants considered price, distance to the grocery store, and tidiness to be factors that affect their decision on where to shop.

"I go to the new store in the neighborhood; they have lower prices compared to others." (P4)

"We go to the store nearby because I like their brand and they are cheaper than other stores." (P3)

One participant mentioned that they have to buy their groceries in an expensive store because it is the only option available.

"I buy my groceries at the local grocery store because we only have one store here (laughing). It's very expensive, but it's the only store, so sometimes there's no choice. But I prefer to travel into the town when I feel well. " (P5)

Others claimed that weather also impacts on their ability to shop for groceries.

"I buy my groceries in the nearby store, but it depends on the weather. If the weather is nice, I can walk a little bit further, and if the weather is bad, I call for a food delivery." (P7)

"If the weather is good, we drive to the grocery store. But when it is bad weather, I just send my wife. She's healthy." (P8)

3.1.5.3. Category 3: temporal perspective.
The interviews reveal that delivery time is one of the main concerns for ordering groceries online. For example:

"I tried to order my groceries from a website before. It's not good. I ordered on Tuesday, and it says no deliveries until next Wednesday. I can't wait that long without food. Now I order my groceries from a different website. I order today, and I get my groceries tomorrow." (P2)

3.1.5.4. Category 4: social surroundings.
One participant mentioned that in-store shopping provides them with an opportunity for social interaction, while another participant prefers to shop online and isolate himself after becoming a widower.

"We shop at different grocery stores. One of the stores has a coffee shop next to it. We stop to have coffee if we meet people we know so we can chat." (P6)

"I used to walk or drive to the grocery store when my wife was still alive. But now (sigh) she is no longer here, Nah too much. I don't like going out without her. Now I ask the taxi drivers to stop at the grocery store when they drive me back from my doctor's office. But most of the time, I order my groceries from a website." (P2).

The findings of the qualitative study indicate that the situational factors driving the adoption of online grocery shopping among older adults are health, mobility, price, distance to store, delivery time, and social interaction. The section below examines the importance of these situational factors when older adults are deciding whether to buy groceries online.

3.2. Conjoint experiment

A conjoint experiment is an experimental approach developed in marketing to investigate individual preferences (Kamphuis et al., 2015). It assumes that consumers view a product, in our case, an online shopping channel, as a bundle of certain features (*attributes*) which have different values (*levels*) (Green and Srinivasan, 1978). Researchers would then typically offer participants multiple versions of a product that are formed by combining different attributes and levels. One advantage of conjoint experiments is that they present a reasonably straightforward task that more closely resembles a real-world decision, for example, trading off shopping convenience for social interaction opportunities (Green and Srinivasan, 1978).

3

3.2.1. Selection of attributes

Based on the literature review on the role of situational variables in online grocery shopping, e.g. Hand et al. (2009); Robinson et al. (2007) and the findings of study 1, I selected six situational variables that can influence older adults' decision on whether to purchase groceries online. The six variables selected included two antecedent factors: *health* and *mobility*; two physical factors: *price* and *distance to a nearby store*; one temporal factor: *delivery time*; and one social factor: *social interaction*.

3.2.2. Hypothesis development

3.2.2.1. Situational variables in the antecedent states.
Physical constraints such as *poor health* and *lack of mobility* are among the primary reasons for buying groceries online (Morganosky and Cude, 2000). A similar finding was also confirmed by Hand et al. (2009). This leads to the following hypothesis:

H1. Individual poor health increases the probability of online grocery shopping.

H2. Older adults who have trouble walking and carrying groceries have a higher probability of purchasing groceries online.

3.2.2.2. Situational variables in the physical environment
3.2.2.2.1. Price. Price is unquestionably one of the most important influences on purchasing groceries (DiSantis et al., 2013). The price of groceries may affect older adults' decision-making regardless of whether they buy in-store or online (Lichtenstein et al., 1993). Thus, I hypothesize:

H3. Higher prices in the nearby grocery store increase the probability of online grocery shopping.

3.2.2.2.2. Distance to a nearby store. This variable is traditionally linked to in-store shopping; however, geographical distance from the nearby store can be a relevant factor affecting online retailers (Dominici et al., 2021). The easy accessibility of online grocery shopping can solve the issues related to difficulties of reaching stores that are too far away from consumers (Dominici et al., 2021). This leads to the following hypothesis:

H4. As the distance to a nearby store increases, so does the probability of online purchases.

