The Effect of Sport Identity on the Relationship Between Affective Experiences of Pleasure Towards Exercising and the Intention to Exercise

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Abstract

Background: Currently, 25% of adults fail to meet recommended physical activity levels, which heightens chances of developing disabilities. To do develop effective interventions, it is essential to understand determinants of exercise intentions. Psychological theories focused on changing cognitive beliefs towards exercising to increase exercise intentions, but recent research indicates that cognitive beliefs only partly explain the intention to exercise. The new Affective-Reflective Theory (ART; Brand & Ekkekakis, 2018) of exercise suggested that affective experiences of pleasure towards exercise could predict the intention to exercise. As the mind processes affective experiences of exercise in two different ways, the effect should be measured implicitly and explicitly. Moreover, it was found that sport identity, a concept developed from self-identity theories, is likely to moderate the relationship between affective experiences of pleasure towards exercise and the intention to exercise. Therefore, this study investigated the relationship between affective experiences of pleasure towards exercise, and the intention to exercise, and how this relationship is moderated by sport identity.

Methods: For this study, a cross-sectional design was utilized, using a survey to measure the variables of interest. 95 participants were includes, aged 18-69. The survey measured the variables affective experiences of pleasure towards exercise, intention to exercise, and sport identity. Affective experiences were explicitly measured with the Affective Exercise Experiences (AFFEXX) scale, and implicitly with a Single Category Implicit Association Test (SC-IAT).

Results: Findings of the study indicated a significant positive relationship between affective experiences of pleasure towards exercise, and the intention to exercise ($R^2 = .0.242$, $p < 0.001$). It was also found that sport identity significantly moderated this relationship ($R^2 = 0.333$, $p < 0.001$), meaning that a higher sport identity strengthens the relationship between affective experiences of pleasure towards exercise, and the intention to exercise.

Conclusion: The outcomes of this study highlighted the importance of understanding how explicit and implicit affective experiences of pleasure towards exercising predict the intention to exercise. Additionally, the moderating role of sport identity highlighted the importance of investigating individuals differences in self-identity that could strengthen or weaken the relationship between affective experiences of pleasure towards exercise and the intention to exercise.

Introduction

Regular physical activity is an essential part of a healthy lifestyle and provides crucial advantages for mental, physical, and social well-being (Lu et al., 2024). Even though most people are aware of the need for physical activity, 1 in 4 adults fail to meet the World Health Organization (WHO) guidelines for physical activity (World Health Organization: WHO, 2022). Adults are recommended to engage in a minimum of 150 minutes of moderate-intensity aerobic physical activity per week, or at least 75 minutes of vigorous-intensity aerobic physical activity, in addition to muscle-strengthening activities on two days or more (World Health Organization, 2022; Brand & Ekkekakis, 2018). The lack of physical activity is a significant issue in modern life, particularly among adults, because they face increasing health issues when they become older. As individuals age, they have a higher chance of getting a wide range of disabilities that are likely to increase the risk of mortality, such as comorbid diseases. A lack of physical activity can increase the risk of obesity and this can raise the risk of a variety of disabilities. Engaging in physical activity, in contrast, has protective effects against this wide range of disabilities that are likely to increase the risk of mortality with aging. Therefore, it is highly necessary that adults prioritize physical activity and increase their quality of life, especially as they age (Gothe et al., 2020).

To address the issue and increase regular physical exercising in adults, various interventions and policies have been created. To create interventions, it is crucial to

understand why certain people fail to engage in regular exercising, and why other people succeed in maintaining physically active (Nigg & Durand, 2016). There are different factors that determine exercise behaviour, such as motivation and discipline. Theories such as the Theory of Planned behaviour (TPB) (Azjen, 1985), the Self-Determination Theory (SDT) (Deci & Ryan, 1985) and the Protection Motivation Theory (PMT) (Rogers, 1975), have been very important to help understand, explain, and eventually promote exercising. These behavioural theories assume that the itention to exercise is determined by cognitive beliefs about exercising. Therefore, interventions based on these theories focus on altering cognitive beliefs to change intentions to exercise (Nigg & Durand, 2017).

However, in a systematic review of Chevance et al. (2019), it was demonstrated that cognitive theories explain only a small portion of the intention to exercise, and that there is a major overlap between these theories. Therefore, understanding how intentions arise by the use of theories such as the TPB, is not sufficient to understand why some people have the intention to exercise, while others do not. This shows the need for further exploration for alternative approaches that can help to understand this matter, in order to enhance the effectiveness of interventions for increasing intentions to exercise (Chevance et al., 2019).

A new approach that could possibly tackle this issue, is the Affective-Reflective Theory (ART) of physical inactivity and exercise (Brand & Ekkekakis, 2018). This theoretical model emphasizes the role of affect, feelings, and emotions towards exercise. In this theory, the role of affective experiences towards physical activity is central. Affective experiences are individuals' emotional evaluations of specific behaviours or circumstances, which can influence attitudes and motivations towards exercise. For example, if you enjoy exercising, you are likely to do it more often and put more effort in it. And if you dislike it, you might avoid it (Brand & Ekkekakis, 2017).

The ART suggests that the mind processes affective experiences of exercise through two types of processes: automatic processing (type-1) and reflective processing (type-2). Automatic processes are fast, intuitive, impulsive and based on past experiences with exercise. These processes usually imply implicit thoughts and experiences. Implicit affective experiences are subconscious evaluations which have an influence on intentions and behaviour, without conscious awareness (Eder, 2011). They play a crucial role in decision making processes regarding the intention to exercise. Therefore, these implicit affective experiences are important to investigate, to understand the influence of affective experiences on the intention to exercise. The second type of processing involves explicit, reflective thinking about affective experiences of exercising. The implicit affective experiences form the basis of the explicit evaluations that decide whether to have the intention to exercise or not (Schinkoeth & Brand, 2020).

So, numerous studies demonstrated the importance of understanding the association between affective experiences and the intention to exercise. However, an instrument to measure such experiences was lacking, until Ekkekakis et al. (2021) developed the Affective Exercise Experiences (AFFEXX) scale. This self-reporting questionnaire was based on the ART theory (Brand & Ekkekakis, 2018), and measures how the intention to exercise may be influenced by a history of pleasant or unpleasant affective experiences with exercising. In their study, Ekkekakis et al. (2021) indicated that affective experiences of pleasure towards exercising could increase the intention to exercise in the future. For example, when you repeatedly experienced pleasure or discomfort during exercising, you would automatically form positive or negative emotions towards exercising.

However, the study of Ekkekakis et al. (2021) and the AFFEXX still has shortcomings. The questionnaire was developed to investigate the effect of affective experiences on the intention to exercise, but it only measures explicit affective experiences of exercise, and not

the implicit affective experiences (Ekkekakis et al., 2021). As mentioned before, implicit affective experiences form the basis of evaluating explicit affective experiences of exercise, and are therefore crucial to investigate (Eder, 2011). Because the AFFEXX only measures on a reflective, conscious level, it does not take implicit thoughts into account (Ekkekakis et al., 2021). Therefore, the AFFEXX itself is an insufficient instrument to measure the effect of affective experiences on the intention to exercise. This highlights the need for a measure for implicit thoughts and emotions, to investigate the effect of affective experiences of pleasure towards exercise, on the intention to exercise.

The most prominent measure for evaluating implicit thoughts, that is used at this point, is the Implicit Association Test (IAT; Greenwald et al., 1998), or variants such as the Single Category Implicit Association Test (SC-IAT; Kaprinski & Steinman, 2006). An IAT assesses implicit thoughts through evaluating response times and the accuracy of the performance on computer-based categorization tasks (Chevance et al., 2019). For example, the IAT can evaluate implicit affective experiences of pleasure towards exercising by measuring how fast people associate constructs of exercise with pleasant or unpleasant words. In this way, the test could reveal implicit emotions about exercising that cannot be measured by conscious self-reporting. Therefore, the IAT could provide a measurement to better understand the effect of implicit affective experiences on the intention to exercise.

