Physical activity among young adults: A health economic evaluation of policy interventions in Greece and in The Netherlands

by

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Abstract

Objectives: The study aimed to explore the influence of policy interventions on physical activity levels among young adults in Greece and in the Netherlands, considering the different contexts of these two countries. Furthermore, it intended to evaluate the efficacy of these policies by assessing their impact on young adults' choices, health outcomes and attitudes toward physical activity.

Methods: We conducted a Discrete Choice Experiment (DCE) to elicit the preferences among interventions that aim to effectively encourage physical activity (PA) of 88 young adults living in Greece or in the Netherlands. Afterwards, we utilized a conditional logit model (CLM) to model the probability of choices among the presented policy intervention attributes. To counteract with the CLM's assumption, of homogeneity, we performed heterogeneity tests across our variables and conducted a post-hoc subgroup analysis for three population characteristics that. showed variance.

Results: Greek residents exhibited a preference for policy interventions that enhance street connectivity, aligning with the country's predominant car use, while Netherlands' residents showed a preference for workplace-based interventions. Moreover, incentive preferences differed, with females in Greece favoring activity trackers and males in the Netherlands showing a preference for monetary benefits.

Conclusions: The findings of this study showcase the significance of contextual disparities between Greece and the Netherlands in shaping young adults' preferences regarding policy interventions aiming to increase physical activity levels. These differences are influenced by the gender, income, alcohol consumption, and smoking habits. Therefore, the needfor tailored strategies when designing interventions for physical activity among young adults in diverse cultural and economic contexts is highlighted.

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List of Acronyms

DCE   Discrete Choice Experiment

WHO   World Health Organisation

GDP   Gross Domestic Product

PA   Physical Activity

PI   Policy Intervention

SCT   Social Cognitive Theory

TPB   Theory of Planned Behavior

CLM   Conditional Logit Model

RUT   Random Utility Theory

BIC   Bayesian Information Criterion

PPP   Purchasing Power Parities

bmi   Body Mass Index

vas   Visual Analogue Scale

SDT   Self-determination Theory

OLS   Ordinary Least Squares

Chapter 1.

Introduction

1.1. Societal Relevance

Physical activity is at the core of physical and mental health as well as the well-being of the populations. It is proven to be effective in preventing and managing non-communicable diseases and improving the quality of life and the mental health, by lowering the stress levels (Nikitara et al, 2017).

The new guidelines of the World Health Organization (WHO) for adults aged 18 to 64, recommend engaging in moderate-intensity physical activity for a minimum of 150 minutes throughout the week. However, as countries experience economic growth, the use of innovative technology, the transportation patterns and the behaviors are altered, indicating lower levels of physical activity in populations (WHO, 2018).

Physical activity factsheets from the WHO, with data from Eurostat, indicate a significant difference in the estimated prevalence of sufficient physical activities among young adults, with Greece and the Netherlands having an overall percentage of 20% and 50% respectively.

In many studies, the absence of physical activity is associated with a higher likelihood of being overweight or obese. The prevalence of these two conditions has risen rapidly worldwide, inducing non-communicable diseases along with high treatment costs and higher mortality.

The study conducted from Okunogbe et al. (2022) about the economic impacts of overweight and obesity for 161 countries, presents current and future estimates of overweight and obesity prevalence, with outstanding increases in both countries.

The Centre for Disease Control and Prevention (CDC) highlights the importance of frequency, intensity, and duration of exercise to be beneficial. The European Commission published in 2022 the fifth Special Eurobarometer 525 with 26,580 European respondents. The frequency of exercising or engaging in other physical activities seemed to be much higher in Netherlands compared to Greece. Even though The Netherlands has a significant higher GDP per capita, with a higher economic growth through the years than Greece, the physical activity levels are higher. Although economic growth and higher GDP levels have been mentioned as potential factors that

can contribute to changes in individuals' physical activity behavior and patterns, it is crucial to consider several determinants that impose an influence on the engagement in physical activity across countries. These determinants include social inequality, cultural disparities, environmental and infrastructure factors, as well as health awareness and educational initiatives (Bock et al. 2013). Such factors encompass legislation and national policies that contribute to disparities in the allocation of the factors that influence physical activity and sedentary behavior between Greece and The Netherlands (Ball et al. 2015).

1.2. Policy Relevance

Physical inactivity is associated with an increased risk of all-cause mortality, followed by several side effects in health (An, 2021). Global and national guidelines for physical activity are crucial for establishing a comprehensive framework of policy implications. WHO encourages each country to initiate its own policy recommendations and targets of its residents' physical activity levels (Bull et al. 2020). However, the knowledge about the cost-effectiveness of these policies is still limited (Gelius et al. 2020). Cost-effectiveness is a crucial factor in the field of health services and policy interventions, with its relevance having been driven by several key factors and claims that good health needs to be maintained at all costs (Hutubessy et al. 2003). The reality of resource scarcity, as well as the needs to allocate resources efficiently, calls for a more complicated approach to health promotion, although it is obvious that healthcare is an absolute priority (World Health Organization, 2016).

