Fostering Sustainable Fashion Consumption: The Influence of University Education on Students

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ABSTRACT,
Nowadays, there is a growing interest in fostering sustainable fashion consumption due to the threats of climate change and increasing awareness of environmental responsibility. Even though many universities have integrated sustainability into their teaching programs, it remains to study how different education factors foster sustainable fashion consumption among students. The goal of this study is to investigate how students' sustainable fashion consumption is influenced by educational elements. Elements include "Active on-and off-campus activities" and "Academic program adaptions". Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology was utilized to examine the relationship between selected sustainability educational components and students' sustainable fashion consumption. All data was collected by an online structured survey from the Netherlands. 100 valid responses were analyzed with the SmartPLS4 software. This study confirmed the statistically significant impacts of specific educational elements on fostering sustainable fashion consumption, namely "Active on-and off-campus activities" and "Academic program adaptions". Students' cultural background acts as a moderator in influencing students' sustainable fashion consumption behaviors. This study makes theoretical and practical implications, by adding knowledge and insights to the sustainability education and fashion field. The result confirms the importance of specific sustainability educational elements – "Active on- and off-campus activities" and "Academic program adaptations" - in promoting sustainable fashion consumption among students.

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Sustainable Fashion Consumption, Sustainability, University's Sustainability Education, PLS-SEM

1. INTRODUCTION

1.1 Topic relevance and complication

Due to rising threats from global climate change, the transition to sustainable consumption patterns has become essential in addressing the challenges of global climate change (Shehawy and Ali Khan, 2024). Nowadays, the fashion industry is considered the second industry that creates the most pollution. As the fast-fashion concept has been introduced and led to cheaper prices, fast-fashion products have been consumed faster. Hence, environmental problems arise (Birkocak et al., 2017). Additionally, fast-fashion consumption and sustainability are two conflicting concepts, which is the main reason why the fashion industry has to transform into a more sustainable one and targets to contribute more sustainable consumption (Daukantiene, 2023).

Individual buying behaviors are considered crucial to sustainable consumption, which has a significant meaning in addressing environmental issues (Cao Minh and Nguyen Thi Quynh, 2024). In the fashion industry, it is reported that 72% of university students purchase products from fast-fashion brands, and the increased pace of fast-fashion trends has led to over-consumption and clothing waste (Saunders, 2024). Thus, it is obvious that students' (sustainable or unsustainable) consumption behaviors can make a profound impact on the fashion industry.

Moreover, it is reported that 42% of the students did not acknowledge environmental sustainability and were not motivated to make sustainable consumption in the fashion industry (Birkocak et al., 2017). However, universities are taking a significant role in making influential sustainability education (Dagiliute et al., 2018), by successfully adapting a sustainability education integrating framework into its curriculum (Martínez-Bravo et al., 2024). Although many universities have integrated sustainability into their teaching programs, it is still unclear how different educational factors in the sustainability education framework can further influence students' fashion consumption behavior. Hence, this thesis examines how various elements of the sustainability education framework influence students' sustainable purchasing behaviors in the fashion industry.

1.2 Knowledge gap

A prior literature by Martínez-Bravo et al. (2024) established the framework of six vital educational factors for integrating sustainability into university education. These factors include: 1. Professional Knowledge and experience transfer; 2. Academic programs adaption; 3. Institutional sustainability involvement; 4. Leisure and engagement; 5.Promotion of students' leadership; 6.Active on- and off-campus experiences. While many universities have adapted this framework for integrating sustainability education, research on how each factor impacts students' sustainable fashion consumption behaviors is still lacking. Additionally, the literature from (Martínez-Bravo et al., 2024), invokes that future research should ideally consider different contextual and cultural factors. As research has proved that young adults in other countries with different GDP levels or cultural backgrounds can act variously in the framed fashion sustainable messages (Grappi et al., 2024). Hence, to the best of this study author's knowledge, there is a knowledge gap between the influence of the six factors on students' consistent sustainable consumption behaviors, considering various contextual and cultural backgrounds.

Regarding students' consumption behaviors in the fashion industry, there is massive research examining the socio-cultural influences on the fashion consumption behavior of university students (Chowdhury, 2020; Anyanwu and Chiana, 2022;

Kimemia, 2024). According to recent research (Anyanwu and Chiana, 2022), Culture, Opinion, Leadership, Family, Social Class, and Ethnicity are key social-cultural factors that foster university students' sustainable fashion consumption behaviors. However, the influence of other factors on university students' fashion consumption behavior remains to be studied. Since university sustainability education strongly affects students' perception (e.g., perceived knowledge of sustainability), there remains a research gap in understanding how various educational factors contribute to fostering sustainable fashion consumption behaviors among university students.

1.3 Purpose of study

In essence, due to the established culture of overconsumption leading to an unsustainable environment (Eberling and Langkau, 2024), there is a growing interest in encouraging sustainable consumption within the fashion industry (Gazzola et al., 2020). However, there is an absence of systematic descriptions or models that clearly illustrate how the educational factors from the sustainability education framework influence students' sustainable fashion consumption behaviors. The literature from Martínez-Bravo et al. (2004) established a sustainability education framework encompassing six critical educational factors, yet their research did not explore the integrated impact of these factors on students' sustainable consumption behavior. Additionally, conceptual clarity is absent regarding how cultural and contextual factors modify these educational impacts on sustainable consumption behavior (Martínez-Bravo et al., 2024). Hence, this thesis intends to investigate the relationship between specific educational factors derived from sustainability education frameworks and their influence on students' sustainable fashion consumption behaviors. Furthermore, this study aims to develop an integrated knowledge of educational, cultural, and contextual influences, specifically concentrating on Dutch university students' sustainable consumption behavior. Applying the quantitative method through designing an online structured survey, this thesis will contribute to fulfilling the conceptual gaps identified in prior studies.