In addition to measuring explicit and implicit experiences, it is crucial to investigate significant factors that may influence the relationship between affective experiences of pleasure towards exercise and the intention to exercise. One such factor may be sport identity, which reflects the extent to which individuals incorporate the role of being physically active into their self-identity (de Bruijn & van den Putten, 2012). People with a high sport identity value aspects of being sporty and are more likely to be motivated to embrace values and behaviours associated with physical activity. When perceiving oneself as sporty, people are

more likely to engage in exercising, as it aligns with their self-concept. Conversely, when perceiving oneself not as a sporty type, people are less likely to engage in exercising (Lamont-Mills & Christensen, 2006: Strachan & Brawley, 2007).

In a study by Strachan et al. (2009), it was found that self-identity can significantly influence affective experiences of exercise. Individuals with a high sport identity tend to experience more positive emotions during exercising, compared to those who have a lower sport identity. This means that the degree to which someone identifies themselves as sporty, can shape emotional responses towards exercising, and potentially enhance or reduce the impact of pleasurable affective experiences on the intention to exercise. Individuals with a high sport identity probably let positive feelings about exercise strengthen their intention to exercise, while individuals with a low sport identity might weaken the relationship of affective experiences and their intention to exercise. This means that the predictive value of affective experiences of pleasure towards exercise on the intention to exercise, will be stronger for individuals with a high sport identity, and weaker for individuals with a lower sport identity (Strachan et al., 2009). Therefore, it is crucial to investigate also the role of sport identity in the relationship between affective experiences of pleasure towards exercising and the intention to exercise.

To summarize, a gap in research is found in investigating the effect of implicit affective experiences of pleasure towards exercise, to understand the effect of affective experiences on the intention to exercise. Additionally, the role of sport identity in this relationship has not been investigated yet, but could be of major importance. By researching this relationship, a better understanding of human feelings and behaviours towards physical activity is possible. Consequently, we can better understand why some people like exercising and why others don’t, and this could help to create more effective interventions and let people exercise more.

So, to study the relationship between affective experiences of pleasure towards exercising and the intention to exercise in order to create effective interventions for adults, the following research question is formulated: ***How is the relationship between affective experiences of pleasure towards physical exercise, and the intention to physical exercise, affected by sport identity?*** In order to examine all aspects of this research question, the research will be guided by the following sub questions:

1. *To what extent are implicit affective experiences of pleasure towards exercise (IAT) and explicit affective experiences of pleasure towards exercise (AFFEXX), associated?*
2. *To what extent are affective experiences of pleasure towards exercise associated with intention to exercise?*
3. *To what extent does sport identity moderate the association between affective experiences of pleasure towards exercise and the intention to exercise?*

Based on the information that has been collected, the following hypotheses will be investigated:

Hypothesis 1: There will be a significant positive correlation between implicit affective experiences of pleasure towards exercise measured with the SC-IAT, and explicit affective experiences of pleasure towards exercise measured with the AFFEXX.

Hypothesis 2: There will be a positive association between affective experiences of pleasure towards exercise, and the intention to exercise. More specifically, explicit affective experiences of pleasure towards exercise will significantly predict the intention to exercise. When including implicit affective experiences, it will explain additional variance in the intention to exercise and significantly improve the prediction of the intention to exercise. So, both explicit and implicit affective experiences of pleasure towards exercise will significantly

predict the intention to exercise, with implicit affective experiences explaining additional variance, beyond what is explained by explicit affective experiences alone.

Hypothesis 3: Sport identity will significantly moderate the relationship between affective experiences of pleasure towards physical exercise and intention to exercise. More specific, a higher sport identity will strengthen the positive relationship between explicit and implicit affective experiences of pleasure towards exercise and the intention to exercise.

In conclusion, it is hypothesized that there will be a significant relationship between affective experiences of pleasure towards physical exercise, and the intention to exercise, which is moderated by sport identity.

Methods

Study Design

The study employed a quantitative approach, in which a cross-sectional design was used, in combination with a survey instrument. This design allowed the investigation of the relationship between affective experiences of pleasure towards exercising, and the intention to exercise, moderated by sport identity.

Participants

A total of 140 participants took part in this study, however the final sample was reduced to 95 participants due to missing values and invalid cases. Table 1displays the demographic characteristics of the participants. The participants were between 18 and 69 years old, with an average of 28.8 years (*SD* = 10.74). More than half of the participants were female (54%), and the majority of the sample consisted of Dutch (57%) participants. Also, most participants were university students (74%) and lived in a urban area (65%).

Inclusion criteria of the participants were being 18 years or older, having access to social media platforms, having sufficient skills in the English language, and therefore being able to answer the survey questions. The only exclusion criterion was being under 18 years.

To recruit participants, different forms of non-probability sampling were used. Convenience sampling and snowball sampling were utilized, whereby participants were recruited via social media platforms such as Facebook, LinkedIn and WhatsApp, as well as through direct personal recruitment. Additionally, self-selecting sampling methods were employed, whereby an advert was posted on SONA systems. Through this advert, first year students of psychology of the University of Twente could sign up to take part in the study, for which they got credits needed for their bachelor's degree.

Table 1

Participant Demographics (N=95)

Demographic Variables	*n*	*%*
Age (*M* = 25.90)		
18-39	81	88
40-59	10	11
60-69	1	1
Gender		
Female	51	54
Male	42	44
Other	2	2
Nationality		
Dutch	54	57
German	18	19
Other	23	24
Living Area		
Rural	33	35
Urban	62	65
Main Occupation		
Student	72	76
Employee	21	22
Other	2	2

Materials

To collect data, a survey instrument was used, which was developed in the program SoScisurvey. The first part of the survey consisted of demographic questions to get insight into the characteristics of the sample, and the second part consisted of items that measured the variables of investigation. In total, the questionnaire measured 15 variables, but for the current study, only the data from the following variables were used: demographical variables, physical activity, intention to exercise, sport identity, affective experiences of pleasure towards exercise, and implicit affective experiences of pleasure towards exercise.

Demographical Variables

The social demographics that were assessed were age, gender, language, nationality, living area, and main occupation. Distributions, frequencies, percentages, means and standard deviations were calculated to get an overview of the demographical characteristics of the participants (see Table 1).

Physical Activity

Physical activity levels of the sample were assessed using the International Physical Activity Questionnaire – Short Form (IPAQ-SF) (Craig et al., 2003). This questionnaire consists of 9 items (e.g. “During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?”), and assesses physical activity by measuring the activity of four intensity levels: vigorous-intensity activities such as jogging, moderate-intensity activities such as cycling, walking and sitting (Lee et al., 2011). Participants reported the duration and frequency of their physical activities. For this research, only information from the 3 questions from the category vigorous-intensity activities were used. Responses were converted into minutes, and then summed up to calculate the total minutes of vigorous exercise per week. A higher score indicated higher

physical activity levels (Flora et al., 2022). Reliability of the scale was found to be consistently high (ranging from 0.66 to 0.88) (Lee et al., 2011).

Intention to Exercise

The variable intention to exercise was measured by 8 items in total, with 4 items measuring intention for moderate activities, and 4 items measuring intention for vigorous activities. For this study, only items assessing intention for vigorous activities were used (e.g. "How likely is it that you will engage in vigorous exercise 1-2 times per week over the next month?"). Participants could answer on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree". The items of this scale were self-constructed items, of which high internal consistency was calculated, indicated by a Cronbach's alpha coefficient of .95. The scoring of the scale involved summing up the items and dividing this number by 4, to get a mean score between 1 and 7. A higher score close to 7 indicated higher intentions to exercise.

