



Understanding sustainable behavior among Finnish university students: The impact of the theory of planned behavior, environmental knowledge, and concern

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ABSTRACT

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Understanding sustainable behavior among Finnish university students: The impact of the theory of planned behavior, environmental knowledge, and concern

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This study utilizes an extended framework of the Theory of Planned Behavior by investigating the influence of attitude, subjective norm, perceived behavioral control, environmental knowledge, and environmental concern on the sustainable behavior of Finnish university students. The model also takes into account the influence of egoistic and biospheric values on students' environmental concerns. Furthermore, the study proposes a new model to investigate the influence of attitude, subjective norm, perceived behavioral control, environmental knowledge, and environmental concern on university students' interest in sustainable consumption practices. This study employs a quantitative research method, with data gathered through an online survey questionnaire. A total of 456 responses from Finnish university students were collected and analyzed using Structural Equation Modelling to address the research questions. The results of this study indicate that both the egoistic and biospheric values of Finnish university students influence their environmental concerns. Additionally, attitudes, subjective norms, perceived behavioral control, environmental knowledge, and environmental concern all positively influence students' sustainable behavior. The new model developed for this study also suggests that attitude and environmental concern both positively influence students' interest in sustainable consumption practices. These results contribute to the Theory of Planned Behavior's assertion as a robust approach to investigating sustainable behaviors.

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Tässä tutkimuksessa hyödynnetään laajennettua Suunnitellun käyttäytymisen teoriaa, tutkimalla asenteen, subjektiivisen normin, koetun käyttäytymisen hallinnan, ympäristötiedon ja ympäristöhuolen vaikutusta suomalaisen yliopisto-opiskelijoiden kestävään käyttäytymiseen. Malli ottaa lisäksi huomioon egoististen ja biosfääristen arvojen vaikutuksen opiskelijoiden kokemaan ympäristöhuoleen. Lisäksi tutkimus ehdottaa uutta mallia, jossa tutkitaan asenteen, subjektiivisen normin, koetun käyttäytymisen hallinnan, ympäristötiedon ja ympäristöhuolen vaikutusta yliopisto-opiskelijoiden kiinnostukseen kestävään kulutuskäyttäytymiseen. Tutkimus käyttää kvantitatiivista tutkimusmenetelmää, ja aineisto kerättiin online-kyselylomakkeella. Yhteensä 456 vastausta suomalaisilta yliopisto-opiskelijoilta kerättiin ja analysoitiin käyttäen rakenteellista yhtälömallinnusta vastatakseen tutkimuskysymyksiin. Tutkimuksen tulokset osoittavat, että sekä egoistiset että biosfääriset arvot vaikuttavat suomalaisten yliopisto-opiskelijoiden ympäristöhuoleen. Lisäksi asenteet, subjektiivinen normi, koettu käyttäytymisen hallinta, ympäristötieto ja ympäristöhuoli kaikki edistävät positiivisesti opiskelijoiden kestävää käyttäytymistä. Tämän tutkimuksen kehittämä uusi malli viittaa myös siihen, että asenteet ja ympäristöhuoli edistävät positiivisesti opiskelijoiden kiinnostusta kestävään kulutuskäyttäytymiseen. Näiden tulosten avulla vahvistetaan Suunnitellun käyttäytymisen teorian kykyä tarkastella kestäviä käyttäytymismalleja

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Nyi

SYMBOLS AND ABBREVIATIONS

AVE	Average Variance Extracted
ASV	Average Shared Variance
α	Cronbach's Alpha
C.R.	Composite Reliability
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DEP	Dominant Social Paradigm
EFA	Exploratory Factor Analysis
IFI	Incremental Fit Statistics
MSV	Maximum Shared Variance
NEP	New Ecological Paradigm Scale
KMO	Kaiser-Meyer-Olkin
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Model
TPB	Theory of Planned Behavior
χ^2	Chi-squared Statistics

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Abstract

(Acknowledgements)

(Symbols and abbreviations)

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1 Introduction

1.1 Background of the Study

As a result of climate change, humanity is presently on a trajectory towards an ecological crisis, causing significant consequences for all nations worldwide. Not only will these impact nature and ecosystems but will also have a profound effect on human livelihoods and quality of life (Gansser & Reich, 2023). This has led to governments and nations having to re-evaluate their respective environmental policies. The Paris Agreement, adopted in 2015 at the United Nations Climate Change Conference, involved 196 parties with the objective of keeping Earth's temperature rises below 2°C. The agreement posits that greenhouse gas emissions shall peak by 2025 followed by a reduction of 50% before 2030 (United Nations, 2024). The Paris Agreement can be viewed as a pioneering global achievement as it brought all nations together in a concerted effort to mitigate climate change and its repercussions. Furthermore, in 2015, the United Nations put forth their Sustainable Development Goals (SDGs). The SDGs serve as a global initiative aiming to end poverty, protecting the planet, and foster peace and well-being for everyone by 2030. In total there are 17 SDG's which include "affordable and clean energy, sustainable cities and communities, responsible consumption and production, and climate action" (United Nations, 2024). Gansser & Reich (2023) state that climate change has prompted changes in consumers' lifestyles in regarding preferences towards environmentally friendly consumption and behavior. People are more conscious of the cost and benefits of their actions towards the ecosystem.

According to Kim & Hall (2019) and Von Borgstede et al. (2013) there are essentially two types of mediations that could be identified as responses to climate change: changes in human behavior, and advancements in technology. Studies indicate a shift in public opinion. From 2005 to 2010, the majority of people believed that advancements in technology was the key factor in combating global warming. However, this consensus in opinion shifted by 2010, with the majority then believing that lifestyle changes are more important than technological innovation in mitigating global warming. Studying and analyzing sustainable

consumption behavior can provide a deeper understanding of how society addresses environmental issues.

According to Telesiene & Gross (2016), the majority of sociological research in Europe since the 1970s regarding environment has focused on categorizing the environmental movement within the framework of new social movements, while aiming to identify new behaviors and support policies related to the environment. Saari et al. (2021) state that after the inception of the European Environment Agency (EEA) in the 1990s, there has been increased focus on the condition of the environment at the European level. The EEA has contributed to the planning and execution of various environmental policies and the integration of environmental concerns into other EU policy areas. According to the Finnish National Agency for Education (2024) Finland is one of the leading countries in comparison for sustainable development according to the UN's SDG indicators. Finland has attained or is nearing attainment of numerous Agenda 2030 goals concerning social and economic sustainability. However, Finland's biggest challenges are in ecological sustainability targets. The most significant challenges for Finland are in goals for the Responsible Consumption and Production, and Climate Action. In these areas, sustainability has even declined in recent years. The Prime Minister's Office of Finland (2022) states that goal Responsible Consumption and Production focuses on sustainable consumption and production practices, while goal Climate Action considers actions that mitigate climate change. Finnish consumers produce over four times more waste compared to other EU countries. For example in 2019 Finnish consumers discarded 400 million kilograms of food. Finland's carbon dioxide emissions have also increased in recent years (Opetushallitus, 2024).

Research on sustainable behavior before the 2000s initially was more focused on determining green consumers for marketing purposes. Moving into the 2000s, research has shifted towards more focusing on examining motivations and psychological factors that influence sustainable behavior (Trudel, 2019). Several theories have been developed and implemented over the years to understand antecedents and motivators that influence environmental actions (Karimi et al., 2021). The Norm Activation Model proposed by Schwartz & Howard (1981) investigates the predecessors of actions that benefit other people

or so called prosocial behavior. The model takes into account effects of understanding of the issue, attribution of accountability, outcome efficiency and lastly, own acknowledgment in the ability to offer assistance. The model has been used to investigate sustainable behavior since it falls under the description of prosocial behavior (Steg & de Groot, 2010). Another theory that has been applied to identify factors influencing sustainable behavior is Social Cognitive Theory (Phipps et al., 2013; Font et al., 2016). The core concept of this theory is that individuals can influence their behaviors and have an impact on environmental events. The theory suggests that both personal and environmental factors can have influence on individuals behavior. Personal factors may include past experiences or an individual's beliefs whereas environmental factors may include circumstantial or social factors. One of the most frequently used and referenced theories in the realm of sustainable behavior and consumption over the years has been Ajzen's (1991) proposed Theory of Planned Behavior (Heath & Gifford, 2002; Yadav & Pathak, 2016; Shin et al., 2018; Karimi et al., 2021; Gansser & Reich, 2023). The theory considers the effects of three antecedents in predicting individuals' intention to carry out a specific behavior. These antecedents are attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). Ajzen (1991) also mentions that adding additional constructs to the Theory of Planned Behavior can enhance the model's predictiveness. The theory has been successful in predicting various realms of sustainable behavior, including sustainable food consumption (Shin et al., 2018; Alam et al., 2020; Elhoushy, 2020), sustainable fashion (Bong Ko & Jin, 2017; Brandão & Costa, 2021), green products (Yadav & Pathak, 2016; Paul et al., 2016; Kumar et al., 2017), and sustainable transportation (Heath & Gifford, 2002; Farag & Lyons, 2010). Additionally, the theory has been used to successfully predict university students' sustainable behavior (Karimi et al., 2021; Ali et al., 2021; Wu et al., 2022). Additional criticism of TPB and other similar theories predicting sustainable behavior posits that the models do not take into account other socially and personally relevant variables and factors, such as knowledge, values, political views, gender, and religion, that may influence behaviors, especially sustainable behavior (Gifford and Nilsson, 2014).

1.2 Research Questions and Objectives of the Research

One of the education-related goals of the UN's Agenda 2030 is to ensure that by 2030, all students gain the expertise and competencies necessary to enhance sustainable development (United Nations, 2024). Puurula et al. (2022) examined qualitative data from Finnish higher education institutions to understand how four universities describe their sustainability policies and their implementation. The study found that these four Finnish universities display qualities for an established sustainable institution and have established sustainable goals that guide their activities. Notably, a commitment to the UN's Agenda 2030 appears to be a common theme among all the research's analyzed universities. Millennials and Gen-Z are anticipated to have crucial role in building a sustainable future and are likely to significantly facilitate in achieving the Sustainable Development Goals (SDGs) (Yamane & Kaneko, 2021). Karimi et al. (2021) emphasize the importance of younger generations and university students as they have faced consequences of historical and current environmental negligence. Moreover, university students most likely possess the technical and professional knowledge that will be needed for developing and advocating change to more sustainable behavior and future. There hasn't been much research on the sustainable behavior of Finnish university students. A study by Komppula et al. (2018) analyzed the sustainable behavior of university students from Finland and Russia. The results suggest that the concept of sustainability for Finnish students discloses all parameters of social, economic and ecological outlooks whereas for Russian students it discloses only as an environmental matter. Finnish students also exhibited significant environmental concerns. Kukkonen et al. (2018) examined Finnish university students' environmental behavior and identified three distinct groups based on their sustainable behavior in daily activities. The group with the highest number of students comprised of students who stated that they conserve resources in their daily lives. This specific group had the highest levels of "Enjoyment of nature" and "Global concerns", as well as the strongest "Intent to support" environmental activities (Kukkonen et al., 2018). Baiardi and Morana (2021) state that there has been an increase in environmental concern across European countries over the last decade. Environmental concern is directly linked to consumers' education, income levels, and the distribution of young people in society. Poortinga et al. (2018) focused on investigating European consumers' beliefs about climate change, concerns, and environmental policies across 23 European countries. While the vast majority of respondents believed in global warming and

acknowledged climate change as a result of human activity, only a much smaller percentage expressed significant worry about it. Furthermore, most respondents indicated they were unlikely to take personal actions to change their energy use habits. Conversely, prior research has also found that greater environmental concern increases people's likelihood of embracing electric vehicles as a mode of transportation in urban areas (Zhu et al., 2020). Schultz et al. (2005) have proposed that individuals with larger worldviews regarding for other beings and living matters are normally associated with environmental concerns that has biospheric characteristics where as individuals with worldviews focused on their personal growths are associated with limited environmental concerns with egoistic characteristics.

Wu et al. (2022) state that many scholars have argued that the environmental knowledge's position in affecting sustainable behavior has been underestimated. Past research has investigated environmental knowledge as a predecessor to attitudes towards sustainable behavior (Raghu & Rodrigues, 2022). Schultz (2000) has highlighted that environmental knowledge serves as a crucial cognitive foundation for the development of such sustainable behavior. Kukkonen et al. (2018) also found that Finnish university students' ecological knowledge positively correlated with their enjoyment of nature and global concerns, which in turn influenced their sustainable behavior. Vicente-Molina et al. (2013) argue that there haven't been many studies focusing on the impact of university students' environmental knowledge on their sustainable behavior.

This present study aims to address the research gap on sustainable behavior among Finnish university students by presenting an extended model of the Theory of Planned Behavior, incorporating the effects of environmental concern and environmental knowledge. Moreover, this research includes an analysis of the influence of perceived values on environmental concern. Additionally, a separate model, constructed by the author, is included to analyze the participants' interest in sustainable consumption practices. As governments, policymakers, and companies become more aware of the detrimental impact of consumer behavior on the environment, it is increasingly important to gain a deeper

understanding of the behavioral factors that influence sustainable behavior and practices. Thus, this research is guided by the following research questions:

- 1. What factors impact Finnish university students' sustainable behavior?*
- 2. What values impact Finnish university student's environmental concern?*
- 3. What factors impact Finnish university students' interest in sustainable consumption practices?*

1.3 Theoretical Framework

This study uses Ajzen's (1991) Theory of Planned Behavior (TPB) as its theoretical basis to analyze the two main constructs, namely sustainable behavior and interest in sustainable consumption practices. The theoretical frameworks of the current study have been illustrated in Figures 1 and 2. Figure 1 is devised to characterize the sustainable consumption of individuals, employing Ajzen's (1991) and Schultz's (2000) previous theories of Planned Behavior and the Environmental Concern scale. Figure 2 illustrates individuals interest in sustainable consumption practices also employing Ajzen's (1991) Theory of Planned Behaviour.

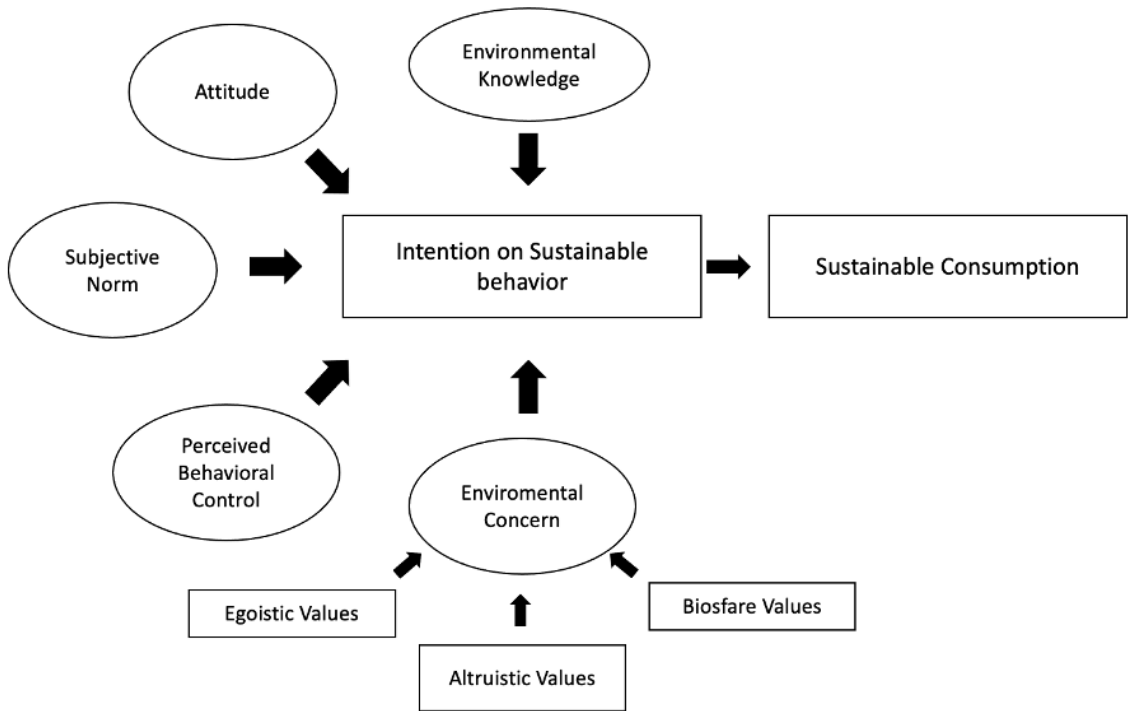


Figure 1. First theoretical model of this study. (Source: Author)

