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Untangling Consumption of Pulse Products Among Dietary Consumer Segments in Finland

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Tiivistelmä/Referat – Abstract <p>Ruokajärjestelmät kuormittavat ympäristöä, ilmastoa ja ihmisten terveyttä. Verrattuna kasvipohjaiseen, on eläinperäinen ruokavalio kestävämpää sekä ympäristön, että yksilön terveyden näkökulmasta. Ruoan riittämättömyys on ajankohtainen ongelma maailman väestön kasvaessa ja siirtymä kohti kasvipohjaisuutta voisi hyödyttää koko ihmiskuntaa. Palkokasvit tarjoavat kustannustehokkaan, ravinteikkaan ja korkeaproteiiniin vaihtoehdon liha- ja maitotuotteille. Ymmärrys kulutuksesta voi auttaa vaikuttamaan siihen mitä ruoaksi tuotetaan. Tutkielman tarkoituksena on selvittää suomalaisten kuluttajien palkokasvin kulutuksen tämänhetkistä tilaa.</p> <p>Moni tekijä vaikuttaa kulutukseen; jotkin niistä estävät ja toiset tukevat valintaa. Yksilölliset tavat ja päätöksenteon mallit kehittyvät ajan saatossa ja ovat jäykkiä muutokselle. Ruoan valinta on erityisen riippuvainen saatavuudesta, identiteetistä ja tavoista. Elintarviketeollisuus on laaja ja vaikuttaa ihmisten ja maapallon terveyteen, sillä ruokaa kulutetaan päivittäin. Valintaan voidaan vaikuttaa tiedostamalla mikä sitä ohjaa. On hyödyllisempää ymmärtää joukkoja yksilöiden sijaan ja segmentointi on tapa määrittellä ryhmiä, jotka jakavat samat esteet ja motivaation. Palkokasvituotteet ovat ruokia, jotka tehdään Fabaceae tai Leguminosae kasviheimojen syötävistä siemenistä tai paloista. Merkittävää on, että palkokasvien tuotannossa maanalan ja veden käyttö on tehokkaampaa, jopa ennallistavaa ja päästöt ovat pienemmät verrattuna eläinperäisiin proteiiniin ja energian lähteisiin.</p> <p>Palkokasvien kulutusta Suomessa lähdettiin selvittämään kyselytutkimuksella. 705 vastausta kerättiin ja analysoitiin luoden kolme ruokavalioiden mukaan eriytettyä segmenttiä: sekasyöjät, fleksaajat ja kasvissyöjät. Näiden kolmen segmentin palkokasvien kulutuksessa on tarkasteltu toistuvuutta kotona ja muualla, esteitä, sekä tuotekategoriatasoa. Yksitoista estettä ja neljätoista tuotekategoriaa esiteltiin tutkimuksessa ja toistuvuutta mitattiin asteikolla 1–4. Vastauksia kerättiin tasaisesti edustamaan jokaista ruokavalioryhmää ja sosio-demografisia tietoja käytettiin segmenttien kuluttajaprofiilien luomisessa. Ristiintaulukoinnilla muuttujia vertailtiin keskenään. Tavoitteena oli tutkia kuinka usein ja mitä palkokasvituotteita kulutetaan ja mitkä ovat kulutuksen esteet. Khiin neliö -testillä määritettiin tulosten merkitsevyyttä. Tutkimuskysymykseen ”<i>Miten suomalaiset kuluttajat kolmessa ruokavaliion mukaan jaetussa segmentissä kuluttavat palkokasvituotteita</i>” vastataan kolmen hypoteesin kautta.</p> <p>Tulosten mukaan kasvissyöjät kuluttavat eniten palkokasveja toistuvuuden ja tuotekategoriat huomioiden. Toisena tulevat fleksaajat ja sekasuojiin tuotekategoria on kapein ja kulutustiheys harvin. Yleisesti vaikuttavimmat esteet palkokasvien kulutukselle ovat tuttuuden ja taitojen puute, sekä ruoansulatusongelmat. Tiedon ja taidon puutetta voidaan selittää palkokasvienkulutuksen harvinaisuudella Suomessa. Terveydelliset syyt ja hinta ovat yllättävän korkealla esteiden listalla. Eniten kulutetuissa tuotteissa on eroja, mutta yleisesti ”kikherneet, linsit tai/ ja pavut vedessä” ovat eniten kulutettu kategoria. Tulokset ovat linjassa päätöksentekoa ja palkokasvien kulutusta käsittelevän kirjallisuuden kanssa. Ristiriitaisia tuloksia saatiin liittyen hintaan ja ruoansulatusongelmien merkittävyyteen verrattessa muihin esteisiin. Tuloksia voitaisiin käyttää palkokasvien käytön lisäämiseen ja kestävämpien ruokailutapojen edistämiseen.</p>			
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Tiivistelmä/Referat – Abstract <p>Food systems cause environmental, climatic and health issues. In comparison to a plant-based diet, an animal-based diet is unsustainable, considering both the environment and individual health. Scarcity of food is a relevant issue with the growing worldwide population, and a shift towards more plant-dense diets could benefit humanity. Pulses offer a cost-efficient, nutritious, high-protein alternative to meat and dairy products. Making sense of food consumption might help affect what is being used and produced for food. The thesis aims to unravel how Finnish consumers currently consume pulses.</p> <p>Multiple factors impact consumption; some prevent, and some support the choice. Individual habits and decision-making processes evolve and are resistant towards change. Food choice is particularly dependent on availability, identity and habits. The food industry is widespread and influential on human and planetary health, because food consumption is daily. Choice can be influenced by acknowledging what affects it. It is more beneficial to understand the masses than individuals. Segmentation helps to define groups that share similar barriers and motives. Pulse products are foods made of edible seeds and pods of crops from the Fabaceae or Leguminosae botanical families. Significantly, during the production of pulses, land and water use is more efficient and restorative, and fewer emissions are caused compared to animal-based protein and energy sources.</p> <p>To unravel the current pulse consumption in Finland, a survey was conducted. 705 responses were gathered and analysed to create three dietary consumer segments: omnivores, flexitarians and vegetarians. The pulse consumption of these segments is evaluated considering consumption frequency at and outside home, barriers to pulse consumption and product categories. Eleven barriers and fourteen product categories were introduced, and frequency was asked on a scale from 1 to 4. Responses were gathered equally from all three dietary groups, and socio-demographic information was used to create consumer profiles. The target was to examine how often and what pulse products are consumed, and which barriers prevent their consumption. Chi-squared tests help to define the statistical significance of the results. The research question “<i>How do Finnish consumers, divided into three dietary segments, consume pulse products?</i>” is answered through three hypotheses.</p> <p>Results indicate that vegetarians consume the most pulses, considering frequency and product categories. Second are flexitarians, and omnivores have the narrowest product range, as well as the rarest usage rate. Generally, the most influential barriers to pulse consumption are familiarity, lack of skills and digestive problems. Knowledge and skills could be explained by the lack of habits of consuming pulses in Finland. Health reasons and prices are high on the list of barriers. The most consumed product categories differ, but “chickpeas, lentils or/ and beans in water” is the most consumed category of all. Results are in line with the literature on decision-making processes and pulse consumption. Conflicting results are related to price and the significance of digestive issues in comparison to other barriers. Results could be used to increase pulse-centric eating and promote more sustainable diets.</p>			
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1 Introduction

Global food systems face diverse issues, including malnutrition, food scarcity and environmental and climatic problems, boosted by mass production. Some areas are simultaneously suffering from a lack of food, while elsewhere, obesity is a common threat (Chen & Antonelli, 2020). The global demand is increasing while resources are scarce (Boye et al., 2010; Chen & Antonelli, 2020; Godfray et al., 2010). Sustainable use of water, land and energy requires understanding the environmental effects (Godfray et al., 2010). The food system already causes a lot of anthropogenic emissions, but the amount might rise with growing demand for food, following an increase in production and transportation (Godfray et al., 2010). More sustainable options should be sought to secure resources for the future.

Animal-based diets harm the environment more than plant-based diets (Carlsson-Kanyama & González, 2009; Godfray et al., 2010; Henn, Goddyn, et al., 2022; Huan-Niemi et al., 2020). Animal-based products (meat and dairy) account for a remarkable amount of the food consumption, exceeding the recommended quantities (Valsta et al., 2018). At the same time, pulse usage has been slim during the past decades (Rokka et al., 2018). Pulses could offer nutritional, diverse and sustainable options for feeding the growing world population.

Switching to a more plant-based diet appears to extensively benefit sustainability goals. Pulses can, for example, enhance the soil condition by producing nitrogen (Food & Nations, 1994) and are found, together with seafood, to be the most climate-friendly protein sources (Carlsson-Kanyama & González, 2009). Besides climatic and environmental advantages, pulses are beneficial for health, helping to control chronic diseases and weight, as well as gut health (Henn, Goddyn, et al., 2022; Leterme, 2002; McCrory et al., 2010). Sustainability aspects are correlated, as diets with lower carbon footprints due to reduced meat and processed food are also found to support human wellbeing (Dixon et al., 2023). Pulses provide minerals, protein, valuable carbohydrates, energy and vitamins (Asif et al., 2013; Boye et al., 2010; Food & Nations, 1994). The environmental, health, and climatic claims support the argument that pulse consumption should be increased.

The main barriers for implementing pulses in the diet are found to be customs and habits (Jallinoja et al., 2016), a lack of preparation skills and knowledge (Didinger &

Thompson, 2020; Śmiglak-Krajewska & Wojciechowska-Solis, 2021), as well as digestive problems (Didinger & Thompson, 2020). Food consumption is habitual, based on previous experiences and shaped by individual past and environmental effects (de Boer et al., 2017). Time scarcity supports the habit-oriented consumer image (Jabs & Devine, 2006), as they may feel like there is no time to spend learning. Consumers are also considered unaware of the environmental impacts of pulses (Henn, Goddyn, et al., 2022). A wide pulse product category could enable tackling barriers by testing different products and methods.

Affordability, together with health, appear as the main motives for the consumption of pulses (Latvala et al., 2012). In Finland, the price of food is currently high: a 10% increase in food prices was estimated for 2022. High prices could lead to more price-conscious food choices (Latvala et al., 2022) and social injustice, as people cannot afford to eat in the same way. Choosing a sustainable option and doing good can also motivate (Vermeir & Verbeke, 2006). Pulses offer an affordable (Śmiglak-Krajewska & Wojciechowska-Solis, 2021), nutritious (Boye et al., 2010), and versatile (Henn, Zhang, et al., 2022) option for animal-based products and simultaneously participate in solving the problems food systems face.

Consumption is affected by multiple factors (de Boer et al., 2017), such as values (Sheth et al., 1991), a combination of individual factors and environment (Chen & Antonelli, 2020; Sheth et al., 1991; Vermeir & Verbeke, 2006), and, for example, habits and social circle (de Boer et al., 2017; Furst et al., 1996). Physical and social environment, customs, skills, knowledge, culture, and availability shape choice (Furst et al., 1996). De Boer and colleagues (2017) touch on the same topic by listing identity building, perception of what is healthy, habits, comparison to peers, and belonging to a group as factors shaping the behaviour. Different models are used to simplify the choice-making processes. Models, for example, narrow down the choice affecting values into main categories: functionality, uniqueness, sociality, emotionality, and curiosity (Sheth et al., 1991).

Food is a fascinating fraction of consumption as people eat every day. The most influential factors on food consumption are found to be taste, price, and healthiness (Latvala et al., 2012; Verain et al., 2016; Vermeir & Verbeke, 2006). According to Finnish Dietary Guidelines published in 2024, Finnish consumers make food decisions based on their values and attitudes, price, preferences, familiarity, well-

being, environmental effects, production practices, effort required in preparation, as well as worry about safety and origin (Erkkola et al., 2024). Guidelines align with the consumption literature. On top of individual factors, social and physical environments shape the decision-making process (Erkkola et al., 2024).

Segmentation groups consumers according to set criteria based on their needs, habits, and, for example, socio-economic factors (Casas-Rosal et al., 2023; Westad et al., 2004). Instead of analysing individuals, segmentation aims to make sense of the decision-making processes of the masses, because the same procedure doesn't fit for all (Kotler et al., 2018). Consumers are put in groups according to their needs, wants, and characteristics (Casas-Rosal et al., 2023). Characteristics that bind a segment together could, for example, be related to shared preferences (Westad et al., 2004), and should be chosen to match the occasion. Segmentation is a widely used tool in marketing and strategic development (Westad et al., 2004) as it is advantageous to understand and target the right customers. The tool can be implemented in research aimed at promoting more sustainable diets. Eating patterns can be affected by understanding who consumes what, why, why not and when. After that, the reasons behind consumption can be understood better.