Explicit Affective Experiences

The Affective Exercise Experiences (AFFEXX) questionnaire was used to measure explicit affective experiences of exercise (Ekkekakis, 2021). The questionnaire originally consists of 36 items (e.g. "Exercise leaves me feeling exhausted - Exercise leaves me feeling energized) measuring three constructs: antecedent appraisals, three core affective experiences, and motivational outcomes variables. For this research only items from the three core affective experiences were used: displeasure/pleasure, tension/calmness and tiredness/energy. Each core affect was measured by 4 items as a set of opposites (e.g. "The feeling I get from exercise is awful - The feeling I get from exercise is fantastic"). Participants rated items on a 7 point Likert scale, where 1 represented negative exercise experiences and 7 represented positive exercise experiences. Scoring of the items involved summing up the scores, dividing by 4, and then calculating a mean score ranging from 1-7. A higher score indicated more

positive exercise experiences. Scoring high on the core affect displeasure/pleasure meant that participants have higher affective experiences of pleasure towards exercise. A high score on the core affect tension/calmness meant that participants had higher affective experiences of calmness towards exercise, and a high score on the core affect tiredness/energy indicated that participants had higher affective experiences of energy towards exercise. Strong internal consistency of the questionnaire was measured, indicated by Cronbach's alpha coefficients above 0.80 for each construct. Additionally, test-retest reliability appeared to be high for all scales, with correlation coefficients ranging from .78 to .88 (Ekkekakis, 2021).

All three core affects were used for descriptive analysis, but for investigating the relationship between explicit affective experiences of pleasure towards exercise and the intention to exercise, only the 4 items of the core affect displeasure/pleasure were used. The pleasure/displeasure items of the AFFEXX have high internal consistency, with a Cronbach's alpha of .90. Test-retest reliability was found to be high, with a correlation coefficient of .88 (Ekkekakis, 2021).

Implicit Affective Experiences

The implicit affective experiences of pleasure towards exercise were measured with the Single Category Implicit Association Test (SC-IAT) (Kaprinski & Steinman, 2006). The SC-IAT was conducted via the SoSci software. The test measures implicit associations between concepts. The aim of the SC-IAT is to measure the strength of implicit associations between to concepts. In this research, the test was used to measure the association between affective experiences of displeasure/pleasure and exercise.

During the test, participants were presented with a set of words that belonged to two opposites (e.g. "pleasure vs. "displeasure"). For both categories, 7 synonyms were created (e.g. "enjoyment", "discomfort"). These words were then associated with 7 physical activities: cycling, running, weightlifting, swimming, jogging, bootcamp and working out. Participants

were then asked to categorize these activities into the appropriate category (pleasure versus displeasure) as quickly and accurately as possible, by using their keyboard keys.

The test consisted of 2 stages, with 2 blocks where participants had to categorise the stimuli, based on pairs of the categories (see Figure 1). In the first stage, synonyms of pleasure and physical activity words were categorized on the left response key, and synonyms of displeasure are categorized on the right response key. The first block was a practice, with 24 trials, and the second block was the real test. In one trial, participants had to categorize a physical activity into the appropriate category (synonym of pleasure, or synonym of displeasure) (see Figure 2).When participants categorized a word in the wrong category or when answering took too long, they had to start the block over again. The process worked the same in the second stage, but then the other way around. Synonyms of displeasure and vigorous activity words are categorized on one response key, and synonyms of pleasure are categorized on a different key.

Figure 1

Schema of The Blocks and Trials of the SC-IAT

Stage	Block	Trials	Function	Left Response Key	Right Response Key
1	1	24	Practice	Synonyms of pleasure + physical activities	Synonyms of displeasure
	2	72	Test	Synonyms of pleasure + physical activities	Synonyms of displeasure
2	3	24	Practice	Synonyms of pleasure	Synonyms of displeasure + physical activities
	4	72	Test	Synonyms of pleasure	Synonym of displeasure + physical activities

Figure 2

Examples of One Trial in Each Stage

Left Response Key	Right Response Key
Swimming	
Moderate or Vigorous Activity + Enjoyment	Discomfort

Left Response Key	Right Response Key
Swimming	
Enjoyment	Moderate or Vigorous Actvitiy + Discomfort

The software calculated a d-score based on the reaction times and accuracy in the different blocks and stages, which gave an indication of the strength of the implicit association between the concepts. A positive d-score indicated a stronger association with the positive dimension (pleasure) and vigorous activity, and a negative d-score indicated a stronger association with the negative dimension (displeasure) and vigorous activity. A d-score close to zero indicated little to no association between vigorous activity and pleasure or displeasure. In general, a d-score of 0.2 is considered a small effect size, 0.5 is considered as a moderate effect size, and 0.8 or higher is considered as a large effect size (Chevance et al., 2017).

Sport Identity

To measure the variable sport identity, the brief version of the Athletic Identity Measurement Scale (AIMS) was used (Brewer et al., 1993). The scale is a widely used measure to assess how strong individuals identify themselves with the athletic role and consists of 7 items (e.g. “I have many goals related to sport.”) . The AIMS is internally consistent, with a Cronbach’ alpha of .81 (Brewer & Cornelius, 2001). The items are assessed on a 7 point Likert-type scale ranging from 1(*strongly disagree*) to 7 (*strongly agree*). For the scoring of the scale, individual items were summed up, and then a mean was derived. The

AIMS scores range from 7 to 49, where higher scores indicate a stronger identification with the athletic role, so a bigger sport identity (Brewer et al., 1993).

Procedure

Participants were directed to the online survey created in the SoSci software by following the link in the advert of the study, shared via different social media platforms and SONA systems. Participants who decided to take part in the study, were first introduced and shortly instructed about the aim of the study and how the questionnaire worked. Then, they were asked to give consent to engage in the study and consequently they could start the questionnaire. Participants took approximately 30-40 minutes to finish the survey. For each new measure, participants were instructed on how the scale worked and what answers they could give. Also for the IAT's, the participants were clearly instructed. The order of the IAT's was randomised, so that all IAT's had even chance of being completed. Before publishing the questionnaire and letting people take part in the study, ethical considerations were made. The BMS Ethics Committee approved the study, which can be found in dossier number 240366. Data of the participants was treated confidentially and participants were informed by this. Also, the research team was the only one with access to the data of the participants, which was kept on securely password-protected computer systems.

Data-Analysis Plan

To analyse the data, the statistical software Rstudio version 4.2.0, was used. The full R-code can be found in Appendix A. The data was imported in R studio and before starting the analysis, the set had to be cleaned. The following R packages were installed and downloaded: tidyverse, readxl, dplyr, psych, magrittr, reader, car and lmtest. Then, unnecessary variables were removed from the dataset, so that only the variables of interest were still included. In this dataset, missing values were deleted by using the function na.omit(), and the dataset was converted into a numeric data frame using the function

as.numeric(). Also, before converting the dataset into numeric factors, for some responses, the comma had to be replaced by a point. Out of this cleaned dataset, different other datasets were created for each specific analysis. For the demographical analysis a dataset was created with the variables age, gender, nationality, main occupation, marital status and living area. For the descriptive analysis of the variables physical activity, affective experiences of exercise, implicit affective experiences of exercise, intention to exercise and sport identity, a dataset with items from the IPAQ, the AFFEXX, the SC-IAT, the AIMS, and items for physical activity and intention to exercise were selected. Then, for the inferential analysis, a dataset with the variables intention to exercise, explicit affective experiences of pleasure towards exercise, implicit affective experiences of pleasure towards exercise, and sport identity was created. In this way, the data was structured and easily usable.

After structuring and cleaning of the data set, descriptive analyses of the demographics were performed. For the participant demographics, frequencies and percentages were calculated, and for the variable age also a mean score and the standard deviation was calculated. This was summarised in a table in the methods section, to get an overview of the characteristics of the sample (see Table 1). Then, descriptive analyses of variables of interest were carried out, whereby mean scores, medians, standard deviations and ranges were calculated (see Table 2).