3.2.2.3. Time-related situational variables
3.2.2.3.1. Delivery time. Delivery time is another important attribute in online grocery shopping. Typically, customers are not willing to wait for a significant amount of time to receive their groceries (de Magalhães, 2021). It is reasonable to assume that if online grocers improve their delivery times, older adults may be more likely to buy their groceries online. Therefore:

H5. The shorter the delivery time, the higher the probability of online grocery shopping.

3.2.2.4. Situational variable in the social dimension
3.2.2.4.1. Social interaction. Another important aspect that has been highlighted for grocery shopping relates to social interactions. It is a widely held view that social interaction is absent when shopping for groceries online (Ramus and Nielsen, 2005). Furthermore, consumers who satisfy their personal and social needs by shopping in grocery stores are likely to consider online grocery shopping as a loss of shopping enjoyment (Ramus and Nielsen, 2005). Although I acknowledge that online grocery shopping may provide a collaborative experience, I adhere to the literature on traditional in-store shopping with the following hypothesis:

H6. The greater the opportunity for social interaction during in-store shopping, the lower the probability of online grocery shopping.

3.2.3. Determination of attributes level

To test the above hypotheses in a conjoint experiment, I defined levels for the six attributes selected. I used two levels for each attribute in order to limit the possible number of scenarios and reduce cognitive demand from the respondent (Wang and Li, 2002), thereby improving the validity of the data (Wang and Li, 2002). The summary of the attribute and attributes levels is presented in Table 2.

3.2.4. Conjoint experiment design

A straightforward way of organizing stimuli in a conjoint experiment is with full factorial design, which generates all possible combinations of attributes and levels (Huertas-García et al., 2016). However, such a design will typically result in an unrealistically high number of profiles (*scenarios*) (Huertas-García et al., 2016). For example, in this study, a full factorial design for six attributes with two different levels generates a total of 64 scenarios (2^6). This number of alternatives can overwhelm the cognitive ability of any respondent (Green and Srinivasan, 1990). I therefore use an orthogonal design, which contains a fraction of a full factorial design (Huertas-García et al., 2016). This design enables the author to reduce the number of scenarios that each participant has to assess. In this case, I use the statistical package SPSS 26.0 (conjoint module) to generate the orthogonal design. As a result, eight choice scenarios were generated. A within-subject design was used for investigating the situational factors. The eight choice scenarios is shown in Table 3.

3.2.5. Sample

The data presented in the conjoint experiment were collected from 206 older adults throughout Norway. The respondents were recruited using an online panel administered by a market research firm in August 2021, and the questionnaire was distributed to respondents via the firm's digital distribution system. Table 4 presents the characteristics of survey respondents.

3.2.6. Data collection

Before the questionnaire was launched, I conducted a pilot study with 15 respondents. This led to some minor changes to the layout of the scenario. The questionnaire begins with a consent statement followed by an explanation of what respondents could expect and an assurance of confidentiality. Each respondent was then presented with all the scenarios (8), and asked to select their preference: buying groceries online or in-store. After finishing the choice task, respondents were asked if they had purchased groceries online and purchased other things online. They were also asked to provide some demographic data. To avoid data being omitted, answering every question was a condition of submitting the questionnaire.

3.2.7. Data analysis

I used the statistical package SPSS 26.0 (conjoint module) for all analyses. Based on the completed choice tasks (whether to buy groceries in-store or online), I can estimate each situational factor level's part-worth (utilities). The part-worth reflects the attractiveness of an

Table 2
Attribute and attribute levels for shopping channel decisions.

Attribute	Attribute level 1	Attribute level 2
Health	Feeling well	Feeling unwell
Lack of mobility	Carrying heavy groceries	Not carrying a lot of groceries
Prices at the nearby store	Expensive	Reasonable
Distance to a nearby store	A-5 minutes walk	A-15 min walk
Delivery time	Tomorrow	1–2 days
Social interaction	Meet and talk with others	Not meeting or talking to anyone

Table 3
The choice scenarios.