Physical activity policy interventions are commonly combined with other public health policies, such as tobacco use, vaccination programs or screening campaigns. These policies constitute a wide range of interventions at a prevention level, aiming to promote wellness, reduce morbidity concerning lifestyle risk factors and ensure that health goals among countries are met (Global Wellness Institute, 2022).

Example policies aimed at promoting physical activity (PA) include initiatives such as the promotion of active transportation, the enhancement of green space areas (Nieuwenhujisen 2014), the improvement of street connectivity (Nazelle et al 2011) or the establishment of incentives for a healthy lifestyle in the workplaces settings (Despres et al. 2014).

1.3. Scientific Relevance

The importance of physical activity policies is acknowledged by academics, indicating the improvement in populations' health and the risk reduction of diseases associated with sufficient physical activity levels (Gelius et al 2020). However, the paradox is that despite of knowing the health benefits of exercising, yet there is witnessed an unacceptably high population burden of absence of physical activity (Bauman et al. 2012). Specifically, studies show that the absence of physical activity increases the risk of major health conditions with evidence that it is responsible for the 6-10% onset of coronary heart disease as well as for breast cancer, type 2 diabetes, and reduced life-expectancy (Lee et al. 2012).

Therefore, the question of why some individuals engage in regular physical activity while others do not is still complex to be answered. This discrepancy may be influenced by various factors, including the age, the gender, the health status or the self-efficacy of the individual, or other social factors, such as the accessibility to some exercise facilities, the work environments of the cultural norms (Bauman et al. 2012). Understanding these factors on both individual and population levels is important when designing effective strategies to promote physical activity and improve the public health.

The contribution of this study will be to indicate the selection of physical activity policy interventions in health improvement in Greece and in The Netherlands, through investigating how the contextual differences of those two countries affect the choices of the individuals. Considering also the individuals' characteristics, like country of residence, smoking habits, income level and other aspects, we can measure how they influence their choices among the most preferred policy intervention.

1.4. Aim of the Research

Taking into consideration the literature, the prevalence of sufficient physical activity in Greece and in the Netherlands, alongside with the motives of exercising and the policy implementations, all convey significant dissimilarities between these two countries. The Dutch population is demonstrated as one of the most physical active nation in EU with 12.8 reported hours of exercising per week (Ipsos, 2021). The Greek population on the other side, is considered one of the least active (Special Eurobarometer 525, 2022). There is an anticipation of physical activity relevance between

these two countries as well as in the PA interventions that already exist from the governments, that has not been studied yet.

The aim of this study is to present how the prementioned differences that exist between two countries, contribute to understanding the differences across the choices of the individuals for the most effective policy intervention that promotes physical activity. Empirically, we chose to compare Greece and The Netherlands, in order to investigate how their cross-cultural, behavioral and economic differences have an effect on their choices regarding physical activity.

1.5. Research Question

The principal research question of this thesis revolves around the impact of contextual disparities between Greece and the Netherlands on the preferences of young adults concerning policy interventions targeted at promoting physical activity.

This study seeks to compare and examine the impact on choices of potential policy interventions implemented in Greece and in the Netherlands, taking into consideration the unique population characteristics of the countries, such as cultural, economic, and social contexts.

Overall, this study aims to contribute to the existing body of knowledge on the selection and effectiveness of policy interventions in promoting physical activity. Valuable new insights can be gained by comparing the outcomes in Greece and in the Netherlands, specified for the group of 18-35 years old. Particularly, the research will offer insights for potential subgroup preferences, behavioral dynamics that contribute to the selection of policy interventions and public health implications, Hence, we aim to make suggestions for future policies development and interventions in order to improve the health rates and the well-being of young adults in these countries and beyond.

1.6. Structure of Thesis

This section provides a guide regarding the structure and the content of the following chapters:

Chapter 2: Theoretical Framework and Background Information

The theoretical framework of health behaviors is described, based on social cognitive theory, self-efficacy theory, theory of planned behavior and potential biases that occur in health research.

Afterwards, the hypotheses for each attribute of policy interventions are provided with the expected results.

Chapter 3: Research Methods

This chapter presents the methodologies and processes supporting the study's research question. It outlines the study design, the sample selection, and the data collection strategy. Also, the application of the Discrete Choice Experiment (DCE) framework is elaborated, including the attribute and levels identification and the design of the online survey. Data reshaping and organization methods are employed, followed by an explanation of the statistical analysis that is utilized in Chapter 4.

Chapter 4: Results

The results' chapter presents the comprehensive analysis of the obtained data. Descriptive statistics are provided, offering an overview of our key variables. The focus then is to the application of the conditional logit model, where the result of the average marginal effects are reported. Moreover, several subgroup analyses are conducted to investigate the specific characteristics of the two countries.

Chapter 5: Conclusion and Discussion

In this section, the findings are summarized and interpreted in the context of the research objectives. The influence of the contextual differences on young adults' preferences for policy interventions aiming to improve the physical activity levels is highlighted. Furthermore, the contribution of this study is further underscored, while the limitations are also mentioned, acknowledging how the boundaries of this research might have affected the research outcomes. Lastly, potential directions for future research are presented, showing opportunities to expand the understanding of our research focus.

Chapter 2.