Before starting the inferential analysis, the following assumptions for the variables of investigation were checked: normality, linearity, homoscedasticity, multicollinearity and independence. Normality was tested using a Q-Q plot and linearity was tested creating a plot in which the linearity between each independent variable and the dependent variable was shown. Furthermore, homoscedasticity of the residuals was checked using the Breusch-Pagan test, and by creating a plot in which the residuals were plotted against the fitted values.

Finally, multicollinearity was tested using the variance inflation factor (VIF), and independence was tested using the Durbin-Watson test.

Subsequently, inferential analyses were performed, through which the hypotheses could be checked. The first hypothesis stated that there would be a significant positive correlation between implicit affective experiences measured of pleasure towards exercising with the SC-IAT, and explicit affective experiences of pleasure towards exercising measured with the AFFEXX. To test this hypothesis, Pearson's correlations were examined and p-values were calculated to check for significant correlations.

To test the second hypothesis, which stated that there would be a significant positive relationship between affective experiences of pleasure towards exercise, and intention to exercise, two linear regression models were constructed. The first model included only explicit affective experiences as independent variable, and intention to exercise as dependent variable. The second model was a multiple regression model, in which the variable implicit affective experiences was added as another independent variable. The variance explained by each model was determined by checking R-squared values and F-statistics, and the significance of the models was assessed by calculating p-scores. To check the added value of implicit affective experiences for explaining the variance in intention, an Analysis of Variance (ANOVA; St & Wold, 1989) was conducted.

Finally, to test the third hypothesis, which stated that sport identity would have a moderating effect on the relationship between affective experiences of pleasure towards physical exercise, and intention to exercise, a moderation analysis (Baron & Kenny, 1989) was performed. In this analysis, sport identity was included as moderator for the relationship between explicit affective experiences and the intention to exercise, and as moderator for the relationship between implicit affective experiences and the intention to exercise. The overall model fit was determined by checking the R-squared and the F-statistic, and the significance

of the model was assessed by interpreting p-values. To determine the added value of sport identity in the relationship between affective experiences of pleasure towards exercise, the second and third model were compared through an ANOVA analysis.

Results

The aim of this research was to investigate how the relationship between affective experiences of pleasure towards exercise, measured by the AFFEXX and the SC-IAT, and the intention to exercise, is moderated by sport identity. To investigate this relationship, descriptive analysis were performed, Pearson's correlations were calculated, multiple linear regression models were created, and a moderation analysis was performed.

Descriptive Analysis

The descriptive analysis consisted of analysing variables of interest and research variables (Table 2). It was found that individuals engaged on average in 4.46 (SD=2.44) types of sport activities in their past, and that individuals currently engage on average in 1.61 (SD=1.01) types of sport activities. For the variable physical activity, findings of the IPAQ indicated that individuals on average engage in vigorous activity for 356.21 (SD= 365.69) minutes per week, indicating moderate to high vigorous activity levels.

Results of the AFFEXX showed that participants associated exercise primarily with pleasure (M=5.92, SD=1.03). They also reported high energy levels during exercise (M=4.97, SD=1.27) and felt slightly more calmness than tension (M=3.51, SD=1.27). Results of the SC-IAT indicated that participants on average obtained a d-score of 0.22 (SD=0.45), indicating a weak relationship between implicit affective experiences of pleasure and exercise (Table 2).

The mean intention to engage in exercising on a scale from 1 to 7, was found to be 5.37 (SD=1.68), indicating moderate to high intention of the participants to engage in physical activity. Finally, results from the AIMS showed that the participants identify themselves moderately with a sportive identity (M=25.57, SD=8.47) (Table 2).

Tabel 2

Descriptive Statistics (N=95)

Demographic Variables	*mean*	*sd*	*median (range)*
Number of sport activities performed in past	4.46	2.44	
Number of sport activities currently performed	1.61	1.01	
Minutes of Vigorous Activity per week	356.21	365.69	240 (0;1680)
Explicit affective experiences			
Displeasure vs Pleasure	5.92	1.03	
Tiredness vs Energy	4.97	1.22	
Tension vs Calmness	3.51	1.27	
D-score of implicit affective experiences	0.22	0.45	0.21 (-0.92;1.52)
Intention to exercise	5.37	1.68	
Sport identity	25.57	8.47	

Note. Mean minutes of vigorous activity per week were measured with the IPAQ, explicit affective experiences of exercise were measured with the AFFEXX, the mean d-score of implicit affective experiences was measured with the SC-IAT and mean sport identity was measured by the AIMS.

Assumptions

Assumptions of the multiple regression model, with explicit affective experiences, implicit affective experiences and sport identity as predictor variables and intention as outcome variable, were checked. The normality assumption was satisfied, as the points in the Q-Q plot closely followed a straight line, which indicated that the residuals were normally distributed. By checking homoscedasticity constant variance was found, as the spread of the residuals was random in the residuals versus fitted values plot. Multicollinearity was acceptable, as the Variance Inflation Factor (VIF) values for all three predictor variable were

below 2, suggesting that the predictor variables were not linearly dependent on each other. Lastly, the Durbin-Watson Test was performed and suggested no significant autocorrelation in the residuals of the model ($DW = 1.99$, $p = 0.48$). These outcomes suggest that the assumptions of the regression model were met.

Correlations

In the first hypothesis it was stated that there would be a significant positive correlation between implicit affective experiences of pleasure towards exercising measured with the SC-IAT, and explicit affective experiences of pleasure towards exercising measured with the AFFEXX. To address this hypothesis, a Pearson correlation was conducted between the implicit affective experiences (SC-IAT) and explicit affective experiences (AFFEXX) (Table 3). A correlation coefficient of $r = 0.207$ was found, indicating a significant positive relationship between the variables ($p < 0.005$). This means that as implicit affective experiences become more positive, explicit affective experiences will also become more positive. As there is a significant positive correlation, the first hypothesis should be accepted.

Correlation coefficients for the other variables have also been examined to understand the relationships (Table 3). There is a significant moderate positive correlation with explicit affective experiences and intention to vigorous activity ($r = 0.450$, $p < 0.001$) and explicit affective experiences have a strong significant positive correlation with sport identity ($r =$ 0,542, $p < 0.001$). Additionally, weak but significant positive correlations were found between implicit affective experiences and intention to vigorous activity ($r = 0.285$, $p < 0.001$) and between implicit affective experiences and sport identity ($r = 0.249$, $p < 0.001$). Finally, a significant moderate positive correlation was found between intention to vigorous activity and sport identity ($r = 0.462$, $p = 0.015$).

Table 3

Pearson's Correlations of Implicit Affective Experiences, Explicit Affective Experiences, Intention to Exercise and Sport Identity (N = 95)

	1	*2*	*3*	*4*
1. Explicit affective experiences of pleasure towards exercise	.			
2. Implicit affective experiences of pleasure towards exercise	0.207*	.		
3. Intention to exercise	0.450***	0.285***	.	
4. Sport identity	0.542***	0.249***	0.462*	.

Note. Explicit affective experiences of pleasure towards exercise were measured with the AFFEXX and implicit affective experiences of pleasure towards exercise were measured by the SC-IAT. Significant codes: ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Regression Analysis

The hypothesis of the second research question stated that there will be a positive association between affective experiences of pleasure towards exercise, and the intention to exercise. It was hypothesized that explicit affective experiences of pleasure towards exercise will significantly predict the intention to exercise and that implicit affective experiences will explain additional variance in the intention to exercise.

To investigate these hypotheses, two regression models were developed. The first model examined the relationship between explicit affective experiences of pleasure towards exercise and intention to exercise (Table 4). The results of the first model indicated that there was a significant positive relationship between explicit effective experiences of pleasure towards exercise, and intention to exercise, and the model explained 20.23% of the variance in intention ($F(1,93) = 23.59$, $p < 0.001$). The second model was a multiple regression

model, with both explicit and implicit affective experiences included (Table 5) . The overall model fit showed that implicit affective experiences have a significant positive effect on intention to exercise and therefore has a significant added value to the model ($F(2,92) = 14.57$, $p < 0.001$), and that the model explained 24.06% of the variance in intention to exercise.