Scenario	Distance to a nearby store	Prices at the nearby store	Meet and talk with others	Delivery time	Health	Mobility: carrying groceries
1	5 Minutes	Expensive	Yes	Tomorrow	Feeling well	Heavy
2	5 Minutes	Reasonable	No	Tomorrow	Feeling well	Not Heavy
3	15 Minutes	Expensive	No	Tomorrow	Feeling unwell	Heavy
4	5 Minutes	Reasonable	No	1–2 Days	Feeling unwell	Heavy
5	15 Minutes	Expensive	No	1–2 Days	Feeling well	Not Heavy
6	5 Minutes	Expensive	Yes	1–2 Days	Feeling unwell	Not Heavy
7	15 Minutes	Reasonable	Yes	Tomorrow	Feeling unwell	Not Heavy
8	15 Minutes	Reasonable	Yes	1–2 Days	Feeling well	Heavy

Table 4
Characteristics of respondents.

Variables	Categories	Total (N)	Percentage (%)
Gender	Female	97	47.1%
	Male	109	52.9%
Age	Minimum	62 years old	
	Maximum	92 years old	
Employment status	Employed	33	16%
	Unemployed	6	2.9%
	Retired	167	81.1%
Living situation	Alone	52	25.2%
	Spouse	153	74.3%
	Others	1	0.5%

attribute level and preferred direction of a particular factor for supporting online grocery shopping (Pu and Grossklags, 2015). Higher part-worths indicate a greater preference, and positive part-worths increase the probability of online grocery shopping.

In addition, the utility scores can be used to find the relative importance of each factor. The relative importance values of factors refer to the extent to which a particular factor plays a role in the act of buying groceries online (Pu and Grossklags, 2015). Thus, a high value means that the variable is important for determining whether an older adult will buy groceries online or not. In contrast, a low value indicates the least important variable.

In terms of the "goodness of fit" test, Pearson's R and Kendall's tau values provide an indication of how well the model performs.

4. Results

In total, 206 respondents completed questionnaires. However, 95 (46%) questionnaires were not included in the conjoint analysis because their responses formed a monotonous pattern (choosing in-store shopping in all scenarios). After this elimination, the number of questionnaires included in the conjoint analysis was 111 (54%).

Table 5 shows the utility estimates for every level of each situational factor. The positive or negative directions of the utility estimates were

Table 5
Utility estimates of variables' levels.

Utilities			
		Utility estimate	Std. error
DISTANCE	5 MINUTES	-,120	,035
	15 MINUTES	,120	,035
PRICE	EXPENSIVE	,033	,035
	REASONABLE	-,033	,035
MEETTALK	YES	-,015	,035
	NO	,015	,035
DELIVERY	TOMORROW	,042	,035
	1-2 DAYS	-,042	,035
HEALTH	WELL	-,163	,035
	UNWELL	,163	,035
MOBILITY	HEAVY	,120	,035
	NOT HEAVY	-,120	,035
(Constant)		1355	,035

consistent with the author a priori hypotheses (H1-H6) and therefore showed theoretical validity. As noted earlier, the positive part-worths increase the probability of online grocery shopping. Looking at Table 5, it is apparent that poor health and trouble walking and carrying groceries increase the probability of online grocery shopping (H1 and H2 confirmed).

Furthermore, increased distance to a nearby store means that older adults are more likely to select online grocery shopping (H4 confirmed). When it comes to price, if the prices at a nearby store are high, this increases the probability of online grocery shopping (H3 confirmed). Tomorrow is a preferred option in terms of delivery time, and this increases the likelihood of buying groceries online (H5 confirmed). As far as social interaction is concerned, no opportunity for interaction in a store increases the probability of online grocery shopping (H6 confirmed). With that said, the utility estimate for social interaction is the lowest and is close to zero. This result makes the interpretation more complex. To a certain degree, it is plausible to assume that the less social interaction an older adult has at a store, the greater the probability of online grocery shopping. However, since the utility estimate is close to zero, it is uncertain that one-factor level is preferred over the other.

Regarding the relative importance values, the result from the analysis shows that three situational factors are considered most important when older adults make a decision about online grocery shopping. These factors are health, mobility, and distance to a nearby store. The relative importance values are presented in Table 6.