1.4 Theoretical positioning

The core theoretical domain that is applied by this thesis is the framework for integrating sustainability education into business degrees (Martínez-Bravo et al., 2024). Six vital factors significantly impact the perceived education of sustainability in university. Out of the six factors, I have chosen to focus on "Active on-and off-campus experiences" and "Academic programs adaption". These two factors are considered critical as they directly engage university students in real-life practical practices (Martínez-Bravo et al., 2024; Gawel et al., 2022), and enhance perceived awareness and values of sustainability (Martínez-Bravo et al., 2024; Wagner et al., 2019). These two factors are hypothesized to be the most influential in fostering sustainable consumption behaviors among students, especially in the fashion industry.

1.5 Research objectives and contributions

As mentioned in the previous section, this study aims to develop an integrated study of the influence of the different sustainability educational factors on students' sustainable fashion consumption behavior. In this thesis, I have chosen two factors and delved into the two factors' impact on students' consumption behaviors. The research question is:

How do components of the sustainability education framework impact students' sustainable fashion consumption?

The key method of collecting data in this study adapts the quantitative method, by designing a standardized online survey. The survey will be sent to students who are currently studying in Dutch universities, aiming to formulate the relationship between education and students' sustainable fashion consumption behaviors. In terms of the context of the study, the context will be in the university setting with sustainability-related programs and courses in the Netherlands, and a primary focus on students who are more fashion-conscious and environmentally aware.

This study is expected to make contributions across the theoretical and practical landscape. This study aims to expand the theoretical understanding of how educational factors, derived from the sustainability education framework (Martínez-Bravo et al., 2024), impact students' sustainable fashion consumption behaviors. It addresses the critical gap by incorporating contextual and cultural factors into the theoretical model and analysis (Figueroa-Garcia et al., 2018; Orellano et al., 2020; Martínez-Bravo et al., 2024). Moreover, this study aims to contribute to the practical field in sustainability education and fashion industry. By providing them insights on the necessity of incorporating education and engaging students in sustainable fashion practice.

2. LITERATURE REVIEW
2.1 Sustainable consumption
In the 21st century, concerns over global climate change and challenges are arising for all human beings. According to a recent study (Daukantiene, 2023), individual consumer behaviors are defined as having significant impacts on our living environment. The progress and result of consumer behavior patterns are identified to have a major impact on various environmental factors (e.g.: renewable energy usage, global warming). Hence, fostering individual sustainable consumption is necessary to address the current ecological challenges.

Moreover, moving forward to sustainable consumption patterns aligns with achieving the 17 Sustainable Development Goals (SDGs), which researchers have attempted and utilized for sustainability development in society (Eberling and Langkau, 2024). Based on the official website of Sustainable Development Goals (THE 17 GOALS | Sustainable Development, n.d.), the 17 SDGs goals are as follows: 1) No poverty, 2) Zero hunger, 3) Good health and well-being, 4) Quality Education, 5) Gender equality, 6) Clean water and sanitation, 7) Affordable and clean energy, 8) Decent work and economic growth, 9) Industry, Innovation and Infrastructure, 10) Reduced inequalities, 11) Sustainable cities and communities, 12) Responsible consumption and production, 13) Climate action, 14) Life below water, 15) Life on land, 16) Peace, Justice and strong institutions, 17)Partnerships for the goals. Specifically, sustainable consumption is directly linked to several SDGs, such as Goal 12, Goal 13, Goal 14, and Goal 15.

In conclusion, it should be noted that sustainable consumption is essential and crucially important to sustainable development. Sustainability development is a vital concern for industries all over the world (Neumann et al., 2021), and sustainable consumption is the cornerstone of creating a more sustainable living world.

2.2 Importance of sustainable consumption in the fashion industry
Nowadays, the fashion industry is at the center of what concerns sustainability because of its massive impact on the environment (Adamkiewicz et al., 2022). In the EU, clothing consumption is the fourth-largest contributor to CO2 emissions. As a response to environmental issues, the fashion industry is responsible for transforming the industry business model to a more sustainable one.

Within the environmental context, fashion companies have shifted the focus of their sustainable practices, to supply chain management, production, and operations (Bjørnbet et al., 2021). To encourage sustainable consumer engagement within the fashion industry, the strategies are through eco-design of clothing to reduce resource consumption (Garcia-Ortega et al., 2023). Increasing sustainability awareness among fashion companies can contribute significantly to border sustainability goals and address global environmental challenges.

However, the trend of fast fashion brands is considered one of the barriers to fostering sustainability implementation in the fashion industry (Peters et al., 2021). As fast fashion has been introduced over the past decades, clothing prices have decreased whereas mass production has increased (Bhardwaj and Fairhurst, 2010). The major barrier to consumers' sustainable consumption is therefore the relatively higher price for the sustainable product and lack of sustainable consciousness and self-responsibility. This leads to major challenges in engaging more consumers in sustainable fashion consumption.