With an ANOVA analysis, the added value of implicit affective experiences of pleasure towards exercise was checked. Results from this analysis indicated that the change in R^2 by adding implicit affective experiences was significant improved ($p < 0.05$). This implies that implicit affective experiences improved the fit of the model.

Summarized, explicit and implicit affective experiences significantly predict the intention to exercise, meaning there is a significant positive association between affective experiences of pleasure and intention to exercise. Therefore, the second hypothesis can be accepted.

Tabel 4

Linear Regression Analysis of the Relationship Between Explicit Affective Experiences (AFFEXX, and Intention to Exercise (N=95)

	β	*se*	R^2	*F*	*p*
Intercept	1.017	0.909			0.266
Explicit affective experiences of pleasure towards exercise	0.735	0.151	0.202	23.59	<0.001***

Note. The independent variable was explicit affective experiences of pleasure towards exercise, measured with the AFFEXX and the dependent variable was the intention to exercise. Significant codes: ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Tabel 5

Multiple Regression Analysis of the Relationship Between Explicit Affective Experiences, Implicit Affective Experiences, and Intention to Exercise (N=95)

	β	*se*	R^2	*F*	*p*
Intercept	1.250	0.898			0.167
Explicit affective experiences of pleasure towards exercise	0.667	0.152			<0.001***
Implicit affective experiences of pleasure towards exercise	0.754	0.350			0.034*
Overall model fit			0.241	14.57	<0.001***

Note. The independent variables were explicit and implicit affective experiences of pleasure towards exercise, measured with the AFFEXX and the IAT, and the dependent variable was the intention to exercise. Significant codes: ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Moderation

In the third hypothesis it was formulated that sport identity will moderate the relationship between affective experiences of pleasure towards physical exercise and intention to exercise. A multiple regression analysis was conducted to examine the interaction effect of sport identity on the relationship between explicit affective experiences and the intention to exercise, and to examine the interaction effect of sport identity on implicit affective experiences and to intention to exercise.

Results showed that the interaction term between explicit affective experiences and sport identity was statistically significant ($\beta = 0.042$, SE = 0.019, $p = 0.032$). This means that sport identity moderates the relationship between explicit affective experiences of pleasure towards exercise, and the intention to exercise. However, the interaction term between implicit affective experiences and sport identity was not significant, indicating that sport

identity does not moderate the relationship between implicit affective experiences of pleasure towards exercise, and the intention to exercise (β = -0.042, SE = 0.037, p = 0.250).

The overall fit of the model was significant, indicating that sport identity does moderate the relationship between explicit and implicit affective experiences of pleasure towards exercise, and the intention to exercise (F(5, 89) = 8.886, p = <0.001). The overall model explained 33.25% of the variance in intention to exercise, which is 9.24% more than the second linear regression model. An ANOVA analysis compared the second model (Table 5) and third model (Table 6). Results indicated that the third model, with sport identity added as moderator, provided a significantly better fit than the second model (p = 0.009).

In conclusion, these results support the hypothesis that sport identity moderates the relationship between affective experiences of pleasure towards exercise, and the intention to exercise. Additionally, sport identity does moderate the relationship between explicit affective experiences and intention, but not between implicit affective experiences and intention.

Table 6

Moderation Analysis of the Relationship Between Explicit Affective Experiences (AFFEXX) and Sport Identity, and Implicit Affective Experiences (IAT) and Sport Identity, and the Intention to Exercise (N= 95)

	β	*se*	*F*	R^2	*p*
Intercept	5.969	2.355			0.013*
Explicit Affective Experiences of Pleasure Towards Exercise	-0.370	0.399			0.356
Implicit Affective Experiences of Pleasure Towards Exercise	1.7	0.996			0.087
Sport Identity	-0.199	0.123			0.109

Interaction Explicit Affective Experiences and Sport Identity	0.042	0.019			0.032*
Interaction Implicit Affective Experiences and Sport Identity	-0.042	0.037			0.250
Overall Model Fit			`8.866	0.333	<0.001***

Note: Sport identity was the moderator in this model and was measured with the AIMS.

Significant codes: ***: p < 0.001, **: p < 0.01, *: p < 0.05.

Discussion

The main aim of this study was to investigate the relationship between affective experiences of pleasure towards physical exercise, and intention to exercise. The main research question ("How is the relationship between affective experiences of pleasure towards physical exercise, and the intention to exercise affected by sport identity?") was studied by investigating three sub-questions. The aim of the first sub-question was to indicate that there would be a significant positive correlation between implicit affective experiences of pleasure towards exercise, measured with the SC-IAT, and explicit affective experiences of pleasure towards exercise, measured with the AFFEXX. This hypothesis was tested by examining Pearson's correlation coefficients of these variables. The goal of the second sub-question was to indicate that explicit affective experiences of pleasure towards exercise significantly predicted the intention to exercise. But also to show that implicit affective experiences explained additional variance of the intention to exercise, beyond what is explained by explicit affective experiences alone, and that explicit and implicit affective experiences of pleasure towards exercise together, significantly predicted the intention to exercise. These hypotheses were tested by creating two linear regression models and by conducting an ANOVA analysis. The aim of the last sub-question was to indicate that sport identity moderated the relationship between affective experiences of pleasure towards physical

exercise and the intention to exercise. This hypothesis was tested by creating a multiple regression model and conducting an ANOVA analysis.

First of all, it was found that affective experiences of pleasure towards exercise have a positive association with the intention to exercise, and that this relationship is moderated by sport identity. Findings of Pearson's correlation analyses showed that there was a significant correlation between affective experiences of pleasure towards exercise measured explicitly by the AFFEXX, in comparison to measured implicitly by the SC-IAT. This suggests that individual's affective experiences of pleasure towards exercise are consistent whether assessed explicitly or implicitly.

Results of the first regression analysis indicated that explicit affective experiences significantly predict the intention to exercise. The second regression analysis showed that the intention to exercise was even better predicted when adding implicit affective experiences to this model, as the R^2 of the second model was almost 4% higher. However, the intention to exercise was mostly explained by explicit affective experiences ($R^2 = 20.23\%$), which was also supported by the stronger correlation coefficient between explicit affective experiences and intention, compared to the correlation coefficient between implicit affective experiences and intention.

Finally, results of the moderation analysis showed that sport identity significantly strengthened the relationship between explicit affective experiences of pleasure toward exercise and intention to exercise. In contrast, sport identity did not moderate the relationship between implicit affective experiences of pleasure toward exercise and intention to exercise. This suggest that sport identity plays a crucial role in enhancing the influence of conscious experiences of pleasure towards exercise on the intention to exercise, but that this effect is not similar for the influence of unconscious experiences of pleasure from exercise. This was also

supported by the correlation coefficients which were stronger for explicit affective experiences.

When reflecting on the outcomes of this study, several important considerations should be made. First of all, the result of the significant positive correlation between explicit measures (AFFEXX) and implicit measures (SC-IAT) of affective experiences of pleasure towards exercise, was as expected. Prior research of Schinkoeth & Brand (2020) found that implicit affective experiences form the basis of explicit evaluations and processes that decide whether to have the intention to exercise or not. Numerous other studies on the strength of the association between implicit and explicit measures have also indicated that these measures tend to show moderately strong correlations (Hofmann et al., 2005).