The goodness of fit measures in Table 7 display Pearson's R and Kendall's tau, which correlate the observed and estimated preferences. In this study, the Pearson's R-value is 0.990, indicating a high correlation level between observed preferences and estimated preferences. Similarly, high values of Kendall's tau (1.000) also demonstrate the model's goodness of fit. What follows is the description of the estimated probability of shopping online per scenario (see Table 8).

5. Discussion

This study set out to examine the situational factors that drive older adults to buy groceries online. The results show that nearly half of the respondents were reluctant to buy groceries online despite their situation. On the other hand, some are open to the idea of buying groceries online or are already incorporating online grocery shopping into their regular shopping routines. Furthermore, those willing to consider online grocery shopping stated they had never shopped for groceries online before. This finding is similar to previous studies where in-store grocery shopping is preferable to online shopping (Bezirgani and Lachapelle,

Table 6
Averaged importance score.

Importance values	
DISTANCE	18,24%
PRICE	11,86%
MEETTALK	11,03%
DELIVERY	12,83%
HEALTH	24,85%
MOBILITY	21,17%

5

Table 7
Correlations between observed and estimated references.

Correlations[a]		
	Value	Sig.
Pearson's R	,990	,000
Kendall's tau	1000	,000

Table 8
Estimated probability of shopping online.

Scenario	Estimated probability of shopping online
Scenario 1	12.6%
Scenario 2	1.5%
Scenario 3	48.1%
Scenario 4	23.8%
Scenario 5	9.7%
Scenario 6	16.5%
Scenario 7	26.7%
Scenario 8	21.4%

2021b; Van Droogenbroeck and Van Hove, 2020). With that said, openness to online grocery shopping can represent an opportunity for online grocery retailers to engage older adults in online grocery shopping. It is therefore critical for grocery retailers to understand in which situations older adults buy groceries online (Hand et al., 2009).

Based on the conjoint analyses, the three most important situational factors determining older adults' decisions to buy groceries online are related to the antecedent states (health and declining mobility) and physical surroundings (distance to a store). While proximity to a nearby store plays an important role, distance alone is not enough to encourage older adults to adopt online grocery shopping. Older adults are more likely to use online grocery shopping when they have health problems, and their ability to walk to a store or carry groceries is impaired. This finding was also reported by Bezirgani and Lachapelle (2021a); Morganosky and Cude (2000).

In terms of delivery time, the result reveals that older adults prefer shorter delivery times. For that reason, more and more online grocery retailers are trying to offer short delivery times, believing that this is the key factor influencing older adults' decision to buy groceries online (Liu and Ling, 2017). Meanwhile, previous research shows that 54.8% of customers were not concerned by delivery times of longer than 24 h, but 70% of customers would be discouraged from buying online if the delivery time was more than three days (Bauerová, 2018). Designing an optimal delivery time is essential, but speed itself may not be enough to encourage older adults to buy groceries online. Other factors also come into play, for example, the delivery precision and quality of food (de Magalhães, 2021). This entails the food being delivered in the same good condition as if the customers had gone to the store and been able to see, touch, and smell the products themselves.

With regard to price, as we expected, the perceived channel (in-store) price influences older adults' decisions on online grocery shopping. The higher the perceived price at a nearby store, the higher the probability of older adults switching to the online channel. This result is consistent with the findings in a study by Yu et al. (2011). However, it is not necessarily the case that higher prices at a nearby store lead to online grocery shopping. Price may influence where people shop, but whether they have other options available (e.g., other stores), what they were willing to pay and what they view as a reasonable price should also be taken into consideration (DiSantis et al., 2013).

One unanticipated result was that social interaction plays the least important role among situational variables when older adults make decisions about buying groceries online. This result is contrary to previous studies, as discussed in Lesakova (2016) and Ramus and Nielsen (2005), for example, which suggested that the social aspect of grocery shopping is considered very important to older adults. This rather contradictory result may be due to the COVID-19 pandemic. The most important public measure to control the pandemic is to cut off opportunities for human-to-human transmission (Gao et al., 2020). Thus, since the first lockdown, people have been avoiding social interaction to some extent, preferring instead to buy their groceries where it is not crowded (Baarsma and Groenewegen, 2021). Consequently, the opportunity to have social interaction is not currently as important as other factors when older adults are deciding where to buy their groceries.