2.3 Impact of selected sustainability framework factors on sustainable consumption
The literature from Martínez-Bravo et al. (2024) has investigated and developed the framework for integrating sustainability education into business and management degrees. By taking into account the insights from students' perspectives, this framework has successfully proposed a comprehensive framework for smoothly integrating sustainability education into university teaching programs. This framework has been adopted by many universities worldwide. Its border goal is to enhance sustainability education for young adults, which has a long-term positive effect on addressing environmental issues. The two chosen factors for my thesis are Active on- and off-campus activities and Academic program adaptions. The details of these two factors are illustrated as follows:

Active on-and off-campus activities: According to a previous study (Martínez-Bravo et al., 2024), Active on-and off-campus activities contain all activities that promote sustainability, such as internships (Weybrecht, 2021), real-life business simulation games(Gawel et al., 2022), and sustainability group projects (Martínez-Bravo et al., 2024). According to recent research from Muhamad Noor et al. (2024), students can develop the skills of "Interpersonal competence" and "Passion" by attending campus sustainability activities. These abilities are considered to be important catalysts to the development of sustainability competencies and help to make sustainable contributions to society.

Academic programs adaption: According to the findings in a prior study (Martínez-Bravo et al., 2024), Academic program adaptation indicates the adaption of sustainability-related curriculum, elective courses, and educational degrees of students. On top of that, students can gain sustainability knowledge through Knowledge Exchange (Fazey et al., 2013), by working on project-based learning (Fazey et al., 2014), and by contributing to developing innovative objectives of sustainability (Yakar-Pritchard et al., 2024).

In conclusion, students who are acknowledged and trained with sustainable practices from their university, are more likely to make constructive contributions to the environment in the future

(Aleixo et al., 2018). Students who are educated with sufficient knowledge of sustainability responsibility are likely to make sustainable consumption. Thus, the transformation to a sustainable consumption pattern is forwarded.

2.4 Theoretical model and hypothesis

The literature review has indicated the positive impact of two educational factors on fostering sustainable consumption of students. Hence, the influence of two educational factors: "Active on- and off-campus experiences", and "Academic programs adaption" on sustainable fashion consumption is investigated. Figure 1 below illustrates the theoretical model and hypothesis for this study. The direct hypothesis is represented by solid arrows, while the moderating hypothesis is represented by dotted arrows.
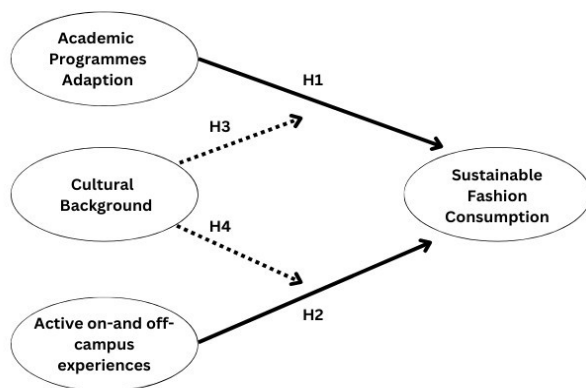

Figure 1: Theoretical Model
Source:Own iillustration

According to Martínez-Bravo et al. (2024), Academic Program Adaption comprises issues related to curriculum design, education degrees, and course planning to integrate sustainability education. Additionally, it refers to whether students adapt to study sustainability-related courses or degrees. In the past decades, higher education institutions (HEI) have played a crucial role in educating young individuals on awareness and responsibilities about climate change and related environmental issues (Juma-Michilena et al., 2023). Meanwhile, universities have taken different initiatives (i.e., lectures, elective courses, study projects) to educate young individuals on sustainable consumption in various industries and thus help address today's environmental concerns (Martínez-Bravo et al., 2024; Juma-Michilena et al., 2023; Mainieri et al., 1997). I therefore propose that:

Hypothesis (H1): Academic program adaptation with sustainability-related courses positively influences students' sustainable fashion consumption behaviors.

According to Martínez-Bravo et al. (2024), Active on-and off-campus activities contain any types of on-campus or off-campus activities that promote sustainability-related knowledge (i.e., Internships, study trips, subjects chapters)(Gawel et al., 2022). In the existing literature, students can gain experimental sustainability knowledge by participating in sustainability-related activities, which play a vital role in engaging in more sustainable behavior and generating transformative change in society (Leichenko et al., 2021; Heeren et al., 2016). Hence, I hypothesize that:

Hypothesis (H2): Active on- and off-campus experiences centered around sustainability positively influence students' sustainable fashion consumption behaviors.

Numerous studies have attempted to explain the impact of cultural backgrounds (age, current status, country) on sustainable consumption, for example, Marzouk and Mahrous, (2020); Peattie, (2010); Minton et al., (2018). Specifically, the literature from Minton et al., (2018) emphasized that consumers with different cultural backgrounds may contribute to sustainable consumption differently. Using the example of engaging in sustainable fashion consumption within the region of EU countries, 75% of Gen Z individuals are reported to purchase second-hand clothes to avoid over-consumption in the fashion industry (Ruiz, 2024). Meanwhile, according to PwC, almost 50% of EU consumers choose products with sustainable origin in various industries (PricewaterhouseCoopers, 2024). Specifically, based on the literature from Yang et al. (2024), sustainable fashion consumption has gained significant recognition and contribution in developed economies, such as developed countries in the EU and the United States. However, the adoption of sustainable fashion behavior is still limited in emerging economies, which may result in lacking commercial activity that promotes sustainable fashion consumption (Yang et al., 2024). In addition, the perceived knowledge gained by the consumer from their education has been identified as a significant catalyst for fostering sustainable fashion consumption in developed countries (Findler et al., 2019). I therefore propose the two following hypotheses:

Hypothesis (H3): The impact of Academic program adaptions on sustainable fashion consumption behavior is moderated by cultural background, such that the effect is stronger in developed countries.