Secondly, the outcome that both explicit and implicit affective experiences of pleasure towards exercise significantly predict the intention to exercise, was as expected. Previous research of the Affective-Reflective Theory (ART) suggests that affective stimuli related to exercise, and combined with a pleasant or unpleasant feeling, can predict the decision to exercise or not (Brand & Ekkekakis, 2021). Furthermore, in another study, Ekkekakis et al. (2021) reported a correlation coefficient of .25 between explicit affective experiences of exercise and actual physical activity. In this study, a correlation coefficient of .45 was found between explicit affective experiences and intention, which means that people who have more positive feelings about exercise, are more likely to have a higher intention to exercise. The reason for a stronger correlation with intention could be that intentions are generally higher than actual behaviours. Often, people have the intention to exercise, but do not act on it and eventually not make the decision to exercise. It is easier for people to express a desire to exercise, than to actually behave through it (Brand & Ekkekakis, 2018). In a study by Bruijn & van den Putte (2012), this phenomenon is called the intention-exercise gap. This gap has

not been thoroughly investigated yet and shows the need for further exploration of this disparity between the intention to engage in physical activity, and actual exercise behaviour.

Moreover, prior to the development of the ART theory, Kwam and Bryan (2010) already found that positive affective states during exercising have a positive influence on exercise intention three months later. Another study also indicated that positive feelings experienced after exercising were significantly associated with subsequent intentions to exercise (Raedeke et al., 2007). Therefore, it is reasonable that a positive relationship between affective experiences of pleasure towards exercise and the intention to exercise was found in this study.

The finding that sport identity positively moderates the relationship between affective experiences and intention to exercise was significant. It means that people who have a high sport identity and perceive themselves as a sportive person, are more likely to translate experiences of pleasure of exercise into a stronger intention to exercise. This suggests that when people who see themselves as sporty, pleasurable experiences with exercising will have a stronger impact on their intentions to exercise later. For example, a person with a high sport identity. This outcome aligns with earlier studies, like the study by Stets & Burke (2000) in which was reported that persons who perceive themselves as athletic are more likely to behave in ways that reflects this identity. In contrast, when someone has a low sport identity, the impact of pleasurable experiences on the intention to exercise is weaker, meaning that positive feelings will not strengthen the relationship between affective experiences of pleasure towards exercise and the intention to exercise.

This specific moderation effect highlights the important role of self-identity in exercise behaviour, which suggests that interventions based on self-identity should be considered. By integrating the outcomes of this study, the role of implicit and explicit affective experiences,

sport identity, and self-identity becomes obvious and should be taken into account when creating new interventions to promote the intention to exercise and actual physical exercise.

Conclusions drawn from this study should be interpreted with caution because of the limitations of this research. First of all, the chosen study design should be acknowledged. For this study, a cross-sectional design was chosen, which is time limited. Because the variables of investigation were measure at the same time, the study was restricted to investigate evidence of a cause-and-effect relationship between affective experiences of pleasure towards exercise, and the intention to exercise (Solem, 2015). Therefore, the long-term effects of affective experiences on the intention to exercise have not been investigated. A longitudinal design would have provided better insights and should be taken in consideration when conducting follow-up investigation.

Another limitation which was shortly acknowledged before, is the intention-exercise gap. In this research, intention was used as a proxy for actual behaviour, based on the assumptions what people will usually carry out their intentions. However, people do not always act on their intentions. When having the intention to exercise, it does not necessarily mean that people eventually make the decision to exercise, which could be called the intention-exercise gap. There are various factor that could cause this disparity, such as motivations, emotional fluctuations, or environmental barriers. Research investigating this issue is still limited, suggesting that this should be taken into account for the future.

Moreover, opportunity sampling could be seen as a limitation of this study, which could have created an unrepresentative sample. In this case, the researchers were young and sporty and probably mainly recruited participants with similar lifestyles which biased the sample towards a sporty sample. Participants of this study engaged on average in four sports in their past, and currently participated in many minutes of vigorous exercise per week, suggesting a sporty lifestyle. In addition, outcomes of the AFFEXX indicated that participants

had positive feelings towards exercising, and they also had high scores on intention to exercise and sport identity. Participants were on average 29 years, many of them still in university and living in urban areas, suggesting they have numerous sport facilities. As a result of the sporty sample, it is likely that participants had affective experiences of pleasure to exercise, and already high intentions to exercise. This could have influenced the conclusion that there is a relationship between these variables, by overestimating the true relationship. When comparing the sample to other studies, such as research by Kwan and Bryan (2010) and Helfer et al. (2015), which also found positive associations between affective experiences of pleasure towards exercise and the intention to exercise, similar sample characteristics were found. These studies also included young, healthy participants. Future research should focus on investigating this relationship in a more diverse population.

A final limitation of the study could be the use of the SC-IAT, computing the traditional d-score to measure implicit affective experiences towards exercising. Research by Chevance et al. (2017) demonstrated that use of the SC-IAT and the d-score possibly has many measurement errors. This was also visible in the sample of this study. Initially, the sample consisted of 140 participants, but due to invalid scores on the SC-IAT, the sample was reduced to only 95 participants. Moreover, it should be questioned whether the SC-IAT really measured implicit thought and feelings. Chevance et al. (2017) mentioned that SC-IAT scores reflect a mix of processes which are not entirely implicit. Implicit processes are totally unaware, non-intentional and non-controllable. This was not truly measured with the SC-IAT, as participants in this study were aware of the fact that they were asked about feelings towards physical exercise, and their sport identity. This suggests that they were likely to be slightly biased, and therefore the validity of the test should be taken into account (Brunal, Tietje & Greenwald, 2004) These limitations should be taken into account when interpreting the

conclusion that implicit affective experiences have an added value for explaining the intention to exercise.

Despite its limitations, this research contributed to a better understanding of the association between affective experiences of pleasure towards exercising and the intention to exercise. The addition of examining the moderating role of sport identity highlights the importance of also investigating individuals differences in self-identity that could influence the relationship. By better understanding what psychological mechanisms determine the intention to exercise, effective interventions can be developed to increase physical activity and eventually the quality of life of adults.

However, future research is needed to address the identified limitations. First of all, limited research has been conducted on investigating alternative scoring methods for the SC-IAT. Chevance et al. (2017) suggested measuring DW-scores and IP-scores, which take into account practice trials and measurement errors with the SC-IATs. These scores would already help to increase the reliability of the SC-IAT, but the validity of this test is still questionable. There is a need for developing new methods to measure true implicit processes. These methods should be focused on being entirely on a unconscious, uncontrollable and unintentional level. This might include implicit tasks or measuring brain activities while associating affective experiences with exercising. Additionally, the moderation effect of sport identity highlighted the role of self-identity in exercise behaviour. This effect has not been investigated thoroughly, but is important to investigate further on as it suggests that interventions based on self-identity could be more effective. Furthermore, future research should aim to recruit a larger, more diverse sample. The relationship between affective experiences and intention to exercise should be investigating across a diverse network of people, including different demographical groups. A longitudinal study could also advance the understanding of psychological mechanisms that determine exercise behaviour.

When the unique outcomes of this study will be considered in combination with the implications and limitations of this study, future research can continue to develop a comprehensive understanding of psychological mechanisms that determine exercise behaviour. This will help to find out why some people exercise more than other, to create more effective interventions, and to reduce the lack of physical activity in today's society.