From the results of the analysis, it is clear that situational factors influence older adults' adoption of online grocery shopping. Moreover, the results suggest that the adoption of online grocery shopping is driven by circumstances rather than by a cognitive elaboration and decision process. This finding was also reported by Hand et al. (2009). Furthermore, this study helps us understand that the situational factors related to health, mobility, and distance to a store are significantly associated with older adults' decisions on whether to buy groceries online.

As was pointed out in the introduction to this paper, it is clear that more online grocery services are becoming available. Whether online grocery shopping has the potential to reduce food access barriers for older adults is still unknown. The results of this study demonstrated that older adults are generally not interested in online grocery shopping unless they have no choice. However, despite relying heavily on in-store shopping when purchasing groceries, many older adults expressed willingness to buy groceries online in specific circumstances. Therefore, online grocery retailers should continue to improve older adults' impressions of online grocery shopping and rethink their existing strategies to attract older adults.

This study entails a few limitations, which are worth mentioning. Firstly, the sample for the conjoint experiment was drawn exclusively from a panel provider. Previous work has suggested that recruitment through panel providers may lead to the over-representation of some groups and under-representation of others (Willems et al., 2006). For instance, thesample may under-represent the non-internet savvy or less computer literate older adults. For that reason, the findings cannot be generalized to represent all older adults. With that said, selecting participants with no internet experience might result in a low prevalence rate of online grocery shopping. Future research could expand the sample to include both online and traditional paper survey samples to examine differences between the two subsamples.

Secondly, not all the situational variables were included in this study. Future studies could include other situational variables in order to broaden the scope in this subject area. Thirdly, this study is solely designed for descriptive purposes. It provides information about respondents' preferences in relation to a shopping channel (online grocery shopping) with an alternative combination of features. Consequently, an accurate prediction of specific point estimates (McClelland, 1998) could not be identified in this study. Future studies should adopt a more holistic framework, such as qualitative comparative analysis (QCA) (Ragin, 2000), that focuses more on predicting and explaining outcomes rather than relationships (Woodside, 2014, 2019). Future studies should also consider carrying out the conjoint experiment with a second set of eight scenarios in order to increase the predictive accuracy.

Despite these limitations, thisstudy makes an important contribution to the existing literature on online grocery shopping. This study helps us understand the circumstances in which older adults are more likely to use online grocery shopping and, to some extent, the role of online grocery shopping in reducing food access barriers. Furthermore, the insights gained from this study may be of assistance to online grocery retailers and potentially to other online retailers. It is evident that the main motives for older adults adopting online grocery shopping relate to personal circumstances that are beyond the control of retailers'. Nevertheless, retailers can take situational factors into consideration when designing promotional programs targeted at older adults.

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Declaration of competing interest

The authors declare no potential conflicts of interest with respect to the research, the authorship, and/or publication of this article.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jretconser.2022.103009.

References

Ackerman, D., Tellis, G., 2001. Can culture affect prices? A cross-cultural study of shopping and retail prices. J. Retailing 77 (1), 57–82.

Ahmad, R., 2002. The older or ageing consumers in the UK: are they really that different? Int. J. Mark. Res. 44 (3), 337.

Baarsma, B., Groenewegen, J., 2021. COVID-19 and the Demand for Online Grocery Shopping: Empirical Evidence from the Netherlands. De Economist, pp. 1–15.

Bauerová, R., 2018. Consumers' decision making in online grocery shopping: the impact of services offered and delivery conditions. Acta Univ. Agric. Silvic. Mendelianae Brunensis 66 (5), 1239–1247.

Belk, R.W., 1975. Situational variables and consumer behavior. J. Consum. Res. 2 (3), 157–164.

Bengtsson, M., 2016. How to plan and perform a qualitative study using content analysis. NursingPlus Open 2, 8–14.

Bernstein, M., Munoz, N., 2012. Position of the Academy of Nutrition and Dietetics: food and nutrition for older adults: promoting health and wellness. J. Acad. Nutr. Diet. 112 (8), 1255–1277.

Bezirgani, A., Lachapelle, U., 2021a. Online grocery shopping for the elderly in Quebec, Canada: the role of mobility impediments and past online shopping experience. Travel behaviour and society 25, 133–143.

Bezirgani, A., Lachapelle, U., 2021b. Qualitative study on factors influencing aging population's online grocery shopping and mode choice when grocery shopping in person. Transport. Res. Rec. 2675 (1), 79–92.