1.1 Target of the study

This thesis aims to research how Finnish people, divided into dietary segments, consume pulse products. This objective will be answered by evaluating a) frequency of pulse consumption at home and elsewhere, b) barriers to pulse consumption, and c) choice of pulse products.

The data is collected from a consumer survey conducted in 2024. Collection took place in Finland to research the practices of Finnish consumers. The survey took place online, and 705 eligible answers were gathered. Respondents were chosen and grouped by their dietary preferences, aiming to get an equal number of answers for each pre-selected group. Dietary groups are used as a segmentation basis to have comparable segments. Other background information was gathered about the age, educational background and location in Finland.

Pulse products are chosen as the topic due to the climatic, environmental and health benefits of the dietary switch towards more plant-based, compared to animal-based products common in Finland. Ideally, the study provides information that can be used to promote beneficial pulse-centric diets.

1.2 Structure

To begin with, background information is provided on food choice processes, pulses as ingredients and products, and the benefits of pulse-centric diets. The introduction proceeds from general consumer choice-making to the consumption of pulses specifically. Several factors underlying food choice are discussed, and the value-action gap and choice models are introduced to explain the phenomenon.

Segmentation is introduced as a method at the beginning of Chapter 3 after listing the three hypotheses. Moving on to presenting the survey and analysis, including the evaluation of validity, reliability and limitations of the research.

Chapter 4 begins with inspecting the segment profiles. The research question, “*How do Finnish consumers, divided into three dietary segments, consume pulse products?*”, is examined through three hypotheses. Pulse product usage is defined for each segment by frequency, barriers and product categories. How often segments consume pulses, what prevents them from choosing pulses and the products they consume are all evaluated.

Eventually, the research is discussed in the context of previous literature, and the consumption practices are speculated and explained. The main results, as well as practical implications, are defined and examined. Future research objectives are suggested, and acknowledgements offer insight into what should be noted about the study. The conclusion provides an overall summary of the thesis.

2 Theoretical background

Chapter 2 provides an overview of the theoretical background of the thesis, beginning with a discussion of the importance of food consumption in the big picture.

Discussing food consumption beyond the individual explains why studying the topic is fundamental and how sustainability is related to the consumption of pulse products.

Decision-making processes and influential barriers, and motives are explained to examine the ways consumers choose products. Choice making is first evaluated generally, moving on to the food-specific level. Definitions for pulses, as well as terminology related to the topic, are provided before observing the previous research on pulse consumption, in and outside Finland. Influential factors are introduced to later compare the research results with the former findings. Why pulse consumption and thus, decision-making on pulse products, is chosen as the topic for the thesis will be explored throughout the chapter.

2.1 Why is diet important?

What is eaten and then also produced for food is affecting human health, and the climate, land use, biodiversity and the state of the world in many aspects (Carlsson-Kanyama & González, 2009; Henn, Zhang, et al., 2022). All listed aspects are noted in the Finnish Nutrition Recommendations released in November 2024, based on research on human well-being and sustainability. A vegetarian diet is encouraged more, in comparison to older recommendations, where the focus was purely on human health. Food systems affect the environment, but the negative impact can be lessened by shifting the diet towards more plant-based and, at the same time, healthier options (Huan-Niemi et al., 2020). Understanding food choice and consumption helps in choosing effective ways to affect what is eaten (Leng et al., 2017).

Feeding the growing worldwide population is a concern that requires alternatives and new food solutions (Boye et al., 2010; Chen & Antonelli, 2020). Pulses, together with cereals and fish, can be found to be the most climate-efficient way to produce protein (Carlsson-Kanyama & González, 2009). Chen and Antonelli (2020) point out that

throughout the food chain, the food system is responsible for up to 37% of anthropogenic Greenhouse Gas emissions, reasoning the need to promote more sustainable choices. Plant-based diets are also seen to have less environmentally harmful effects than animal-based diets (Carlsson-Kanyama & González, 2009; Godfray et al., 2010; Henn, Goddyn, et al., 2022) and over-fishing challenges the sustainability of seafood (Godfray et al., 2010).

Sustainable consumption, as a term, describes consumption where, on top of individuals' needs and wants decision-making process involves consideration of the social responsibility of the environment (Vermeir & Verbeke, 2006). The food system as a whole targets more sustainable practices to produce enough food for the Earth's population without harming the planet irreparably (Vermeir & Verbeke, 2006). Thus, the concept includes economic, social, and environmental goals, and a sustainable product should contribute to improving at least one of the three goals (Vermeir & Verbeke, 2006). As sustainability is not a tangible asset, it must be communicated to achieve results.

Pulses appear as sustainable ingredients on all three levels (Blomhoff et al., 2023; Erkkola et al., 2024). Next, consumer choice will be discussed, focusing on the decision of what to eat, and further exploring pulse consumption, as well as answering the question, “why choose pulses?”

2.2 Consumer decision-making

Consumer decision-making regarding food has been influenced by factors beyond the mere satisfaction of needs. Describing consumption enables differentiation of practices across groups and situations (Holt, 1995). Classically, position in society, power and status are illustrated with consumption (Veblen & Howells, 1899). Values (Sheth et al., 1991), past life experiences, present and future visions (Furst et al., 1996) as well as product-related factors (Chen & Antonelli, 2020) shape the choice. Next, decision-making processes are discussed in general and in the context of food. Choice models and frameworks are introduced, and unconscious influences are discussed. From individual choice-making, the thesis moves on to understanding why and how consumption practices are significant in the broader context.

2.2.1 Decision-making as a process

Consumers are a diverse group (Vermeir & Verbeke, 2006) whose reasoning behind decision-making varies. Products are attributes that benefit and carry individual or shared meanings (Holt, 1995). Consumption is often habitual (de Boer et al., 2017) so knowing the habits and understanding what is affecting the choice-making process (barriers and motives) helps to understand markets. Developed frameworks, models and attributes are introduced here.

Processes behind the product choice are complex, and many researchers have aimed to make sense of them (Furst et al., 1996; Holt, 1995; Sheth et al., 1991; Veblen & Howells, 1899). As an action, consumption can be seen as experience, integration, classification and a play (Holt, 1995). Experience is personal level, and integration refers to the symbolic meaning. Classification is related to the product being a vessel carrying cultural or personal value. Consumption as a play is the interpersonal level and metaphor introduced by Holt (1995).

One model aiming to explain the consumer choice-making process is the food choice process model by Furst and colleagues (1996). What has, is, or will happen (life course), influence from the environment (both micro and macro level), as well as individual values and habits (personal system), all affect what is chosen (Furst et al., 1996). The model explains how choice-making is shaped by time and is simultaneously conscious and unconscious. Unconscious habits make choices easier, as people don't have to go through the same process every time they choose something (Furst et al., 1996). It has, for example, become a habit over time to eat specific food at a certain time (like rice porridge when it's Christmas), and thus people are loyal to the habit.

Sheth, Newman, and Gross (1991) have developed a framework comprising five factors that influence consumption. The factors bear different values associated with the choice and are: functional, social, emotional, epistemic or cognitive and conditional or situational. Comparing these values defines whether consumers choose "to buy" or "not to buy" (Sheth et al., 1991). It depends on the individual, situation, and the products, which of the values is the most influential, and where the consumer decides to make a compromise. For example, accessories with big logos bear a lot of social value, as the person expects others to notice and recognise the brand. However,

functional value is usually considered the predominant one (Sheth et al., 1991). By researching consumption based on values, knowledge about what affects purchase choice can be used to overcome barriers and underline possibilities.

Chen and Antonelli (2020) review food choice models to create a multidisciplinary framework for an overall understanding. The determinants for food choice are categorised into five groups: food-internal, food-external, personal-state, cognitive and sociocultural. These go in line with the framework of Furst and colleagues (1996) as the five groups include both “life course” and “personal system” factors. The similarity between texts twenty-five years apart shows how the same influential factors remain relevant. This means that consumer decision-making seems to be a relatively stable process.

The frameworks acknowledge that the division of affecting factors into groups is not straightforward, and categories overlap. This also describes how multidimensional decision-making is, even though consumers often view it as irrational and habitual. Another factor is that unconscious actions and conscious values may not align due to the value-action gap, which will be discussed in Chapter 2.2.3. after addressing the food choice.

2.2.2 Choosing what to eat

Some reasons behind the choice of food are rational and reasoned, some are impulsive and habitual (de Boer et al., 2017; Vermeir & Verbeke, 2006). Some decisions are influenced by past experiences, some by the current environment (Furst et al., 1996). Some choices are made based on personal preferences, and some are based on the influence of others (Sheth et al., 1991; Vermeir & Verbeke, 2006). Reasons are individual, but also similar among, for example, people with a specific diet, or in a certain cultural context. Both general (Sheth et al., 1991) and specifically food consumption (Chen & Antonelli, 2020; Furst et al., 1996) models are used to understand the consumption practices in the thesis.

The supply and availability are notable factors affecting consumption. In Veblen's (1899) classic work about consumption, the economic actions are seen to be influenced by the environment and social constructions. This traditional idea

supports the claim that domestic production affects what is being consumed in Finland (Huan-Niemi et al., 2020). Measuring in market volume, livestock production accounts for 47% of agriculture in Finland, where at the same time, 32% of the food purchases are meat and dairy. (Huan-Niemi et al., 2020). However, pulse production has increased from 2010 to 2017 (Piipponen et al., 2018), and consumption of pulses has been a part of Finnish food culture for a long (Jallinoja et al., 2016).

When considering food consumption, taste preferences, price and healthiness are often recognised as the prominent influential factors in the choice-making process (Latvala et al., 2012; Verain et al., 2016; Vermeir & Verbeke, 2006). Finnish Dietary Guidelines add familiarity, production methods and safety, together with origin, to the list (Erkkola et al., 2024). The choice framework by Sheth, Newman and Gross (1991), introduced in Chapter 2.2.1, places functionality as the main influential factor in value-based choice-making. In the food context, functionality can be seen as related to price, satiety, healthiness and, for example, simplicity of preparation. Vermeir and Verbeke (2006) argue, for their part, that habits guide the choice when motivation is missing.

Identity is one important factor related to food consumption (de Boer et al., 2017; Erkkola et al., 2024). Through identity, individuals show who they are, find a group to belong to, and develop continuity in life (de Boer et al., 2017). Vermeir and Verbeke (2006) found that psychosocial factors, including attitudes and subjective norms, predict sustainable food choice more than demographic factors, underlining the impact of identity building. The strong relations of food and identity can be seen, for example, in the conversation that rose after the release of the 2024 version of Finnish dietary guidelines (Laakkonen, 2024; Valkonen, 2024). The new version differs from the previous releases, especially considering the animal-based foodstuffs (Erkkola et al., 2024).

Identity can consist of multiple factors. Environment, social relations, personal and general history, and societal standards all influence its formation. Take, for example, the fact that eating meat on an everyday basis in the Western world is a relatively new phenomenon, considered normal today. It was rare to afford or have meat available before the Industrial Revolution in the 19th Century (Grigg, 1995; Latvala et al., 2012; Leterme, 2002). Only the privileged people in society often consumed it. Thus, eating

meat wasn't in the identity of common people. Nowadays, the situation has changed, and vegetarian or vegan diets are seen as distinctive (de Boer et al., 2017). Many people consider a meal without meat an exception (Latvala et al., 2012). Identity as motivation guiding food choice might not be as dominant for non-vegetarians, as eating meat is often taken for granted (de Boer et al., 2017). What should be acknowledged is that people haven't always been identified by what they eat or even defined their diets as is common nowadays.

As habits, skills, timeframe, social circles, and social and physical environments, to name a few, influence food decisions strongly, it is interesting to research how Finnish people consume pulse products. Often in conversation, they are related to plant-based diets, but at the same time, pea soup and peas as a side dish have a steady position in Finnish culinary tradition (Pajari et al., 2025). Some people acknowledge the sustainability benefits of pulses, but others see the correlation to meat replacements as a negative aspect. Values and actions don't always align, even if people have strong opinions on certain matters, which will be unravelled next.

2.2.3 Value-action gap

There is a difference between what is valued and desired and how people eventually act. Sustainability is, for example, in general considered positive and desired, but this attitude does not always translate into a purchase (Grunert, 2011). Building identity and making rational choices based on the information available, such as eco-labels, do affect food decisions, but sometimes, even when the motivation is there, consumers choose otherwise (Grunert, 2011; Vermeir & Verbeke, 2006). Grunert (2011) refers to the "hierarchy of effects" model when discussing the lack of consumer action towards more sustainable food choices. Value-action and attitude-behavioural intention gaps are other terms used to describe the dilemma where values or attitudes do not align with actions or behaviour.