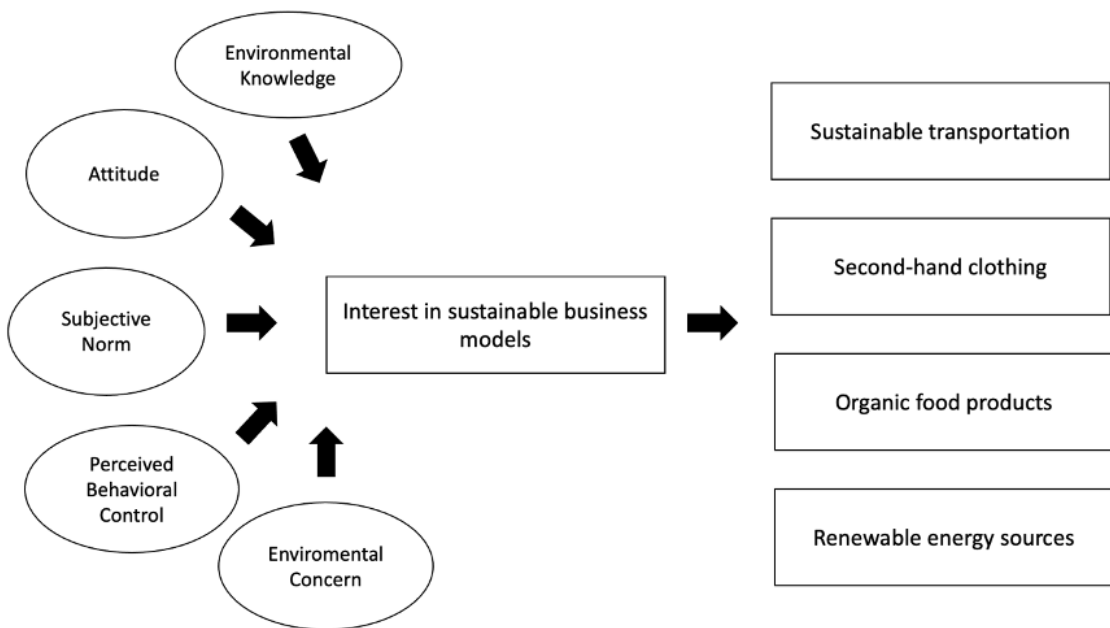


Figure 2. Second theoretical model of this study. (Source: Author)

1.4 Limitations of the Research

It is essential to point out that this study is compromised by several limitations. Firstly, the homogenous sample consisting solely of Finnish university students compromises the ecological validity of the results. Ecological validity refers to generalizability of the results, meaning, how well the collected data and subsequent conclusions represent the overall population of interest (Bryman, 2012). The current research sampled all of its participants from a subpopulation of students from two Finnish universities and one Finnish university of applied science. Therefore, one ought to be conscious of this limitation when generalizing the results to the entire population of Finnish university students and the Finnish population in general. Second, this study was constrained by the fact that the construct of interest is only assessed via 5 factors. This is, by definition, a bounded assessment of the students' pro-environmental behavior. Meaning, there may be other influential variables that remain outside the scope of this research. A further limitation is that this study only considers four examples of sustainable consumption practices. Meaning, this study only assesses the intention to consume the four types of sustainable businesses, leaving other types of businesses out of the equation. Finally, this research is susceptible to biases related to survey research. The respondents' answers to the survey questions can be influenced by, for instance, social desirability bias. This refers to participants' likelihood to answer to survey items in a manner deemed favorable by others (Bryman, 2012).

1.5 Research Methodology

This study utilizes a cross-sectional survey method for data collection. This methodology aligns well with the current descriptive research questions (Fowler, 2008). The theoretical basis of this research is formed with an extensive preliminary literature review on the topic. Subsequently, the current research questions are formed on the grounds of this literature review. Then, several hypotheses are devised to guide this study in answering the research questions. This survey is cross-sectional and it uses quantitative methods to analyze data that allows the formation of variation between variables to analyze emerging patterns and

relationships (Bell et al., 2019). All of the questionnaire items regarding sustainable behavior and their sources have been illustrated in Appendix 1.

Data collection is conducted by means of an online survey. This is due to its convenient and efficient quality, and to enhance the rates of response. To analyze the survey responses this study utilizes an exploratory factor analysis (EFA), a confirmatory factor analysis (CFA) and structural equation modeling (SEM). The EFA and CFA are used to assess the data's reliability and validity, while SEM is utilized in examining the relationships among variables in the model. The statistical analyses are performed using IBM SPSS Statistics and IBM SPSS Amos.

1.6 Thesis Outline

This thesis is divided into five sections. First, we start with research's introduction. Second chapter of the research reviews existing literature and the theoretical frameworks for the study. This includes prior research and literature concerning sustainable behavior, sustainable consumption practices, theory of planned behavior, and as the review progresses hypotheses for the research are formed. Chapter three discusses the research design and methodology. In chapter four, the methods for testing hypotheses are defined, and the results of the tests are analyzed. The final chapter discusses the study's results and conclusions which includes both theoretical and practical, and lastly concludes with recommendations for the future research and limitations for the study.

2 Literature Review

This literature review will examine the existing literature regarding sustainable behavior and factors influencing it. Firstly, the concept and specific definition for sustainable behavior will be explained. Following this, prior models that have been used to analyze sustainable

behavior will be introduced with the focal point on the Theory of Planned behavior and its corresponding factors. Then other factors influencing the intention on the pro-environmental behavior will be introduced and why they were chosen for the study's model. After this chapter introduces the different sustainable consumption practices used in this research and elaborates on why they were chosen. Lastly, the chapter distinguishes differences between qualitative and quantitative research and explains why quantitative research was chosen for this study.

2.1 Sustainable Behavior and Prior Frameworks

It is paramount to state that there is not a one single unitary definition for sustainable behavior, but rather, the literature on the topic consists of a multitude of different definitions. To define sustainable behavior the present research uses interchangeably the definition of pro-environmental behavior by Stern et al. (1999). They categorize sustainable behavior into two distinct categories, namely, public and private. The public sphere refers to collective activist efforts of committed individuals (e.g. activism, participation in protests), good citizenship (e.g. engaging in campaigns or educational programs within communities), and support for environmental policies (e.g., support for the implementation and enforcement of stricter environmental regulations). The private sphere, on the other hand comprises the utilization and disposal of personal and household items with environmental implications in mind. Stern et al. (1999) posit that the private sphere is also the primary focus of consumer research, and it has a more direct impact on the environment in comparison to the public sphere. In the prevailing consumer research literature on the topic, Vazifehdoust et al. (2013) define environmental purchasing behavior as “affirmative selection and acquisition of products and services that most effectively minimize negative environmental impacts over their life cycle of manufacturing, transportation, use and recycling or disposal”. Several theoretical models and approaches have been developed to describe consumers' sustainable behavior and intentions. The Information Deficit Model (IDM), also known as deficit model or in other words knowledge gap model, was created in the 1980's to theorize that the scientific community can improve public's scientific literacy by enhancing more public engagement (Miller, 2001; Wynne, 2006; Abunyewah et al., 2020). The basis of the model is that public skepticism towards scientific communications mostly arises from the public's lack of knowledge and issues related to the communications. To mitigate public skepticism

and encourage acceptance of environmental risk messages, providing sufficient information about the topic can be seen as the optimal solution to bridge the knowledge gap. Thus, providing the public with relevant information about an issue or concern can lead to a shift in people's perception, beliefs and attitude leading to positive actions. Value-Belief-Norm theory developed by Stern and Diez (1994) suggests that an individual's value orientation serves as a predictor for their socio-psychological factors, attitudes, and behaviors. It suggests that engaging in sustainable actions is driven by personal norms, which are triggered when individuals perceive environmental threats to others or the biosphere and believe their actions can assist in reducing these consequences. In recent years, Phipps et al. (2013) introduced a theory highlighting that individuals past behavior patterns predict future behavior. Their model suggest that personal factors, the socio-cultural environment, and previous behaviors collectively shape future actions

2.2 Theory of Planned Behavior

2.2.1 Background

Ajzen's and Fishbein's (1975) and Ajzen's (1991) Theory of Planned Behavior (TPB) is widely considered as one of the influential theories and most used regarding predicting and formulating behavior (Karimi et al., 2021). The theory's foundation lies in predicting behavior through evaluating how individuals' attitudes, subjective norms, and perceived behavioral control influence their intention to engage in specific behaviors and actions (see Figure 3). The theory is an extension from the original Theory of Reasoned Action (TRA), additionally incorporating the variable of perceived behavior control. As attitudes towards a specific improve, enhanced by stronger subjective norms and perceived behavioral control, these factors combined shape individuals' intentions to engage in the behavior. The theory posits that intention itself is the primary predictor of actual behavior (Ajzen, 2002; Fielding et al., 2008).

2.2.2 Attitude

Attitude can be defined as a cognitive state of readiness, influencing the individual's response to various circumstances and objects encountered (Ajzen, 1991; Yadav & Pathak, 2016; Kumar et al., 2017). An individual's attitude towards a specific behavior indicates how positively or negatively overall they perceive that behavior. The more favorable the attitude toward an individual's behavior, the higher the probability that the individual will engage in that behavior. Favorable attitudes are typically associated with positive evaluations of outcomes, thereby increasing the tendency for the individual to participate in that specific behavior. Previous research has predominantly identified two categories of environmental attitudes, namely, general attitudes and specific attitudes (Nguyen et al., 2016; Tanner & Kast, 2003). General attitudes involve assessments of environmental issues, whereas specific attitudes are concerned with the assessment of particular categories of eco-friendly products or behaviors. Research suggests that specific attitudes are more inclined to lead to sustainable behavior (Nguyen et al., 2016; Tanner & Kast, 2003).

2.2.3 Subjective Norms

Ajzen (1991) posits that subjective norms are perceived social pressures from the individual's reference group to perform or not to perform a specific behavior. If the individual's social circle has positive support and attitudes to a specific behavior, this will positively influence the individual's perception of that behavior. In essence, subjective norms can be deemed as the influence emerging from an individual's immediate social circle or society at large, thereby influencing their behavior and decision-making processes. (Gansser & Reich, 2023; Yadav & Pathak, 2016).

2.2.4 Perceived Behavioral Control

Perceived behavior control (PBC) refers to the degree of ease or difficulty associated with performing a specific action by an individual (Ajzen 1991). In pro-environmental studies, perceived behavioral control (PBC) is often defined as consumers' beliefs regarding their ability to manage different aspects of consumption, such as cost, time, availability, and product labeling. (Tanner & Kast, 2003). When individuals perceive sustainable behavior as challenging, the likelihood of adopting environmentally and climate-friendly practices reduces. Alternatively, if individuals perceive pro-environmental behavior as practical to incorporate into their daily routines, they are more inclined to engage in such actions (Gansser & Reich, 2023). Also, perceived behavioral control is understood to have a direct impact on the behavior itself. Even if someone intends to perform an action, they may find themselves unable to do so if they lack direct control over the behavior (Vermeir & Verbeke, 2008).

2.2.5 The Application of the Theory of Planned Behavior

Theory of Planned Behavior states that intention is the primary precursor to behavior. As a general principle, the stronger the intention to participate in specific behavior, the greater the probability it will be accomplished (Ajzen, 1991). According to TPB, the aforementioned variables of attitude, subjective norms, and perceived behavior control form the basis of intention. TPB has been used in numerous studies and research on topics related to sustainable behavior and green consumption, such as sustainable fashion (Brandão & Costa, 2021; Bong Ko & Jin, 2017), sustainable food consumption (Paul et al., 2016; Karajin & Iris, 2007; Alam et al., 2020), recycling behaviors (Davis et al., 2009), and green transportation (Farag & Lyons, 2010). Furthermore, research by Yadav and Pathak (2016) supports the integration of additional constructs in the Theory of Planned Behavior (TPB), enhancing the predictive effectiveness of the model from 27.1% to 37.7%. The study proposes additional constructs in regarding effects of environmental knowledge and environmental concern.

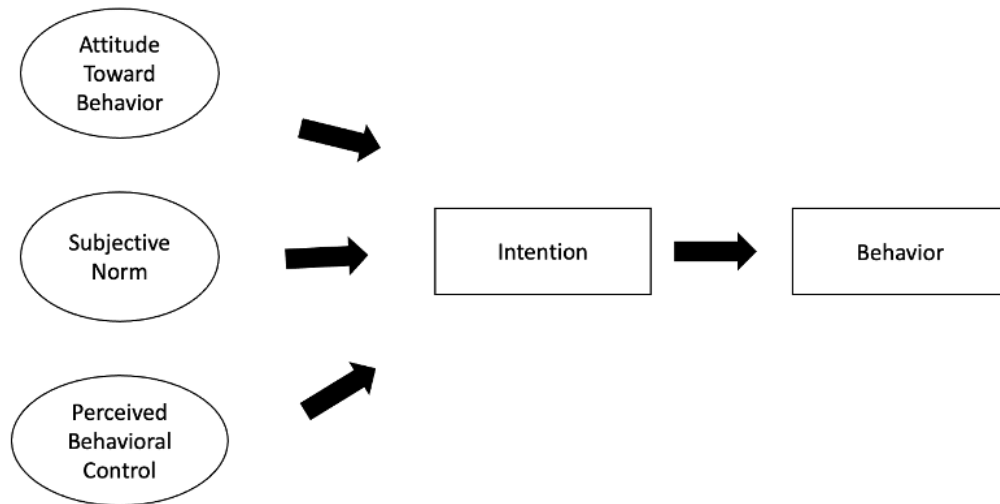


Figure 3. Ajzen's (1991) Theory of Planned Behavior.

However, other research has critically noted inconsistencies between what consumers claim and actual behavior itself. This phenomenon is described to as intention-behavior gap (Sheeran, 2002).

2.3 Environmental Knowledge

Fryxell and Lo (2003) define environmental knowledge as “a general knowledge of facts, concepts, and relationships concerning the natural environment and its major ecosystems”. Schahn and Holzer (1990) distinguish between two categories of knowledge related to environmental action: abstract and concrete. Abstract knowledge concerns a broader insight in environmental issues, including problems, causes, and solutions. Whereas, concrete knowledge, on the other hand, is practical knowledge that can be implemented and carried out. Hines et al. (1987) analyzed over 100 different studies focused on attitude and determined that abstract knowledge emerged as the most significant category of knowledge in predicting environmental action. Ecoliteracy developed by Laroche et al. (1996) can be also defined as an individual's capacity to recognize or articulate ecologically related

symbols, concepts, and behaviors. Environmental knowledge incorporates the information that an individual possesses to understand and address issues related to the environment. The individual is conscious of how their sustainable actions contribute to the environment. This understanding translates into impactful behavior toward the environment through a sense of responsibility (Lin & Niu, 2018) Furthermore, scholars have criticized the underestimation of the role of environmental knowledge in impacting sustainable behavior. While it is commonly acknowledged that environmental knowledge alone may not serve as a direct motivator for pro-environmental behavior, it is considered a crucial cognitive foundation upon which sustainable behavior can be built (Wu et al., 2022).

The sample population of the current study is university students. Al-Naqbi & Qasim (2018) researched the environmental knowledge of university students. Their findings suggest that students most likely have gained their environmental knowledge during their earlier school years, before entering university. This could be due to exposure to media and social interactions, science education in schools, family dynamics and fostering a positive outlook toward environmental issues. In the context of the TPB, numerous studies have demonstrated the favorable effect of environmental knowledge on attitude, intention, and behavior itself (Kumar et al., 2017; Yadav & Pathak, 2016; Lin & Niu, 2018). Yadav and Pathak (2016) detected that there was a notable positive influence of environmental concern on the intention of young consumers towards purchasing green products.

Lin and Niu (2018) found that consumers' understanding of environmental issues, their environmental awareness, and compliance with social norms positively influence their environmental attitudes. They posited that consumers are increasingly inclined toward purchasing green products. Thus, stating that companies ought to answer to this demand by offering green products to meet consumers' needs. Furthermore, research suggest a reverse effect of lack of knowledge as well. Vicente-Molina et al. (2013) propose that inadequate understanding of the environment and misinformation about environmental issues may reduce pro-environmental behavior.

2.4 Environmental Concern

Environmental concern refers to the degree to which individuals are aware of environmental problems and demonstrate a desire and willingness to help address them (Paul et al., 2016). Environmental concern is characterized by a strong commitment in protecting the environment, thus increased environmental concern leads to a greater likelihood of purchasing eco-friendly products. (Yadav and Pathak, 2016). Environmental concern can be seen as essential to environmental research and it serves as a crucial factor in consumers' decision-making progress (Liao et al., 2020) There have been several studies, particularly in recent years, that have examined the environmental concern's influence on sustainable behavior. Ahmed et al. (2021) founded that environmental concern had positive effect on Chinese college student's purchase intentions for organic food. The results also emphasize that environmental concern can be deemed as a positive mediator in the relationship between attitude and the purchase intentions of the students. Yadav and Pathak (2016) examined young consumers intention regarding purchasing green products in a developing country. Results suggest that, out of all examined variables, environmental concern had the biggest influence on the purchase intention. The study analyzed effects of environmental concern, attitude, environmental knowledge, subjective norm, and perceived behavioral control on purchase intention. Paul et al. (2016) also found that environmental concern had a positive effect on consumers' attitude, purchase intention, and perceived behavioral control indicating that higher concern for the environment straightforwardly influence the efforts to reduce consumer's environmental footprint.