Theoretical Framework and Background Information

2.1. Self-efficacy Theory

Self-efficacy refers to individuals' level of confidence in their ability to perform a specific behavior or achieve the desired outcome (Lee et al. 2008). This concept holds significant implications for promoting changes in health behaviors and has been extensively applied across various health domains, including physical activity, weight loss, nutrition, smoking behavior and many more. Extensive research has demonstrated that self-efficacy beliefs engage a notable influence on the adoption of new health behaviors and their transferability across time. Particularly, individuals seem reluctant to engage in new behaviors if they lack confidence in their ability to perform them effectively (Pekmezi et al. 2018). Self-efficacy beliefs play a crucial role in the long-term maintenance of those health behaviors. A study revealed that self-efficacy significantly predicted the engagement in physical activity among adults, even five years after completing a six-month walking program (Marquez et al. 2006).

According to the self-efficacy theory, an individual's self-efficacy can be influenced by four primary sources of information: past accomplishments in performance of the activity, observational learning, verbal encouragement, and physiological states (Lee et al. 2008). Previous achievements are widely acknowledged as the most influential approach for cultivating self-efficacy. Notably, positive experiences and accomplishments tend to reinforce one another, creating a cycle of success. Conversely, experiences characterized by previous failures can be disheartening and contribute to diminished levels of self-efficacy (Hagger et al. 2001).

In research conducted by Hagger and his colleagues in 2001, it was revealed that past behavior not only predicted to a great degree the self-efficacy of individuals, but also the Theory of Planned Behavior variables, which is explained in the following section.

Namely, self-efficacy can be linked to the context of policy interventions aiming to improve physical activity levels among young adults, through its influence on individuals' belief of their ability to control the outcomes of those interventions. Higher self-efficacy can be expected to lead to a greater engagement, motivations, and adherence of individuals to different types of policy interventions, components, goal-setters, and incentives within the policy context. Accurately,

young adults with high self-efficacy are hypothesized to perceive themselves as capable to adhere to different types of policy interventions. For example, if a policy intervention involves the engagement of a company's employees in a after-work exercising program, those with high self-efficacy will believe that they have the skills to take advantage of this opportunity and engage in that program. What is more, the components of an intervention can be influenced as well by the self-efficacy levels of the individuals. High self-efficacy adults can be more confident of their skills to benefit from those components, such a media campaign, or a networking program, while actively participating in the intervention. The theory of self-efficacy can be also linked with the incentives accompanied by the policy, such as financial benefits. It can be hypothesized that those incentives will be more effective to people with high self-efficacy, as they motivate them with the belief that their efforts of following the policy will lead to positive outcomes, while enhancing their engagement.

2.2. Theory of Planned Behavior

Theory of Planned Behavior (TPB) suggests that the behavioral achievement depends on the intentions of the individuals and their abilities as well (Brookes, 2021). The intention to engage in a particular behavior is shaped by several factors, including one's attitude toward the behavior, the perceived social norms regarding its performance, and the perception of control over performing the behavior (Jackson et al. 2003).

In particular, the TPB has received empirical support across various health behaviors, including physical activity. Such studies are those by Hauselnblas et al 1997 and by Hagger et al. 2002, that have demonstrated the applicability of the TPB. Specifically, it is found that TPB accounted for 44.5% of the variance in physical activity intentions and for 27.4% of the variance in actual physical activity behavior (Hagger et al. 2002).

Policy interventions targeting physical activity levels among young adults can be informed by the three key principles mentioned. By understanding the factors that shape individuals' intentions and behaviors, policymakers can design interventions that address the attitude toward the behavior, the perceived subjective norms, and the perceived behavioral control (Shafieinia et al. 2016). Specifically, policy interventions aim to shape positive attitudes towards exercising. This can be succeeded through marketing campaigns that highlight the benefits of physical activity and presents the expected positive outcomes on individuals. Policy interventions can also focus on influencing the social norms by promoting social support through communities in institutions, such as

universities, municipalities, or workplaces, promoting the creation of an encouraging culture of physical activity and an engagement among individuals. Last but not least, the perceived behavioral control can be addressed through policies by considering the barriers of physical activity and by offering opportunities to enhance individuals' control over engagement in exercising. This can contain incentives like enhancing the safety and affordability of facilities or promoting an active way of transportation (Chatzisarantis et al. 2005).

The policy interventions incorporated in this study include three key areas. The first policy intervention involves the replacement of parking spaces with green areas, while the second policy focuses on the enhancement of street connectivity and the creation of walking and bicycle lanes. Lastly, the third intervention entails the provision of on-site facilities in the workplace that encourage after-work physical activity instead of after-work drinks. These policy interventions serve as the basis for testing the influence of TPB principles on the behavior change related to physical activity.

Precisely, the present study incorporates the three aforementioned fundamental principles of TPB, to inform the context of the policy interventions that will be researched. Firstly, the replacement of parking areas with parks aligns with the shaping of positive attitudes towards exercising by creating such an environment that promotes exercising and limits the use of motorized means of transport. Secondly, the enhancement of street connectivity addresses the perception of behavior control, by providing individuals with easier access and greater control over engaging in physical activity and active transportation. Last but not least, the inclusion of on-site facilities in the workplace relates to the shaping of positive attitudes and the influencing of social norms. By offering opportunities for physical activity in the workplace, this intervention creates a supportive culture that values and encourages a healthy and active lifestyle.