Value-action or attitude-behavioural intention gap describes the situation where a favourable action is not met (Vermeir & Verbeke, 2006). Vermeir and Verbeke (2006) discuss the attitude-behavioural intention gap in the context of sustainable food consumption. For example, price, brand familiarity, and convenience explain the

lack of action. Those factors sometimes affect food choices more than values. Fascinating point about habitual consumption is its connection to motivation, as Vermeir and Verbeke (2006) state, that low motivation leads to habitual behaviour. Thus, when the motivation, supported by attitudes, is high enough and stronger than the barriers, the actions seem to be more likely. Habits take over without motivation.

New approaches to encourage people to make recommended food decisions should be sought. Nudging is a good tool to overcome problems stemming from the value-action gap because the focus is on affecting unintended behaviour (Leng et al., 2017). Informing and teaching consumers works to a certain extent, but the gap between attitudes and behaviour shows how, for example, consumers interested in sustainability can make product choices regardless of their values if the other option is more affordable or better available. Understanding not only values but also actions helps shape consumption. Thus, pulse consumption of the three dietary segments is evaluated from different viewpoints in the thesis.

Next, the consumption of pulses will be discussed. The chapter includes a thorough explanation of what pulses and products made of them are. After this, the consumption of pulses in and outside Finland, according to the literature, will be discussed to build a base for the research for the thesis

2.3 Consuming pulses

Pulses have been a staple crop around the world since ancient times (Didinger & Thompson, 2020), and the consumption is strongly driven by health reasons and affordability (Henn, Zhang, et al., 2022; Latvala et al., 2012). Pulse consumption among different groups has been researched, and diverse barriers to pulse consumption have been identified (Didinger & Thompson, 2020; Henn, Zhang, et al., 2022; Reid, 2010), cultures and the consumption frequency between them have been evaluated (Didinger & Thompson, 2020; Lucier et al., 2000) and motives for pulse consumption are found (Heer & Winham, 2020; Reid, 2010; Śmiglak-Krajewska & Wojciechowska-Solis, 2021).

The thesis aims to unravel the pulse consumption of three Finnish consumer segments. To link the results with previous literature, an overview of how pulses are

consumed is offered here. The pulse consumption will be introduced based on research from other countries where similar studies have been conducted, and Finnish food consumption will be unravelled.

In this chapter, a more thorough explanation is offered for what pulses and products made of them are, and why it is beneficial to consume pulses. The state of pulse consumption in Finland and elsewhere is evaluated, and the barriers against and motives supporting pulse consumption are identified based on existing literature.

2.3.1 Pulses as products

Dried seeds or pods of crops belonging to the Fabaceae or Leguminosae (two names for the same family) botanical family and suitable for the human diet are referred to as pulses (Henn, Zhang, et al., 2022; McCrory et al., 2010). Fresh products, such as oil crops and clover, are excluded from the classification. Pulses are differentiated from leguminous crops that are harvested to extract oil, and to exclusively improve soil, as pulses are harvested to be used as such (Food & Nations, 1994; Henn, Zhang, et al., 2022; McCrory et al., 2010). Classification by FAO excludes fresh peas and beans and soil fertiliser crops from the same botanical family, as those are used in different ways (Food & Nations, 1994; Śmiglak-Krajewska & Wojciechowska-Solis, 2021). Green peas and beans for food are classified as vegetable crops (Food & Nations, 1994) and not part of the pulse category by the definition used in this study.

The pulse plant category includes a selection of different peas and beans, as well as lentils and lupins (Food & Nations, 1994). Leguminous crops, defined as pulses, are currently harvested mainly for animal feed, but also for direct human consumption (Rokka et al., 2018). In everyday context, pulses are often known as peas, lentils and beans (Pajari et al., 2025). The definition used in the thesis is as follows: pulses are dried seeds or pods of Fabaceae or Leguminosae botanical families used for human food.

Nutritionally, pulses are beneficial for humans, containing proteins and necessary amino acids, carbohydrates and high amounts of dietary minerals (Boye et al., 2010). 18% to 25% or 32% (depending on the source) of the total weight is protein, differing from one pulse variety to another (Boye et al., 2010; Didinger & Thompson, 2020;

Food & Nations, 1994). The carbohydrates consist mainly of nutritional fibre, which is crucial for digestion (Asif et al., 2013; Food & Nations, 1994). Most pulses require some way of processing before consuming to avoid toxins and make them easier to digest (Śmiglak-Krajewska & Wojciechowska-Solis, 2021).

Pulses can be used for food in various ways, and new products, fighting the barriers such as preparation challenges, are introduced on top of the traditional recipes (Henn, Zhang, et al., 2022). Pulses are generally suitable for various products, from pastries to soups and ready-to-eat meals, as pulse proteins have great properties for processing. (Boye et al., 2010). 14 product categories are included in the survey for the thesis. Common among all of them is that the pulses are dried along the food chain, somehow processed and used as human food. The chosen products are available and commonly known in Finland, suitable for the cultural context.

2.3.2 Benefits of a pulse-dense diet

Due to health and sustainability challenges associated with high meat consumption, it is necessary to find alternative protein sources. Advantages of all three sustainability aspects, human health, environment and climate, support the increasing consumption of pulses. Pulses are beneficial for a balanced diet containing a lot of protein, necessary amino acids and dietary fibre (Boye et al., 2010; Didinger & Thompson, 2020; Food & Nations, 1994). Thus, the consumption of pulses is often recommended by health organisations (Leterme, 2002). They appear to help control chronic diseases, including diabetes and obesity (Leterme, 2002). Replacing red meat partly with pulses can be seen to result in improvements in gut health and weight control, as well as in the quality of fats (Pajari et al., 2025).

From an environmental and climatic point of view, the production of plant-based foodstuffs is often less harmful in comparison to animal-based foodstuffs (Carlsson-Kanyama & González, 2009; Godfray et al., 2010). Pulse consumption is a great and nutritious way to increase the proportion of plant-based products in one's diet (Pajari et al., 2025). Research has indicated that water and soil can be used more efficiently, and cultivation of pulses can even contribute to the reduction of greenhouse gas emissions (Śmiglak-Krajewska & Wojciechowska-Solis, 2021). Pulses improve soil

quality by producing nitrogen (Food & Nations, 1994). Together with cereals and fish, pulses are considered the most climate-efficient protein sources (Carlsson-Kanyama & González, 2009). Solutions to fight food scarcity and malnutrition can also be sought from pulses (Boye et al., 2010).

The 2024 edition of Finnish Nutritional Recommendations, based on the Nordic equivalent released in 2023, focuses on the environmental aspects of food. Based on scientific evidence, the environmental aspects are added to the recommendations, traditionally highlighting the human well-being in social, physical and psychological levels (Blomhoff et al., 2023). Especially, meat products are limited in the 2023 Nordic recommendations and the 2024 Finnish equivalent. From the health perspective, the amount of meat should be less than 350 grams a week, whereas from the environmental perspective, it should be “as low as possible” (Blomhoff et al., 2023). In contrast, the amount of pulse products, especially peas, beans and lentils, should be increased (Blomhoff et al., 2023). Pulses should account for a remarkable part of the diet, replacing meat as a protein source.

2.3.3 Background on pulse consumption in Finland and elsewhere

After the Second World War, Finnish diets switched towards a more meat-dense (Piipponen et al., 2018), following the general trend led by increased wealth and urbanisation in modern society (Chen & Antonelli, 2020; Grigg, 1995). In the past, meat had been a scarce luxury food (Latvala et al., 2012). Nowadays, it is consumed in Finland three times as much as 60 years ago (Piipponen et al., 2018).

In 2020, it was reported that on average, meat and dairy were together accountable for 32% of households' food purchases (Huan-Niemi et al., 2020). In 2018, 94% of Finnish consumers consumed meat in some form (Piipponen et al., 2018). This can be associated with the strong animal-based production, as 47% of primary domestic agriculture production is livestock production, considering market volumes (Huan-Niemi et al., 2020). The shifts in production practices and food supply affect what is consumed (Chen & Antonelli, 2020; Huan-Niemi et al., 2020). In recent years, a transformation in practices has become visible in Finland, as the consumption of animal-based products has decreased from 2020 to 2022 (Latvala et al., 2022).

In Finland, protein intake is mainly animal-based (69 % of men and 66 % of women), and two in three people don't get enough dietary fibre (Valsta et al., 2018). People don't eat out a lot, and food prices have been increasing (Latvala et al., 2022). Finnish people often bring lunch from home to work, and if there is an option to eat at a lunch restaurant, 43% of women and 38% of men choose to do so (Valsta et al., 2018).

Pulses have been a part of the Finnish culinary culture for a long time (Jallinoja et al., 2016). Peas, as a side dish or a soup, hold a firm position. For example, pea soup, a common food still today, has been prepared in Finland for hundreds of years, and horse beans have been cultivated already on Medieval times (Pajari et al., 2025). However, some pulses have been brought to Finland recently through globalisation and are new in the cultural context.

Nowadays, when mentioning pulse products (“palkokasvituotteet” in Finnish), the response can be biased as the product category is strongly linked to meat replacements and vegetarian diets. This shows the emotional attachment to one's diet (de Boer et al., 2017). Even in the research, dairy and meat are listed as “foundation foodstuffs” (“peruselintarvikkeet”), positioning ingredients like pulses as special (Latvala et al., 2022). Now, a vegetarian diet, which used to be common, is an exception (Latvala et al., 2012).

Europe-wise, Henn, Zhang, and colleagues (2022) have researched pulse product consumption. They define and compare consumers' perceptions and usage of pulses in Denmark, Germany, Poland, Spain, and the United Kingdom. The comparison is interesting as all countries have unique culinary histories. In some places, pulses hold a prominent position in the food culture. Elsewhere, pulses are brought from other cultural spheres. Additionally, the type of pulse used varied from one country to another, as the research was conducted with 12 pulse types (Henn, Zhang, et al., 2022). For example, Spanish consumers were found to prefer lentils and chickpeas, whereas Polish consumers chose kidney beans and peas (Henn, Zhang, et al., 2022).

Jallinoja and colleagues (2016) conducted research in Finland in the mid-2010s. The data, collected in 2013, shows that in Finland, peas were the most commonly used pulses, whereas tofu and other soy-based products were the rarest (Jallinoja et al., 2016). This could be explained by the steady position of the pea in food culture (Pajari et al., 2025). The focus of Jallinoja, Niva and Latvala's (2016) study is strongly

on motives and barriers. These topics will be discussed in Chapter 2.3.4. Since the 2016 publication of the paper by Jallinoja and colleagues, more information has become available. Sustainability has dominated the conversation (Dixon et al., 2023), and people might be more aware of the impact the food chain has.

Though the topics of Jallinoja and colleagues (2016) are similar to the thesis; it is beneficial to research consumption for two reasons. Now, after 9 years of publication, there could be changes, for example, due to the coronavirus outbreak in 2020 and the escalation of the Russo-Ukrainian war in 2022. Jallinoja and others (2016) examined the barriers and discovered one group of people who, in general, consume a lot of pulse products. The thesis aims to, besides barriers and frequency, differentiate consumer segments based on the consumption of 14 diverse pulse products, somewhat similarly to the research by Henn, Zhang, and colleagues (2022). The three factors will also be discussed with respect to each other.

Biases, habits, and food culture affect consumption. This is related to the value-action gap, as people often choose food without thinking further about the reasons, driven by personal models and strategies (Furst et al., 1996). Customs often affect more than information about the healthiness or other benefits listed. The barriers and motives to consume pulses are next discussed to introduce both drivers and blocks for increasing the proportion of pulses on the plate.

2.3.4 Barriers and motives for pulse consumption

It is beneficial to acknowledge and study the barriers to tackle them. Barriers are preventing actions towards desired outcomes, such as more sustainable food choices. For example, a plant-based diet is often found hard to follow due to knowledge gaps or habits of consuming animal-based products (de Boer et al., 2017). Grunert (2011) examines six barriers, particularly those related to sustainable food choices when information and motivation are present. People don't notice or understand the information, interpretation is flawed, sustainability is traded off for another value, or action is simply not in line with the values (Grunert, 2011).

Pulse products often go hand-in-hand with overall plant-based products considering barriers, but the topic has been researched especially for pulse consumption as well.