There have been several methods to measure individuals' environmental concern in the literature. One of the most widely used methods has proven to be the NEP-scale by Dunlap & Van Kiere (1978) and Dunlap et al. (2000). Xiao et al. (2019) argues that the NEP-scale in its original and revised version have been acknowledged as the most commonly utilized metric for environmental concern in the literature. The NEP-scale (New Environmental Paradigm) is a questionnaire measuring the level of environmental concern. Anderson (2012) posits that the NEP scale can also be utilized as an indicator of an environmental worldview or paradigm. In the 1960s and 70s social psychologists in The US implied that the predominant societal worldview, Dominant Social Paradigm (DSP) was in midst of a

shift to a greater environmental concern (Anderson, 2012). Subsequently, Dunlap and Van Kiere (1978) assessed where individuals stand in this transition. The old anthropocentric worldview (DSP), recognizes humans as its center, placing them above other species while devaluing consequences of negative environmental impacts. This paradigm views environmental concern solely through a human focused lens. The new worldview (NEP) recognizes a more holistic ecological paradigm, in which humans are seen as symbiotic part of the ecosystem, co-existing with other species, rather than prevailing above them. In this worldview, environmental concern considers the entire ecosystem including other species. The original NEP scale was met with some criticism. As a response to this criticism, an updated version was devised, known as the New Ecological Paradigm Scale (new-NEP). The new-NEP includes 15 items, measured on a Likert Scale. Eight of the items represent the new prevailing environmental worldview, while the remaining seven represent the old anthropocentric worldview (Dunlap et al., 2000).

2.5 Environmental Concern Values

According to Schwartz and Bilsky (1987) our values encompass conceptual ideas, such as equality and sustainability, that play a crucial role in shaping our decision-making abilities. They form the framework for different attitudes and shape us to engage in corresponding behaviors. Based on this Stern and Dietz (1994) have developed Value-Belief-Norm model (VBN), which explains attitudes and behaviors related to the natural environment. The model suggests that individuals' value orientation serves as a predictor for their socio-psychological factors, attitudes, and behaviors. The basic premise is that individuals' value orientations are highly stable and less prone to change over time. Thus, the model suggests that engaging in pro-environmental actions is caused by personal norms related to such actions. These norms become active in individuals who recognize environmental surroundings posing as threats to other people, other species, or the biosphere. These individuals believe that the actions they undertake have the potential to mitigate these consequences (Stern et al., 1999). Schultz (2000) has created a survey-based metric to assess environmental concern among individuals (see Figure 4). The measure examines the reasons for individuals' environmental concern within the framework of the VBN theory. The

measure is based on the idea that people's concerns about environmental problems are essentially linked to the extent to which individuals consider themselves part of the natural environment. It takes into account individuals' values based on how they consider themselves, other people, and other organisms. These three values were called egoistic, altruistic and biospheric.

Biospheric Values

Animals
Plants
Fish and sea life
Birds

Egoistic Values

Myself
My future
My lifestyle
My health

Altruistic Values

All humans
Children
Community values
My family

Figure 4. Schultz's (2000) measure for environmental concern.

Egoistic values are centered around protecting environmental aspects that impact each individual personally. Therefore, the assumption is that if individuals perceive

Environmental changes as a personal threat, they are likely to adopt pro-environmental attitudes. Thus, in this value base, individuals value themselves more than other people or organisms (Stern & Dietz, 1994; Schultz, 2000; Stern et al., 1999).

Altruistic values refer to principles that prioritize the welfare of others over one's own interests. Individuals with altruistic values are motivated by a genuine concern for others and are inclined to act in ways that benefit society, the environment, or other people, often without anticipating reciprocal compensation (Batson, 2008). When individuals behave accordingly to by these norms, they assess actions and situations based on the expenses, sacrifices, and advantages that affect not just personally but also diverse groups. These groups can encompass an ethnic group, a community, a nation, or the global population overall (Stern & Diez, 1994; Gansser & Reich, 2023).

Biospheric values are principles that lead individuals to make decisions about engaging in pro-environmental actions based on primarily considering the perceived impacts on the ecosystem and biosphere as a whole. A strong orientation towards biospheric values emphasizes the intrinsic value of nature, creating a moral obligation to engage in pro-environmental behavior (De Groot et al., 2009).

All individuals have egoistic, altruistic, and biospheric values to varying degrees, and each of these value types can serve as a foundation for pro-environmental behavior. For instance, an individual might choose to use public transportation instead of owning a car because of the potential cost savings on fuel, maintenance, and parking fees (egoistic), the desire to reduce overall traffic and promote cleaner air for the community (altruistic), or the commitment to minimizing the environmental impact associated with personal vehicle use, including air pollution and habitat disruption (biospheric). As a result, individuals emphasizing altruistic or biospheric values over egoistic values do not necessarily engage in more environmentally friendly behaviors by default (De Groot et al., 2009).

2.6 Sustainable Consumption Practices

This study also investigates the relationships of precedent factors affecting the Finnish university students' interest in sustainable consumption practices, by constructing a new theoretical model by adapting Ajzen's Theory of Planned Behavior. Subsections below explains the four sustainable consumption practices used in this study and why they were chosen.

Vehmas et al. (2024) explain that sustainable value offered by companies may not always align with customer perspectives. Therefore, it is crucial to gain a better understanding of the determinants of consumers' interest to engage in sustainable consumption practices. This study attempts to provide new insight into this realm by investigating the relationship between the five extended TPB variables and consumers' interest in sustainable consumption practices. This can provide crucial applicable insight that companies can utilize to provide better sustainable value that aligns with customers' most prevalent sustainability concerns. The following four categories of sustainable consumption practices were chosen due to their ample availability, easy application and generalized nature, meaning, each of these practices are likely to be widely practiced by the entire population.

2.6.1 Second-hand fashion as a sustainable consumption practice

Based on the EU statistics (EU, 2022), in 2020 the environmental and climate impact of textile consumption in Europe ranked fourth on average in a global life cycle perspective. Production of textiles requires a large amount of energy, water, and various chemicals throughout diverse manufacturing processes. Transportation emissions and packaging waste also contribute to the distribution and retail of textile (EU, 2023). On average, the carbon footprint of textile consumption per person was 270 kg in the EU (EU, 2020). Buying second-hand clothing involves purchasing previously owned or unwanted apparel from sources such as consignment shops, thrift stores, concession stores, and online platforms. In this business model, once purchased, ownership of the clothing is permanent (Brand et al.,

2023). Gopalakrishnan and Matthews (2018) state that competitive pricing, a diverse selection of products, and high-quality offerings are factors that draw consumers to resale, consignment and thrift stores. An analysis made by Yan et al. (2015) investigates the shopping behavior of college students regarding second-hand clothing revealed that students who frequented second-hand stores showed higher levels of environmental consciousness and price sensitivity compared to those who did not engage in such shopping. Moreover, these students typically purchase used clothes not solely for economic reasons but also to align themselves with environmentally friendly practices, express a vintage aesthetic, and to establish their unique style.

2.6.2 Sustainable Transportation

According to EU statistics, road transport contributed to 24% of the total CO₂ emissions in the EU area in 2020. The majority of emissions originate from light-duty vehicles, encompassing passenger cars and vans, totaling around 15% of the total EU CO₂ emissions (EU Commission, 2024). In addition to emissions, light-duty vehicles can have various short-term consequences, such as, noise and air pollution, traffic jams and accidents (Egset & Trond, 2019). EERE (US government agency, 2024) defines sustainable transportation as “low- and zero-emission, energy-efficient, and affordable modes of transport, including electric and alternative-fuel vehicles, as well as domestic fuels”. Primary ways of sustainable transportation can be considered walking, cycling and public transportation. If using a personal vehicle is necessary, choosing a vehicle that minimizes fuel consumption and emissions is recommended (Motiva, 2024). European Environment Agency (2023) published that the EU’s domestic transport GHG (Greenhouse gas emissions) have been steadily increased since 2013 until the Covid-19 pandemic. Since the pandemic emissions have again steadily continued to increase. EEA estimates that the domestic transport emissions in the EU will only drop below their 1990 level in 2032. Cattaneo et al. (2018) found that increased environmental pollution heightened the interest of Italian university students in the safety and ecological impact of their chosen mode of transport. Also, the more students there were concerned about the sustainability of transportation, the more they were inclined to use buses, trains, active transportation, and carpooling. Egset & Trond (2018)

investigated transport priorities of Norwegian university students in wintertime and found that the attitude of environmental concern was positively correlated with the increased use of active transport.

2.6.3 Organic Food Products

The organic mark shows that the food has been produced in strict compliance with EU organic production standards. Organic farming refers to a sustainable agricultural approach that prioritizes environmental protection and animal welfare throughout the entire food supply chain. For example, the EU's organic logo on processed food products indicates that a minimum of 95% of the ingredients of agricultural origin are organic. This means that supermarkets and other retailers are allowed to label their products as organic only if they comply with the stated rules. Other practices include raising livestock in free-range, open-air environments, using organic fodder, prohibiting genetically modified organisms (GMOs), avoiding chemical pesticides and synthetic fertilizers, and utilizing on-site resources for natural fertilizers and animal feed (EU, 2018; European Commission, 2024). The area of agricultural land under organic farming in the EU grew by more than 50% from 2012 to 2020, with an annual increase of 5.7%, reaching approximately 14.9 million hectares. One of the main reasons behind the demand for organic food products is increasing policy support and the growing demand from European citizens for high-quality, sustainable food production (European Commission, 2023; IFOAM, 2024). Several studies have been conducted on consumers' organic food consumption and the factors influencing it (Shin et al., 2018; Ahmed et al., 2021; Ali et al., 2021; Carrión Bósquez et al., 2023). Carrión Bósquez et al. (2023) found that attitudes towards environmental protection and buying organic products positively influenced university students' intentions to purchase organic food products. Additionally, subjective norms and perceived behavioral control (PBC) influenced this intention. In similar research Ali et al. (2021) concluded that university students' purchasing behavior of organic food is significantly influenced by health consciousness, consumer trust, pricing policies, and personal attitudes.

2.6.4 Renewable Energy Sources

UN (2024) states that renewable energy is produced from natural resources that replenish themselves quicker than they are utilized. For instance, sunlight, geothermal energy, hydropower, and wind energy can be constantly replenished. The generation of renewable energy results in significantly lower emissions compared to the usage of fossil fuels, also reducing emissions of air pollutants, improving energy security and mitigating climate change. European Environment Agency (EEA, 2023) estimates that renewable energy generated around 22,5 % of the energy consumed in the EU region in 2022. The share of renewables in Europe has been steadily growing in the last two decades and is expected to keep growing. Solid biomass stands out as the predominant renewable energy source, significantly impacting carbon sinks and biodiversity. It is widely applied in electricity generation, industrial processes, and residential heating. In 2022, Europe's solid biomass constituted a substantial 40% of the total renewable energy supply. Other notable renewable sources include wind (15%), hydropower (10%), liquid biofuels (7%), and heat pumps (7%). Sweden, Latvia, and Finland had the highest share of energy from renewable sources in the EU. Finland's renewable energy sources share was estimated to be around 50%, growing almost by 5% from the previous year (EEA. 2024). Liobikienė et al. (2021) research indicated that the extent of renewable energy development and consumers' financial capacities strongly impacted their tendency to use renewable energy. Additionally, subjective norms positively influenced this intention. However, attitudes towards renewable energy did not show a significant effect on consumers' intention to use it.

2.7 Qualitative and Quantitative Research

Trochim (2006) states that reasoning can be categorized into inductive and deductive reasoning. Conclusions from specific observations are investigated in Inductive reasoning, whereas deductive reasoning starts with a primary principle and applies it to specific situations to reach a logical conclusion (see Figure 5). Inductive research progresses from specific observations to broader themes and theories, whereas deductive research works from theory to hypotheses to data, confirming or challenging the theory (Newman, 2000).

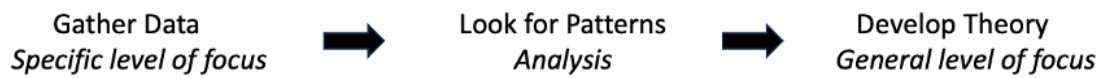


Figure 5. Inductive Research (Qualitative data) (Blackstone, 2012)

Quantitative research which typically is categorized deductive, uses statistical analysis to link existing knowledge with new insights and collecting numerical data from various participants and locations. Quantitative research tests hypotheses derived from theories (see Figure 6). Whereas Qualitative research which normally is categorized inductive, gathers data in natural environments with researchers identifying patterns and themes from participants (Creswell & Plano Clark, 2007; Soiferman, 2010). This study, focusing on factors influencing university students' sustainable behavior, uses a quantitative approach, collecting numerical data through an online survey and testing hypotheses from existing literature.

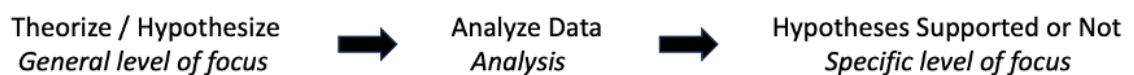


Figure 6. Deductive research (Quantitative data) (Blackstone, 2012)

3 Methodology

This chapter presents the methodology of this research. The first subsections elaborate on the statistical analyses that are performed. Furthermore, data collection and sampling methods are introduced, followed by details of the survey instruments. Finally, the hypotheses of the current research are presented.

3.1 Data Analysis

This research will utilize Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Model (SEM) in the specified order. EFA will be used to assess the consistency between theory and findings. Next, CFA will be employed to assess models' validity and reliability. Lastly, SEM will be conducted to test the hypotheses put forward earlier.

3.1.1 Exploratory Factor Analysis

Exploratory factor analysis is a widely used statistical method. It draws upon Charles Spearman's Factor Analysis (1904), which is employed to detect underlying relationships among observable variables. Typically, EFA is employed when there is insufficient evidence supporting the factor structure, or when the research aims to discover the quantity of common factors and the arrangement of factor loadings. (Norris & Lecavalier, 2010). Finch (2020) states that EFA can be utilized when prior information about the underlying latent structure is lacking. When there is little empirical evidence or theoretical framework for a factor model, EFA becomes necessary to explore the structure. On the other hand, if there is a strong theoretical basis but limited empirical data, EFA may still be used to examine potential factor solutions limited by the theoretical framework. Overall, EFA is essential when researchers need to investigate latent structures without assumptions. It was concluded that employing EFA is relevant for this research, as the Theory of Planned Behavior has been expanded to incorporate additional constructs such as "Environmental Knowledge" and

"Environmental Concern," along with values influencing environmental concern. Additionally, a new model has been proposed to analyze the effects of environmental knowledge, environmental concern, attitude, social norm, and perceived behavioral control on the interest in sustainable consumption practices.

3.1.2 Confirmatory Factor Analysis

Finch (2020) states that theoretically, a confirmatory factor analysis (CFA) is employed when there already exists a valid theoretical expectation regarding the anticipated factor structure and previous empirical findings upholding this structure. This anticipated factor structure and previous empirical findings are often derived from multiple EFA studies. This way CFA serves the purposes of a) evaluating the extent to which the proposed latent variable model fits with the observed data and b) comparing a limited set of models to determine the one that is the most favorable fit to the data. CFA is crucial for evaluating how accurately the observed variables reflects theoretical underlying constructs. When paired with validity assessments, it provides insight into the overall quality of the theoretical measurement model. (Hair et al., 2010). CFA can serve multiple purposes such as validating constructs, testing measurement consistency across groups, evaluating intricate error patterns, confirming factor structure, ensuring scale reliability, assessing form equivalence, and exploring population differences (Brown, 2003). This research will perform CFA to process the data and examine reliability and validity before SEM modelling.

3.1.3 Structural Equation Model

Structural Equation Modeling (SEM) is a statistical method utilized for examining relationships among observable variables, allowing researchers to quantitatively assess proposed theoretical models. SEM helps researchers evaluate the extent to which sample data supports the theoretical model. If the data does not support the model, researchers can make adjustments to improve the model for further testing. (Schumacker and Lomax, 2004). SEM utilizes CFA while also extending the path analysis. It allows users to analyze the

relationships among latent, or unobservable variables. Each latent variable is associated with at least two or more measured variables, thus essentially forming a small-scale CFA to assess whether the measured variables are in fact representing the latent construct. This provides an additional advantage: the correlations among the observed variables serve as indicators of their reliability, and SEM can account for this. As a result, the relationships among the latent variables accurately reflect their true correlations, unaffected from measurement error. (Streiner, 2006). This research will utilize SEM, considering its advantages and its progression following CFA. SEM will be used to examine the hypotheses formulated previously in this research.

3.2 Reliability and Validity

Sanders (2015) considers that reliability and validity are fundamental abstracts regarding research methodology, representing the credibility and attributes of findings and conclusions in the study. Kimberlin and Winterstein (2008) emphasizes that reliability and validity are critical indicators of a measuring instrument's quality. The process of constructing and validating focuses on minimizing errors during measurement. This section will provide definitions of reliability and validity, as well as detail the various methods and analyses used to assess the study's reliability and validity.