Burnard, P., 1991. A method of analysing interview transcripts in qualitative research. Nurse Educ. Today 11 (6), 461–466.

Caspi, C.E., Sorensen, G., Subramanian, S., Kawachi, I., 2012. The local food environment and diet: a systematic review. Health Place 18 (5), 1172–1187.

Chocarro, R., Cortiñas, M., Villanueva, M.-L., 2013. Situational variables in online versus offline channel choice. Electron. Commer. Res. Appl. 12 (5), 347–361.

de Magalhães, D.J.A.V., 2021. Analysis of critical factors affecting the final decision-making for online grocery shopping. Res. Transport. Econ. 101068.

DiSantis, K.I., Grier, S.A., Odoms-Young, A., Baskin, M.L., Carter-Edwards, L., Young, D. R., Kumanyika, S.K., 2013. What "price" means when buying food: insights from a multisite qualitative study with black Americans. Am. J. Publ. Health 103 (3), 516–522.

Dominici, A., Boncinelli, F., Gerini, F., Marone, E., 2021. Determinants of online food purchasing: the impact of socio-demographic and situational factors. J. Retailing Consum. Serv. 60, 102473.

Gao, X., Shi, X., Guo, H., Liu, Y., 2020. To buy or not buy food online: the impact of the COVID-19 epidemic on the adoption of e-commerce in China. PLoS One 15 (8), e0237900.

Green, P.E., Srinivasan, V., 1978. Conjoint analysis in consumer research: issues and outlook. J. Consum. Res. 5 (2), 103–123.

Green, P.E., Srinivasan, V., 1990. Conjoint analysis in marketing: new developments with implications for research and practice. J. Market. 54 (4), 3–19.

Hand, C., Riley, F.D.O., Harris, P., Singh, J., Rettie, R., 2009. Online grocery shopping: the influence of situational factors. Eur. J. Market. 43, 1205–1219.

Hensen, B., Mackworth-Young, C., Simwinga, M., Abdelmagid, N., Banda, J., Mavodza, C., Weiss, H., 2021. Remote data collection for public health research in a COVID-19 era: ethical implications, challenges and opportunities. Health Pol. Plann. 36 (3), 360–368.

Herne, S., 1995. Research on food choice and nutritional status in elderly people: a review. Br. Food J. 97, 12–29.

Hsieh, H.-F., Shannon, S.E., 2005. Three approaches to qualitative content analysis. Qual. Health Res. 15 (9), 1277–1288.

Huang, D.L., Rosenberg, D.E., Simonovich, S.D., Belza, B., 2012. Food access patterns and barriers among midlife and older adults with mobility disabilities. Journal of aging research 2012.

Huertas-García, R., Nunez-Carballosa, A., Miravitlles, P., 2016. Statistical and cognitive optimization of experimental designs in conjoint analysis. European Journal of management and business economics 25 (3), 142–149.

Ishikawa, M., Yokoyama, T., Nakaya, T., Fukuda, Y., Takemi, Y., Kuzama, K., Murayama, N., 2016. Food accessibility and perceptions of shopping difficulty among elderly people living alone in Japan. J. Nutr. Health Aging 20 (9), 904–911.

Kamphuis, C.B., de Bekker-Grob, E.W., von Lenthe, F.J., 2015. Factors affecting food choices of older adults from high and low socioeconomic groups: a discrete choice experiment. Am. J. Clin. Nutr. 101 (4), 768–774.

Kohijoki, A.-M., 2011. The effect of aging on consumer disadvantage in grocery retail services among the Finnish elderly. J. Retailing Consum. Serv. 18 (4), 370–377.

Krippendorff, K., 2018. Content Analysis: an Introduction to its Methodology. Sage publications.

Lesakova, D., 2016. Seniors and their food shopping behavior: an empirical analysis. Procedia-Social and Behavioral Sciences 220, 243–250.

Lichtenstein, D.R., Ridgway, N.M., Netemeyer, R.G., 1993. Price perceptions and consumer shopping behavior: a field study. J. Market. Res. 30 (2), 234–245.

Liu, Y.-F., Ling, I.-L., 2017. The faster the better? Delivery time preference for online shopping: an abstract. In: Marketing at the Confluence between Entertainment and Analytics. Springer, 705-705.