Identified obstacles to pulse consumption are versatile, from individual and as simple as an undesired taste or structure (Jallinoja et al., 2016; Śmiglak-Krajewska & Wojciechowska-Solis, 2021), to more nuanced, like a lack of knowledge and skills to prepare the pulses for food (Henn, Zhang, et al., 2022; Śmiglak-Krajewska & Wojciechowska-Solis, 2021). In Finland, taste and health aspects are drivers, where inconvenience and lack of knowledge are recognised among the barriers to pulse consumption (Jallinoja et al., 2016).

Digestion problems are one factor often brought up in pulse consumption literature (Didinger & Thompson, 2020; Henn, Zhang, et al., 2022), but at the same time, adding pulses to the diet can lead to improved health (Pajari et al., 2025; Śmiglak-Krajewska & Wojciechowska-Solis, 2021). Lucier and colleagues (2000) studied pulse consumption in America and discovered that cultural background is a significant factor. This could be related to habits and skills, as people of Hispanic background who consume the most pulses in America are accustomed to incorporating them into their traditional recipes. There is no need to learn new skills to cook or adjust recipes, as it is habitual to choose pulses. On the contrary fourth main barrier of Polish consumers was a lack of “dietary habits” to consume pulses, supporting the cultural significance claim (Śmiglak-Krajewska & Wojciechowska-Solis, 2021).

Barriers can be conquered by, for example, informing consumers through intervention, promotional campaigns and increasing their motivation (Didinger & Thompson, 2020; Śmiglak-Krajewska & Wojciechowska-Solis, 2021) or by affecting their irrational decision-making process through nudging campaigns (Leng et al., 2017). New, innovative ways to incorporate pulses into diets in desirable ways, like exploiting pulses in bakery or, for example, extruded products, could also work as a tool to overcome barriers (Boye et al., 2010; Henn, Goddyn, et al., 2022).

The reasons for pulse consumption are often related to health benefits, finding an alternative to meat or affordability (Śmiglak-Krajewska & Wojciechowska-Solis, 2021). Price is important, especially in times of increased food costs (Latvala et al., 2022). Didinger and Thompson (2020) list being shelf-stable among the perks of pulse products. Sustainability doesn't appear to be the top motivation for choosing pulses (Henn, Zhang, et al., 2022). Familiarity could decrease issues with skill and knowledge, encouraging to finding of options from the prevailing culinary culture. The motives for consumption should be emphasised to overcome drawbacks.

Barriers to pulse consumption among different dietary segments in Finland will be discussed in the thesis to learn why people are hesitant to consume pulse products. In general, pulses are associated with being healthy, cheap and an alternative protein source. Motives as such are not researched, but the choice of products could indicate motives, for example, if some products are affordable or familiar.

3 Material and methodology

The methodology chapter will begin with an explanation of the segmentation method, which will then be linked to the thesis topic. The quantitative consumer survey will be introduced, moving from the structure and responses to limitations, followed by the data hypotheses and analysis.

The research hypotheses are based on existing literature regarding food choice and pulse consumption. They help answer the research question “*How do Finnish consumers, divided into three dietary segments, consume pulse products?*” by focusing on the three aspects related to consumption.

H1: The pulse consumption barriers are different among the dietary segments.

H2: The pulse consumption frequency is different for each segment.

H3: The pulse products consumed by the segments are different.

3.1 Consumer segmentation in the thesis

After studying influential factors on food consumption and defining pulse products, an explanation of segmentation is offered. To add value to existing research on pulse consumption and choice-making, segmentation will be used to understand how Finnish customer groups consume pulses. The segments could help to promote a more pulse-dense diet in suitable ways for each segment. Examining the barriers and motives, frequency and preference of products among the chosen dietary segments, pulse consumption in Finland can be examined.

Segmentation is a way to categorise consumers according to selected variables based on their needs, habits or, for example, socio-economic factors (Casas-Rosal et al., 2023; Westad et al., 2004). This makes determining the consumption patterns easier (Vermeir & Verbeke, 2006). In consumer segmentation, segments are subgroups of the entire customer base (Casas-Rosal et al., 2023). As a tool, it simplifies the otherwise scattered information about how people act by understanding that one way of doing things doesn't work for all (Kotler et al., 2018). Especially in the modern,

individualistic world, segmentation can help to form a heterogeneous group of consumers (Verain et al., 2016).

Segments consist of people sharing a uniform response, behaviour or characteristics (Casas-Rosal et al., 2023; Kotler et al., 2018; Westad et al., 2004). A good segment consists of a group where the differences among members are minimal, but maximal when compared to others (Casas-Rosal et al., 2023; Huan-Niemi et al., 2020). The group should be distinct and measurable, and thus well identified and defined (McDonald, 2012).

Socio-demographic factors such as age or location seem popular in creating subgroups for segmentation. Piipponen and colleagues (2018) argue that there are significant differences between age groups in how they consume. Age is one way to differentiate consumers, but segmentation should be based on factors relevant to the research, considering habits, needs and responses (Westad et al., 2004). The focus of segmentation basis choice should be on figuring out how consumers behave and make decisions to reach effective results (Casas-Rosal et al., 2023).

Segmentation is traditionally used by businesses to plan and define markets (McDonald, 2012). It is used to avoid problems of mass marketing by focusing on people who can be seen as potential buyers (Casas-Rosal et al., 2023; Kotler et al., 2018) and for product development and creating market strategies (Westad et al., 2004). The goods and services can be promoted to customers who are likely to be interested in the first place (Kotler et al., 2018). In the thesis, segmentation is used as a tool to define the consumption of the masses.

The needs of the segment should be distinctive, and the criteria defining the individual members should be clear. One problem of segmentation is using general lifestyle as a segmentation method (Kotler et al., 2018). General behaviour tends to be heterogeneous, and specific phenomena are hard to predict for such broad segments. The problem can be overcome by choosing domain-specific, relevant segments (Verain et al., 2016). Choosing the right segments is important in the thesis, which will be discussed next.

Food is unique in how it is consumed. The motives behind food choice serve as a good segmentation base, as the information reveals what specific groups are sensitive to

and what choices consumers make (Verain et al., 2016). What affects food, more precisely pulse, consumption should be at the core of segmentation choice in the thesis. The distinction method to maximise the difference from other segments is diet. Using diets as a segmentation method, instead of age or other socio-economic factors, offers a topic-specific approach, even though the chosen diets overlap to some extent (omnivores and flexitarians). The demographics, commonly used to define a segment (Kotler et al., 2018), are used in the thesis to create consumer profiles. Profiles aim to describe the usual members within each segment.

As food consumption is very habit and routine-oriented, a behavioural approach has been chosen as the segmentation model for this thesis. Behavioural segmentation relies on a person's knowledge, attitude, status and how the portrayed product can be used (Kotler et al., 2018). One way of behavioural segmentation is usage rate, which is highlighted as one of the ways to understand consumption of the segment. Loyalty status can be seen as similar to usage rate in the research. The more frequent the purchase, the more loyal the customer. However, the two are not fully comparable, as light users can be very committed to using pulses in certain situations, like pea soup during Shrovetide in Finland. Thus, the focus is on usage rate instead of loyalty.

The segmentation mode used in the thesis is diet. Diet is part of lifestyle preferences and can be a combination of multiple approaches, as stated by Kotler and colleagues (2018). Lifestyle and how food is being consumed accordingly are common ways to segment food consumers (Casas-Rosal et al., 2023). The geographic location influences the diet as it sets the consumer into a certain cultural and, for example, religious frame (Furst et al., 1996). Diet is behavioural, as knowledge and responses shape it, and it could be seen as psychographic, as people are affected by others. Diet shapes an individual's identity, and as identity can affect how food choices are made, diet and food choice are linked (de Boer et al., 2017).

On top of the influence diet has on food choice, the data on pulse consumption were collected so that all dietary groups defined in the survey were represented equally. Thus, the choice of segmentation basis can be rationalised as follows: diet is an important part of pulse consumption choice, affecting what is eaten, and the dietary segments are of the same size.

Healthier and more sustainable food choices could be promoted more efficiently when targeted directly at segments. This can be done by recognising what is meaningful to them (Verain et al., 2016). Casas-Rosal, with colleagues (2023), argue that segmentation should emphasise products and decision-making. This research aims to follow their guideline for segmentation. Choice-making is at the core of segmentation, as segments can be seen as representative samples of decision makers (McDonald, 2012). Thus, choice-making processes and segmentation work together as a base for understanding pulse consumption. Gathered information could be valuable for promoting pulse usage, which should increase for sustainability reasons introduced in the previous chapters.

3.2 Quantitative consumer survey

This chapter introduces the data collection. The survey (Appendix 1) consisted of quantitative and qualitative questions. The research for the thesis is based on the quantitative part. First, the data collection as well as the survey are explained, after which a closer look at the responses is offered. Validity, reliability and limitations are discussed before moving on to data analysis.

3.2.1 Data collection and the survey

The data for the research were collected via an online consumer survey moderated by Aistila Oy. The survey was conducted as part of the LEGUME-research project executed by the University of Helsinki. The survey was planned in collaboration with the University of Helsinki and Aistila. During the testing period, the survey remained unaltered. The data was collected from December 2023 to January 2024 in Finland. The attendees were recruited from the Cint platform, which is used in marketing research and thus has multiple consumer registers.

Attendees represent different age groups, genders, locations, educational backgrounds, household sizes, and follow different diets. The survey offered pre-selected options for many socio-demographic questions. For example, the home region could be chosen from five options and the educational background from six

(Appendix 1). This additional information can be used to create profiles for consumers in different segments. At the time of data collection, all respondents were adults, aged between 18-70, so it can be assumed that they contribute to the purchase decisions in the household.

There are three diets differentiated in the survey: 1) omnivore, 2) flexitarian and 3) vegetarian, including vegans. To gather responses evenly from people following the three diets, the number of answers was limited based on gender and diet category. The target was to stop collecting responses when a certain category was full. After questions about gender and diet, the survey would inform the participant whether they could continue or whether the group was already full. In the end, the number of answers varied between dietary groups. Poor-quality responses to open questions or those that were left unfinished were eliminated from the final sample of 705 answers.

3.2.2 Survey and the responses

The survey began by explaining to the respondents their rights. Information was offered about why the research was being conducted, by whom, and how long it would take to answer. Participants received contact information for further questions about the study, as well as a research fact sheet offering more detailed guidance. The answering could have been quit at any point, and it was made clear that answers would be stored anonymously and safely by the University of Helsinki for analysis and reports.

The goal was to divide participants equally based on their diet. Equal distribution would mean 33 % of the respondents in each dietary group. The distribution, however, was 40% omnivores, 31% flexitarians and 30% vegetarians. The percentages differ from the division of the given diets among the Finnish adult population, which should be acknowledged. In the vegetarian group, there ended up being more women than targeted, and 5 % of the respondents answered “other/ don’t want to specify” as their gender. In two other diet groups, the division between men and women was more equal.

Considering the consumption frequency, participants were asked how often they consume pulses at home and outside of it. The “at home” answers are highlighted in

the research to display the everyday consumption pulses. Food consumption occurs mostly at home, and people bring home-cooked lunch to work; eating out in a restaurant is fairly uncommon in Finland (Valsta et al., 2018). The study aims to find consumer segments in everyday life. Restaurant consumption will be discussed briefly, keeping focus on at-home consumption.

The question asking which of the listed pulse products the participant had bought in the past month is used to evaluate product-level consumption. The 14 pulse product categories included in the survey and thus portrayed in the thesis are: “Dried chickpeas, lentils or/and beans”, “chickpeas, lentils or/ and beans in water”, “talkkuna (flour with pea as one ingredient) or chickpea flour”, “dry crushed or shredded pulses”, “canned soups or meals”, “fish replacements”, “dairy replacements”, “tofu or tempeh”, “pulled or fresh processed pulses”, “balls or steaks”, “pastes and spreads”, “sausages”, “cold cuts” and “other pulse products”.

Eventually, 705 responses were used for the research data. There were no respondents from Ahvenanmaa or in educational group 1 (no education). Those groups will thus not be included in the research when creating consumer profiles based on the region and the academic background, even though the options were offered in the survey.

3.2.3 Validity, reliability and limitations

Research trustworthiness depends on multiple factors, and the limitations should be evaluated and acknowledged. Next, this will be discussed in the context of the thesis. Validity and reliability can be used to assess the research quality (Vehkalahti, 2008). Validity shows whether the right things were measured, and reliability estimates the accuracy of the measurements (Vehkalahti, 2008). Reliability is thus related to errors in measurements and is particularly notable in the analysis phase, as validity is strongly tied to the survey's execution.