Reliability indicates on how consistently a data collection technique, or techniques yield the same findings, ensuring that other researchers would have had similar observations or conclusions, or that there is transparency in how sense is derived from the raw data (Saunders, 2015). In this study, reliability in the EFA is determined by calculating Cronbach's alpha for each factor, while reliability in the CFA is assessed using composite reliability (CR). Cronbach's alpha is a statistical method used to assess internal consistency by examining the correlations among responses to items within a questionnaire. Thus, internal consistency assesses how consistent responses are across a portion of items. It reveals how well the given items measure the same construct. Generally, as the number of items in a summated scale increases, Cronbach's alpha tends to be higher. Cronbach's alpha

consists of an alpha coefficient ranging from values between 0 and 1, where values of 0.7 or higher suggest that the items within the scale measure the same construct (Saunders, 2015; Kimberlin & Winterstein, 2008). Similar to Cronbach's alpha composite reliability (CR) serves as an indicator of internal consistency within scale items. Composite reliability assesses the overall reliability of a scale and is typically determined through confirmatory factor loadings based on the factor loadings of the constructs. The accepted value for composite reliability coefficients (CR) is also set above 0.7 (Brunner & Süß, 2005; Hair et al., 2010).

Validity refers to how accurately a data collection method measures its intended targets and how well research findings reflect the subject matter they aim to address. (Saunders, 2015). This study utilizes various types of validity methods across different levels of the study. In EFA, three types of validity were utilized: validities regarding convergent, discriminant, and face validity. Convergent validity refers to the extent to which different methods measure the same trait, whereas discriminant validity pertains to the degree of distinction between different traits. (Carmines and Zeller, 1979). For the convergent validity, the significance of factor loading depends on the sample size. Typically, smaller sample sizes correlate with higher factor loadings. According to Mwansisya et al. (2021), a sample size of 350 might require a minimum loading of 0.3 to be considered sufficient. Discriminant validity is commonly defined as capability to distinguish between two separate constructs, typically assessed by investigating the correlation between them. While there is no universally agreed-upon threshold for the level of correlation across constructs that definitively confirms discriminant validity, Cheung et al. (2023) suggest examining whether the correlation between two constructs does not exceed 0.7. This ensures that the shared variance between the two constructs is no more than 49%, thereby supporting discriminant validity. In simpler terms, the shared variance between the two constructs should be less than 50%. Face validity evaluates if a test seems to measure its intended construct. It assesses whether a measure appears relevant and suitable for its intended purpose at a surface level. The researcher must verify whether the results align logically with the questionnaire. A group of variables loading onto one factor should share a common interpretation (Gaber & Sharon, 2010). In CFA validity was assessed through average variance extracted (AVE), maximum shared variance (MSV), and average shared variance (ASV). Discriminant validity is indicated when the

MSV value is lower than the ASV value, while AVE measures convergent validity (Mwansisya et al., 2021).

3.2.1 Other Model-Fit Parameters

To evaluate the goodness-of-fit of the measurement model, various fit indices were utilized. These included the chi-squared statistic (χ^2), RMSEA, and CFI. The chi-squared statistic (χ^2) is widely used to assess the overall fit of a model. It tests whether there is a significant difference between the proposed model and the actual data structure. A well-fitting model retains the null hypothesis, indicating that the chi-squared statistic should not be significant (Smith & McMillan, 2001). The CFI compares a specified model's fit to that of an independence model where variables are assumed uncorrelated. It measures the discrepancy between observed and predicted covariance matrices using the chi-square index. CFI values close to 1 indicate good fit, with sensitivity less affected by sample size but requiring nonzero correlations for effectiveness. In contrast IFI, also gauges model fit but is similarly insensitive to sample size and can exceed 1, with values above 0.90 generally deemed acceptable (Moss, 2009) Lastly, RMSEA is used as a measure of badness-of-fit, where values below 0.05 signify a good fit, and values between 0.05 and 0.08 are still considered adequate (Huynho et al., 2016).

3.3 Data Collection and Sampling

This research uses a quantitative research method utilizing an online questionnaire. The data was collected through an online survey anonymously from during the period of 11th December 2023 to 18th January 2024. Total of 456 respondents completed the survey. Table 1 demonstrates the distribution of responses concerning gender, age, and educational institution. The distribution of respondents' genders was even, with a slight predominance of females comprising approximately 57% of the total number of respondents. Regarding respondents' educational institutions, the responses primarily comprised three institutions:

LUT University, LAB University of Applied Sciences, and the University of Tampere. These three institutions accounted for approximately 99% of the total respondents, with LUT University students comprising about 50% of the total data, while students from LAB and the University of Tampere both accounted for about 24% of the data, with a difference of 2 responses. As expected, respondents aged 20-30 represented the largest age group. This is understandable considering that the majority of university students generally fall within this age range. The survey questionnaire has also taken into account the political views of university students, the distribution is indicated in Table 2. The table shows that the political views are evenly distributed among students. On a scale of 1-10 (left-right political orientation), the median value for respondents was 5.29, slightly leaning towards the right. The highest chosen value for political views was 7, with 69 responses. The value with the lowest frequency was 10, with 18 responses. The survey questionnaire was created using the SurveyMonkey platform. An electronic link was distributed to students primarily through email as well as through various social media channels. According to Statistic Finland (2024) there were estimated to be around 163 000 university students in Finland in 2022. To obtain precise estimates of a 95% confidence interval in populations exceeding 100,000 individuals, a minimum sample size of 384 is required (Saunders et al., 2015).

Gender	Frequency	% Share	% Accumulation
Female	262	57.70%	57.70%
Male	192	42.30%	100.00%
Total	454	100.00%	
Age			
Under 20 years	7	1.50%	1.50%
20 to 30 years	394	86.40%	87.90%
Over 30 years	55	12.10%	100.00%
Total	456	100.00%	
School			
LUT University	231	50.80%	50.80%
LAB	110	24.20%	75.00%
Tampere University	112	24.60%	99.60%
Other	2	0.40%	100.00%
Total	455		

Table 1. Distribution of Respondents

Political View			
1 (Left)	30	6.96%	6.96%
2	32	7.42%	14.38%
3	59	13.69%	28.07%
4	55	12.76%	40.83%
5	58	13.46%	54.29%
6	35	8.12%	62.41%
7	69	16.01%	78.42%
8	49	11.37%	89.79%
9	26	6.03%	95.82%
10 (Right)	18	4.18%	100.00%
Total	431		

Table 2. Distribution of Political Views Among Respondents

3.4 Measures

To ensure the scale's validity and reliability, questions were selected based on prior research and studies. The questions were initially drafted in English but were later translated into Finnish to enhance clarity and comprehension for the respondents.

From the original version of the Theory of Planned Behavior by Ajzen (1991), attitude, subjective norm, perceived behavior control and intention were measured. Three items were adopted from Van Bieregen, Semengi et al. (2011) and Do valle et al. (2005) to measure attitude towards sustainable products. Subjective norm was measured using three items adapting the scale from Vermeir and Verbeke (2008). These items measure the influence of family, friends, and society on students' sustainable behavior. Perceived Behavior Control was constructed from Elhoushy (2020) using two items to measure the student's evaluation on the ability to purchase sustainable products. Two items were used

to measure students to purchase sustainable products using prior scales from Chen (2013) and Ajzen (1991).

Environmental concern was measured using Dunlap's (2000) NEP-scale. Ten items were selected from the original 15-scale, with 5 items measuring the old-world paradigm and 5 items measuring the new world paradigm. This study also examines the reasons for students' environmental concern by applying 9 items from the environmental concern measure by Schultz (2000). These items measure students' egoistic, altruistic, and biosphere value bases. Environmental knowledge was measured using 3 items. The scale was adapted from Mostafa (2006), which was used to measure respondents' perceived environmental knowledge of environmental issues. Lastly 4 items were constructed from Jaiswal & Kant (2018) and Shrum et al. (1995) to measure students' sustainable purchase behavior.

3.5 Framework

Prior studies have established that attitude strongly predicts consumers' sustainable behavior (Brandão & Costa, 2021; Paul et al., 2016; Alam et al., 2020; Amoako et al., 2020). Brandão & Costa (2021) found that attitude had a positive impact on predicting consumers' intentions for sustainable fashion consumption. Alam et al. (2020) analyzed the influence of consumers' personal factors on sustainable food consumption, wherein attitude demonstrated a positive impact on consumers' intention to engage in the consumption of sustainable food. Amoako et al. (2020) have also found that positive attitude is associated with green purchasing behavior. However, Wu et al. (2022) found that the direct effect of attitude didn't have a statistically significant impact on waste management behavior of Chinese university students.

The literature review indicates an anticipation that a change in attitude towards the purchase of environmentally friendly products would positively influence the intention to purchase such products. On the basis of this review, following hypothesis is proposed:

H1a: Individuals' positive attitudes positively contribute to their intention to consume environmentally friendly products.

Minton et al (2018) studied two categories of social norms associated with sustainable consumption—normative and self-enhancing—across three nations: France, Japan, and the United States. Normative norms can be classified as norms that are encouraged by the reference group and are generally accepted as the norm within the society. Self-enhancing norm refers to how individuals differentiate themselves within a group through unconventional and introspective sustainable actions. The findings reveal a positive correlation between a country's pragmatism and the propensity of its consumers to engage in self-enhancing sustainable behaviors that benefit the environment. Swaim et al. (2014) also found that subjective norms had a positive influence on students' intention to engage in environmentally responsible behavior. The research survey data were collected from a large public university. Thus, the second hypothesis is set as:

H1b: Subjective norms positively contribute to individuals' intention to consume environmentally friendly products.

Perceived behavioral control has been observed to positively impact on both sustainable behavior intention and behavior itself (Zhu et al., 2020; Ahmed et al., 2021; Shin et al., 2018; Afridi et al., 2021). For instance, Shin et al. (2018) discovered a positive correlation between the selection of organic menu items and consumers' PBC. Afridi et al. (2021) have also identified that individuals with high PBC demonstrated enhanced control over their behavior. They also have a higher concern for environmental sustainability for future generations, leading to a tendency to purchase environmentally friendly products and services. The third hypothesis is formulated as follows:

H1c: Individuals' perceived behavioral control has a positive effect on the intention to consume environmentally friendly products.

In recent years, researchers have increasingly acknowledged the role of environmental knowledge in sustainable behavior and intention (Yadav & Pathak, 2016; Lin & Niu, 2018; Amoako et al., 2020; Wu et al., 2022). These findings have further been detected especially among university students (Janmaimoo and Khajohnmanee, 2019; Al-Naqbi & Qasim, 2018; Ahamad & Mariani, 2018). Janmaimoo & Khajohnmanee (2019) studied pro-environmental behaviors among Thai university students and found that environmental knowledge had a positive correlation with their sustainable behaviors. The study also suggests that knowledge about environmental issues and policies gained through formal education could potentially benefit positive environmental attitudes. However, this might not necessarily translate into increased engagement in direct environmental behaviors for students. Al-Naqbi and Qasim (2018) and Ahamad and Mariani (2018) have also found positive relationships between environmental knowledge and sustainable consumption in university students. Al-Naqbi and Qasim (2018) state that university students possess a high level of knowledge regarding sustainable development (SD) and education for sustainable development (ESD). This requires improving the quality of life on Earth and developing the ability to make decisions that prioritize the everlasting well-being of the economy, environment, and equality across all societies. However, Vicente et al. (2013) has concluded that while knowledge is a prerequisite for sustainable behavior, it is insufficient on its own due to the presence of external factors that influence human behaviors. Based on the aforementioned information, the fourth hypothesis is formulated as follows:

H1d: Individuals' environmental knowledge has a positive effect on the intention to consume environmentally friendly products.

Environmental concern is a fundamental aspect of environmental research and an important predecessor in the consumer decision-making process. Higher degree of environmental concern may result in positive eco-friendly purchasing (Zhu et al., 2020). Environmental concern has been found to have a positive effect on sustainable behavior and intention, including purchase intention towards sustainable food products (Naveed et al., 2020), green product consumption (Paul et al., 2016; Yadav & Pathak, 2016), and the adoption of bicycle-sharing as a new mode of transportation (Zhu et al., 2020). Saari et al. (2021) analyzed the sustainable behavior of European Union consumers. The study had a

sample of over eleven thousand respondents from nine different countries in the EU. The findings suggest that environmental concern significantly impacts behavioral intention, which in turn positively influences sustainable consumption behavior. Environmental concern also directly affects sustainable behavior. Similarly, Zeng et al. (2023) have also discovered a positive and significant relationship between environmental concerns and sustainable behavior. The study investigated how environmental knowledge and perceptions of environmental risks influence the environmental concerns of university students. Furthermore, the study explored how environmental attitudes facilitate the relationship between environmental concern and sustainable behavior. All items regarding the hypothesis H1 - H2 are mentioned in Appendix 1. Thus, the fifth hypothesis is formulated as follows:

H1e: Individuals' environmental concern has a positive effect on the intention to consume environmentally friendly products.

Previous research has highlighted discrepancies between consumers' stated intentions and their actual behavior, a phenomenon known as the intention-behavior gap (Sheeran, 2002). Armitage and Conner (2001) emphasize the significant divide between consumers' intentions and their actions, explaining why positive attitudes towards organic and environmentally friendly products may not consistently lead to pro-environmental behavior. Thus, the sixth hypothesis is formulated as follows:

H1f: Individuals' intention has a positive effect on the intention to consume environmentally friendly products.

This study also examines the effects of individuals' value orientations on their perceived environmental concern using Schultz's (2000) survey-based metric. The metric is based on the concept that individuals' environmental concerns are fundamentally connected to the degree to which individuals feel themselves to be a part of the natural environment. The values are derived from individuals' self-perception and their regard for other people and organisms. Steg and De Groot (2012) highlighted that biospheric values seem to be more efficient predictors of sustainable behavior compared to other factors. This highlights the importance of gaining a deeper understanding of how personal values,

particularly biospheric values, influence sustainable behavior. Nguyen et al. (2016) have found that consumers who prioritize biospheric values tend to hold more favorable attitudes toward environmental protection, which results in an increase in purchasing behavior of energy-efficient appliances. Similarly, Chakraborty et al. (2021) have also found that biospheric values had the most direct influence on willingness to participate in sustainable activities. The study analyzed educators' value orientations from higher education institutions. Surprisingly, Gansser & Reich (2023) found that individuals' egoistic environmental concern had more influence on the attitude toward sustainable behavior than their altruistic environmental concern. This finding suggests that consequences that do not personally affect an individual have less influence on their attitude. Thus, the seventh, eight and ninth hypotheses are formulated as follows:

H2a - H2c: An individual's egoistic, altruistic, and biospheric values have an impact on their environmental concern.

The study also explores the relationships between five extended Theory of Planned Behavior (TPB) variables and consumers' interest in sustainable consumption practices. It highlights the importance of aligning sustainable value offered by companies with customer perspectives. The four chosen sustainable consumption practices are selected for their wide availability, ease of application, and general nature. Thus it was concluded that hypothesis tenth, eleventh, twelfth, thirteenth and fourteenth are formulated as follows:

H3a - H3e: An individual's attitude, subjective norm, perceived behavioral control, environmental knowledge and environmental concern are positively related with the interest in sustainable consumption practices.

Appendix 1 illustrates the detailed construct of the survey including items, sources for the items and structure of the survey.

3.6 Summary of Hypothesis

Based on the literature review, a total of 14 hypotheses were developed and grouped into three categories. The first category examines the direct impact of five factors (attitude, subjective norm, perceived behavioral control, environmental knowledge and environmental concern) on the intention on sustainable behavior. The category also examines the effect of individuals' intention on their sustainable consumption behavior (Hypothesis 1). The second category explores how individuals' different values (egoistic, altruistic and biosphere) have effect on their environmental concern (Hypothesis 2).

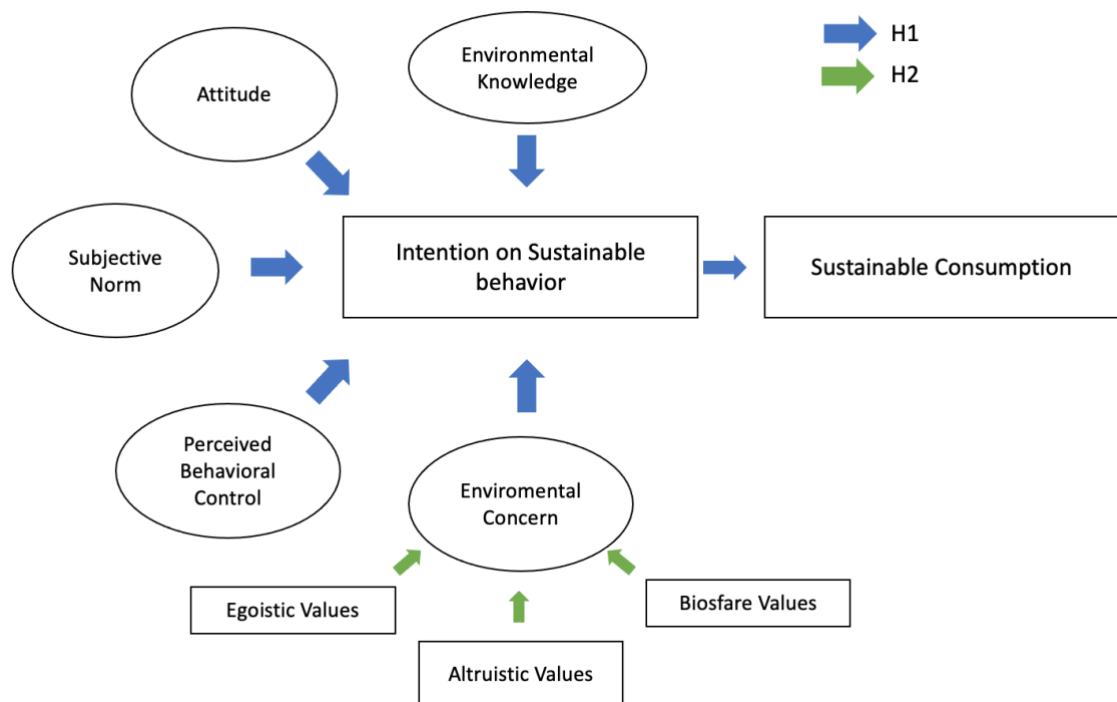


Figure 7. First and second hypothesis categories. (Author)

The third and the final category investigates the direct impact of five factors (attitude, subjective norm, perceived behavioral control, environmental knowledge and environmental concern) on an individual's interest in sustainable consumption practices (Hypothesis 3).