McClelland, D.C., 1998. Identifying competencies with behavioral-event interviews. Psychol. Sci. 9 (5), 331–339.

Meneely, L., Strugnell, C., Burns, A., 2009. Elderly consumers and their food store experiences. J. Retailing Consum. Serv. 16 (6), 458–465.

Morgan, D.L., 2008. Snowball Sampling, vol. 2. The SAGE encyclopedia of qualitative research methods, pp. 815–816.

Morganosky, M.A., Cude, B.J., 2000. Consumer Response to Online Grocery Shopping. International Journal of Retail & Distribution Management.

Mortimer, G., Fazal e Hasan, S., Andrews, L., Martin, J., 2016. Online grocery shopping: the impact of shopping frequency on perceived risk. Int. Rev. Retail Distrib. Consum. Res. 26 (2), 202–223.

Moschis, G.P., Lee, E., Mathur, A., 1997. Targeting the mature market: opportunities and challenges. J. Consum. Market. 14, 282–293.

Nicholson, M., Clarke, I., Blakemore, M., 2002. One brand, three ways to shop': situational variables and multichannel consumer behaviour. Int. Rev. Retail Distrib. Consum. Res. 12 (2), 131–148.

no, Government., 2021. Retirement age. Retrieved from. https://www.regjeringen. no/no/tema/pensjon-trygd-og-sosi ale-tjenester/pensjonsreform/sporsmal-og-svar/a-til-a/id594893/#Pensjonsri ngsalder.

Polit, D.F., Beck, C.T., 2004. Nursing Research: Principles and Methods. Lippincott Williams & Wilkins.

Pu, Y., Grossklags, J., 2015. Using Conjoint Analysis to Investigate the Value of Interdependent Privacy in Social App Adoption Scenarios.

Ragin, C.C., 2000. Fuzzy-set Social Science. University of Chicago Press.

Ramus, K., Nielsen, N.A., 2005. Online Grocery Retailing: what Do Consumers Think? *Internet Research.*

Robinson, H., Dall'Olmo Riley, F., Rettie, R., Rolls-Willson, G., 2007. The role of situational variables in online grocery shopping in the UK. Market. Rev. 7 (1), 89–106.

Seitz, C., Pokrivčák, J., Tóth, M., Plevný, M., 2017. Online grocery retailing in Germany: an explorative analysis. J. Bus. Econ. Manag. 18 (6), 1243–1263.

Statista, 2021a. Share of consumers who bought food and groceries online in Norway in 2020, by age group. Retrieved from. https://www-statista-com.ezproxy.uis.no/stat istics/615940/share-of-online-food-and-groceries-shoppers-in-norway-by-age-gro up/.

Statista, 2021b. Share of individuals who purchased food or groceries online in Norway from 2009 to 2019. Retrieved from. https://www.statista.com/statistics/ 700680/share-of-individuals-who-purchased-groceries-online-in-norway/.

Thompson, J.L., Bentley, G., Davis, M., Coulson, J., Stathi, A., Fox, K.R., 2011. Food shopping habits, physical activity and health-related indicators among adults aged≥ 70 years. Publ. Health Nutr. 14 (9), 1640–1649.

Van Droogenbroeck, E., Van Hove, L., 2020. Triggered or evaluated? A qualitative inquiry into the decision to start using e-grocery services. Int. Rev. Retail Distrib. Consum. Res. 30 (2), 103–122.

Vasileiou, K., Barnett, J., Thorpe, S., Young, T., 2018. Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. BMC Med. Res. Methodol. 18 (1), 1–18.

Verhoef, P.C., Langerak, F., 2001. Possible determinants of consumers' adoption of electronic grocery shopping in The Netherlands. J. Retailing Consum. Serv. 8 (5), 275–285.

Wang, D., Li, J., 2002. Handling large numbers of attributes and/or levels in conjoint experiments. Geogr. Anal. 34 (4), 350–362.

Willems, P., Brown, M., Van Ossenbruggen, R., Vonk, T., 2006. The effects of panel recruitment and management on research results. In: Paper Presented at the ESOMAR Panel Research Conference, Barcelona, Spain, Nov.

Woodside, A.G., 2014. Embrace• perform• model: complexity theory, contrarian case analysis, and multiple realities. J. Bus. Res. 67 (12), 2495–2503.