By incorporating these policies into interventions, policymakers can address attitudes, perceived control, and social norms, while increasing the likelihood that young adults will engage in physical activity.

2.3. Biases in Health Research

Similar to other disciplines, health research is susceptible to various sources of bias. Obtaining an understanding of these bias sources is essential in order to establish reliable and accurate conclusions (Althubaiti A. 2016).

Social Desirability Bias. The phenomenon of social desirability bias describes the inclination of the study population to position themselves in a more favorable and socially accepted situation, rather than responding honestly. Accurately, the respondent gives an answer that will possibly please the researcher or agree with what is presented in the survey. This behavior may be influenced by diverse factors and often leads to an overestimation of socially accepted attitudes and behaviors and an underestimation of the reality. (Bispo J. 2022). Qualitative studies are usually posed with that significant challenge that potentially leads to skewed results, holding researchers back from eliciting the social norms in empirical investigations (Latkin et al. 2017).

Hypothetical Bias. The DCE as a type of a stated preference method, requires respondents to choose their preferred scenario of a hypothetical condition. Comparing a hypothetical condition to a non-hypothetical choice experiment, where respondent is provided with real goods, studies reveal the existence of hypothetical bias. In that case, the willingness to pay for a scenario, with its attributes and levels, is lower in a hypothetical choice experiment than in a non-hypothetical (Aoki et al. 2022). Therefore, hypothetical bias can reduce the validity of the DCE, as the condition described in the experiment is hypothetical and does not imitate real-world decision-making scenarios. However, according to a study, by giving the respondents time to think for each of their choice of scenarios of the survey, they seem to be more consistent and provide more accurate results (Veldwijk et al. 2020).

Information Bias. It is considered one of the most frequent causes of bias in a health-related research and can be caused due to misclassifications or incorrectly measured variables. Misclassifications can be non-differential, in the case where the respondents of both control and treatment group provide inaccurate measurements, and differential, in the case where a measurement difference is shown between the two groups (Nikolopoulou K. 2023).

2.4. Hypotheses

Type of policy intervention. The choice of a policy intervention promoting a behavior and a lifestyle change is significantly influenced by their specific context. Particularly for Greece, considering its reliance on cars and means of transport as the primary mode of transport, it is anticipated that individuals living in Greece will show a preference for policy of the enhancement of street connectivity, aiming for improved urban accessibility. On the other side, given the

Netherland's reputation for cycling and using of active transportation and their several green areas, we hypothesize that they might prefer the policy of on-site workplace facilities, in order to integrate physical activity in their daily routines.

Components of policy intervention. The interventions found in the existing literature mainly fall into two categories: policies incorporating behavioral components and those incorporating cognitive components. Behavioral components primarily involve self-monitoring techniques and aim to facilitate the active modification of individuals' physical behavior. For instance, an example policy may entail establishing local communities where individuals can observe others engaging in the same activity and receive verbal encouragement (Lee at al. 2008). On the contrary, cognitive components are comprised of educational and counselling approaches, with the goal of influencing individuals' attitudes and beliefs. As an illustration, a market campaign that highlights the positive expected outcomes of increased PA levels could serve as a policy employing cognitive components (Oyibo et al. 2018). Our hypothesis suggests that considering Greece's strong sense of community and interpersonal relationships, individuals living in Greece will be more inclined to the establishment of local communities in order to observe other engaging in exercising and gain a verbal encouragement, while they will foster their sense of helping each other. For the Netherlands, we hypothesize that individuals will prefer the marketing campaigns that will align with their pragmatic culture and help them sets their physical activity goals.

Goal setting within policies. In a meta-analysis conducted by Chase (2015) that examined the overall effectiveness of interventions designed to increase PA behavior, goal setting was among the variables considered. Goal setting within policy interventions can be established either by the interventionist, such as authorities, general guidelines for PA, companies, and the mayor, or individually by the participant or a larger group of people, such as co-workers and neighbors. As young adults often exhibit a higher level of autonomy in their decision-making (Watson et al. 2023), we can hypothesize that in a setting involving them, individually-setting goals for PA within policy interventions may be more effective in promoting a behavior change, compared to situations where goal setting is determined by external interventionists. By allowing young adults to establish their own goals there is a higher likelihood of motivation and behavior change. This approach also aligns with the principles of self-determination theory (SDT), that suggests that autonomy and self-relevance play a significant role in promoting behavior change. On the contrary, when goal is set externally, that may be perceived as less personally meaningful and not totally capture individuals' preferences and values (Deci et al. 2001). Specifically, we expect that individuals living in Greece, have strong community values and therefore might prefer the goal setting to be done by a group of

people, aligning with their collective spirit. While individuals in the Netherlands who value their autonomy, might prefer to set their exercise goals individually.