Hypothesis (H4): The impact of Active on-and off-campus experiences on sustainable fashion consumption behavior is moderated by cultural background, such that the effect is stronger in developed countries.

3. METHODOLOGY
3.1 Model methodology

The methodology applied by this study is the Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology, a multivariate tool for evaluating complicated relationships between various constructs, which are established, estimated, and analyzed for casual relationships within the theoretical model (Lucius et al., 2023; Hair and Alamer, 2022). Meanwhile, the PLS-SEM methodology is particularly useful in composite-based models like the one in this study (Damberg, 2021; Rigdon et al., 2017). In the existing literature, the PLS-SEM methodology is massively used in sustainability research (Ghasemy et al., 2020), management and social science research (Legate et al., 2021), and higher institution education research (Barcia et al., 2022). Moreover, PLS-SEM is suitable for estimating models that contain reflective constructs as in this study (Damberg et al., 2023). Hence, The goal of adapting the PLS-SEM approach of this study is to establish and test hypotheses about how sustainability educational factors influence sustainable fashion consumption. I estimated the model by using the SmartPLS4 software (Richter et al., 2023).

3.2 Study sample and measurement

For the data collection process, a sample size comprised of at least 100 respondents was needed, as the literature has stated that larger sample sizes significantly improve the reliability and validity of study results (Frost, 2024). The respondents were required to answer an online structured survey via Qualtrics in May 2024. The data collection approach adopted by this study is

the snowball sampling method. It began by sharing the survey with one or more respondents via WhatsApp, Facebook, and Instagram. Then, the process continued with the essence of referrals from these respondents until it reached the desired amount of sample size (N=100). Meanwhile, quick, less expensive, and flexible approaches are considered advantages of the snowball sampling approach, whereas it could lead to sample bias due to the similar backgrounds of respondents (Dovetail Editorial Team, 2023). In order to navigate the sample bias, I shared the survey on diverse social platforms and reached out to multiple student associations to ensure a more representative sample.

Despite the exogenous and endogenous construct items questions, the composite moderator "cultural background" consists of three latent variables: Age, current status, and country. These three latent variables are chosen to indicate different aspects of cultural background that might impact students' sustainable fashion consumption behaviors. Thus, the demographic data (age, current status, country) were collected at the start of the survey.

At the beginning, 122 responses were collected. After removing the outliers and speeders, the final sample contained 100 respondents who are currently studying at the University of Twente & Erasmus University Rotterdam in the Netherlands, or who previously studied in the universities mentioned above. In the demographic data results, it is clear that younger individuals were overrepresented, with most respondents falling within the 18-24 and 25-34 years age groups. Moreover, most respondents were either Bachelor's or Master's students, see Table 1 below for a more detailed sample description. However, it is important to note that the "other" item in the "Status" category of Table 1 indicates students who studied and graduated from the above-mentioned university and are currently unemployed. Specifically, I set the "country" item as a dummy variable, where 0= developing country and 1= developed country.

Table 1: Demographic information for respondents

Measure	Items	Frequency	Percent (%)
Age	Under 18 years old	0	0.0
	18-24 years old	52	52.0
	25-34 years old	43	43.0
	35-44 years old	3	3.0
	45-54 years old	2	2.0
	Over 55 years old	0	0.0
Status	Bachelor's student	40	40.0
	Master's student	39	39.0
	PhD student	7	43.0
	Employee	3	3.0
	Other	13	13.0
Country	Developing country	55	55.0
	Developed country	45	45.0

Sources: Own calculations based on SmartPLS4 results

In the measurement of constructs, all the items were adapted from prior literature within the context of sustainable fashion consumption, see Table 2 in Appendix A for a more detailed items description. All the constructs' items were measured in a five-point Likert scale, where 1 stands for "Strongly Disagree" and 5 stands for "Strongly Agree". The adapted items on the construct of "Sustainable Fashion Consumption" were based on the literature of Tama et al. (2017) and Park and Lee, (2021). The adapted items on the construct of "Active on-and off-campus activities" and "Academic program adaptions" were based on the study of Martínez-Bravo et al. (2024). All the constructs in the model were measured respectively.

4. RESULTS
4.1 Measurement model and assessment

As recommended by the literature (Hair et al., 2018), all the indicator loadings in the reflective measurement model are above 0.708. It is considered acceptable item reliability since the constructs in the model explain more than 50 percent of the indicator's variable. For additional information on indicator loadings, refer to Table 3 in Appendix B. The second step is to assess the ρA, in order to evaluate the internal consistency reliability. As shown in Table 3, all the constructs' values except for sustainable fashion consumption are between 0.7 and 0.9. The ρA of sustainable fashion consumption is 0.653, as this study is exploratory research, the result of ρA should be acceptable (Joireskog, 1971; Hair et al., 2018). Next, I assessed the convergent validity using average variance extracted (AVE) metrics. Since all constructs' values are above the threshold of 0.5, I assume it is confirmed for internal consistency reliability and convergent validity.