One of the biggest limitations related to the validity of the conducted research is that the materials and responses were gathered in Finnish and thus must be translated into English for the reporting. Through translation, some information can be understood differently, and hidden meanings might change (Vehkalahti, 2008).

However, the thesis aims to evaluate consumption in Finland. Conducting the research in Finnish and then translating it for reporting purposes should result in responses suitable for the desired cultural context. Data is also collected in a certain environment and time, where certain pulse products are available. The cultural sphere of the research affects the validity because if the same study were conducted elsewhere or at a different time, the results would change.

Limitations of the segmentation method are related to stereotypes, complexity and measuring. These occur especially when segmentation is used as a marketing tool without effective data backup (Kotler et al., 2018). It is tempting to rely on stereotypes when grouping consumers into segments, as the complex structures are missed. This can, however, be misleading. In the pulse consumption research, the stereotype might be that a heavy pulse consumer is a vegan female person living in Helsinki and that they would consume all pulse products, especially more niche products like sausages and cold cuts. Measuring the efficiency of segmentation can fail when the segmentation is conducted, but there is no monitoring to determine whether the outcome is desired.

One aspect noted while examining the data is that many respondents appear to hold strong prejudices and opinions regarding pulse products. For example, answering the question "How easy do you think it is to find pulse products in the store?" with "I don't want to find them!". In the responses, attitudes that pulses were meat replacements solely meant "for vegans" and some new products that are not meant for "regular consumers" were repetitive. The word "palkokasvi" (Finnish for pulse) has a connotation that may affect how the survey is answered. Attitudes towards certain words and the topic in general might affect the willingness to answer, as well as the results.

When analysing the barriers and consumption of certain products, a few things must be noted. The respondents had multiple options, and some could choose all, some only one. About the product usage, the respondents were asked whether they "have bought it in the past month". This ties the results to a certain time slot; another layout of questions could have been used. If the survey is repeated or research continued, a broader approach could be chosen. These aspects should be noted in the analysis.

3.3 Data analysis

Results were analysed in Stata using the “tab” function to create cross-tabulations. This method enables the comparison of two variables with each other. Cross-tabulation is one of the most common methods to analyse quantitative results (Vehkalahti, 2008). The variables in each crosstab were the “diets” and, depending on what is evaluated, either the frequency, barriers or products. The chosen two variables could have been, for example, diet and reported barriers. Microsoft Excel is used along with Stata to create tables and graphs and convert the results into percentages. The sample size of individual segments, as well as all responses, is reported when using percentages in tables to ease understanding of the material.

The correlation between the variables was tested using the chi-squared test, which compares detected and expected frequencies to determine whether the chosen variables are dependent (Vehkalahti, 2008). Chi-squared tests were performed in Stata to examine the correlation between the variables. The Chi-square test allows for examining the statistical significance of the results. Testing significance involves evaluating hypotheses by comparing the null hypothesis with the alternatives. The null hypothesis claims that the variables are independent (Vehkalahti, 2008). The outcomes were summarised, and the statistical significance of the research can be assessed through the p-values. $p < 0.05$ has been chosen as the significance level, meaning that p-values above this do not yield significant results (Vehkalahti, 2008).

For the analysis, the data were simplified by deleting the unnecessary rows for the research. In the Excel results, all respondents had multiple rows because of the categorising question, which is not relevant to this research. The useful information was the same on each row for the same respondent. Age groups are narrowed down to three: over 55 years, 40-55 years and under 40 years. The ages are chosen to create groups of similar size. This division is made to define consumer profiles and is used in Table 1. What should also be noticed about the profiles is that the region “Ahvenanmaa” and educational level 1 (“no education”) are excluded from the analysis because there are no answers in these groups.

To unravel how Finnish people consume pulse products, three questions from the survey are analysed. The consumption frequencies, both at home and outside, are evaluated, with emphasis on at-home consumption. Barriers are defined for each segment to add information on an already researched topic. Lastly, the pulse product usage of the segments is characterised. Next, the findings will be discussed.

4 Findings

Results of the research are introduced, beginning with a definition of the profiles for three dietary segments (Table 1). Three evaluated questions are introduced, and the frequency, barriers, and products used by the segments are evaluated and analysed, with tables and graphs presenting the results. Descriptive results are linked to previous literature in Chapter Five.

4.1 Consumer segments

Diet is chosen as a segmentation basis to get groups of equal size. This is possible because the participants were elected to represent the three diets: omnivore, flexitarian, and vegetarian. The segmentation is based on what the participants reported as their diet. To build a comprehensive image of the segments, consumer profiles are examined to determine the kind of consumers belonging to each group.

Segments are named “omnivore” (does not restrict animal-based products), “flexitarian” (restricts animal-based products) and “vegetarian“(Table 1). Flexitarian in the thesis refers to a consumer who has reported decreasing consumption of meat and/or milk products in recent years. Vegetarians do not consume meat but can consume other animal-based products and/ or fish, they are not necessarily vegans.

In general, omnivore respondents belong to all different age groups, as 32-34% of each age group are omnivores. Secondary school is clearly the most prominent educational background, as 53.7% (151) of the group listed it as their highest degree. The share is over 10% higher than in the flexitarian and vegetarian segments, even though secondary school is the most common among all respondents (45.7% of all). The second prominent group is lower academic degree (22.8%), and primary school is interesting, as of all diets, the biggest share is omnivores (7.8%). Most (33.5%) of omnivores are from Helsinki-Uusimaa, but distribution between areas is more even than among other segments. The share of omnivores is prominent in Northern and Eastern Finland. 23.8% come from the North or East, the amount being 16.2% for flexitarians and 11.5% for vegetarians. Similarly, 23.8 % of omnivores are from Western Finland. Omnivores can thus be from any age group but are likely to have a

secondary school or lower academic degree as their educational background, and they come from the Helsinki-Uusimaa region (Table 1).

Table 1. Segment profiles according to age, educational background and home region

	Omnivore (n=281)	Flexitarian (n=216)	Vegetarian (n=208)	Total (n=705)
Age				
<i>Over 55</i>	95	71	28	194
%	33.8 %	32.9 %	13.5 %	27.5 %
<i>40-55 years old</i>	94	69	61	224
%	33.5 %	31.9 %	29.3 %	31.8 %
<i>Under 40</i>	92	76	119	287
%	32.7%	35.2%	57.2 %	40.7 %
Educational background				
<i>Primary school</i>	22	11	11	44
%	7.8 %	5.1 %	5.3 %	6.2 %
<i>Secondary school</i>	151	87	84	322
%	53.7 %	40.3 %	40.4 %	45.7 %
<i>Lower Academic degree</i>	64	53	54	171
%	22.8 %	24.5 %	26.0 %	24.3 %
<i>Higher academic degree</i>	39	59	50	148
%	13.9 %	27.3 %	24.0 %	21.0 %
<i>Licentiate or doctoral</i>	5	6	9	20
%	1.8 %	2.8 %	4.3 %	2.8 %
Home region				
<i>Helsinki-Uusima</i>	94	76	92	262
%	33.5 %	35.2 %	44.2 %	37.2 %
<i>Other parts of Southern Finland</i>	53	53	38	144
%	18.9 %	24.5 %	18.3 %	20.4 %
<i>Western Finland</i>	67	52	54	173
%	23.8 %	24.1 %	26.0 %	24.5 %
<i>Northern and Eastern Finland</i>	67	35	24	126
%	23.8 %	16.2 %	11.5 %	17.9 %

Considering age, the flexitarian segment is similarly distributed as omnivores; 31-36% of these respondents belong to each age group. Secondary school is the most common educational background, with 40.3% of flexitarians answering that. Higher academic degrees account for a significant share, with 27.3% as only 21% of all respondents belong to that group. The flexitarian group has the most respondents

holding higher academic degrees. Helsinki-Uusimaa is the most common region among flexitarians (35.2%), followed by other parts of Southern Finland (24.5%), and Western Finland as the third most common (24.1%). A flexitarian consumer is most likely from Southern Finland, secondary school or higher academic degree being their highest level of education, but they can be from any age group.

Vegetarians are the only segment where one age group is prominent, 57.2% of respondents being under 40. The difference to the second largest age group (40-55 years) is 29.3%. There is a drop in respondents in the higher academic degree group between flexitarians and vegetarians, from 27.3% to 24%. However, the share of licentiate or doctoral level rises from 2.8% to 4.3%. Education-wise, the biggest share is secondary school (40.4%), with lower academic degrees second (26%). The share of answers from Helsinki-Uusimaa is clearly the most prominent (44.2%), followed by Western Finland (26%). Vegetarian consumers are likely to be under 40 years old and living in the Helsinki-Uusimaa area, with a secondary school background.

4.2 Consumption frequency

Respondents were asked to report their consumption frequency first at home and then outside the home, on a scale from 1 to 4. One equals less than once a week, and four more than five times per week. Figure 1 illustrates the variation in frequencies

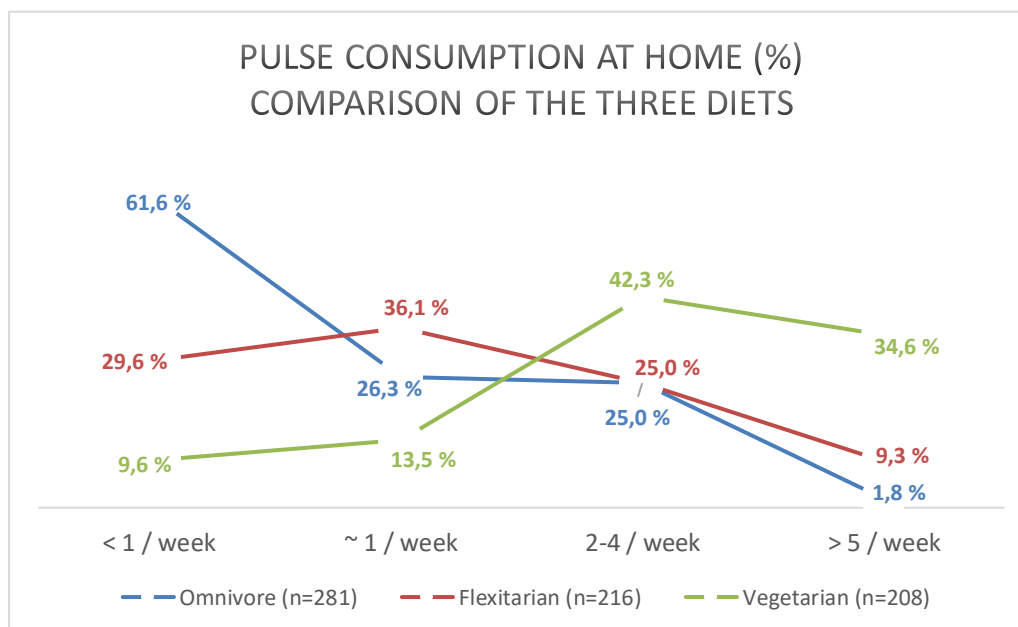


Figure 1. Pulse consumption frequencies of three dietary segments at home

cross segments, showing how the most common consumption frequencies differ between all three segments. Vegetarians consume pulses the most often.

The pivot table function is used to calculate averages for consumption frequency at and outside the home for each segment (Appendix 2), and Figure 1 illustrates the results. The consumption frequency for all groups was relatively low. 257 (36.5%) of all 705 respondents reported an at-home pulse consumption of less than once a week, and 97 (13.8 %) more than five times a week ($p=0.00$, Appendix 2). Outside the home, even lower averages were reported. 455 (64.5%) of all consumers consume pulses outside the home less than once a week, and only 15 (2.1%) more than five times a week ($p=0.00$, Appendix 2). Food is often eaten at home; outside meals are exceptions. Home as an environment aligns with habitual food consumption.

Of consumers following an omnivore diet, the most common frequency was found to be “less than once a week”. 61.6% (N=281) reported the lowest consumption option. 29.6% of flexitarians (N=216) and 9.6% (N=208) of vegetarians consume pulses at the lowest frequency, according to the data. Simultaneously, 34.6% of vegetarians stated they consume pulse products at home “more than five times a week”, as for the omnivore group, the same number is 1.8%. For the flexitarian segment, the dominant frequency is “once a week” (36.1%), followed closely by the “less than once a week” option (29.6%). Vegetarians consume pulses most often. 42.3% of vegetarians consume pulses “2-4 times per week”.

Averages calculated using the PivotTable function in Excel yield similar results, considering the differences between dietary groups (Table 2). Outside the home, it seems like groups are closer to each other, even though there are still parallel differences. The average consumption of pulse products at home, on a scale from 1 (less than once a week) to 4 (more than five times a week), is 1.52 for the omnivore segment and 3.02 for the vegetarian segment. Outside the home, the difference is thinner, from 1.27 for omnivores to 1.89 for vegetarians.