Provision of incentives. In the context of policy interventions aiming to promote PA change, one more crucial aspect to consider is the provision of the incentives. Incentives usually serve as motivators that can influence individuals' decision-making processes (Vlaev et al. 2019). Whether it is through financial incentives or other forms, incentives play a pivotal role in shaping individuals' responses to a policy intervention. In a setting of young adults, we can hypothesize that policies incorporating monetary incentives, either with a form of tax refunds or with monetary benefits, will be more successful in promoting a change of behavior in exercising, compared to policies with materialistic incentives or no incentives. By offering monetary incentives within policy interventions, young adults may perceive an immediate reward for engaging in desired behaviors and subsequently increasing the likelihood of sustained behavior change (Marteau et al. 2009). While materialistic incentives, such as free activity trackers, can provide direct feedback on individuals' PA levels and motivate them for self-monitoring, they may not offer the same immediate reward as a monetary incentive. Similarly, policies with no incentives may lack the external motivation that young adults are pursuing. Particularly, we hypothesize that young adults living in Greece might be more inclined to the free activity trackers, as these devices might facilitate their need for social connections and encouragement of other individuals with the same goal. Moreover, give the Netherlands' more individualistic culture, we can expect that they will prefer the monetary benefits as an instant incentive that can align with their personal achievement.

Chapter 3.

Research Methods

3.1. Study Design

Understanding the preferences of individuals, regarding policy interventions who aim to increase their physical activity levels, is beneficial for the formulation of health policies and strategic preparations. In the absence of observational data, stated preference methods can be employed to obtain individuals' preferences. Among these methods, a frequently used approach is the discrete choice experiment (DCE), which is a quantitative methodology positing that individuals engage in decision-making by making trade-offs and selecting the alternative of a product or service or policy that provides them the highest utility or benefit (Wang et al. 2021).

3.2. Study Population

The study population comprised young adults aged between 18 and 35 years, living in Greece or in The Netherlands. The selection of this target group was driven by the recognition that this age group represents a unique opportunity to observe and assess the effectiveness of interventions, as they are generally more receptive to change their behaviors and have a long-term impact of such interventions. By focusing on young adults, the study sought to gain insights into the potential outcomes and implications of policy interventions in shaping the future patterns of physical activity behavior.

3.3. Data collection

Numerous of survey software products for the creation of a DCE exist. In this study, in order to collect the data, the spotlight software was utilized to generate the scenarios for the experiment. To determine the required sample size, the following formula was employed:

$$N > 500c/(t*a)$$

where "t" represents the number of choice tasks, "a" represents the number of alternatives and "c" the number of analysis cells.

In the context of examining main effects, "c" corresponds to the highest number of levels among all the attributes considered. For this study, the sample size needed, was calculated to 42 participants. As the study examines the influence of policy interventions in two countries, there were collected 43 responses from young adults in The Netherlands and 45 responses from Greek young adults.

3.4. Discrete Choice Experiment

As aforementioned, the most utilised type of stated preference method is the DCE. It was initially developed by McFadden and other researchers in 1973 with focus on travel demand analysis. DCEs were primarily employed to investigate the decision-making process of travel means, such as trains, buses, airplanes or cars (Bernasco et al. 2013). Later on, Louviere and Hensher (1982) and Louviere and Woodworth (1983) applied DCEs on studying transport marketing and economics, with an influence of psychology and economics (OECD, 2018).

In recent years, DCE has gained prominence in various domains, including health and healthcare settings (Johnson et al. 2013). However, despite the increasing availability of extensive datasets, there are still haps in the existing data that hinder the ability of researchers to address inquiries in the field of health economics. In response to this need, DCEs have gained considerable popularity, as they offer opportunities to tackle a wide range of research questions, which may otherwise remain inadequately answered. More specifically, DCEs enable researchers to gain insight on the preferences of individuals and therefore facilitate clinical and policy decisions with a better understanding of the behaviors exhibited by key actors within the health sector. Additionally, a DCE allows for the quantification of trade-offs that respondents are willing to make between different aspects of healthcare, such as balancing risks and benefits. Furthermore, these experiments contribute to an overview of monetary and non-monetary valuations, enabling the assessment of the worth of healthcare services and outcomes. That information can be useful for a cost-benefit or cost utility analysis. DCEs also may provide a forecast of the demand for new treatments (Lancsar et al. 2017).

The discrete choice framework comprises a series of assumptions concerning four fundamental components of choice-making (Ben-Akiva et al. 1999):

1. Decision makers: The decision maker, whether an individual or an agent, is responsible for making a selection among all available options.

2. Alternatives: Within the choice sets, which encompasses all the available options, the decision maker is asked to choose a single alternative.

3. Attributes: Each alternative possesses distinctive attributes that contribute to its appeal for the decision maker. The decision maker evaluates which alternative is more attractive based on these attributes.

4. Decision rule: According to economic theory, the decision maker selects the alternative choice that maximizes their expected utility, which can be interpreted as net gain, profits or satisfactions.

Explicitly, DCE employs a survey-based experimental design wherein participants are presented with a series of hypothetical scenarios, known as choice tasks. Within each choice occasion, respondents are presented multiple alternatives and are asked to choose their preferred alternative in each task, enabling researchers to quantify the relative strength of preferences.