Last but not least, the value of Heterotrait–Monotrait ratio of correlations (HTMT) metrics was used to determine discriminate validity (Hair et al., 2018; Henseler et al., 2014). As shown in Table 4 below, all the values are significantly smaller than 0.85 (Henseler et al., 2014), thus, the discriminate validity is established.

Table 4: Heterotrait–Monotrait Ratio of Correlations

Path	HTMT
ACA↔ APA	0,615
Age ↔ APA	0,049
Age ↔ ACA	0,095
Country ↔APA	0,229
Country ↔ACA	0,099
Country ↔ Age	0,085
Status ↔ APA	0,160
Status ↔ACA	0,182
Status ↔Age	0,669
Status ↔Country	0,258
SFC ↔APA	0,772
SFC ↔ ACA	0,847
SFC ↔ Age	0,067
SFC ↔ Country	0,360
SFC ↔ Status	0,179

4.2 Structural model and assessment

After assessing the measurement model, I further assessed the structural model. The criteria needed to access contains collinearity(VIF), R² value, and PLSpredict. First and foremost, the VIFs ranged from 1.337 to 3.650, which was below the critical value of 5 (Hair et al., 2018). Therefore, I assume that there is no critical collinearity issues in this model. Next, I examined the R² value of the endogenous constructs of the model, with the R² value of 0.583, indicating that the model's drivers can explain 58.3% of the variance in sustainable fashion consumption. The result of the R² value in this study is similarly large, as the previous study investigated sustainable consumption behaviors among young individuals reporting an R² value of 0.409 (Činjarević et al., 2022).

Finally, I applied the PLSpredict to test the predicted predictive relevance. PLSpredict is a straightforward tool for researchers to estimate the predictive capabilities of the model (Shmueli et al., 2019). Based on the recommendation in the literature (Shmueli et al., 2019), I applied the k-fold cross-validation where k= the number of subgroups, by setting k=10 and executed the procedure 10 times to test the out-of-sample power on the endogenous variable of the model.

To interpret the result of PLSpredict, several criteria are needed to access. Firstly, I evaluated the value of Q^2 predict (Table 5 in Appendix C). It is verified that the predictions outperformed the most naive benchmark. Then, following the outline from Hair and Alamer (2022), I compared the naive LM benchmark to RMSE and MAE indicators. Based on the literature (Hair et al., 2018), the model has high predictive power if no indicator has a greater RMSE (or MAE) value than the LM model. Moreover, the model has a medium predictive power if a minority of the indicators has greater RMSE (or MAE) values than the LM model (Hair et al., 2018). Based on the results in Table 5, Appendix C, the model indicates a medium predictive power, two out of three indicators (SFC1 and SFC4) show lower prediction errors whereas one indicator (SFC5) demonstrates higher prediction errors. Hence, it can be considered that the model's predictive performance is moderate.

4.3 Moderator analysis

In terms of analyzing the moderators' effects on my endogenous construct, I accessed the moderating effect by running a bootstrapping application in SmartPLS4, with a sub-sample size of 10,000. In this thesis, "cultural background" is used as a composite moderator variable comprising three latent variables: Age, current status, and country. Thus, the moderating effect of these three latent variables was assessed reflectively.

To interpret the moderating effects' results regarding three latent variables, the criteria of p-value and path coefficient of three latent variables are needed to evaluate. This study adopts a p-value threshold of p ≤ 0.1 to investigate the statistical significance since this study is set in an exploratory research context (Jakobsen et al., 2014). The relevant data can be found in Table 6, Appendix D. According to Table 6, it can be confirmed that the latent variable "country " has a statistically significant moderating impact on the relationship between both "Academic program adaptions" and "Sustainable fashion consumption" (β= -0.326,p-value= 0.081), and "Active on-and off-campus activities" and "Sustainable fashion consumption" (β= 0.239,p-value= 0.088).

However, the other two latent variables (age, and current status) were not statistically significant toward both relationships. This can result in a rather small sample size for this study, as a bigger sample size can improve the statistical power and provide more reliability (Frost, 2024).

Based on the interpretation of bootstrapping results, the latent variable "country" was confirmed with a statistically significant moderating impact on both relationships. Therefore, I further applied simple slope analysis for the latent variable "country". The figures of simple slope analysis can be found in Appendix E.

Based on the chart shown in Figure 2, Appendix E, it can be established that more participation in "Active on- and off-campus activities" leads to more sustainable fashion consumption for students from developed countries. At the same time, Figure 3 in Appendix E indicates that more "Academic program adaption" leads to more "Sustainable fashion consumption" among students from developed countries. See Appendix G for more graph details. On top of that, since there is no significant moderating impact found for latent variables "Age" and "Current status", it is not necessary to assess simple slope analysis for these two latent variables (Ali, 2022).

5. DISCUSSION
5.1 Discussion of the hypothesis testing results

This study aimed to investigate the impact of selected sustainability educational factors – "Active on-and off-campus activities" and "Academic program adaptions" on students' sustainable fashion consumption behaviors. The research question is the following: How do components of the sustainability education framework impact students' sustainable fashion consumption? To answer this question, the relationship between sustainable fashion consumption behaviors and educational elements – "Active on-and off-campus activities" and "Academic program adaptions" – was measured. Meanwhile, the role of cultural background (age, current status, country) as a moderator between educational factors and students' sustainable fashion consumption behaviors was examined.