Table 2. Averages for pulse consumption frequency at home and outside on a 1-4 scale.

Averages for pulse consumption frequency:	Omnivore	Flexitarian	Vegetarian	Total
At home	1.52	2.14	3.02	2.15
Outside home	1.27	1.52	1.89	1.53

4.3 Consumption barriers

The barriers for pulse consumption are evaluated based on the question “Which of the following things currently prevent you from eating pulse products at home?”. Considerably, respondents could choose how many barriers they report, meaning some might have chosen all and some none. Figure 2 portrays the differences among the dietary segments to show influential barriers. The dotted line shows the significance of the barriers for all responses. The percentage values of the total respondent pool are visible to see how relevant the barrier is for all. The two main barriers, “not familiar enough” and “lack of cooking skills”, are statistically significant results with p-values under 0.05 (Table 3). “Abdominal problems” (p=0.2) and “too expensive” (p=0.3), with high values, do not yield statistically significant results.

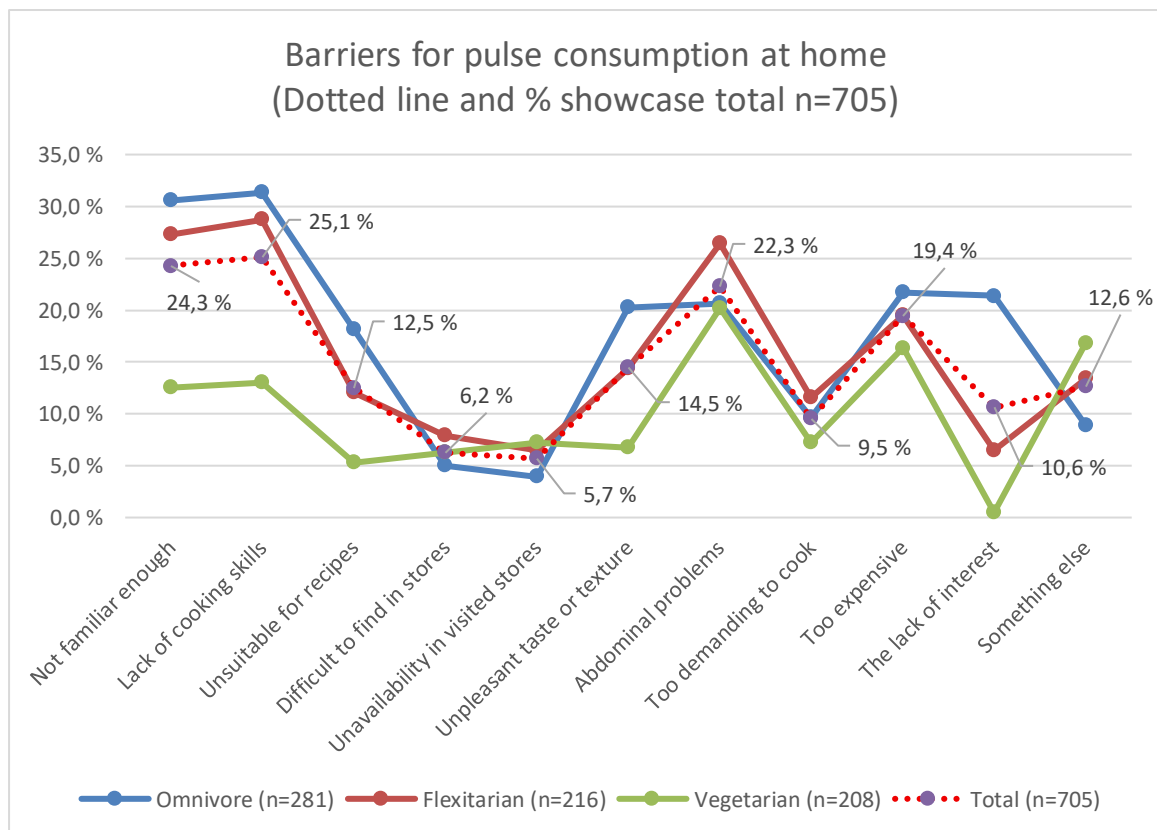


Figure 2. Barriers to pulse consumption for all participants and the dietary segments

The top three barriers for each dietary segment are in bold red in Table 3. The same influential factors are, to some extent, repetitive in the answers, but there are differences between groups. Respondents following either an omnivore or a flexitarian diet have the most in common, sharing the same top two barriers. The main barrier for both was found to be “lack of cooking skills” ($p=0.00$), with 31.3% of the former ($N=281$) and 28.7% of the latter ($N=216$) group choosing this ($p=0.00$). “Not familiar enough” ($p=0.00$) comes second for both. The third reason for omnivores is “too expensive” (21.7%, $p=0.3$), and for flexitarians “digestive problems” (26.4%, $p=0.2$), but these results are not statistically significant p -value above 0.05.

Table 3. Barriers for pulse consumption, the top 3 barriers for each segment and the total in bold red

Pulse products <i>Chi-square</i>	Omnivore (n=281)	Flexitarian (n=216)	Vegetarian (n=208)	Total (n=705)
Not familiar enough $X^2 (2, N = 705) = 22.9, p = 0.00$	30.6 %	27.3 %	12.5 %	24.3 %
Lack of cooking skills $X^2 (2, N = 705) = 23.5, p = 0.00$	31.3 %	28.7 %	13.0 %	25.1 %
Unsuitable for recipes $X^2 (2, N = 705) = 18.2, p = 0.00$	18.1 %	12.0 %	5.3 %	12.5 %
Difficult to find in stores $X^2 (2, N = 705) = 1.7, p = 0.4$	5.0 %	7.9 %	6.3 %	6.2 %
Unavailability in visited stores $X^2 (2, N = 705) = 2.8, p = 0.2$	3.9 %	6.5 %	7.2 %	5.7 %
Unpleasant taste or texture $X^2 (2, N = 705) = 17.7, p = 0.00$	20.3 %	14.4 %	6.7 %	14.5 %
Digestive problems $X^2 (2, N = 705) = 3.1, p = 0.2$	20.6 %	26.4 %	20.2 %	22.3 %
Too demanding to cook $X^2 (2, N = 705) = 2.4, p = 0.3$	9.6 %	11.6 %	7.2 %	9.5 %
Too expensive $X^2 (2, N = 705) = 2.2, p = 0.3$	21.7 %	19.4 %	16.3 %	19.4 %
The lack of interest $X^2 (2, N = 705) = 60.4, p = 0.00$	21.4 %	6.5 %	0.5 %	10.6 %
Something else $X^2 (2, N = 705) = 7.0, p = 0.03$	8.9 %	13.4 %	16.8 %	12.6 %

“Digestive problems” was reported as the main barrier for vegetarians ($N=208$), with 20.2% of them choosing it as a limiting factor. The second was “something else”

(16.8%), and the third was “too expensive” (16.3%). To the option “something else” ($p=0.03$), respondents could specify what they meant. Examples of answers are:

1. That people don't eat pulses in their free time, as at workplace canteens, they get them so often
2. There is no reason
3. Or other family members don't want to eat pulses.

4.4 Consumed product categories

Product level consumption is analysed from the question “Which of the following pulse products have you bought in the past month?”. The pulse categories consumed by the three segments are evaluated next. Figure 3 compares the dietary segments by their consumption of different products.

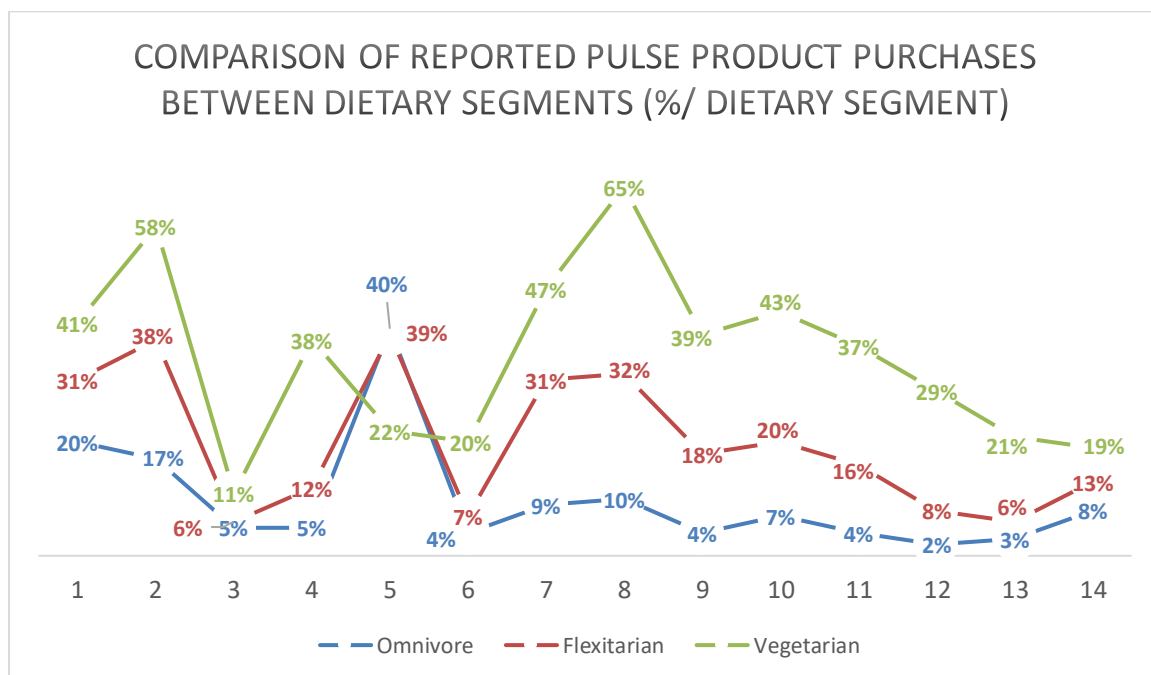


Figure 3. Pulse products purchased by the three dietary segments (numbers described in Table 4) In Table 4 most consumed product categories by all participants and the segments are marked in bold red. Considering all 705 responses, the most used pulse products were “chickpeas, lentils or/ and beans in water”, with 35.2% of respondents ($p=0.00$) consuming products in this category (Table 4). After that come “canned soups or meals” (34.2%, $p=0.00$), “tofu or tempeh” (33%, $p=0.00$), and “dried chickpeas, lentils or/and beans” (29.5%, $p=0.00$), all with more than 200 respondents or 29% of

them reporting consumption of these products. “Talkkuna (roasted grain or legume-based flour, also called “kama”) or chickpea flour” was found to be the least consumed category, with 48 respondents.

Table 4. The percentages of consumers consuming given pulse products

Pulse products <i>Chi-square</i>	Omnivore (n=281)	Flexitarian (n=216)	Vegetarian (n=208)	Total (n=705)
1 Dried chickpeas, lentils or/and beans $X^2 (2, N = 705) = 26.6, p = 0.00$	19.6 %	31.5 %	40.9 %	29.5 %
2 Chickpeas, lentils or/and beans in water $X^2 (2, N = 705) = 26.6, p = 0.00$	16.7 %	37.5 %	57.7 %	35.2 %
3 "Talkkuna" or chickpea flour $X^2 (2, N = 705) = 8.6, p = 0.01$	4.6 %	5.6 %	11.1 %	6.8 %
4 Dry crushed or shredded pulses $X^2 (2, N = 705) = 98.0, p = 0.00$	5.3 %	12.0 %	38.5 %	17.2 %
5 Canned soups or meals $X^2 (2, N = 705) = 19.1, p = 0.00$	39.5 %	38.9 %	22.1 %	34.2 %
6 Fish replacements $X^2 (2, N = 705) = 39.0, p = 0.00$	3.9 %	6.9 %	20.2 %	9.6 %
7 Dairy replacements $X^2 (2, N = 705) = 91.7, p = 0.00$	8.5 %	31.0 %	46.6 %	26.7 %
8 Tofu or tempeh $X^2 (2, N = 705) = 168.1, p = 0.00$	9.6 %	32.4 %	65.4 %	33.0 %
9 Pulled or fresh processed pulses $X^2 (2, N = 705) = 96.6, p = 0.00$	4.3 %	18.1 %	39.4 %	18.9 %
10 Balls or steaks $X^2 (2, N = 705) = 88.3, p = 0.00$	7.5 %	19.9 %	42.8 %	21.7 %
11 Pastes or spreads $X^2 (2, N = 705) = 86.7, p = 0.00$	4.3 %	16.2 %	36.5 %	17.4 %
12 Sausages $X^2 (2, N = 705) = 84.7, p = 0.00$	2.5 %	8.3 %	29.3 %	12.2 %
13 Cold cuts $X^2 (2, N = 705) = 51.0, p = 0.00$	2.8 %	5.6 %	20.7 %	8.9 %
14 Other pulse products $X^2 (2, N = 705) = 13.9, p = 0.00$	7.8 %	13.4 %	19.2 %	12.9 %

The hypothesis is that the segments consume different pulse products. However, there are similarities among the top three most consumed pulse products of the dietary groups and thus, the hypothesis is only partly validated. In general, as shown in Figure 3, the lines are somewhat parallel, indicating that the same products are consumed in relatively equal amounts by all groups. The consumption is, in most cases, highest among the vegetarian segment and lowest among omnivores.