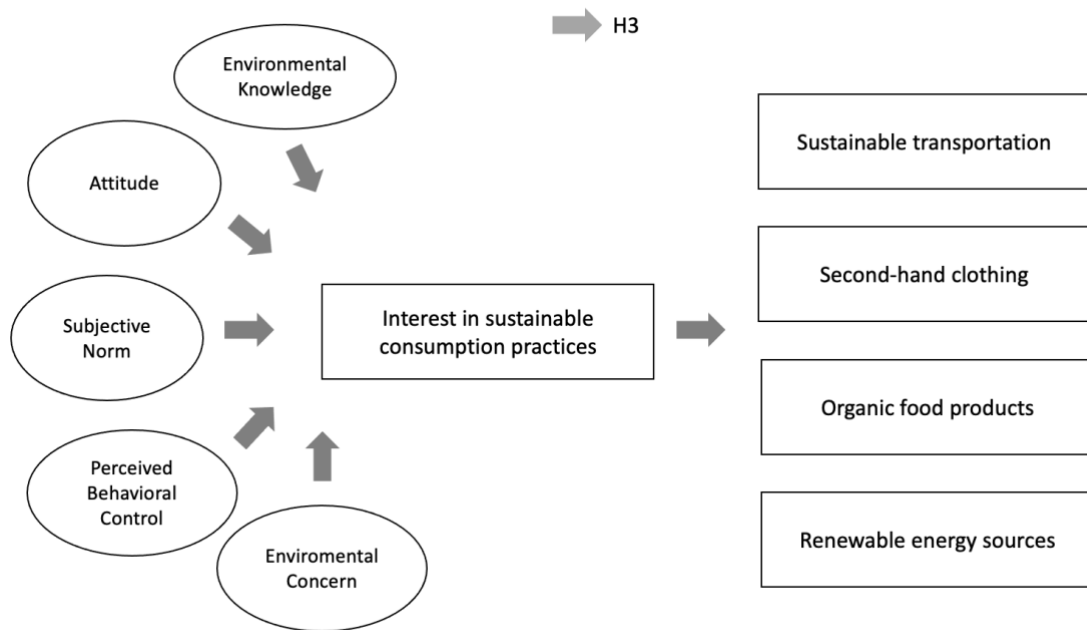


Figure 8. Third hypothesis category. (Author)

The hypotheses are detailed in Figures 7 and 8. This study will also have control variables which will include gender and political view. Table 3 will show all of the hypotheses of the study.

Hypothesis	Relationship
H1a	Individuals' attitudes positively contribute to their intention to consume environmentally friendly products.
H1b	Subjective norms positively contribute to individuals' intention to consume environmentally friendly products.
H1c	Individuals' perceived behavioral control has a positive effect on the intention to consume environmentally friendly products.
H1d	Individuals' environmental knowledge has a positive effect on the intention to consume environmentally friendly products.
H1e	Individuals' environmental concern has a positive effect on the intention to consume environmentally friendly products.
H1f	Individuals' intention to behave sustainably has positive effect on their sustainable consumption behavior.
H2a	An individuals' egoistic value has an impact on their environmental concern.
H2b	An individuals' altruistic value has an impact on their environmental concern.
H2c	An individuals' biospheric value has an impact on their environmental concern.
H3a	Individuals' attitudes positively contribute to their interest in sustainable consumption practices.
H3b	Subjective norms perceived by individuals' positively contribute to their interest in sustainable consumption practices
H3c	Individuals' environmental knowledge positively contributes to their interest interest in sustainable consumption practices
H3d	Individuals' perceived behavioral control positively contributes to their interest in sustainable consumption practices
H3e	Individuals' environmental concerns positively contribute to their interest in sustainable consumption practices

Table 3. All of the hypotheses of this study

4 Analysis and Results

This chapter presents the results of this research. The analysis and results are divided into two sections. First section displays the analysis and results for the topic of sustainable behavior and the later section displays the analysis and results for the topic of interest in sustainable consumption practices. Based on the results of the statistical analyses hypotheses are either confirmed or rejected.

4.1 Sustainable Behavior

This segment analyzes the data regarding the first and second research questions. First, the data will be interpreted, after which it will go through variable screening. This is followed by Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM). Lastly, based on the results, the hypotheses will either be confirmed or rejected.

4.1.1 Data Screening

In this part of the analysis, where we examine hypotheses 1 and 2, there were a total of 414 respondents. The gender distribution among the respondents was 240 females and 174 males. Most respondents fell into the age bracket of 20-30 years, accounting for 360 individuals. There were 7 respondents under 20 years old, and 47 respondents over 30 years old.

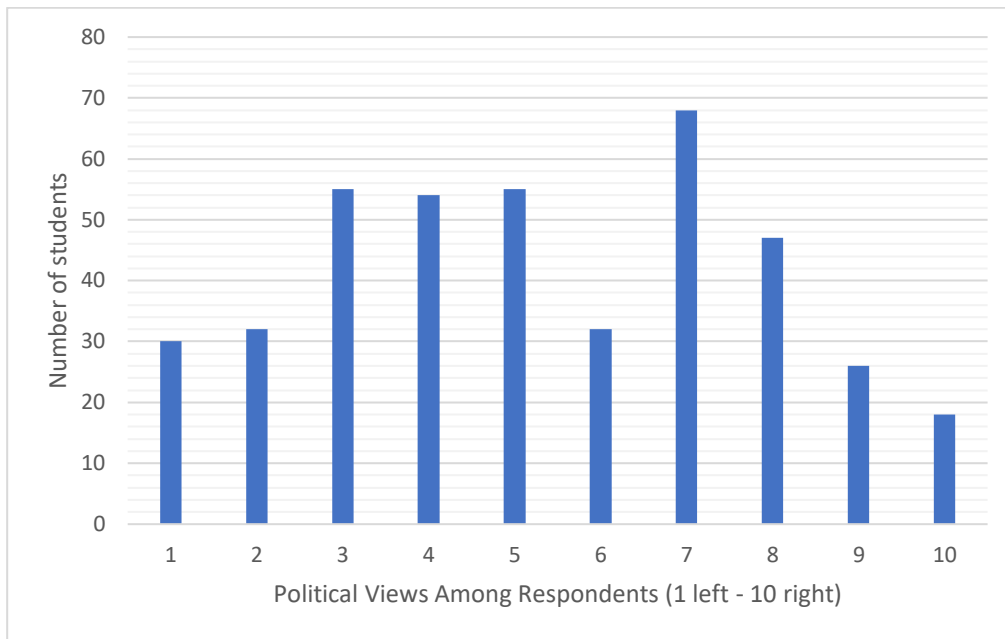


Table 4. The political views of respondents regarding sustainable behavior.

The distribution of political views among the respondents is illustrated in Table 4, showing a tendency towards right-leaning views (on a scale of 1 to 10, where 1 represents left-leaning views and 10 represents right-leaning views). Table 5 also depicts the distribution of school affiliation of the respondents. Total of 414 responses were included in this analysis. To ensure validity, all responses with missing values were deleted. Additionally, no outliers were detected.

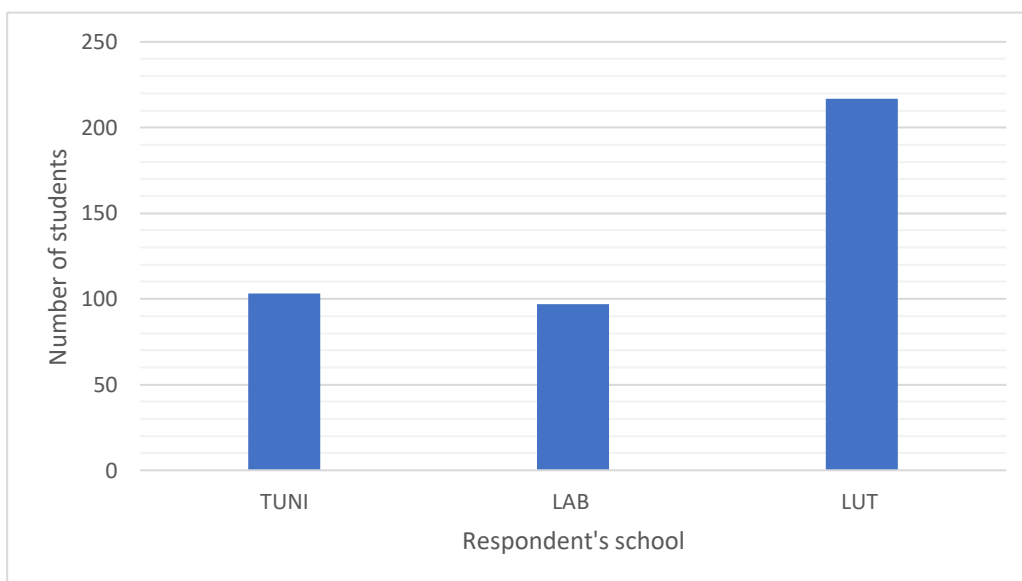


Table 5. The school distribution of respondents regarding sustainable behavior

4.1.2 Variable Screening

Skewness and kurtosis were used to test data's normal distribution. Skewness refers to the alignment of a data set's mode, median, and mean relative to each other. A distribution is symmetric when the mean is positioned centrally within the distribution, indicating no skewness. Kurtosis, on the other hand, measures how much data deviate from or cluster around the mean. Acceptable values for both skewness and kurtosis typically fall within around the value 2 (Demir, 2022). There were some kurtosis issues with certain variables. A square root transformation was used to reduce the kurtosis levels. Square root can help make the data distribution more symmetric and closer to a normal distribution (Kiely et al., 1996). Following this assessment, no variables exhibited abnormal distribution except for Age, which had a kurtosis statistic of 3.890. This can be explained by the age distribution of the respondents, as most Finnish university students fall into the age bracket of 20-30. The skewness and kurtosis values are provided in Appendix 2.

4.1.3 Exploratory Factor Analysis (EFA)

An EFA was run on the initial 36 items corresponding to the 8 variables used in the analysis. Principal Axis Factoring was chosen for the factor extraction with a varimax rotation. First the communalities of the solutions were analyzed. Items NEP1, DEP1, DEP4 and NEP4 were removed due to their low values in communality, being lower than the threshold 0.2. Proceeding with the EFA, also items NEP3 and SUB4 were removed due to their loadings falling below the accept criteria of 0.3 regarding the sample size of 400 (Metsämuuronen, 2005). A total of 8 factors were loaded in the analysis from 30 remaining items. Only two factors were loaded from the initial three value based constructs. One factor with emphasis on egoistic values with one altruistic value item corresponding to family, and second factor with emphasis on biospheric values with two altruistic value items corresponding to upcoming generations and all of humanity. Considering the nature of the variables and correlations between each other, it was decided to keep the mentioned factors in the analysis. Also variables intention and behavior are

loaded into the same factor. Considering previous research that has observed differences between consumers' intentions and actual behavior, it was decided in this study to retain this factor and examine intention and behavior items as one factor. This approach allows for a more detailed examination of consumer's sustainable behavior itself. Remaining items all loaded between values 0.375 – 0.862. Each factor's eigenvalue was greater than 1.0 and loaded between values 1.785 – 4.004. Also variances explained by the factors were between 59,75% - 80,08% indicating a good total representation. A Cronbach's alpha was utilized to measure the internal consistency of the factors. Internal consistency indicates the degree to which the items on a survey collectively measure the intended construct. A common measure of internal consistency is Cronbach's alpha (Cronbach, 1951; Fieldö 2018). Cronbach's alpha scores range from 0 to 1, with higher values indicating that the questionnaire items effectively measure the same construct, and lower values suggesting that the items do not measure the same construct. Generally, an accepted level of Cronbach's alpha is 0.6 and above. All of the factors of the present study had at least a value of 0.647 or above, implying a sufficiently reliable internal consistency. Bartlett's test of sphericity was utilized to assess sufficiency of correlations among the items in each of the extracted factors. Each factor posited a statistically significant value of below 0.05. A Kaiser-Meyer-Olkin test was used to determine the adequacy of the sample for a factor analysis. All of the present factors, except one, had a value greater than 0.6. The one factor namely Subjective Norm, had a value of 0.561. A value greater than 0.6 is deemed sufficient by Metsämuuronen (2005). Gliner et al. (2016) suggests that a value above 0.5 can also be deemed acceptable. Therefore, it was concluded that the present study did not require any modifications and the analysis could be conducted. The KMO value exceeds 0.50, indicating that the sampling adequacy criteria are met. The Bartlett test of sphericity is statistically significant, demonstrating that correlation matrix significantly differs from an identity matrix. Consequently, the remaining 30 items loaded into an eight-factor solution explain 62.9% of the total variance. The results from the exploratory factor analysis suggest that our factors demonstrate overall good validity. To further validate these findings, we conducted confirmatory factor analysis (CFA), which will be discussed next.

Construct	Items	Hypothesis Category	Factor Loading	Variance Extracted (%)	KMO	Cronbach's Alpha (α)	Eigenvalue
Attitude	ATT1	Hypothesis 1	0.678	56.58%	0.795	0.775	2.264
	ATT2		0.735				
	ATT3		0.765				
	ATT4		0.409				
Subjective Norm	SUB1		0.721	59.7%	0.561	0.647	1.793
	SUB2		0.750				
	SUB3		0.375				
Environmental Concern	DEP2		0.483	56.4%	0.680	0.605	1.693
	NEP2		0.580				
	DEP3		0.787				
Perceived Control Behavioral	PBC1		0.624	66.5%	0.654	0.734	1.998
	PBC2		0.798				
	PBC3		0.630				
Environmental Knowledge	EK1		0.410	59.5%	0.613	0.657	1.785
	EK2		0.726				
	EK3		0.628				
Sustainable Behavior	INT1		0.630	74.4%	0.848	0.910	3.722
	INT2		0.605				
	BEH1		0.739				
	BEH2		0.775				
	BEH3		0.771				
New Egoistic Values	EGO1	Hypothesis 2	0.662	73.0%	0.816	0.876	2.923
	EGO2		0.808				
	EGO3		0.754				
	ALT1		0.736				
New Biosphere Values	ALT2		0.577	80.1%	0.860	0.938	4.004
	ALT3		0.637				
	BIO1		0.839				
	BIO2		0.858				
	BIO3		0.862				

Table 6. Detailed values of the EFA

4.1.4 Confirmatory Factor Analysis

AMOS version 27.0 was utilized for performing the Confirmatory Factor Analysis. Confirmatory Factor Analysis is used to affirm that the data fits stated hypothesized measurement model by testing convergent validity, discriminant validity and reliability. Initially the items and factors extracted from the EFA had a relatively good model fit, as it had Chi-squared = 1048, Degrees of freedom = 377, Relative Chi / Df = 2.77, CFI = 0.911, IFI = 0.912; RMSEA = 0.066. Although RMSEA had a higher value than the threshold 0.05, values between 0.05 – 0.08 can be deemed acceptable (Huynho et al., 2016). However, factors Subjective Norm and Environmental Knowledge had both reliability and convergent validity issues with CR values lower than the threshold 0.7 and AVE values lower than threshold 0.5. Thus, items SUB3 was removed from the factor Subjective Norm and EK1 from the Environmental Knowledge factor. Both items had low loading with SUB3 having 0.27 and EK1 and 0.43 respectively. Table 7 summarizes the final CFA model results. Final CFA model had overall slightly better fit statistics, as it follows Chi-squared = 953, Degrees of freedom = 322, Relative Chi / Df = 2.95, CFI = 0.915, IFI = 0.915; RMSEA = 0.069. However, the model didn't have reliability and convergent validity issues as the prior model.