For the first hypothesis, "*Academic program adaptation with sustainability-related courses positively influences students' sustainable fashion consumption behaviors.*", is established. According to the interpretation of the results, students' sustainable fashion consumption is significantly influenced by the "Academic program adaption" construct. By reviewing and comparing to another construct "Active on-and off-campus activities" impacts, "Academic program adaptions" played a more significant role in fostering students' sustainable fashion behaviors. It has been demonstrated that the integration of sustainability concepts, such as in elective courses, lectures, and research-level study positively increases students' awareness of sustainable fashion responsibility. These findings further supported the prior research results from Birkocak et al., (2017), which highlighted the role of students' gained knowledge from academic programs has a major influence on environmental awareness and sustainable responsibility among university students.

The second hypothesis, "*Active on- and off-campus experiences centered around sustainability positively influence students' sustainable fashion consumption behaviors.*", is confirmed. Based on the results' interpretation, the construct "Active on-and off-campus activities" positively correlated to students' sustainable fashion consumption. The findings are consistent

with expectations, as prior studies have confirmed this beneficial impact on fostering sustainable consumption among students (Martínez-Bravo et al., 2024; Garcia-Gonza lez et al., 2022; Mahat et al., 2017). Students' participation in sustainability-related activities, whether on or off campus, can significantly enhance their understanding of sustainable fashion consumption, and thus further engage in it. In the meantime, the findings of this study are aligned with the findings of Muhamad Noor et al,(2024), which emphasized the role of engaging in sustainability-related activities in fostering students' contributions to sustainable consumption (Muhamad Noor et al., 2024).

For the third and fourth hypotheses – *"The impact of Academic program adaptions on sustainable fashion consumption behavior is moderated by cultural background, such that the effect is stronger in developed countries."* and *"The impact of Active on-and off-campus experiences on sustainable fashion consumption behavior is moderated by cultural background, such that the effect is stronger in developed countries."* – both are partially supported. As "cultural background" is a composite moderator consists of three latent variables: Age, Current status, and Country, which are chosen to represent the different components of the concept of cultural background. All latent variables' moderating effects have to be confirmed to fully establish the H3 and H4. However, based on the moderator analysis, only one latent variable "country" was found to have a statistically significant moderating impact on both paths toward sustainable fashion consumption. This result provides partial support for hypotheses three and four. Whereas the other two latent variables, "Age" and "Current status" failed to find a significant moderating impact. Thus, hypotheses three and four failed to be fully established. This could result in the rather small sample size of this regional study, as a larger and more diverse sample size could add more validity and robustness tests of the moderating effect (Helm & Mark, 2010).

Reflecting on the research gap, there remains a gap in understanding how different educational factors foster students' sustainable fashion consumption among students. As this study is one of the few studies that delve into the impact of sustainability educational elements on students' sustainable fashion consumption behaviors, the field of sustainability education benefits significantly from the study, by adding knowledge and helping to bridge the existing research gap.

5.2 Theoretical implication
In the past years, many studies examined the correlation between universities' sustainability education and sustainable consumption (Martínez-Bravo et al., 2024; Birkocak et al., 2017). Meanwhile, numerous studies attempted to investigate the motivated factors behind consumers' engagement in sustainable fashion consumption (Bly et al., 2015; Chan & Wong, 2012; Lundblad & Davies, 2015). For instance, studies have examined the impacts of psychological factors (Penz & Drewes, 2022), economic factors (Hassan et al., 2022), and social factors (McNeill & Moore, 2015), which influence consumers' sustainable fashion consumption behaviors. This study aims to contribute to this existing body of knowledge by examining the relationship between university educational factors, sustainable fashion consumption behaviors, and cultural background as moderators among students.

In addition, there is no research has been conducted examining the relationship between educational factors and sustainable fashion consumption behaviors among students studying in the Netherlands. Hence, the findings of this study contribute to the existing theoretical field of sustainability education concerning sustainable fashion consumption in the Netherlands.

5.3 Practical implication
In the upcoming years, the findings of this study can make a significant impact on two practical implications. First and foremost, this study established the relationship between educational factors and sustainable fashion consumption among students in the Netherlands. Based on the existing literature, researchers have investigated the integration of sustainability into university education. As a result, this study provides insights on highlighting the importance of "Active on-and-off campus activities" and "Academic program adaptions" in fostering sustainable consumption behaviors among students. Thus, the practical field of sustainability education in universities benefits from this study by encouraging the development of a study curriculum with the value of sustainability and incorporating real-life campus activities into the university. This can increase the awareness of engaging in sustainable fashion practices and more environmentally conscious for young individuals.

Secondly, this finding has important implications for developing managerial strategies in the fashion industry, as this study examined the importance of educational factors in fostering sustainable fashion consumption. The results of this study are in line with those of Armstrong et al., (2016), who found that young individuals need to be exposed to real-life sustainable fashion practices and thus foster sustainable fashion consumption. Hence, this study provides insightful opinions to fashion companies, on how could they collaborate with universities for sustainable fashion projects and encourage students to engage in these practices.