Regarding the initial CBC design of the DCE, a nearly orthogonal design was utilized, with 1 level overlap of the attributes. As the attributes and levels set generated many different alternatives (3*2*3*3), it was not possible to elicit preferences for all the possible combinations, like in a full factorial design (Johnson et al. 2013). Therefore, a nearly orthogonal design was employed, whereby attributes and levels were deliberately chosen to guarantee a substantial level of orthogonality or independence among the attribute levels and to eliminate any correlation between the attributes (Szinay et al. 2021). To counterbalance the choice task complexity and therefore enhance the behavioral efficiency, the adoption of attribute level overlap was introduced in the design. The level of one attribute was hold constant, making the choice easier for the respondent, while improving his consistency in decision-making. In fact, the level overlap enables researchers to capture the preferences for all the attributes that influence choice making, even if some of these are evidently less influential than others (Jonker et al. 2018).

Identifying the attributes:

The first stage in designing a DCE implies the identification of the attributes relevant to the policy interventions of enhancing physical activity. The sample population is young adults, aged between 18-35 years-old, therefore the focus is on four main attributes of physical activity that matter mostly for these ages:

[1]: Type of policy intervention, [2]: Type of policy intervention components, [3]: Goal setting of the physical activity levels, [4]: Incentives of the policy intervention

Assigning attribute levels:

The levels of each attribute reflect the situations that a young adult might have faced, based on the literature. *Figure 1* shows an overview of the levels of each attribute.

Figure 1: Attribute levels

Attributes	Levels		
Type of Policy Intervention	Replacement of parking spaces in the neighborhood by green areas	Enhancing of street connectivity and walking/bicycle lines	On-site facilities in the workplace that encourage after-work physical activity instead of after-work drinks
Components	Creation of communities in institutions to observe others engaging in the same activity and get verbal encouragement	Market campaign with expected positive outcomes in individuals' physical activity levels	-
Incentives	Tax refunds or monetary benefits	Free activity trackers	No incentives
Goal Setting	Physical activity goals are set by guidelines or authorities	Physical activity goals are set by the participant	Physical activity goals are set by a group of people

Linking operationalizations to hypotheses:

Once the attributes of physical activity and their levels were defined, it is needed to examine how the inclusion of these attributes provides insights to support our hypotheses.

Type of policy intervention. One main attribute to consider is the nature of the policy interventions. This attribute captures whether the intervention target an environmental change, such as creating more green areas or enhancing the street connectivity, or on improving the working environments in terms of promoting after-work exercise. By operationalizing this attribute and identifying the needs of Greece and the Netherlands, it can be investigated whether different types of interventions have varying effects on young adults' physical activity behavior. This information will help assess how effective each specific intervention is in promoting a change in exercising.

Components of policy intervention. Another attribute to consider is the components of those interventions, which are categorized in behavioral and cognitive components. Initially, it can identify whether the interventions primarily incorporate self-monitoring techniques and observation of other engaging in physical activity (behavioral components) or educational and counseling approaches to influence attitudes and beliefs (cognitive components). Therefore, it can be evaluated whether interventions that directly target behavior change are more effective compared to those focusing on attitudes and beliefs, as suggested by our hypothesis.

Goal setting within policy intervention. The attribute of goal setting can be operationalized by identifying whether the goals are set by external interventionists or individually by the participants. Aligning the goal setting with the SDT, it can be evaluated whether individually setting goals for physical activity are more effective in promoting behavior change among young adults, compared to externally setting goals. Therefore, it can be determined if SDT principles can be applicable to this study and whether autonomy in goal setting influences behaviors.

Provision of incentives. Through this attribute it can be examined whether the policy interventions incorporate monetary incentives, materialistic incentives, such as free activity trackers, or no incentives. Hence, it reflects the role of incentives in shaping young adults' response to those policy interventions and assesses whether policies offering monetary incentives are more successful in promoting behavior change in physical activity compared to free activity trackers or no incentives at all. The motivational effects of different types of incentives can be further investigated.

In general, examining the responses of young adults in relation to contextual factors, such as cultural and environmental schemes or individuals' characteristics, can help understand how these factors may interact with the policy interventions and influence their effectiveness. Subsequently, analyzing the data collected through operationalizing the attributes, will provide valuable information in order to support the initial hypotheses.

Designing the questionnaire and establishing the preferences:

Once the hypotheses proved to be supported by the data, an online survey was developed.

The first part contained demographic questions about the country of residence, the gender, the age, the weight, the height, the employment status, and the income of the respondents. Corresponding to the answers, the respondents were mainly categorized regarding their bmi levels and their country of residence. The expectation was to observe significant differences between physical activity levels among young adults living in Greece and those living in The Netherlands, as well as among people characterized as healthy and those as overweight or even obese.

The second part of the survey explained the concept of the DCE survey and an explanation of policy interventions, followed by two training tasks with fewer attributes per scenario.