Construct	Items	Category Hypothesis	Standardized Factor Loading	Average Variance Extracted (AVE)	Composite Reliability	t-value
Attitude	ATT1	Hypothesis 1	0.74	0.573	0.842	13.468
	ATT2		0.84			14.871
	ATT3		0.74			13.390
	ATT4		0.70			***
Subjective Norm	SUB1		0.88	0.657	0.792	9.362
	SUB2		0.73			***
Environmental Concern	DEP2		0.65	0.568	0.796	12.736
	NEP2		0.80			15.548
	DEP3		0.81			***
Perceived Control Behavioral	PBC1		0.63	0.521	0.759	10.173
	PBC2		0.89			10.591
	PBC3		0.61			***
Environmental Knowledge	EK2		0.81	0.540	0.699	8.695
	EK3		0.65			***
Sustainable Behavior	INT1		0.82	0.682	0.915	19.327
	INT2		0.80			18.661
	BEH1		0.83			19.624
	BEH2		0.86			20.594
	BEH3		0.82			****
New Egoistic Values	EGO1	Hypothesis 2	0.66	0.641	0.876	14.479
	EGO2		0.80			18.793
	EGO3		0.89			21.497
	ALT1		0.84			***
New Biosphere Values	ALT2		0.74	0.752	0.938	20.352
	ALT3		0.77			21.894
	BIO1		0.92			34.902
	BIO2		0.94			37.206
	BIO3		0.94			***
Model Fits Statistics	$\chi^2 = 1048$; $df = 377$; Relative $\chi^2 = 2.77$; CFI = 0.911; IFI = 0.912; RMSEA = 0.066.					

Table 7. Detailed values of CFA

Table 8 summarizes the validity concerns of the model. Only the Environmental Knowledge factor was slightly lower than the threshold 0.7 in the Composite Reliability indicating that the model has good overall reliability. Considering how close the value is to the threshold, it was decided to proceed with the study. The model has good convergent validity as all of the standardized factor loadings were above 0.6 and also all of the factors had AVE above 0.50 with the lowest value being 0.521 in PBC factor. Also, all of the MSV were lower than their respective AVE for all the factors.

	CR	AVE	MSV	ASV
BEH	0,915	0,682	0,426	0,263
ATT	0,842	0,573	0,426	0,235
EC	0,796	0,568	0,406	0,230
PBC	0,759	0,521	0,203	0,095
EGO	0,876	0,641	0,371	0,166
BIO	0,938	0,752	0,406	0,218
EK	0,699	0,540	0,281	0,128
SUB	0,792	0,657	0,229	0,123

Table 8. Validity concerns of the sustainable behavior model.

To evaluate discriminant validity Fornell and Larcker's (1981) criteria's was utilized. In the table, the bold diagonal elements represent the square root AVE, while the other elements indicate inter-variable correlations. The criterion states that the diagonal elements should be greater than the corresponding off-diagonal elements within their respective rows and columns, as observed in the table. All of the T-values were also larger than 1.96. Thus, we can say that our variables have good discriminant validity (see Table 9). From the model extracted from EFA, two items were dropped concluding to final remaining 28 items.

BEH	ATT	EC	PBC	EGO	BIO	EK	SUB
0,826							
0,653	0,757						
0,550	0,537	0,754					
0,434	0,361	0,223	0,722				
0,395	0,392	0,608	0,115	0,801			
0,507	0,535	0,637	0,171	0,609	0,867		
0,530	0,458	0,220	0,450	0,121	0,250	0,735	
0,479	0,390	0,380	0,234	0,289	0,341	0,284	0,811

Table 9. Discriminant validity for the CFA

4.1.5 Structural Equation Model

Results for the Structural Equation Model indicate an overall good fit with the data, as it follows Chi-square = 1043, Degrees of freedom = 368, Relative Chi / Df = 2.83, CFI = 0.912, IFI = 0.913; RMSEA = 0.067. Table 10 shows the detailed values for the SEM.

Hypothesis H1a – H1e analyses effects of factors attitude, subjective norm, perceived behavioral control, environmental knowledge and environmental concern on the individuals sustainable behavior utilizing the Theory of Planned Behavior.

Hypothesis H1a – Individual's attitudes positively contribute to their sustainable behavior.

The positive standardized estimate of 0.473 indicates a favorable association between attitude and sustainable behavior. Precisely, a one-unit rise in attitude corresponds to a 0.473-unit increase in sustainable behavior. Comparing the standardized estimates among the predictors reveals that attitude has the most significant impact on behavior. Since the p-value is below Hypothesis 1a can be confirmed.

Hypothesis H1b – Subjective norms positively contribute to individual's contribute to individual's sustainable behavior.

Hypothesis 1b is confirmed as the p-value is below 0.05. As hypothesized, the positive standardized estimate of 0.228 indicates a positive relationship between subjective norms and sustainable behavior. Therefore, a one-unit increase in subjective norms results in a 0.228-unit increase in sustainable behavior.

Hypothesis H1c – Individual's perceived behavioral control has a positive effect on the sustainable behavior.

Hypothesis 1c is confirmed as the p-value is below 0.05. As hypothesized, the positive standardized estimate of 0.228 indicates a positive relationship between perceived behavioral control and sustainable behavior. Therefore, a one-unit increase in subjective norms results in a 0.228-unit increase in the behavior.

Hypothesis H1d – Individual's environmental knowledge has a positive effect on the sustainable behavior.

Hypothesis 1d is supported since the p-value is below 0.05. As predicted, the positive standardized estimate of 0.434 illustrates a beneficial relationship between environmental knowledge and sustainable behavior. Thus, a one-unit increase in environmental knowledge corresponds to a 0.434-unit increase in behavior. Additionally, environmental knowledge exhibited the second highest influence on behavior.

Hypothesis H1e – Individual's environmental concern has a positive effect on their sustainable behavior.

Hypothesis 1e is confirmed as the p-value is below 0.05. As hypothesized, the positive standardized estimate of 0.301 indicates a positive relationship between environmental concern and sustainable behavior. Therefore, a one-unit increase in subjective norms results in a 0.301-unit increase in behavior.

Hypothesis 1f – Hypothesis 1f was deleted due to intention and factor loading into one factor.

Hypotheses H2a through H2b examines which individual's values divided into egoistic and biospheric values influence their environmental concern.

Hypothesis H2a – An individual's egoistic values have influence on their environmental concern.

Hypothesis H2a is confirmed as the p-value is below 0.05. As hypothesized, the positive standardized estimate of 0.171 indicates a positive relationship between egoistic values and environmental concern. Therefore, a one-unit increase in egoistic values results in a 0.171-unit increase in environmental concern.

Hypothesis H2b – An individual's egoistic values have influence on their environmental concern.

Hypothesis H2b is supported with a p-value below 0.05. As anticipated, the positive standardized estimate of 0.198 demonstrates a favorable relationship between altruistic/biospheric values and environmental concern. Therefore, a one-unit increase in alt/bio values results in a 0.198-unit increase in environmental concern. Also taking into account the effects of control variables, only the political variable control for hypothesis 2 had significant effect on the environmental concern. The result's positive estimate suggests that the more university students' environmental concern increases the more political views become more right-leaning. It is noteworthy that the estimate is relatively small, only having a value of 0.073 indicating that there isn't much increase.

Relationships	Estimates	Standard Error	T-values	P-value	Hypothesis Supported
Hypothesized Relationships					
H1a: ATT → BEH	0.473	0.096	4.928	***	Supported
H1b: SUB → BEH	0.228	0.065	3.527	***	Supported
H1c: PBC → BEH	0.228	0.077	2.949	0.003	Supported
H1d: EK → BEH	0.434	0.110	3.933	***	Supported
H1e: EC → BEH	0.301	0.72	4.200	***	Supported
H2a: EGO24 → EC	0.171	0.034	5.092	***	Supported
H2b: BIO24 → EC	0.198	0.035	5.722	***	Supported
Control Variables					
Gender for H1	0.071	10.3	0.694	0.488	
Political View H1	0.033	0.021	1.598	0.110	
Gender for H2	0.076	0.083	0.918	0.359	
Political View H2	0.073	0.016	4.428	***	
Squared Multiple Correlation					
BEH	0.594				
EC	0.534				
Model Fit Statistics	$\chi^2 = 1043$; $df = 368$; Relative $\chi^2 = 2.83$; CFI = 0.912; IFI = 0.913; RMSEA = 0.067.				

Table 10. Detailed values for the SEM regarding sustainable behavior

4.2 Interest in Sustainable Consumption Practices

This segment analyzes the data regarding the third research questions. First, the data will be interpreted, after which it will go through variable screening. This is followed by Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM). Lastly, based on the results, the hypotheses will either be confirmed or rejected.

4.2.1 Data Screening

In this part of the analysis, where we examine hypothesis 3, there were a total of 417 respondents. The gender distribution among the respondents was 239 females and 178 males. Regarding age, most respondents fell into the 20-30 age bracket, with 362 respondents, similar to the analysis of hypotheses 1 and 2. There were 7 respondents under 20 years old and 48 respondents over 30 years old. The distribution of political views among the respondents is illustrated in Table 11, showing a slight lean towards right-leaning views (on a scale of 1 to 10, where 1 represents left-leaning views and 10 represents right-leaning views).

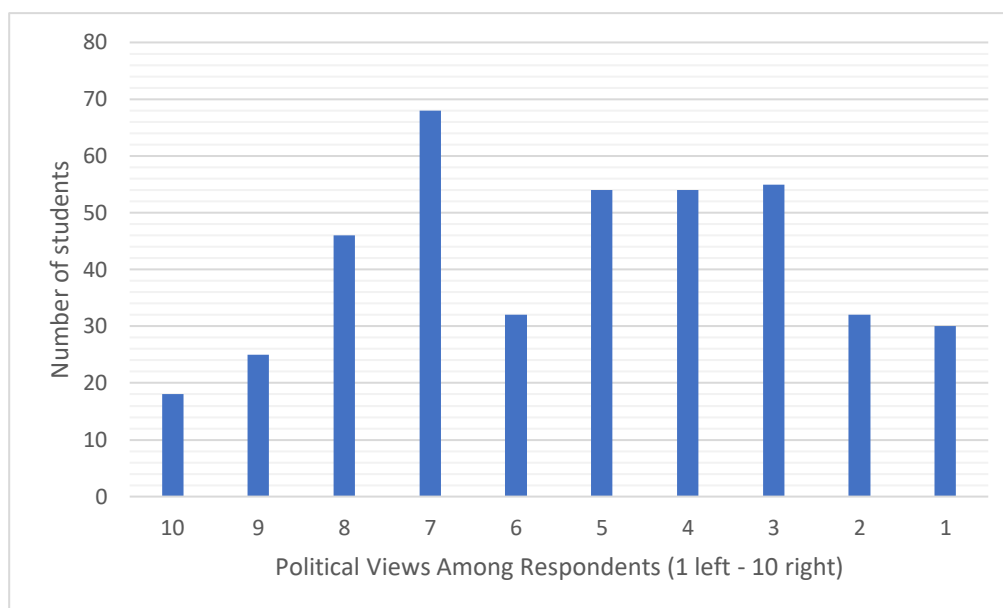


Table 11. The political views of respondents regarding sustainable consumption practices

Table 12 also depicts the distribution of school affiliation of the respondents. Total of 417 responses were included in this analysis. To ensure validity, all responses with missing values were deleted. Additionally, no outliers were detected.

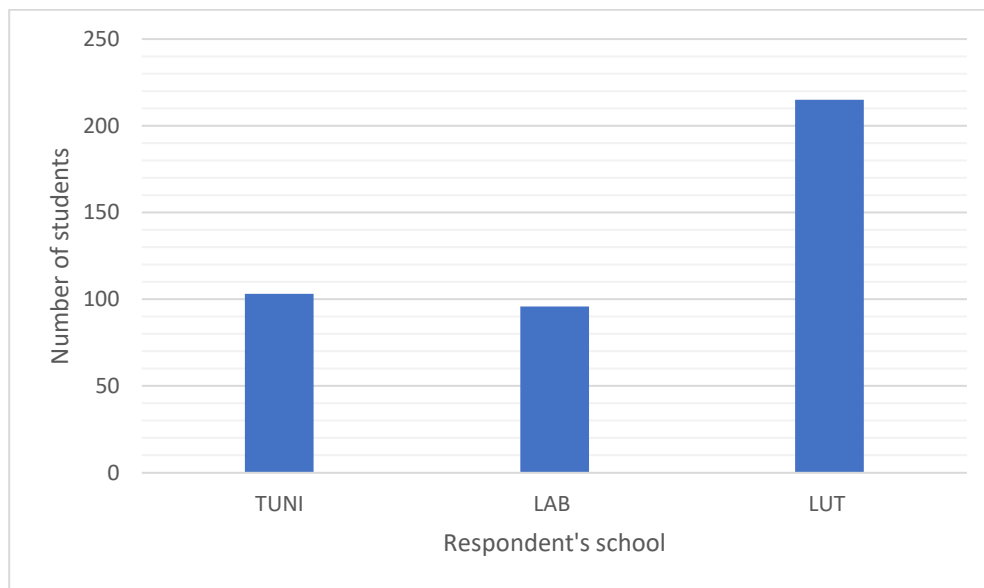


Table 12. The school distribution of respondents regarding interest in sustainable consumption practices

4.2.2 Variable Screening

Skewness and kurtosis were also used to test data's normal distribution. There were also some kurtosis issues, as with the previous dataset, with some of the variables. A square root transformation was used to reduce the kurtosis. Subsequently, no variables exhibited abnormal distributions except for Age and the variable NEP1, which had kurtosis statistics of 3.793 and 2.350, respectively. Values for the respondents' age can be explained by the nature of respondents' ages, as most Finnish university students fall into the age bracket of 20 - 30. It was also decided to leave the NEP1 variable, as it didn't exceed the threshold of 2.0 standard deviations too much, although this should be remembered in the future analysis of this study. The skewness and kurtosis values are provided in appendix 3.

4.2.3 Exploratory Factor Analysis (EFA)

An EFA was run on the initial 26 items corresponding to the 6 variables used in the analysis. Principal Axis Factoring was chosen for the factor extraction with a varimax

rotation. First the communalities of the solutions were analyzed. Items NEP4, EK1, DEP4 and BFC1 were removed due to their low values in communality, being lower than the threshold 0.2. Proceeding with the EFA, also items SUB4, NEP1, DEP1 and BFC2 were removed due to insufficient criterias such as low loadings falling below the accept criteria of 0.3 regarding the sample size of 400 (Metsämuuronen, 2005), and two-cross loading. During the analysis, SUB3 had a substantially low communality but removing it resulted in a rotated factor matrix only loading 5 factors with BFC items loading with the environmental concern items as an one factor. It was decided that SUB3 was to be kept as it still had loading value of over 0.3. Altogether a total of 6 factors were loaded in the analysis from 18 remaining items. Remaining items all loaded between values 0.318 – 0.814. Each factor's eigenvalue was greater than 1.0 and loaded between values 1.534 – 2.688. Also variances for the factors were between 58,78% - 82,4% indicating good total representation. All of the factors of the present study had at least a Cronbach Alpha value of 0.6489 or above, implying a sufficiently reliable internal consistency. Bartlett's test of sphericity was utilized to assess sufficiency of correlations among the items in each of the extracted factors. Each factor posited a statistically significant value of below 0.05. A Kaiser-Meyer-Olkin test was used to determine the adequacy of the sample for a factor analysis. All of the present factors, except one, had a value greater than 0.6. The one factor, namely Subjective Norm, had a value of 0.561. A value greater than 0.6 is deemed sufficient by Metsämuuronen (2005). Gliner et al. (2016) suggests that a value above 0.5 can also be deemed acceptable. For the overall model, the KMO value is above 0.50, indicating that the sampling adequacy criterion is met with p value being lower than threshold 0.05. Additionally, the Bartlett test of sphericity is statistically significant so it demonstrates that our correlation matrix is statistically distinct from an identity matrix, as expected. Therefore, it was concluded that the present model did not require any modifications and the analysis could be conducted. Thus the remaining 18 items loaded into six-factor solution is explaining 54.9% variance of the total variance. The findings from the exploratory factor analysis indicate that our factors demonstrate good overall validity. To further validate these findings, we employed confirmatory factor analysis (CFA), which will be discussed next. Table 13 shows detailed values of EFA regarding interest in sustainable consumption practices.

Construct	Items	Hypothesis Category	Factor Loading	Variance Extracted (%)	KM O	Cronbach's Alpha (α)	Eigenvalue
Attitude	ATT1	Hypothesis 3	0.651	56.30%	0.795	0.774	2.688
	ATT2		0.732				
	ATT3		0.796				
	ATT4		0.432				
Subjective Norm	SUB1		0.734	59.78%	0.559	0.648	1.793
	SUB2		0.792				
	SUB3		0.322				
Environmental Concern	DEP2		0.603	57.69%	0.729	0.749	2.308
	NEP2		0.718				
	DEP3		0.792				
	NEP3		0.398				
Perceived Control Behavioral	PBC1		0.627	66.81%	0.657	0.737	2.004
	PBC2		0.812				
	PBC3		0.643				
Environmental Knowledge	EK2		0.694	76.67%	0.500	0.695	1.534
	EK3		0.688				
SCP	BFC3		0.597	81.76%	0.500	0.777	1.635
	BFC4		0.789				

Table 13. Detailed values of the EFA

4.2.4 Confirmatory Factor Analysis (CFA)

Initially the items and factors identified from the EFA had a relatively good model fit, as it has Chi-square = 241, Degrees of freedom = 120, Relative Chi / Df = 2.00, CFI = 0.954, IFI = 0.954; RMSEA = 0.053. Although RMSEA had a higher value than the threshold 0.05. However, the model had complications with poor loadings, reliability and convergent validity issues with CR values lower than the threshold 0,7 and AVE values lower than threshold 0.5. Thus, items SUB3 was removed from the factor Subjective

Norm. Corresponding items had poor loading of 0.27. NEP3 had also lower standardized factor loading of 0.6 as it had 0.45. The item was deleted. Table X summarizes the final CFA model results. Final CFA model had acceptable fit statistics, as it follows Chi-square = 193, Degrees of freedom = 89, Relative Chi / Df = 2.16, CFI = 0.958, IFI = 0.959; RMSEA = 0.053. However, the model didn't have the same reliability and convergent validity issues as the prior model.