In essence, fashion brands can leverage this study's insights to develop collaboration with universities. For example, by providing an internship centered around sustainability (Weybrecht, 2021), guest lecture (Martínez-Bravo et al., 2024), a study project with real-business sustainability problems (Gawel et al., 2022), and workshops promote the importance of sustainable fashion consumption among students and professionals in the university (Martínez-Bravo et al., 2024). Overall, these possible collaborations tremendously benefit both the university and the fashion company, as they will share resources and knowledge and drive the sustainable fashion pattern forward.

6. CONCLUSION
6.1 Main conclusions

This study intended to investigate an in-depth understanding of university education's influence on sustainable fashion consumption among students. The research question of this study is the following: How do components of the sustainability education framework impact the sustainable fashion consumption of students? The relationship between sustainable fashion consumption and two selected sustainability educational factors — Active on- and off-campus activities and Academic program adaptions- were examined to answer this research question. In addition, a standard online survey was conducted to accomplish the research goals. A total of 100 responses were collected and finalized for the data collection process, and the data was analyzed through the software SmartPLS4.

The results demonstrated a positive relationship between sustainability educational factors and sustainable fashion consumption among students. The education factor "Academic program adaption" was found to have a statistically significant impact on sustainable fashion consumption. Additionally, it also shows a statistically significant relationship between "Active on-and off-campus activities" and sustainable fashion consumption.

However, it could not be fully established that the relationship between the sustainability educational factors and sustainable fashion consumption is moderated by cultural backgrounds (age, current status, and country). The latent variables (Age, Status) do not have a statistically significant direct impact on the relationship in the model.

Overall, the result of this study highlights the significance of university education in fostering sustainable fashion consumption, since it has a positive impact on promoting sustainable fashion consumption. The findings of this study can serve as a guideline for educational workers in the sustainability education field. However, this study can only be viewed as a starting point, in order to investigate a deeper understanding of the relationship between university education and sustainable fashion consumption among students, more in-depth research is required.

6.2 Limitations and future research

Reflecting on the limitations of this study, various aspects are taken into consideration. First of all, this study adopted a relatively small sample size (N=100). When adopting the PLS-SEM methodology, the rule of thumb is to meet more than ten times the maximum number of inner or outer model linkages pointing at latent variables in the model (Sarstedt et al., 2022). Even though the sample size of this study meets the minimum requirements, the larger sample size brings more reliability to the results (Shieh, 2013). Hence, one notable limitation of this study is the small sample size brought relatively small reliability and robustness of the results. Therefore, future researchers are recommended to expand the sample size when following this direction of study.

Moreover, this is a regional study within the context of Dutch universities and the data were collected from students who are studying in the Netherlands. Therefore, future researchers are advised to expand the regional reach of the study.

In addition, this study collected demographic data containing age, current status, and the country as latent variables in the composite moderator "Cultural background". Future studies might investigate the role of other latent variables and their moderating impact. For instance, the income level, and gender of respondents may act as moderators in future studies that follow similar directions. Most importantly, future researchers are advised to collect these data from a wider range of communities, in order to navigate sample bias.

7. ACKNOWLEDGEMENT

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APPENDIX

Appendix A

Table 2: Measurements

Constructs	Code	Items	Sources
Sustainable fashion consumption	SFC1	I prefer to purchase clothing and accessories from environmentally responsible fashion brands.	Tama et al.,(2017)
	SFC2	I prefer to buy clothing and accessories that are durable and timeless, over those that quickly go out of fashion, to support sustainable fashion consumption.	Tama et al.,(2017)
	SFC3	I avoid buying clothes and accessories that contribute to environmental pollution.	Park and Lee, (2021)
	SFC4	I am familiar with sustainable clothing brands currently available.	Park and Lee, (2021)
	SFC5	I believe that my consumption of sustainable clothing can positively impact society and the environment.	Park and Lee, (2021)
Active on-and off-campus activities	ACA1	I actively participate in on-campus or off-campus groups that discuss sustainability issues	Martínez-Bravo et al., (2024)
	ACA2	I regularly attend university-held webinars related to sustainability	Martínez-Bravo et al., (2024)
	ACA3	I find that participating in sustainability-related university events increases my interest in making sustainable fashion consumption.	Martínez-Bravo et al., (2024)
	ACA4	I participate in study trips organized by my university that offer opportunities to learn about sustainability.	Martínez-Bravo et al., (2024)
	ACA5	I seek out internships or full-time jobs that focus on sustainable business practices.	Martínez-Bravo et al., (2024)
Academic programs adaptions	APA1	Students in my academic program are encouraged to incorporate sustainability into their research project or thesis.	Martínez-Bravo et al., (2024)
	APA2	I have been involved in study projects that focus on sustainability within my academic program.	Martínez-Bravo et al., (2024)
	APA3	My academic program includes courses or lectures that emphasize the importance of sustainability in the fashion industry.	Martínez-Bravo et al., (2024)
	APA4	My academic program provides mentoring opportunities for students to learn about sustainability.	Martínez-Bravo et al., (2024)
	APA5	My academic program offers elective courses that provide practical knowledge in sustainability.	Martínez-Bravo et al., (2024)