The third part introduced the first six choice sets. The participant was presented with two different alternatives and a no-policy intervention alternative and was asked "In which of the following scenarios would you be more inclined to increase your physical activity levels?". Alternatives were labeled as Scenario A, Scenario B and None. Each scenario encompassed descriptions of the four attribute levels. Initially, it provided information regarding the type of policy intervention, followed by details concerning the incentives offered by the policy to the individuals involved. Subsequently, it outlined the goal setting aspect, and finally, it elucidated the elements of the policy designed to stimulate the anticipated change. They choice sets have a panel structure, wherein each respondent provides multiple outcomes for a series of scenarios. While requesting for an answer to multiple choice tasks allows the collection of additional information of their preferences, it is also important to acknowledge that additional observations from the same respondent do not constitute independent information. This is relevant to our study, where multiple outcomes are available for each scenario, further highlighting the presence of non-independent observations (Lancsar et al. 2017). `

Figure 2: Sample Choice Set

Scenario A	Scenario B	None
On-site facilities in the workplace that encourage after-work physical activity instead of after-work drinks	Enhancing of street connectivity and walking/bicycle lanes	

Free activity trackers with daily goals	No incentives	I wouldn't choose any of these scenarios
Physical activity goals are set by the government/mayor or the company	Physical activity goals are set by the government/mayor or the company	
Market campaign with expected positive outcomes in individuals' physical activity levels	Creation of communities in institutions to observe others engaging in the same activity and get verbal encouragements	

In the following section, personal characteristics and background questions were enquired. Given that individuals may assign varying degrees of value to different alternatives, it is crucial to incorporate observable characteristics into the analysis plan, in order to ensnare the sources of heterogeneity among preferences for policy interventions. In this study, several variables that hold potential relevance in examining the factors influencing the physical activity levels of young adults were identified. Specifically, those include the smoking and alcohol habits, the self-preserved health status of the respondent, the current exercise levels, as well as their future exercise aspirations. Additionally, the willingness of participants to adopt an intervention aiming to increase their physical activity levels, the mode of transportation used for commuting to work or university and the underlying motivations driving their engagement in physical activity are also considered as important factors. By incorporating these variables, a comprehensive understanding of the determinants behind physical activity behaviors will be obtained.

Lastly, the remaining six choice sets were presented in the respondent.

The DCE survey was pilot tested through interviews among five students, to ensure its clarification. Afterwards, the final questionnaire was spread through social media, among young adults in Greece and in The Netherlands. Each respondent was randomly assigned to a DCE version, while the attributes' order was constant in order to keep the clarity of the choice making.

3.5. Description of the Research Methods

Reshaping the data

In the case of a DCE, it is usually suggested to transform the data from wide to long format, even if there is no case of panel data. The respondents of our survey are presented with multiple choice sets, each with three alternative options and then they choose their preferred option. The wide format of the data depicts each choice set as a single row, where the columns indicate each attribute (Pérez-Troncoso, 2020). When transforming the data into a long format, there is created a row for each choice the respondent made and the columns consist of the respondent ID, the attributes of the alternatives and the indicators. Therefore, this transformation is easier to examine the influence of individual attributes on choice behavior and estimate the effects. Accurately, using Stata code, the variables representing the choices and the attribute configurations were renamed and then the data was reshaped from wide to long format.

Data Organization

In the employed model some of the variables were continuous, necessitating the creation of dummy variables for categorization.

In the context of income, the range of variable's values spanned from 200€ to 9,900€ while notable disparities exist in income between Greece and the Netherlands. To facilitate meaningful comparisons, different dummy variables were generated for both countries. The categorization of the data relied on information obtained by the taxation sale for the yearly income that is in force in Greece. Specifically, a single tax was applicable to income gained from 1st of January of 2021 to 31st of December of 2021, ranging from 9% to 44% as following:

[a]: 9% for yearly income lower than 10,000€, [b]: 22% for yearly income 10,000€-20,000€, [c]: 28% for yearly income 20,000€ to 30,000€, [d]: 36% for yearly income 30,000€ to 40,000€, [e]: 44% for yearly income higher than 40,000€

Accordingly, there were created five income categories, that translated the yearly income to a rounded monthly income, without taking into consideration a 13th month wage that is given in some countries as a holiday gift. Specifically, the dummy variable income_greece is categorized as following:

[1]: income_greece takes the value "1" and is characterized as a low income when the monthly income is below 840€ (calculated on average. as 10,000 yearly income, divided by 12 months), [2]: income_greece takes the value "2" and is characterized as a medium income when its monthly value ranges from 841€ to 1,670€, [3]: income_greece takes the value "3" and is characterized as a medium-high income when its monthly value ranges from 1,671€ to 2,500€, [4]: income_greece takes the value "4" and is characterized as a high income when its monthly value ranges from 2,501€ to 3,340€, [5]: income_greece takes the value "5" and is characterized as a very high income when its monthly value is above 3,341€

Afterwards, these values were translated to Netherlands' monthly incomes through the Purchasing Power Parities (PPP). PPPs are currency conversion rates aiming to equalize the purchasing power across different currencies, by eliminating their disparities in the price levels (OECD, 2023).