Construct	Items	Category Hypothesis	Standardized Factor Loading	Average Variance Extracted (AVE)	Composite Reliability	t-value
Attitude	ATT1	Hypothesis 3	0.73	0.571	0.841	12.912
	ATT2		0.86			14.463
	ATT3		0.75			13.184
	ATT4		0.68			***
Subjective Norm	SUB1		0.91	0.670	0.800	8,315
	SUB2		0.71			***
Environmental Concern	DEP2		0.60	0.560	0.789	11.559
	NEP2		0.80			14.901
	DEP3		0.83			***
Perceived Control Behavioral	PBC1		0.63	0.523	0.761	10.192
	PBC2		0.90			10.335
	PBC3		0.60			***
Environmental Knowledge	EK2		0.84	0.554	0.709	7.670
	EK3		0.64			***
SCP	BFC3		0.77	0.651	0.788	13.459
	BFC4		0.85			***
Model Fits Statistics	$\chi^2 = 193$; $df = 89$; Relative $\chi^2 = 2.16$; CFI = 0.958; IFI = 0.959; RMSEA = 0.053.					

Table 14. Detailed values of CFA in regarding interest in sustainable consumption practices

Table 15 summarizes the validity concerns of the model. The model has good convergent validity as all of the standardized factor loadings were above 0.6 and also all of the factors

had AVE above 0.50 with the lowest value being 0.523 in PBC factor. Also all of the MSV were lower than their respective AVE for all the factors.

	CR	AVE	MSV	ASV
EK	0,709	0,554	0,198	0,119
ATT	0,841	0,571	0,392	0,228
SUB	0,800	0,670	0,147	0,112
EC	0,789	0,560	0,406	0,182
PBC	0,761	0,523	0,193	0,102
SCP	0,788	0,651	0,406	0,223

Table 15. Validity concern of the model

Fornell & Lacker (1981) criteria was used to establish discriminant validity (see Table 16). From the model extracted from EFA, two items were dropped concluding to final remaining 16 items.

EK	ATT	SUB	EC	PBC	SCP
0,744					
0,445	0,755				
0,282	0,384	0,819			
0,201	0,523	0,369	0,748		
0,439	0,361	0,225	0,229	0,723	
0,293	0,626	0,382	0,637	0,291	0,807

Table 16. Discriminant validity of the model

4.2.5 Structural Equation Modeling (SEM)

Results for the Structural Equation Model estimates overall a good fit with the data and the model, as it follows Chi-square = 247, Degrees of freedom = 109, Relative Chi / Df = 2.26, CFI = 0.950, IFI = 0.951; RMSEA = 0.055.

Hypothesis H3a - H3e – analyses effects of factors attitude, subjective norm, perceived behavioral control, environmental knowledge and environmental concern on the individuals interest in sustainable consumption practices utilizing the Theory of Planned Behavior.

Hypothesis H3a – Individual’s attitudes positively contribute to their interest in sustainable consumption practices.

Hypothesis 3a is accepted given that the p-value is below 0.05. The positive standardized estimate of 0.50 suggests a positive relationship between attitude and interest in sustainable consumption practices. Specifically, a one-unit increase in attitude corresponds to a 0.50-unit increase in intention. Comparing the standardized estimates of the antecedents reveals that attitude has the strongest positive association with interest in sustainable consumption practices.

Hypothesis H3b – Individual’s subjective norms positively contribute to their interest in sustainable consumption practices.

The positive standardized estimate of 0.10 suggests a positive relationship between subjective norm and interest in sustainable consumption practices. Specifically, a one-unit increase in attitude corresponds to a 0.10-unit increase in intention. Hypothesis 3b is confirmed as the p-value is below 0.05.

Hypothesis H3c – Individual’s environmental knowledge positively contributes to their interest in sustainable consumption practices.

The positive standardized estimate of 0.025 suggests a positive relationship between environmental knowledge and interest in sustainable consumption practices. Specifically, a one-unit increase in attitude corresponds to a 0.025-unit increase in intention. Environmental knowledge had the lowest one-unit increase of the corresponding factors. However, hypothesis 3c was rejected as the p-value is above 0.05 at 0.777.

Hypothesis H3d – Individual’s perceived behavioral control positively contributes to their interest in sustainable consumption practices.

The positive standardized estimate of 0.004 suggests a positive relationship between subjective norm and interest in sustainable consumption practices. Specifically, a one-unit increase in attitude corresponds to a 0.10-unit increase in intention. However, hypothesis 3d was also rejected as the p-value is above 0.05 at 0.947.

Hypothesis H3e – Individual’s environmental concern positively contributes to their interest in sustainable consumption practices.

The positive standardized estimate of 0.454 suggests a positive relationship between environmental concern and interest in sustainable consumption practices. Specifically, a one-unit increase in attitude corresponds to a 0.454-unit increase in intention. Comparing the standardized estimates of the antecedents reveals that environmental concern had the second greatest influence on interest in sustainable consumption practices. Hypothesis 3e is confirmed as the p-value is below 0.05. Also taking into account the effects of control variables, gender had a statistically significant effect on the interest in sustainable consumption practices. The result’s negative estimate suggests that males tend to have lower interest in sustainable consumption practices compared to their females counterparts. Detailed values for SEM has been depicted in the Table 17.

Relationships	Estimates	Standard Error	T-values	P-value	Hypothesis Supported
Hypothesized Relationships					
H3a: ATT → SCP	0.507	0.089	5.706	***	Supported
H3b: SUB → SCP	0.108	0.055	1.964	0.050	Not
H3c: PBC → SCP	0.04	0.066	0.066	0.947	Supported
H3d: EK → SCP	0.025	0.090	0.283	0.777	Not
H3e: EC → SCP	0.454	0.071	6.396	***	Supported
Control Variables					
Gender for H3	-0.320	0.089	-3.594	***	
Political Vie H3	-0.13	0.018	-0.684	0.494	
Squared Multiple Correlation					
BFC	0.562				
Model Fit Statistics	$\chi^2 = 247$; $df = 109$; Relative $\chi^2 = 2.26$; CFI = 0.950; IFI = 0.951; RMSEA = 0.055.				

Table 17. Detailed values for SEM

5 Discussion and Conclusion

In this final chapter, the study's findings are analyzed to demonstrate their relevance to the research questions. Subsequently, both the theoretical and practical implications of the study are discussed. Finally, the chapter concludes with an assessment of the study's limitations and offers recommendations for future research. The primary objective of this study was to enhance comprehension of consumer behavior within the realm of sustainable consumption. Employing a dual approach, the research delved into two key aspects: consumer sustainable behavior and consumer interest in sustainable consumption

practices. Data were collected through an online survey, and the findings of each investigation will be delineated in separate sections. The initial section will focus on analyzing consumer sustainable behavior, while the subsequent section will elucidate findings regarding consumers' interest in embracing sustainable consumption practices.

5.1 Research Findings

This study's results indicate significant positive relationships between attitude, subjective norm, perceived behavioral control, environmental concern, and environmental knowledge on Finnish university students' sustainable behavior, particularly in relation to attitude and environmental knowledge. Additionally, students' egoistic and biospheric values had a positive influence on their environmental concern. In terms of sustainable consumption practices, both attitude and environmental concern had a positive influence. The effects of environmental knowledge, perceived behavioral control, and subjective norm were not statistically significant. Figures 9 and 10 demonstrate the results of this study. Therefore, these findings allow us to answer the research questions posed in the first chapter of this study.

Regarding research *question 1*, Figure 9 illustrates that Attitude, Subjective Norm, Perceived Behavioral Control, Environmental Knowledge, and Environmental Concern all positively affect Finnish university students' Sustainable Behavior.

For research *question 2*, Figure 9 shows that Egoistic and Biospheric values positively influence university students' Environmental Concern.

Lastly, concerning research *question 3*, Figure 10 demonstrates that Attitude and Environmental Concern positively influence university students' Sustainable Consumption Practices.

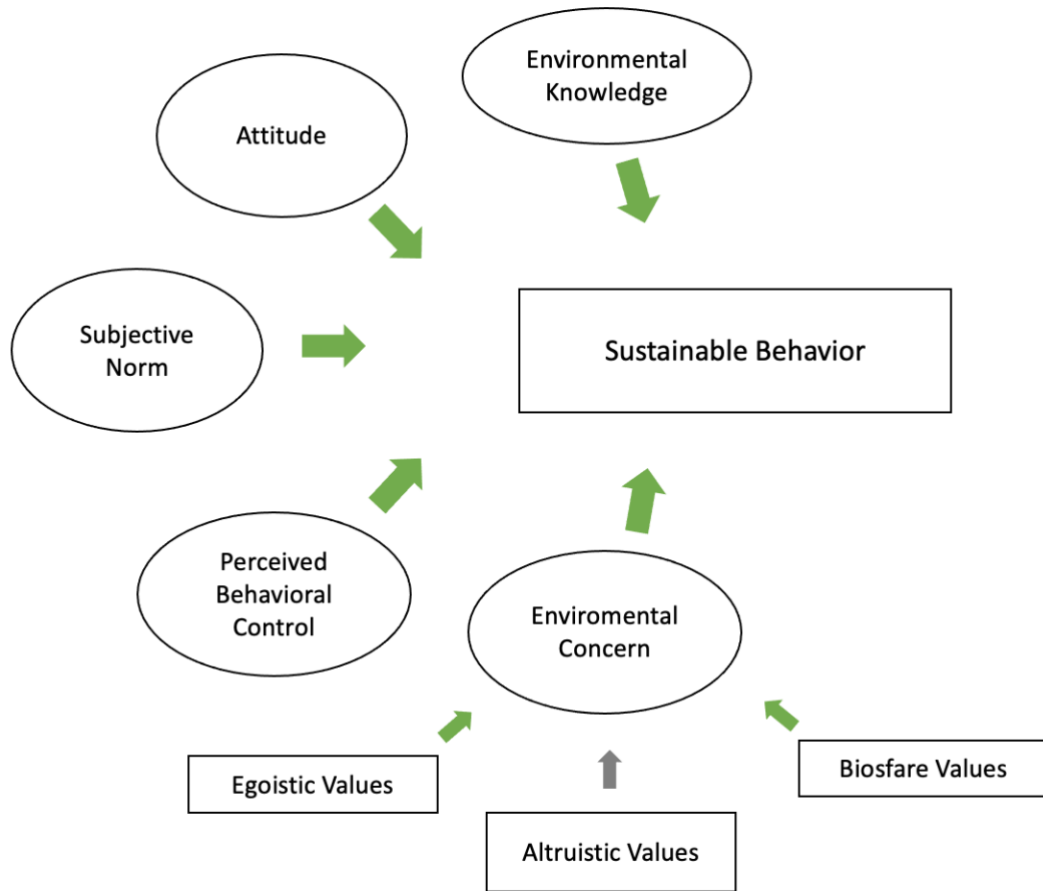


Figure 9. Results of the first and second research questions of the study.

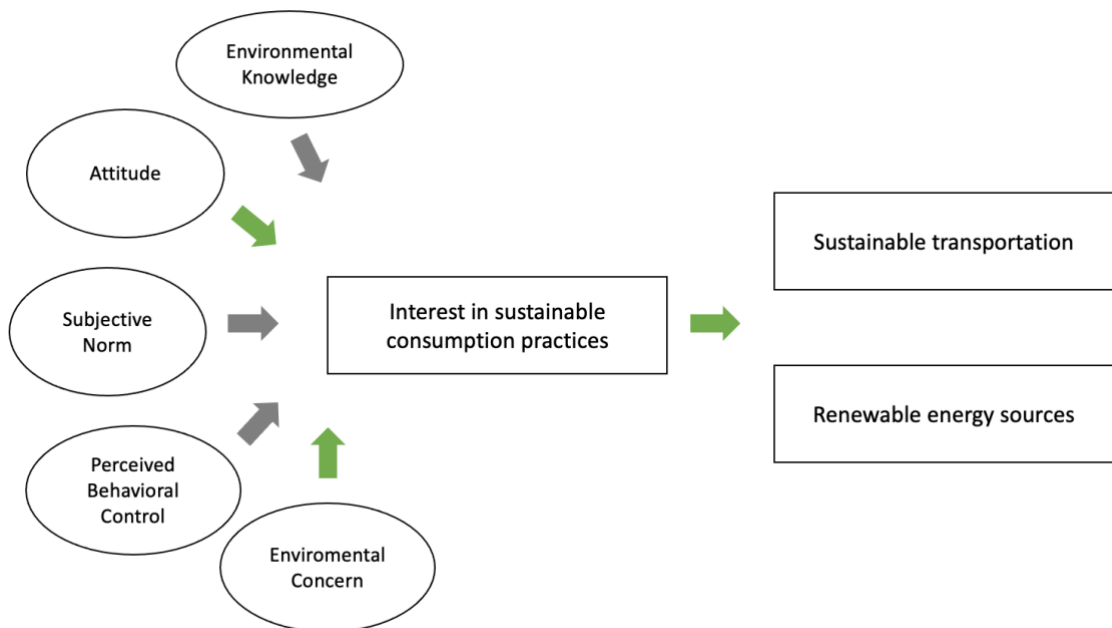


Figure 10. Results of the third research question of the study.

5.2 Results of Sustainable Behavior

It is noteworthy to mention that during the analysis, the intention variable was excluded because it loaded into the same factor as the behavior variable. Thus, it is important to note that Hypothesis 1f was deleted due to intention and factor loading into one factor. Therefore, the focus of the study is on sustainable behavior, excluding the effects of intention. Additionally, regarding altruistic values, their values loaded onto both egoistic values and biospheric values, thus the impact of altruistic values has been excluded aso from the focus of this study.

5.2.1 The relationships between Attitude and Sustainable Behavior

The results of the study indicate a positive relationship between attitude and sustainable behavior in Finnish university students. Among all the examined variables, attitude demonstrated the strongest positive association to sustainable behavior. This reaffirms that attitude serves as a critical antecedent to sustainable behavior because it encompasses an individual's readiness, assessments, and evaluations of outcomes related to sustainability. Favorable attitudes towards sustainable practices enhance the likelihood of individuals engaging in these behaviors, driven by their positive perceptions and evaluations of the benefits associated with sustainable actions. This result is also in line with the prior research that has emphasized the significance of attitude as a determinant of behavior (Nguyen et al., 2016; Tanner and Kast, 2003; Brandão & Costa, 2021; Paul et al., 2016) and Ajzen's Theory of Planned Behavior (1991) as it is one of the three main predecessors that influence individual's behavioral intentions, which in turn predict actual behavior.

5.2.2 The relationships between Subjective Norms and Sustainable Behavior

The results of the study indicate a positive relationship between subjective norms and sustainable behavior in Finnish university students. This indicates that perceived social expectations of university students from their social circle (such as family, friends, or society itself) are significantly associated with their sustainable behavior. These results also are in line with the prior literature regarding subjective norms' positive association with consumers' sustainable consumption (Vermeir & Verbeke, 2008; Naveed et al., 2020) and university students' intentions to engage in environmentally responsible behavior (Swaim et al., 2014). In the context of the Theory of Planned Behavior (TPB), this highlights the role of social factors in shaping behavioral intentions and actual behaviors.

5.2.3 The relationship between Perceived Behavioral Control and Sustainable Behavior

The results of the study indicate a positive relationship between perceived behavioral control and sustainable behavior in Finnish university students. This demonstrates that students' perception of their ability to perform sustainable behavior is positively associated with their likelihood of actually engaging in that behavior itself. These results also reflect prior research findings in which PBC has had positive influence on both sustainable behavior intention and behavior itself (Zhu et al., 2020; Ahmed et al., 2021; Shin et al., 2018). Theory of Planned Behavior emphasizes the influence of PBC regarding its position to affect a behavior by their perception of their control over their actions.