Appendix B

Table 3: Indicator Loadings, reliability and convergent validity

Constructs	Items	Loadings	ρA	AVE
Active on-and off-campus activities	I actively participate in on-campus or off-campus student groups that discuss sustainability issues.	0.861	0.881	0.717
	I regularly attend university-held webinars related to sustainability.	0.856		
	I find that participating in sustainability-related university events increases my interest in making sustainable fashion consumption.	0.869		
	I participate in study trips organized by my university that offer opportunities to learn about sustainability.	0.834		
	I seek out internships or full-time jobs that focus on sustainable business practices.	0.850		
Academic program adaptions	Students in my academic program are encouraged to incorporate sustainability into their research project or thesis.	0.852	0.922	0.730
	I have been involved in study projects that focus on sustainability within my academic program.	0.901		
	My academic program includes courses or lectures that emphasize the importance of sustainability in the fashion industry.	0.782		
	My academic program offers elective courses that provide practical knowledge in sustainability.	0.848		
Sustainable Fashion Consumption	I prefer to purchase clothing and accessories from environmentally responsible fashion brands.	0.805	0.653	0.591
	I am familiar with sustainable clothing brands currently available.	0.715		
	I believe that my consumption of sustainable clothing can positively impact society and the environment.	0.784		

Sources:
Items sources:
(Martínez-Bravo et al., 2024)
(Tama et al., 2017)
(Park and Lee, 2021)
Results sources:
Own illustration based on SmartPLS4 results

Appendix C

Table 5: PLS_predict Results

Indicators	$Q^2_{predict}$	PLS-SEM-RMSE	PLS-SEM MAE	LM RMSE	LM MAE	Difference RMSE	Difference MAE
SFC1	0.195	0.769	0.614	0.813	0.633	0.044	0.019
SFC4	0.279	0.883	0.712	0.954	0.764	0.071	0.052
SFC5	0.274	0.790	0.590	0.756	0.566	-0.034	-0.024

Source: Own illustration based on SmartPLS4 results

Appendix D

Table 6: Path Coefficients

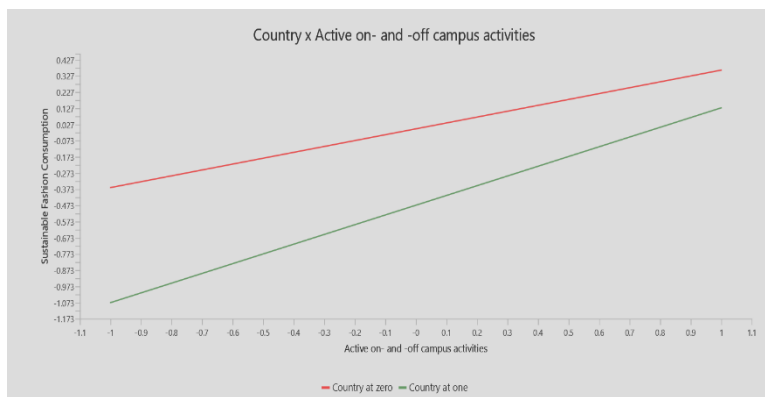| Path	Path coefficient (β)	p-value
Academic Program Adaptations → Sustainable Fashion Consumption	0.460	0.003
Active on- and off-campus activities → Sustainable Fashion Consumption	0.363	0.005
Age → Sustainable Fashion Consumption	0.010	0.469
Country → Sustainable Fashion Consumption	−0.472	0.002
Status → Sustainable Fashion Consumption	−0.082	0.280
Country x Active on- and off-campus activities → Sustainable Fashion Consumption	0.239	0.088
Age x Active on- and off-campus activities → Sustainable Fashion Consumption	−0.132	0.280
Status x Active on- and off-campus activities → Sustainable Fashion Consumption	0.134	0.180
Age x Academic Program Adaptations → Sustainable Fashion Consumption	−0.070	0.319
Country x Academic Program Adaptations → Sustainable Fashion Consumption	−0.326	0.081
Status x Academic Program Adaptations → Sustainable Fashion Consumption	−0.007	0.479
Source: Own illustration based on SmartPLS4 results		

Appendix E

Figure 2: Simple slope analysis for Country x Active on-and-off activities → Sustainable fashion consumption

Sources: Own illustration based on SmartPLS4 results

Notes: Green line represents the developed country, Red line represents the developing country
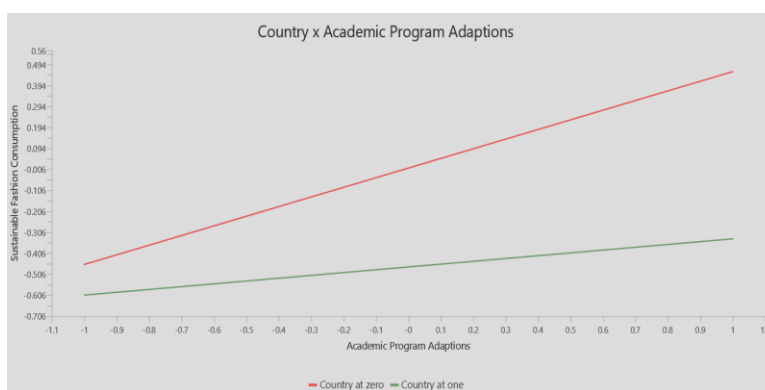

Figure 3: Simple slope analysis for Country x Academic program adaptions → Sustainable fashion consumption

Sources: Own illustration based on SmartPLS4 results

Notes: Green line represents the developed country, Red line represent the developing country