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Appendix A

R Code

```
#Data Analysis Questionnaire Thesis
#Demographical data

##1. Install and load packages
install.packages("tidyverse")
library(tidyverse)

install.packages("readxl")
library(readxl)

install.packages("dplyr")
library(dplyr)

install.packages("psych")
library(psych)

install.packages("magrittr")
library(magrittr)

install.packages("readr")
library(readr)

##2. Import Dataset

data_AFFEXX24 <- read_delim("data_AFFEXX24.csv", delim = ";", escape_double =
FALSE, col_types = cols(STARTED = col_character()),
                        trim_ws = TRUE)
```

```
View(data_AFFEXX24)



##3. Data Preparation and Cleaning
#Make different Data Sets
#Dataset with all variables I need: for demographics + statistics
data1 <- data_AFFEXX24 %>%
  select(C101_01:C106, C110:E102_36, F801_01:F801_07, G301xD:G301mL4)
View(data1)

# Remove rows with NA values from data1
data1 <- data1[complete.cases(data1), ]

#Dataset with all demographics
demographicsdata <- data1 %>%
  select(C101_01:C106, C110:D112_02,E102_01:E102_36)
View(demographicsdata)

#Demographics wihout affex
demographics <- data1 %>%
  select(C101_01:C106, C110:D112_02)
View(demographics)

#Data only AFFEXX
affexxdata <- data1 %>%
  select (E102_01:E102_36)
View(affexxdata)
```

```
##4. Descriptive Statistics Participants (Methods Secion)
#AGE
#Rename column C101_01 and remove first row
names(demographics)[which(names(demographics) == "C101_01")] <- "Age"
demographics <- demographics[-c(1), ]
demographics$Age <- as.numeric(demographics$Age)
#Calculate mean age
Age_mean <- mean(demographics$Age)
print(Age_mean)

# Calculate the age range
age_min <- min(demographics$Age)
age_max <- max(demographics$Age)
age_range <- paste(age_min, "-", age_max)

# Print the age range
print(age_range)

#age distribution + percentages
age_breaks <- c(18, 30, 40, 50, 60, 70, Inf)
age_labels <- c("18-29", "30-39", "40-49", "50-59", "60-69", "70+")
demographics$Age_Category <- cut(demographics$Age, breaks = age_breaks, labels =
age_labels)
age_distribution <- table(demographics$Age_Category)
print(age_distribution)



age_distribution <- table(demographics$Age_Category)
total_obs <- sum(age_distribution)
age_percentages <- (age_distribution / total_obs) * 100
```

```
print(age_distribution)
print(age_percentages)



#SD age
Age_sd <- sd(demographics$Age)
print(Age_sd)

#Frequency age
frequentie_Age <- table(demographics$Age)
print(frequentie_Age)

percentage_Age <- prop.table(frequentie_Age) * 100
print(percentage_Age)



#GENDER
#Rename column C105
names(demographics)[which(names(demographics) == "C105")] <- "Gender"

#Frequency gender
#Gender
frequentie_Gender <- table(demographics$Gender)
print(frequentie_Gender)

percentage_Gender <- prop.table(frequentie_Gender) * 100
print(percentage_Gender)

#NATIONALITY
#Rename column C106
```

```
names(demographics)[which(names(demographics) == "C106")] <- "Nationality"

#Frequency =
frequentie_Nationality <- table(demographics$Nationality)
print(frequentie_Nationality)

percentage_Nationality <- prop.table(frequentie_Nationality) * 100
print(percentage_Nationality)

#OCCUPATION
#Rename column C106
names(demographics)[which(names(demographics) == "C110")] <- "Occupation"

#Frequency occupation
frequentie_Occupation <- table(demographics$Occupation)
print(frequentie_Occupation)

percentage_Occupation <- prop.table(frequentie_Occupation) * 100
print(percentage_Occupation)

#MARITAL STATUS
#Rename column C111
names(demographics)[which(names(demographics) == "C111")] <- "Status"

#Frequency
frequentie_Status <- table(demographics$Status)
print(frequentie_Status)

percentage_Status <- prop.table(frequentie_Status) * 100
print(percentage_Status)
```

```
#LIVING AREA
#Rename column C1112
names(demographics)[which(names(demographics) == "C112")] <- "Live"

#Frequency
frequentie_Live <- table(demographics$Live)
print(frequentie_Live)

percentage_Live <- prop.table(frequentie_Live) * 100
print(percentage_Live)

View(demographics)



##5. Descriptive statistics patricipants (results section)
#Variables: exercise demographics, IPAQ & AFFEXX
#Create dataset with only IPAQ items
ipaq <- demographics %>%
  select(D102_02:D112_02)
View(ipaq)

#Make everything numeric and change comma's into punt
ipaq$D102_02 <- as.numeric(ipaq$D102_02)
ipaq[86, "D102_02"] <- 5
View (ipaq)

ipaq$D103_01 <- as.numeric(ipaq$D103_01)
ipaq[1, "D103_01"] <- 1.5
ipaq[18, "D103_01"] <- 0.75
```

```
ipaq[23, "D103_01"] <- 0
ipaq[37, "D103_01"] <- 1.5
ipaq[48, "D103_01"] <- 1.5
ipaq[95, "D103_01"] <- 2
View (ipaq)


ipaq$D103_02 <- as.numeric(ipaq$D103_02)
ipaq[10, "D103_02"] <- 60
ipaq[53, "D103_02"] <- 0
ipaq[95, "D103_02"] <- 150
View (ipaq)
# Verwijder rijen met NA's in de specifieke kolommen
ipaq_clean <- ipaq[complete.cases(ipaq[, c("D102_02", "D103_01", "D103_02")]), ]

# Bekijk het schoongemaakte dataframe
View(ipaq_clean)

#Calculate MET scores for vigorous activity
# Calculate total minutes per day for vigorous activities in minutes
ipaq_clean$totalminutesperday <- ipaq_clean$D103_01 * 60 + ipaq_clean$D103_02
print(ipaq_clean$totalminutesperday)

# Calculate total minutes of vigorous activity per week
ipaq_clean$totalminutesperweek <- ipaq_clean$D102_02 * ipaq_clean$totalminutesperday
print(ipaq_clean$totalminutesperweek)

vigorousactivity_mean <- mean(ipaq_clean$totalminutesperweek)
print(vigorousactivity_mean)
```

```
vigorousactivity_sd <- sd(ipaq_clean$totalminutesperweek)
print(vigorousactivity_sd)

# Bereken range
vigorousactivity_range <- range(ipaq_clean$totalminutesperweek)
print(vigorousactivity_range)

# Bereken mediaan
vigorousactivity_median <- median(ipaq_clean$totalminutesperweek)
print(vigorousactivity_median)

# Bereken minimum en maximum
vigorousactivity_min <- min(ipaq_clean$totalminutesperweek)
vigorousactivity_max <- max(ipaq_clean$totalminutesperweek)

# Bereken range
vigorousactivity_range <- range(ipaq_clean$totalminutesperweek)
print(vigorousactivity_range)

#Variable exercise demographics
#Create dataset with only exercise types items
exercisetype <- demographics %>%
  select(C201_01:C205_05)
View(exercisetype)

#Calculate means
exercisetype$C201_01 <- as.numeric(exercisetype$C201_01)

past_mean <- mean(exercisetype$C201_01)
print(past_mean)
```

```
past_sd <- sd(exercisetype$C201_01)
print(past_sd)

exercisetype$C203_01 <- as.numeric(exercisetype$C203_01)
present_mean <- mean(exercisetype$C203_01)
print(present_mean)

present_sd <- sd(exercisetype$C203_01)
print(present_sd)

#AFFEXX Demographics
#Create affexx dataset with only the core affective experiences:
#Unpleasant (negative) vs Pleasant (positive)
#Calmness (positive) vs Tension (negative)
#Tiredness (negative) vs Energy (positive)
corexperiences <- affexxdata %>%
  select(E102_11:E102_13, E102_17:E102_20, E102_22, E102_30:E102_32, E102_35)
View(corexperiences)


#Make all columns numeric
corexperiences <- sapply(corexperiences, as.numeric)
warnings()

#Remove first row
corexperiences <- corexperiences[-1, ]
View(corexperiences)
```

```