Woodside, A.G., 2019. Accurate case-outcome modeling in economics, psychology, and marketing. Psychol. Market. 36 (11), 1046–1061.

Yin, Y., Pei, E., Ranchhod, A., 2013. The shopping experience of older supermarket consumers. J. Enterprise Inf. Manag. 26, 444–471.

Yu, U.-J., Niehm, L.S., Russell, D.W., 2011. Exploring perceived channel price, quality, and value as antecedents of channel choice and usage in multichannel shopping. J. Market. Channel 18 (2), 79–102.

Appendix A

NSD

Dato
17.10.2019

Type
Standard

Referansenummer
502106

Prosjekttittel
Elderly food consumers: Factors that may affect their food-related decisions

Behandlingsansvarlig institusjon
Universitetet i Stavanger / Det samfunnsvitenskapelige fakultet / Norsk hotellhøgskole

Prosjektansvarlig
Fifi Kvalsvik

Prosjektperiode
30.05.2019 - 30.08.2021

Kommentar
NSD has assessed the change registered on 14.10.2019. The project will now also process special categories of personal data about health. This Assessment replaces the previous one.

Our assessment is that the processing of personal data in this project will comply with data protection legislation, presupposing that it is carried out in accordance with the information given in the Notification Form and attachments dated 17.10.2019, as well as in dialogue with NSD. Everything is in place for the processing to begin.

NOTIFY CHANGES

If you intend to make changes to the processing of personal data in this project it may be necessary to notify NSD. This is done by updating the Notification Form. On our website we explain which changes must be notified. Wait until you receive an answer from us before you carry out the changes.

TYPE OF DATA AND DURATION

The project will be processing special categories of personal data about health, and general categories of personal data, until 30.08.2021. Collected personal data will be stored internal to the data controller for research until 30.08.2022.

LEGAL BASIS

The project will gain consent from data subjects to process their personal data. We find that consent will meet the necessary requirements under art. 4 (11) and 7, in that it will be a freely given, specific, informed and unambiguous statement or action, which will be documented and can be withdrawn.

The legal basis for processing special categories of personal data is therefore explicit consent given by the data subject, cf. the General Data Protection Regulation art. 6.1 a), cf. art. 9.2 a), cf. the Personal Data Act § 10, cf. § 9 (2).

PRINCIPLES RELATING TO PROCESSING PERSONAL DATA

NSD finds that the planned processing of personal data will be in accordance with the principles under the General Data Protection Regulation regarding:

- lawfulness, fairness and transparency (art. 5.1 a), in that data subjects will receive sufficient information about the processing and will give their consent

- purpose limitation (art. 5.1 b), in that personal data will be collected for specified, explicit and legitimate purposes, and will not be processed for new, incompatible purposes

- data minimisation (art. 5.1 c), in that only personal data which are adequate, relevant and necessary for the purpose of the project will be processed

- storage limitation (art. 5.1 e), in that personal data will not be stored for longer than is necessary to fulfil the project's purpose

THE RIGHTS OF DATA SUBJECTS

Data subjects will have the following rights in this project: transparency (art. 12), information (art. 13), access (art. 15), rectification (art. 16), erasure (art. 17), restriction of processing (art. 18), notification (art. 19), data portability (art. 20). These rights apply so long as the data subject can be identified in the collected data. NSD finds that the information that will be given to data subjects about the processing of their personal data will meet the legal requirements for form and content, cf. art. 12.1 and art. 13.

We remind you that if a data subject contacts you about their rights, the data controller has a duty to reply within a month.

FOLLOW YOUR INSTITUTION'S GUIDELINES

NSD presupposes that the project will meet the requirements of accuracy (art. 5.1 d), integrity and confidentiality (art. 5.1 f) and security (art. 32) when processing personal data.

To ensure that these requirements are met you must follow your institution's internal guidelines and/or consult with your institution (i.e. the institution responsible for the project).

FOLLOW-UP OF THE PROJECT

NSD will follow up the progress of the project underway (every other year) and at the planned end date in order to determine whether the processing of personal data has been concluded/is being carried out in accordance with what is documented.

Good luck with the project!

Contact person at NSD: Karin Lillevold

Data Protection Services for Research: +47 55 58 21 17 (press 1)