“Chickpeas, lentils and/or beans in water” are the only product category found in the top three of all segments. This could be explained by the fact that the products are easy to use (no need for soaking) and do not aim to replace other foodstuffs. For vegetarians, many animal-based product replacements are consumed significantly more compared to the omnivore segments.

The top three pulse products purchased by omnivores are: “canned soups and meals”, “dried chickpeas, lentils or/and beans” and “chickpeas, lentils or/ and beans in water”, in this order. Habitual consumption seems to be visible in the answers. Pea soup is one of the most common pulse products in Finland, and “canned soups and meals” are consumed a lot by all dietary groups, especially omnivores (39.5%) and flexitarians (38.9%). What is significant about this category is that it is the only category where consumption decreases from omnivores towards vegetarians.

The flexitarian segment shares the same top two product categories as omnivores, but the third comes “tofu or tempeh”. Considering these products, the gap between omnivores and flexitarians is big, over 20%. In general, flexitarian consumers report consuming more pulse products in comparison to omnivores.

The consumption increases again from flexitarians to vegetarians, following the same pattern as between the omnivore and flexitarian segments. The top three products are all consumed by more than 45% of vegetarian respondents, “tofu or tempeh” being the most consumed category (65.4%). Other common products among vegetarian consumers, differentiating from the other two segments, seem to be: “dairy replacements” (46.4%) and “balls or steaks” made of pulses (replacing meat equivalents) (42.8%). “Chickpeas, lentils or/and beans in water” belong to the top three of all segments.

5 Discussion

This chapter summarises the findings, answers the hypothesis, identifies the main outcomes and compares them to the previous research. The pulse consumption is discussed, considering the introduced segment profiles, followed by the discussion with respect to the literacy background. Practical implications are suggested before finishing the chapter with acknowledgements.

5.1 Findings summary

The answer to the research question will be discussed, returning to the hypothesis and evaluating the profiles of the surprisingly similar segments. According to the conducted chi-squared tests and the p-values, only some results are statistically significant. P-value should be below 0.05 to prove the significance. Considering the consumption of the product categories and frequencies, all results, shown in Table 4 and Appendix 2, are statistically significant according to the chosen indicator. However, when evaluating the barriers to pulse consumption, only some results were significant, as seen in Table 3.

There is no simple way to describe the profile of any dietary segment. According to the data, consumers of all age groups are represented equally within the omnivore and flexitarian segments. In the vegetarian group, “under-40-year-olds” are dominant. This could mean that pulse consumption is the most common among this age group, as vegetarians appear to consume the most pulses. Flexitarians and vegetarians seem to have higher education, suggesting that pulses are more common on plates of those with an academic background. Pulse consumption increases towards the South on the map, as a significant share of respondents from Northern and Eastern Finland belong to the omnivore segment, representing the lowest consumption.

Considering H1 barriers are to some level similar, but there are differences when comparing the segments. Omnivore and flexitarian segments share the same barriers to pulse consumption. Skills and knowledge are on the way to pulse consumption for omnivores and flexitarians. To overcome these barriers, more easily reachable and culturally somewhat familiar information and products could be offered. Serving

pulses outside the home removes preparation problems. However, this might not be a way to reach omnivore consumers, as the consumption outside the home is rarer than once a week. Vegetarians report consuming more pulses, which indicates familiarity. The main barriers for them are related to digestive problems and the price. Digestive problems were among the top three barriers for flexitarians and vegetarians, and a significant share of omnivores (20.6%) reported the barrier. What is interesting is that for vegetarians, digestive issues are the first reason, but for others, third or even lower on the list. Thus, if the target is to increase the consumption of pulses among omnivores, knowledge and skills seem to be more important factors than digestion.

The results indicate differences between segments in consumption frequencies, supporting H2. Most flexitarians consume pulses at home at least once a week, whereas for omnivores, the consumption is rarer. Vegetarians are the segment clearly consuming the most pulses, on average, 2-4 per week. Pulse consumption at home is more common among all segments compared to outside.

Product-category-wise, to discuss the H3, flexitarians consume many products, such as “fish or dairy replacements” and “chickpeas, lentils, and/or beans in water” over 20% more than omnivores. The only product category where both groups report consumption of over 38% is “canned soups and meals”. This product category is interesting, as it is the only category where the consumption of vegetarians is less than for the other two segments. This could prove the impact of culture on food choice (Jallinoja et al., 2016). Vegetarians consume the most pulse products, so the research doesn’t acknowledge that certain segments would consume certain pulse products, except for the “canned soups and meals”. Otherwise, the product category choice seems to align with the consumption frequency. The more the segment consumes pulses in general, the more they consume each category.

Generally, the dietary segments differ from one another. This is true as the frequencies are significantly different, and even though there are similarities in the barriers and products, there is also diversity in the responses. The biggest differences are between omnivores and vegetarians, and flexitarians are in the middle, sharing top barriers and products with both other segments. Vegetarians consume the most pulses with the highest frequency and variety of products. Especially omnivores, but also flexitarians, could consume pulses more frequently and in various product

categories. Barriers might reflect the consumption frequency, as skills are the main barrier for the segment with the lowest frequency, omnivores.

5.2 Connection to previous literature

Food consumption influences health, climate and environment (Carlsson-Kanyama & González, 2009; Henn, Zhang, et al., 2022). Pulses offer a nutritious option to animal-based products, often requiring more resources. The survey indicates that Finnish people in three dietary groups consume little pulses, and the consumption could be increased significantly, considering frequency and the product variety. Jallinoja, together with colleagues (2016), examined the potential of increasing the proportion of pulses in the diets of people in meat-eating cultures. The research found that younger people with higher education are the most likely to consume high amounts of pulses. Peas are listed as the most used, and tofu and soy as the least used plant proteins, according to Jallinoja and colleagues (2016). Their results are somewhat in line with the thesis, as they indicate that young people consume a lot of pulses. The profile of the vegetarian segment doesn't, however, indicate a significantly higher level of education, as in the previous study and in the thesis, tofu is among the most used pulse products for flexitarians and vegetarians. Peas are also common, considering the category of "canned soups or meals".

Previous literature discovered a lack of knowledge and skills, as well as habits, to stand in the way of consuming pulses (Didinger & Thompson, 2020; Śmiglak-Krajewska & Wojciechowska-Solis, 2021). Pulses have also been seen to be "old-fashioned" or "poor person's food", which are negative factors for certain consumer groups (Didinger & Thompson, 2020; Henn, Goddyn, et al., 2022). Collected data doesn't indicate that pulses would be viewed as "old-fashioned" as all product categories except "soups and other canned meals" were consumed more in younger age groups when compared to the older (Henn, Goddyn, et al., 2022).

Abdominal problems have been mentioned among the barriers (Didinger & Thompson, 2020), but health appears simultaneously as one of the reasons to increase pulse consumption (Henn, Goddyn, et al., 2022; Leterme, 2002; Reid, 2010). The survey data support the claims that skills and knowledge, as well as

digestion, are the main barriers to pulse consumption (Didinger & Thompson, 2020; Śmiglak-Krajewska & Wojciechowska-Solis, 2021; Vermeir & Verbeke, 2006). Respondents believe pulses to be expensive, difficult to use and cause digestive issues, implying that these factors should be targeted if the increase in pulse consumption is desired following the 2024 Finnish Dietary Guidelines (Erkkola et al., 2024). Notably, skills are an issue among segments that consume meat. Omnivores and flexitarians eat pulses rarely, which can be affected by a lack of skill and knowledge. Digestive problems, the prominent barrier for vegetarians, could be tackled with innovative pulse products that are easier to digest. These aspects should be emphasised and developed further to increase consumption among vegetarian consumers.

Factors that affect food choice, listed by Vermeir and Verbeke (2006), are relevant in consumption choices about pulse products. Habitual food choice, discussed by de Boer and colleagues (2017) is visible in the survey, as the omnivore and flexitarian segments list familiarity and lack of skills as the top barriers. Price is in the top 3 for vegetarians, and of the two other segments, approximately one-fifth of the respondents found it a barrier. Thus, both individual factors and environment shape the choice, barriers and motives (Chen & Antonelli, 2020; Vermeir & Verbeke, 2006). Erkkola and colleagues (2024) found that Finnish customers make food decisions based on values, price, familiarity and, for example, required effort. The survey was conducted in Finland, and analysing the barriers, it seems that decision-making is affected by the listed factors.

The price seems to be a complicated topic. Some literature argues that affordability is a motive for pulse consumption (Didinger & Thompson, 2020). The data collected for the thesis indicates, however, that the high price is among the top barriers for two dietary groups. In general, sustainable food products often seem expensive for the consumer (Vermeir & Verbeke, 2006). How respondents view the price tag of pulse products can depend on their familiarity with certain products, as omnivores report pulses to be expensive. However, vegetarians also found pulse products expensive, which could be related to the products they consume. Dried beans or beans in water are affordable, but processed products made of pulses can be more expensive than, for example, animal-based products. Vegetarians consume high amounts of processed products such as “balls and steaks” or “dairy replacements”. Information

about cheaper options could be provided for both segments. The current global circumstances in 2025, with inflation and high prices, can potentially nudge people naturally towards pulses as a nutritious but inexpensive food.

Price, habits and capability prevent actions, even though pulses are sustainable considering both health and environmental effects. Not all consumers are interested in such topics, but even if they are familiar with the advantages, the attitude-behavioral intention gap might prevent them from choosing the sustainable option (Vermeir & Verbeke, 2006). Focus should be on messages that appeal to attitudes and beliefs to change the consumption practices towards more sustainable ones (Vermeir & Verbeke, 2006). Chapter 2 introduced choice-making models that can be utilised when exploring pulse consumption and discussing how to affect. The thesis aims to describe the pulse consumption, but it can be analysed and discussed based on the models.

The five-value model by Sheth, Newman and Gross (1991) can explain different barriers and motives for choosing pulses. Functional reasons for choice are often related to health, price efficiency, and finding plant-based alternatives (Śmiglak-Krajewska & Wojciechowska-Solis, 2021) and seem to steer the pulse consumption of vegetarians. Social values could occur as biases against pulses in one's social environment. For example, the survey responses indicated that some people don't consume pulses because their spouses or children don't want to eat them. Emotional values are often related to past experiences and skills. Missing skills, the leading barrier to pulse consumption among omnivores and flexitarians, is related to the lack of emotional ties to pulses. It can also be tied to the fourth value: epistemic. Fifth – conditional - value is related to a certain environment and situation, which in the pulse context could mean, for example, how easy it is to find pulses or the purchasing power. The influence of the environment is not a significant barrier for any segment, but the price is.

Furst (1996) discusses food choice with a model explaining how life course, micro- and macroenvironments and personal systems shape the choice. Life course includes experiences such as previous issues with preparing pulses or with digestion. The environment is present in the results as the cultural significance of pea soup favours the “canned soups and meals” category. Personal systems are related to habit formation and basing decisions on how an individual has acted before. In the thesis,

personal systems are related to the lack of skills and knowledge and the custom of eating meat. Pulse consumption can be nudged by the environment because the systems to support pulse-dense diets can be created, but they should be supported by actions on all levels of the Furst's model (1996).

Identity building has been found to shape food choice (de Boer et al., 2017; Erkkola et al., 2024). This could be visible in the results as some participants report negative attitudes towards pulses and thus, do not want to consume such products. Value-action gap is visible if they argue to avoid all pulses but still consume a lot of “canned soups and meals” which occur to have a very different image. About the product categories, an interesting difference to the research by Jallinoja and colleagues (2016) could be pointed out. According to the results, “tofu or tempeh” are among the top three products for both flexitarians and vegetarians. In the previous study, it was found to be the least consumed. Also, the top products were the peas, whereas this survey indicates that “chickpeas, lentils or/ and beans in water” are the prominent category. Sadly, these studies are not fully comparable as different things were asked. An interesting discussion can still stem from the two results.