#Reverse scoring the items from calmness vs tenstion so that you get negative (tension) vs positive (calmness) like the other two

corexperiences <- as.data.frame(corexperiences)  # Convert corexperiences to a dataframe if it's a matrix, array, or numeric vector


corexperiences <- corexperiences %>%
  mutate(
    E102_17 = recode(E102_17, `1` = 7, `7` = 1, .default = E102_17),
    E102_19 = recode(E102_19, `1` = 7, `7` = 1, .default = E102_19),
    E102_22 = recode(E102_22, `1` = 7, `7` = 1, .default = E102_22),
    E102_31 = recode(E102_31, `1` = 7, `7` = 1, .default = E102_31)
  )


View(corexperiences)


#Then calculate means and this I can put in the table of the demographics. Then the demographics are done.
#Mean and sd pleasure/displeasure
corexperiences <- corexperiences %>%
  mutate(gempleasure = (E102_11 + E102_30 + E102_32 + E102_35) / 4)
View(corexperiences)


pleasure_mean <- mean(corexperiences$gempleasure)
print(pleasure_mean)


pleasure_sd <- sd(corexperiences$gempleasure)
print(pleasure_sd)


#Mean and sd calmness/tension
corexperiences <- corexperiences %>%
  mutate(gemcalmness = (E102_17 + E102_19 + E102_31 + E102_22) / 4)
View(corexperiences)
```

```
calmness_mean <- mean(corexperiences$gemcalmness)
print(calmness_mean)

calmness_sd <- sd(corexperiences$gemcalmness)
print(calmness_sd)

#Mean and sd energy/tiredness
corexperiences <- corexperiences %>%
  mutate(gemenergy = (E102_12 + E102_13 + E102_18 + E102_20) / 4)
View(corexperiences)

energy_mean <- mean(corexperiences$gemenergy)
print(energy_mean)

energy_sd <- sd(corexperiences$gemenergy)
print(energy_sd)

##5. Statistical Analysis
statistics <- data1 %>%
  select(D202_01:D202_04, E102_11, E102_30, E102_32, E102_35, F801_01:F801_07,
G301xD)
View(statistics)

#Delete first row
statistics <- statistics[-c(1), ]

#komma's in punten
statistics$G301xD <- as.numeric(gsub(",", ".",statistics$G301xD))

#Make everything numeric
```

```
statistics <- sapply(statistics, as.numeric)

#DESCRIPTIVE STATISTICS
##INTENTION
#Calculate cronbach's alpha for intentions
intention <- data1 %>%
  select(D202_01:D202_04)
View(intention)

intention <- intention[-c(1), ]
intention <- sapply(intention, as.numeric)

alpha_result <- alpha(intention)
alpha_result <- alpha(intention, check.keys = TRUE)
print(alpha_result)

#Create column with mean of intention
statistics <- as.data.frame(statistics)
statistics <- statistics %>%
  mutate(gemintention = (D202_01 + D202_02 + D202_03 + D202_04) / 4)
View(statistics)

#descriptive statistics intention
#mean and sd intention
intention_mean <- mean(statistics$gemintention)
print(intention_mean)

intention_sd <- sd(statistics$gemintention)
print(intention_sd)
```

```
#SPORT IDENTITY

#descriptive statistics sport identity

#Create column with sum of sport identiy

statistics <- statistics %>%

  mutate(totalsportid = (F801_01 + F801_02 + F801_03 + F801_04 + F801_05 + F801_06 +
F801_07))

View(statistics)


#mean and sd

sportid_mean <- mean(statistics$totalsportid)

print(sportid_mean)


sportid_sd <- sd(statistics$totalsportid)

print(sportid_sd)


#IAT

#descriptive statistics IAT

iat_mean <- mean(statistics$G301xD)

print(iat_mean)


iat_sd <- sd(statistics$G301xD)

print(iat_sd)


summary(statistics$G301xD)


iat_range <- range(statistics$G301xD)

print(iat_range)



#descriptive statistics affexx

#already done here above, but do again in statistics dataset only for pleasure/displeasure
```

```
statistics <- statistics %>%
  mutate(gempleasure = (E102_11 + E102_30 + E102_32 + E102_35) / 4)
View(statistics)

#now only keeps colums that I need to use
finalstatistics <- statistics %>%
  select(gemintention, totalsportid, gempleasure, G301xD)
View(finalstatistics)



colnames(finalstatistics) <- c("intention", "sportid", "AFFEXX", "IAT")
View(finalstatistics)

##INFERENTIAL STATISTICS
#Create regression model
model <- lm(intention ~ AFFEXX + IAT + sportid, data = finalstatistics)
summary(model)

install.packages("car")
library("car")
avPlots(model)



# Assumptions
# 1. Checking normality of residuals (using a Q-Q plot + Shapiro Wilk test)
qqnorm(model$residuals)
qqline(model$residuals)

#deze niet normaal:
shapiro.test(residuals(model))
```

```
# 2. Checking homoscedasticity of residuals (using a plot of residuals vs. fitted values)
plot(model$fitted.values, model$residuals, xlab = "Fitted values", ylab = "Residuals")

#Breusch-Pagan test
install.packages("lmtest")
library(lmtest)
bptest(model)

# 3. Checking linearity (independent vs. each predictor variable)
plot(finalstatistics$AFFEXX, model$intention, xlab = "AFFEXX", ylab = "intention")
plot(finalstatistics$IAT, model$intention, xlab = "IAT", ylab = "intention")
plot(finalstatistics$sportid, model$intention, xlab = "sportid", ylab = "intention")

# 4. Checking for multicollinearity among predictor variables (using variance inflation factor - VIF)
vif(model)

# 5. Checking for Indepence (using Durbin-Watson test)
dwtest(model)

#check mean and sd of IAT
IAT_mean <- mean(statistics$G301xD)
print(IAT_mean)

IAT_sd <- sd(statistics$G301xD)
print(IAT_sd)

#Research question 2
#Eerst pearson's correlaties berekenen
```

```
# Berekenen van Pearson-correlatie
correlation <- cor(finalstatistics$AFFEXX, finalstatistics$intention)
correlation <- cor(finalstatistics$AFFEXX, finalstatistics$IAT)
correlation <- cor(finalstatistics$AFFEXX, finalstatistics$sportid)

correlation <- cor(finalstatistics$IAT, finalstatistics$sportid)
correlation <- cor(finalstatistics$IAT, finalstatistics$intention)

correlation <- cor(finalstatistics$intention, finalstatistics$sportid)

# Correlatietabel maken
correlation_matrix <- cor(finalstatistics[c("AFFEXX", "intention", "IAT", "sportid")])

# P-waardes berekenen
p_values <- matrix(NA, ncol = ncol(correlation_matrix), nrow = ncol(correlation_matrix))
for (i in 1:ncol(correlation_matrix)) {
  for (j in 1:ncol(correlation_matrix)) {
    if (i != j) {
      p_values[i, j] <- cor.test(finalstatistics[[i]], finalstatistics[[j]])$p.value
    }
  }
}

# Voeg p-waardes toe aan de correlatietabel
correlation_table <- cbind(correlation_matrix, p_values)

# Geef de tabel namen voor betere leesbaarheid
colnames(correlation_table) <- rownames(correlation_table) <- c("AFFEXX", "intention",
"IAT", "sportid")

# Toon de correlatietabel
```

```
print(correlation_table)

# Print de correlatiecoëfficiënt
print(correlation)

# Berekenen van Pearson-correlatie
correlation <- cor(finalstatistics$IAT, finalstatistics$intention)

# Print de correlatiecoëfficiënt
print(correlation)

# Model 1: Alleen expliciete affectieve ervaringen (AFFEXX)
model1 <- lm(intention ~ AFFEXX, data = finalstatistics)

# Model 2: Expliciete en impliciete affectieve ervaringen (AFFEXX en IAT)
model2 <- lm(intention ~ AFFEXX + IAT, data = finalstatistics)

# Samenvattingen van de modellen
summary(model1)
summary(model2)

# Vergelijking van de modellen
anova(model1, model2)

#Moderation
model3 <- lm(intention ~ AFFEXX + IAT + sportid + AFFEXX:sportid + IAT:sportid, data =
finalstatistics)
summary(model3)

anova(model2, model3)
```