5.2.4 The relationship between Environmental Knowledge and Sustainable Behavior

The results of the study indicate a positive relationship between environmental knowledge and sustainable behavior in Finnish university students. Table 10 shows that environmental knowledge had the second strongest positive association with sustainable behavior among university students. This demonstrates that individuals who possess a deeper understanding of environmental issues are better equipped to make informed decisions and engage towards sustainable behavior. This is in line with the prior research that have acknowledged the role of environmental knowledge in sustainable behavior in recent years (Yadav & Pathak, 2016; Lin and Ni, 2018; Amoako et al., 2020) and it's connection to university students sustainable consumption (Janmaimoo & Khajohnmanee, 2019; Al-Naqbi & Qasim, 2018; Ahamad and Mariani, 2018). Assessing previous research it seems that university students tend to have more environmental knowledge compared to a regular consumer due to factors such as access to formal education, more resources through school and peer influence within the academic environment. Access to higher education can introduce students to a wide range of sustainable topics such as environmental issues and climate change, leading to increased awareness.

5.2.5 The relationship between Environmental Concern and Sustainable Behavior

The results of the study indicate a positive relationship between environmental knowledge and sustainable behavior in Finnish university students. These findings reflect that Finnish university students' increased concern for the environment and commitment in protecting it translates to a more sustainable behavior. This correlates with the recent research finding stating that environmental concern plays a crucial role in decision-making progress and in precursor for pro-environmental behavior (Liao et al., 2020; Yadav & Pathak, 2016).

5.2.6 The relationship between Egoistic Values and Environmental Concern

The results of the study indicate a positive relationship between egoistic values and environmental concern in Finnish university students. Egoistic values are often motivated by personal gain and self-interest, and when individuals assess environmental issues as directly affecting their well-being, they are more likely to prioritize environmental concerns. Motivational factors could be for example financial implications through direct costs and savings and health implications as direct health effects such as environmental pollution and quality of life. These results are supported by the prior research on individuals' values acting as a predictor for their socio-psychological factors (Stern and Dietz, 1994). Furthermore, these results are in contrast with the prior research stating that egoistic values don't have significant influence on individuals' attitudes and willingness in sustainable behavior (Chakraborty et al., 2021; Nguyen et al., 2016). It is noteworthy to acknowledge that the inclusion of the impact on respondents' families within the construct of egoistic values in this study may introduce a nuanced perspective distinct from that of prior research on egoistic values. The incorporation of family influence into the framework of egoistic values may potentially alter the rationale underlying the relationship observed in this study. Specifically, the influence of family dynamics may affect egoistic values with elements of altruistic consideration, thereby modifying the interpretation of the construct within this research context.

5.2.7 The relationship between Biospheric Values and Environmental Concern

The results of the study indicate a positive relationship between biospheric values and environmental concern in Finnish university students. It is noteworthy to acknowledge that the inclusion of the effects on respondents' altruistic values, such as considerations for upcoming generations and the welfare of humanity as a whole, within biospheric values in this study introduces a different perspective distinct from that of prior research. The incorporation of altruistic values may reshape the interpretation of biospheric values

within this research context, emphasizing a broader concern for humanity, nature and all living things. Thus these results indicate that Finnish university's students' new biospheric values rooted in appreciation for nature, humanity and all living things are associated positively with their environmental concerns. This is in line with the prior research, where biospheric values have had more impact on individuals' attitudes toward environmental protection, and willingness to participate in sustainable activities (Chakraborty et al., 2021; Nguyen et al., 2016).

5.3 Results of Interest in Sustainable Consumption Practices

It is noteworthy to mention that during the analysis, two of the original sustainable consumption practices (organic food and second-hand clothing) were excluded due to insufficient data. Thus, the remaining sustainable consumption practices, public transportation and renewable energy resources, are the focus of this study. Therefore, all of the following references to sustainable consumption practices concern these two consumption practices.

Despite the increasing awareness among consumers regarding environmental and social issues regarding consumption practices, there persists a tendency to continue consuming these practices. This phenomenon may be attributed to various barriers that hinder consumers from developing an interest in sustainable consumption practices. Therefore, this paper addresses a gap in the literature on sustainable consumption by exploring the barriers that play a significant role in predicting interest in consuming sustainable consumption practices. This investigation is conducted by examining the relationship between barriers and the Theory of Planned Behavior (TPB) framework. The study contributes to the TPB framework by including two more factors: Concern and Knowledge.

5.3.1 The relationship between Attitude and the interest in Sustainable Consumption Practices

The results of the study indicate a positive relationship between attitude and the interest in sustainable consumption practices in Finnish university students. This indicates that those who have favorable views and positive evaluations of sustainable practices are more likely to be interested in engaging with and supporting sustainable businesses, namely public transportation and renewable energy sources. These findings provide further support for the current theoretical framework that posits that pro-environmental attitudes predict the interest in sustainable consumption practices. This aligns well with prior research that suggests a similar relationship. A 20-year meta-analysis by Bamberg and Möser (2007) showed that pro-environmental attitudes are positively correlated with the intention to utilize public transport. Moreover, Heath and Gifford (2002) showed that all the five variables of the extended TPB, including attitudes, serve as significant predictors of individuals' intentions to use it. Prior research provides similar alignment in regards to the usage of renewable energy sources as well. It has been shown that positive attitudes significantly predict the acceptance of solar and wind power (Sovacol & Ratan, 2012). Moreover, Bang et al. (2000) applied the Theory of Reasoned Action to investigate individuals' attitudes towards renewable energy. They found that pro-environmental attitudes significantly predict renewable energy use.

5.3.2 The relationship between Subjective Norms and the interest in Sustainable Consumption Practices

The results of the study indicate no significant relationship between subjective norms and the interest in sustainable consumption practices. These results imply that the social pressure or influence from peers, family, and society does not play a significant role in influencing Finnish university students' interest in sustainable consumption practices. Students' decisions to engage with sustainable consumption practices are not affected by whether they believe others think they should or should not engage in these behaviors.

5.3.3 The relationship between Perceived Behavioral Control and the interest in Sustainable Consumption Practices

The results of the study indicate no significant relationship between perceived behavioral control and the interest in sustainable consumption practices. This implies that Finnish university student's perception of whether they have the needed resources to engage in sustainable consumption practices doesn't influence their interest in these consumption practices.

5.3.4 The relationship between Environmental Knowledge and the interest in Sustainable Consumption Practices

The results of the study indicate no significant relationship between environmental knowledge and the interest in sustainable consumption practices. This indicates that being well-informed about current environmental issues and aware of the environmental labels and symbols does not correlate Finnish university students' interest in sustainable consumption practices.

5.3.5 The relationship between Environmental Concern and interest in Sustainable Consumption Practices

The results of the study indicate a positive relationship between environmental concern and the interest in sustainable consumption practices. This indicates that those who have considerable concerns for the welfare of the environment are more likely to be interested in consuming the products and services of sustainable businesses. This finding is in alignment with prior research that supports the current theoretical framework. The findings of Heath and Gifford (2002) that showed that all the five variables of the extended TPB, including environmental concern, serve as significant predictors of individuals'

intentions to use public transport is aligned with the current findings. Furthermore, prior research indicates that environmental concern strongly predicts consumers' intentions to employ solar power (Wolske et al., 2017).

5.4 The relationships of Gender and Political View on Sustainable Behavior and Sustainable Consumption Practices

Regarding the control variables of this study, Gender and Political views, only Gender had significant influence on university students' interest in sustainable consumption practices indicating that males tend to have lower interest in sustainable consumption practices compared to their females counterparts. These results are in line with the previous researchers stating that women are more attentive to the ecological and ethical aspects of products and exhibit more environmentally friendly attitudes (Gifford & Nilsson, 2014). Also Political Views had a significant influence on university student's environmental concerns. The result's positive estimate suggests that the more university students' environmental concern increases the more political views become more right-leaning. These results are in contradiction with the previous research. Gifford and Nilsson (2014) assert that people with conservative political views tend to be less worried about environmental issues, whereas those with liberal political views are more likely to engage in eco-friendly actions when they encounter environmental degradation. Although it should be noted that in Finland the political divide is not as obvious due to the presence of many parties, which suggests that the division may not be as divided.

5.5 Theoretical Contribution

This study has several contributions to the research of environmental behavior and sustainable consumption practices. Firstly, these findings contribute to the existing body of literature. By providing further evidence to support prior results associated with the Theory of Planned Behavior in regarding predicting behavior, specifically in the realm of pro-environmental behavior. The results emphasize the effectiveness of the Theory of

Planned Behavior, as all of its original constructs had a significant positive relationship with sustainable behavior. Also this study proposes a new extended theoretical model by utilizing Ajzen's Theory of Planned Behavior by adding two new constructs of environmental concern and environmental knowledge, which has also positively influenced Finnish university student's sustainable behavior. This study also examines the impact of university students' value systems on their environmental concern, adapting previous research frameworks by Stern (1999) and Schultz (2000). The results indicated that students' egoistic and biospheric value systems positively influenced their environmental concern. Thus, demonstrating that the mentioned research metrics are suitable for measuring consumers' value systems concerning their environmental concern. Furthermore, this research added to the current body of theoretical literature by suggesting a new theoretical framework to assess the relationship between the aforementioned TPB variables, environmental knowledge, environmental concern and the interest in sustainable consumption practices. The findings provide valuable insight into the efficacy of TPB as a means of assessment of interest in sustainable consumption practices. Moreover, the findings also point out some limitations of TPB as an explanatory as two out of three of the original set of TPB constructs did not show a significant relationship with interest in sustainable consumption practices. This implies that even though TPB is a well-established theoretical framework, it cannot be directly applied to all sustainability related topics.

5.6 Practical Implications

This study provides practical insights by identifying the factors influencing Finnish university students' sustainable behavior and interest in sustainable consumption practices. These findings can give green brand practitioners in adapting more effective strategies to promote consumers' motivations and behaviors towards purchasing green brands and sustainable practices. Green brand practitioners can utilize these findings in their brand messaging and marketing campaigns. By addressing university student's specific concerns and motivations concluded in the study, practitioners can utilize strategies that direct to the preferences and behaviors of this collective target group of this study, thus contributing

to the positive sustainable change in consumption and environmental outcomes. As university students transition to adulthood and become independent members of society, they will gain greater significance for marketers and policymakers. They will hold major decision-making power regarding societal consumption and behavior patterns, as they have experienced the consequences of past and present decisions. University students will be pivotal stakeholders, significantly driving behavioral changes in the near future. Also, analyzing university students' behavior is essential because constructing a sustainable society is closely tied to universities and higher education institutions. These institutions play an essential role in generating knowledge and innovation through academic research, student involvement, and social impact assessments.

Also this study shows that both Finnish university student's egoistic and biospheric values have a positive influence on their environmental concerns. Policymakers can make environmental policies that will appeal to individuals that have values rooted in both egoistic and biospheric values, such as incorporating policies that will apply cost savings or health benefits, with the long-term benefits for the environment and society. These benefits could be mitigating climate change or preserving biodiversity. By providing information on how sustainable behavior and sustainable consumption practices can align with personal interests and benefits, policymakers can promote and encourage more motivation to act sustainably.

5.7 Limitations and Future Research

To interpret the findings of this study it is essential to be aware of its limitations. This study had several limitations to the generalizability of the findings. Firstly, the homogenous nature of the sample limits the applicability of the results to the broader population. All the participants were recruited from only three educational institutions in Finland. Meaning, one needs to be cautious when applying these results to another environment or subpopulation. Similar homogeneity applies to the age range and educational background of the participants. The participants' age range was predominantly between 20 and 30, and they were all students of an institution of higher

education. This means that all of the participants represent a specific subpopulation that is, on average, more educated than the general population. Thus, their views and attitudes towards sustainability may differ from those of the rest of the population due to their higher exposure to pro-environmental information in university. Furthermore, this research is vulnerable to biases related to survey research. The participants' responses to the survey items may be influenced by biases such as the social desirability bias. This refers to the tendency to answer survey items in a way that is viewed favorable by others (Bryman, 2012). Environmental topics are among the most pressing talking points in today's politics, so social desirability may influence participants' responses. Lastly, the effects of intention and altruistic value variables were excluded from the analysis due to their items' strong loadings on other variables. Also, sustainable consumption practices focus on two aspects: sustainable transportation and the use of renewable energy.

This study investigated the relationship between a distinct set of TPB related variables and sustainable behavior. Future research ought to be conducted with further TPB related variables. For instance, this could entail the assessment of the role of psychological and personality traits in sustainable behavior. Moreover the inclusion of participants from a broader set of demographics and various socioeconomic status would increase the generalizability of the current body of knowledge. It may well be that proclination towards sustainable behavior and interest in sustainable consumption practices varies greatly between different ages and life situations. Thus, further research should be carried out to understand the potential complexities of these variables.

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APPENDIX

Factors	Questions	Sources
Attitude	I believe that purchasing environmentally friendly products is an essential way to conserve natural resources and mitigate harmful environmental impacts, such as waste and pollution. I believe that my decision to purchase environmentally friendly products has a positive impact on both the environment and society. I believe that by choosing to purchase environmentally friendly products, I contribute to the conservation of natural resources. I feel good about myself when I choose environmentally friendly products.	Van Biergelen, Semengi et al. (2011) Do valle et al. (2005)
Subjective Norm	I feel that my friends expect me to commit to buying environmentally friendly products. I feel that my family expects me to commit to buying environmentally friendly products. I feel that society expects me to commit to buying environmentally friendly products. People can trust that I am committed to doing my part in promoting environmentally friendly products.	Vermeir and Verbeke (2008)
Perceived Behavioral Control	I have the ability to acquire environmentally friendly products if I choose to do so. I am capable of purchasing environmentally friendly products. I have financially sufficient resources to acquire environmentally friendly products.	Elhoushy (2020)
Environmental Knowledge	I consider myself well-informed in current environmental issues. I have the capability to choose products that mitigate environmental impact. I am knowledgeable about environmental labels and symbols on products.	Mostafa (2006)
Environmental Concern	Humans were meant to rule over the rest of nature. (DPS) The balance of nature is strong enough to cope with the impacts of modern industrial nations. (DPS) The so-called "ecological crisis" facing humankind has been greatly exaggerated. (DPS) The earth has plenty of natural resources if we just learn how to develop them. (DPS) The earth is like a spaceship with very limited room and resources. (NPS) If things continue on their present course, we will soon experience a major ecological catastrophe. (NPS) The balance of nature is very delicate and easily upset. (NPS) We are approaching the limit of the number of people the earth can support. (NPS)	Dunlap et al. (2002)
Values Bases of Environmental Concern	Egoistic values – My lifestyle / Health / Future. Altruistic values – My family / Future generations / All humanity. Biosphere values – Animals / Plants / All living things.	Schultz (2000)
Intention	I intend to acquire environmentally friendly products in the future. I intend to consider the environmental and social impacts of the product in my next purchase.	Chen (2013) Ajzen (1991)
Behavior	In the last three months, I have purchased eco-friendly products over non-eco-friendly products when their features have been similar. In the last three months, I have consciously bought environmentally friendly products. In the last three months, I have consciously bought eco-friendly products, even if they were more expensive than non-eco-friendly ones.	Jaiswal & Kant (2018) Shrum et al. (1995)

Appendix 1. All the items related to sustainable behavior and their sources

Skewness Kurtosis

Statistique Statistique

Gender	.324	-1.904
Age	1.444	3.890
ATT2	1.363	1.782
ATT3	1.258	1.399
ATT4	1.258	1.113
SUB1	-.284	-1.127
SUB2	-.433	-.909
SUB3	.578	-.630
SUB4	.891	.580
DEP1	.539	-.724
DEP3	1.276	1.142
NEP3	.482	-.498
DEP4	-.057	-.888
NEP4	.962	.389
PBC1	1.417	1.762
PBC2	1.340	1.493
PBC3	.074	-1.259
EGO1	.048	-.849
EGO2	.144	-.959
EGO3	.768	-.106
ALT1	.264	-.929
ALT2	1.524	1.764
ALT3	1.115	.705

BIO1	1.291	1.033
BIO2	1.112	.453
BIO3	1.111	.505
EK1	1.076	1.119
EK2	.918	.625
EK3	.893	.223
INT1	.959	.530
INT2	.826	.051
BEH1	.844	-.288
BEH2	.671	-.880
BEH3	.158	-1.362
Political	.033	-.988
ATT1NEW	1.329	1.577
NEP1NEW	1.594	2.438
NE2NEW	1.113	.749
DEP2NEW	1.094	.697

Appendix 2. Skewness and kurtosis of items related to sustainable behavior

Skewness Kurtosis

Statistique Statistique

Gender	.297	-1.921
Age	1.440	3.793
ATT2	1.354	1.725
ATT3	1.274	1.496
ATT4	1.244	1.071
SUB1	-.295	-1.114
SUB2	-.436	-.903
SUB3	.579	-.619
SUB4	.885	.552
DEP1	.531	-.694
DEP3	1.261	1.081
NEP3	.475	-.507
DEP4	-.061	-.886
NEP4	.965	.385
PBC1	1.401	1.703
PBC2	1.331	1.443
PBC3	.084	-1.258
EK1	1.062	1.027
EK2	.922	.642
EK3	.881	.188
BFC1	.808	-.084
BFC2	1.134	.251
Political	.026	-.992

ATT1NEW	1.315	1.510
NEP1NEW	1.580	2.350
NEP2NEW	1.087	.672
DEP2NEW	.933	1.178
BFC3	1.342	1.061
BFC4	1.208	.816

Appendix 3. Skewness and kurtosis of items related to interest in sustainable consumption practices