The data on what and how much Finnish consumers consume pulse products is relevant for future research. By understanding the current situation, it will be easier to evaluate possible changes in consumption practices over time. These could occur, for example, through migration, new agricultural methods and innovations, food scarcity or adaptation of new practices. Understanding reasons behind choices enables effective actions to promote change through, for example, nudges or policies (Leng et al., 2017). Segmentation helps to navigate among different consumers (Verain et al., 2016; Westad et al., 2004).

The results are mainly in line with previous literature. Abdominal problems, however, don't seem to be as influential for everyone, and the price is seen as a barrier, even though pulses are often considered an affordable food (Didinger & Thompson, 2020; Latvala et al., 2012; Śmiglak-Krajewska & Wojciechowska-Solis, 2021). From a motivation point of view, the good efforts could be emphasised to boost the consumption (Vermeir & Verbeke, 2006). The value-action gap should be acknowledged by using nudges. Meanwhile, the problems should be targeted by finding digestion-friendly options and offering products from different price categories.

5.3 Practical implications

Knowing the frequency of pulse usage, reasons preventing pulse consumption, and the products consumed by different dietary groups in Finland, actions to promote consumption can be tailored. The actions are more noteworthy when they are based on research and understanding of targeted phenomena. Information on how Finnish people consume pulses based on their diets could be used to motivate them to increase pulse consumption and overcome obstacles. Results are valid for product development, communication, public sector food decisions, and preparing regulations. As local production has been seen to affect consumption, the production side could also be affected, as adding supply could increase demand in line with it. Pulses can potentially help solve food scarcity and health-related problems and are an environmentally as well as climate-friendly option for a balanced, protein-dense diet. Thus, research to understand pulse consumption is important.

By lowering specific barriers and focusing on communicating what is important for the consumers, changes in the consumption practices can be promoted (Vermeir & Verbeke, 2006). Informing consumers about the products seems to lower the barriers. Information should be provided, especially on availability, benefits and how to prepare and utilise pulses. These line up with the suggestions of Vermeir and Verbeke (2006) to promote sustainable food products in general.

For omnivores and flexitarians, lacking information about the preparation or benefits of pulses, interventions to spread information about them could work. For vegetarians, the main barrier is found to be digestive problems. Skills, or familiarity, are not problems for them. Thus, the information should be offered to people who eat meat. For vegetarians, the obstacles can be overcome by, for example, developing products easier to digest. The omnivores and vegetarians listed the price among the top three barriers, meaning that marketing pulses as affordable or even lowering the prices could motivate the consumption. This should, however, be conducted differently for segments that consume different products and on different frequencies.

5.4 Acknowledgements

The data for the thesis was not gathered, and thus, the survey was not created for this specific research. According to Vehkalahti (2008), data should be gathered to serve the purpose of the study. The research is conducted based on data, and the research question is shaped to utilise existing data that otherwise would remain unresearched. This, however, affects the outcome. Some questions and answers are also somewhat hard to interpret. For example, asking whether “too expensive” is a barrier to pulse consumption does not indicate what is expensive and what is not. Affordability is subjective and related to, for example, one's income level.

Another factor related to the data is that the 705 respondents are not equally distributed considering region, educational background or age. This means that there are issues in creating consumer profiles, as the clear majority of participants, for example, come from the Helsinki-Uusimaa area. Considering the dietary groups, the issue is that, though the groups are similar in size among the data, the allocation between the dietary segments in real life is not the same. Of all Finnish people, a higher percentage are omnivores than of the participants.

The aspects that might affect pulse consumption but were not included in the survey and thus not evaluated limit the study. Some consumers avoid pulses due to health issues related to digestion, but simultaneously, food restrictions can increase pulse consumption. Dietary restrictions like gluten, lactose or carbohydrate sensitivities are not noted in this research. This could be interesting for future research. However, these aspects do not significantly affect the segmentation study on pulse products, as the aim is purely to showcase what pulse products Finnish people consume.

Chi-squared test, used to evaluate the statistical significance of the results, shows that some results are significant and some are not. Considering the frequencies and product categories, p-values are under the chosen significance level of $p=0.05$. All barriers to pulse consumption didn't yield statistically significant results, which should be acknowledged.

6 Conclusions

The thesis unravels the consumption practices of Finnish consumers in three dietary segments. Omnivores are consuming the least pulses with the biggest potential to increase by learning new ways and finding products, as the used categories are currently limited, dominated by “canned soups and meals”. The barriers and used products can explain the rare consumption. Knowledge and skills are missing, and it becomes boring to eat the same product often.

Flexitarians consume more, but the leap to vegetarians is bigger than to omnivores, meaning that many aspects are shared with the latter group. However, the product category is already wider among this group, which reported limiting meat and dairy consumption. The frequency and consumed products seem to be correlated. The more diverse the product categories, the more often pulses end up on the plate. Vegetarians consume pulses 2-4 times per week, and their product catalogue is the widest. The main barriers for this segment, representing the highest-frequency consumers of pulses, differ from the other two segments. Vegetarians already have the skills and knowledge, so they don't need guidance. Their barriers are related to price and digestibility. However, the results considering those barriers are not statistically significant.

The research is beneficial because it aims to offer insight into how Finnish people currently consume and choose pulses as a part of their diet. The thesis ventures what stands in the way of pulse consumption, comparing survey results to existing literature and research on choice. Finnish consumers are divided into segments to understand how groups, that make food choices in different ways to begin with, act. Results could be used to promote the consumption of pulses. The benefits of pulse-centric and plant-based eating in comparison to animal-based equivalents are introduced to support the need for understanding pulse consumption.

Further research on the topic could focus on other factors, influential in choosing pulses as food. These could be, for example, food restrictions due to sensitivities. The data is also based on what people report about their practices. Research using another method could offer interesting insight into how people actually act. When asked to describe their actions by people themselves, the perception and value-action gap can shape the answers.

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Appendices

Appendix 1. Survey questions (in Finnish) that were utilised in the Thesis.

[Seuraava](#)

Sukupuoli

Nainen

Mies

Muu/En halua määritellä

Mikä seuraavista kuvaa ruokavaliotasi parhaiten?

sekasyöjä, en rajoita liha- ja maitotuotteiden syömistä

sekasyöjä, olen vähentänyt liha- ja/tai maitotuotteiden kulutusta viime vuosina

kasvisruokavalio, kuten vegaani, pescovegetaristi tai lakto-ovovegetaristi

[Seuraava](#)

Kiitos, että halusit vastata kyselyyn, mutta tämä tutkimus ei ole sinulle sopiva.

[Seuraava](#)

Edustamasi ryhmä on täynnä. Kiitos kyselyyn vastaamisesta!

[Seuraava](#)

Syntymävuosi**Korkein koulutuksesi**

- ei koulutusta
- peruskoulu/keskikoulu/kansakoulu
- ylioppilas- tai ammatillinen tutkinto
- alempi korkeakoulututkinto
- ylempi korkeakoulututkinto
- lisensiaatin tai tohtorin tutkinto

Asuinmaakunta

- Länsi-Suomi (Keski-Suomi, Etelä-Pohjanmaa, Pohjanmaa, Satakunta, Pirkanmaa)
- Helsinki-Uusimaa
- Muu Etelä-Suomi (Varsinais-Suomi, Kanta-Häme, Päijät-Häme, Kymenlaakso, Etelä-Karjala)
- Pohjois- ja Itä-Suomi (Etelä-Savo, Pohjois-Savo, Pohjois-Karjala, Kainuu, Keski-Pohjanmaa, Pohjois-Pohjanmaa, Lappi)
- Ahvenanmaa

Palkkasvituotteet ovat palkkasveista, kuten erilaisista pavuista, herneistä tai linsseistä, valmistettuja tai niitä sisältäviä eri tuotekategorioihin kuuluvia tuotteita. Näitä ovat esimerkiksi pakatut palkkasvit, säilötyt palkkasvit, maidot, jogurtit, tahnat kuten hummus, lihatuotteiden tapaan käytettävät tuotteet, valmisruoat, pyörykät, pihvit tai kuivatut tuotteet kuten rouheet ja suikaleet.

Kuinka usein syöt palkkasvituotteita

kotona

harvemmin kuin kerran viikossa

noin kerran viikossa

2-4 kertaa viikossa

yli 5 kertaa viikossa

kodin ulkopuolella

harvemmin kuin kerran viikossa

noin kerran viikossa

2-4 kertaa viikossa

yli 5 kertaa viikossa

Mitkä seuraavat asiat estävät palkkasvituotteiden syöntiäsi kotona tällä hetkellä?

Voit valita useita.

<input type="checkbox"/> En tunne palkkasvituotteita tarpeeksi	<input type="checkbox"/> En osaa laittaa palkkasviruokia	<input type="checkbox"/> Palkkasvituotteet eivät sovi laittamiini ruokiin	<input type="checkbox"/> Minun on vaikea löytää palkkasvituotteita kaupasta
<input type="checkbox"/> Palkkasvituotteita on huonosti saatavilla kaupoissa, joissa asioin	<input type="checkbox"/> En pidä palkkasvituotteiden mausta tai suutuntumasta	<input type="checkbox"/> Saan palkkasvituotteista vatsavaivoja	<input type="checkbox"/> Palkkasveja sisältäviä aterioita on työlästä valmistaa
<input type="checkbox"/> Palkkasvituotteet ovat kalliita	<input type="checkbox"/> Palkkasvituotteet eivät kiinnosta minua	<input type="checkbox"/> Muu, mikä? <input type="text"/>	

Mitä seuraavista palkkasvituotteista olet ostanut viimeisen kuukauden aikana?

<input type="checkbox"/> kuivatut kikherneet, linsit tai/ja pavut	<input type="checkbox"/> vedessä olevat kikherneet, linsit tai/ja pavut	<input type="checkbox"/> talkkuna tai kikhernejauho	<input type="checkbox"/> kuivat palkkasvirouheet ja/tai -suikaleet
<input type="checkbox"/> säilykkeet tai -ateriat, kuten hernekeitto	<input type="checkbox"/> kalaa korvaavat palkkasvisäilykkeet, kuten soijarouhe- tai herneproteiinisäilykkeet	<input type="checkbox"/> Palkkasvipohjaiset maitotuotteiden korvaajat, kuten soijajuoma, soijajogurtti tai soijakerma	<input type="checkbox"/> tofu tai tempeh
<input type="checkbox"/> palkkasveista valmistettu nyhtötuote, tuoremuru tai suikaleet	<input type="checkbox"/> palkkasvipyörykät tai -pihvit, kuten falafelit	<input type="checkbox"/> palkkasvitahnat tai levitteet, kuten hummus	<input type="checkbox"/> palkkasveja sisältävät nakit tai makkarat
<input type="checkbox"/> palkkasveja sisältävät leikkeleet	<input type="checkbox"/> muut palkkasveja sisältävät valmisruoat		

Appendix 2. Pulse consumption frequency of three dietary segments at and outside the home

Omnivore:	Home (n=281)	Out (n=281)
< 1 / week	<u>173 (61.6%)</u>	<u>223 (79.4%)</u>
~1 / week	74 (26.3%)	41 (14.6%)
2-4 / week	29 (10.3%)	15 (5.3%)
>5 / week	5 (1.8%)	2 (0.7%)
Flexitarian:	Home (n=216)	Out (n=216)
< 1 / week	64 (29.6%)	<u>136 (63.0%)</u>
~1 / week	<u>78 (36.1%)</u>	49 (22.7%)
2-4 / week	54 (25.0%)	29 (13.4%)
>5 / week	20 (9.3%)	2 (0.9%)
Vegetarian:	Home (n=208)	Out (n=208)
< 1 / week	20 (9.6%)	<u>96 (46.2%)</u>
~1 / week	28 (13.5%)	49 (23.6%)
2-4 / week	<u>88 (42.3%)</u>	52 (25.0%)
>5 / week	72 (34.6%)	11 (5.3%)
TOTAL:	Home (n=705)	Out (n=705)
< 1 / week	257 (36.5%)	455 (64.5%)
~1 / week	180 (25.5%)	139 (19.7%)
2-4 / week	171 (24.3%)	96 (13.6%)
>5 / week	97 (13.8%)	15 (2.1%)
Chi-square	$X^2 (6, N = 705) = 262.6, p = 0.00$	$X^2 (6, N = 705) = 74.6, p = 0.00$