The PPP ratio between the two countries of interest is calculated by dividing the PPP of the Netherlands by the PPP of Greece (OECD, 2023), as following:

$$PPP\ ratio = {PPP_{Netherlands}}/{PPP_{Greece}} = {0.749}/{0.528} \approx 1.418$$

Afterwards, the income_greece thresholds were multiplied by the PPP ratio to estimate the equivalent income thresholds in the Netherlands. Therefore, the dummy variable income_netherlands is categorized as following:

[1]: income_netherlands takes the value "1" and is characterized as a low income when the monthly income is below 1,190€ (calculated by rounding the following to the nearest decade: $income_{greece} * ppp_{ratio} = 840 * 1.418 = 1,191.12$), [2]: income_netherlands takes the value "2" and is characterized as a medium income when its monthly value ranges from 1,191€ to 2,370€, [3]: income_netherlands takes the value "3" and is characterized as a medium-high income when its monthly value ranges from 2,370€ to 3,550€, [4]: income_netherlands takes the value "4" and is characterized as a high income when its monthly value ranges from 3,550€ to 4,740€, [5]: income_netherlands takes the value "5" and is characterized as a very high income when its monthly value is above 4,740€

Afterwards, a mutual category for income levels was created for both countries. The variable's values range from one to five, indicating each of the aforementioned categories of income. Therefore, we have a common categorization for income categories, although each category indicates another range of monthly incomes per country.

In the scope of this study, the body mass index (BMI) was computed using the formula weight divided by the square of height in meters (Nuttall, 2015):

$$bmi = \frac{weight}{\left(height/100\right)^2}$$

This calculation enabled the assessment of individuals' body composition and a better evaluation of the sample's weight status that will allow further analysis and comparisons within the study. Subsequently, there were introduced four dummy variables to classify individuals into bmi categories. Specifically, the following categorizations were implemented:

[a]: bmi takes the value "1", labeled as underweight with a bmi lower than 18.5, [b] bmi takes the value "2", labeled as healthy weight with a bmi between 18.5 and 25, [c] bmi takes the value "3", labeled as overweight with a bmi between 25 and 30, [d] bmi takes the value "4", labeled as obese with a bmi exceeding 30

In the context of the Visual Analogue Scale (vas) ranking, the overall health of the individual, based on their own perception, took values ranging from 0 to 100. 0 indicates the worst state of health, whereas 100 the best health state. There were created three categories of the variable vas_rank, as following:

[a]: vas_rank takes the value "1" and indicates poor health if vas is below 50, [b]: vas_rank takes the value "2" and indicates fair health if vas is between 50 and 70 , [c]: vas_rank takes the value "3" and indicates good health if vas is above 70

Regarding the variable indicating the exercise frequency of the respondents, there was a transformation to a binary variable, specifying if the frequency of physical activity is considered efficient. Following WHO (2018) guide, it is recommended to engage in moderate-intensity physical activity for a minimum of 150 minutes throughout the week. Therefore, assuming that the average exercise session lasts about an hour, the frequency of physical activity is calculated to minimum 2 to 3 times a week. Taking this into consideration, our dummy variable:

[1]: exercise takes the value "1" if the respondent exercises at least three times per week, [2]: exercise takes the value "0" I the respondent exercises less than three times per week

3.6. Statistical analysis

Once the data of 88 young adults have been collected, it was essential to perform a statistical analysis in order to draw conclusion about the young adults' preferences of those policy interventions aiming to increase physical activity. In the DCE, when respondents expressed their preferred alternative of policy intervention within the given choice set, it was assumed that this alternative offered them higher levels of utility compared to the other policy intervention or the no-policy intervention.

Random Utility Theory

In the context of Random Utility Theory (RUT), the utility attributed to an alternative is considered to be influenced by both the observable characteristics (attribute levels) and the unobservable characteristics specific to the alternative. The theoretical framework also presumes that when individuals are confronted with a selection between multiple alternatives, they will opt for the alternative that maximizes their utility. The utility function is defined as an indirect utility function, determined by the levels of the attributed alongside a random error term that captures the limitations of a researcher in measuring the utility precisely (McFadden 1974).

Conditional Logit Model

Choice data obtained from a forced-choice Discrete Choice Experiment (DCE) are commonly analyzed using a limited dependent-variable model. This is because the dependent variable in the regression analysis typically takes the value of 1 if the selected alternative was chosen in a specific choice task, or 0 if the alternative was not chosen in that task. The primary method employed to analyze data derived from this type of experiment is the conditional logit model (Hauber et al. 2016).

The conditional logit model establishes a relationship between the probability of choosing among two or more alternatives and the characteristics associated with the attribute levels defining those alternatives. In the context of a DCE, the attribute levels represent the elements that define each profile within the choice task (Broek-Altenburg et al. 2020). McFadden demonstrated that the conditional logit model is consistent with the principles of random utility theory. Notably, McFadden's contribution involved the application of the logit model to choose behavior in accordance with economic theory, resulting in a regression model that connects choices to the characteristics of the available alternatives for decision makers. McFadden (1974) coined the term

"conditional logit" to describe this innovative approach. Initially, McFadden applied this framework to observed transportation choices, which laid the groundwork for what is now recognized as conjoint analysis. Conjoint analysis encompasses hypothetical or stated choices and has benefited from McFadden's seminal work.

Despite the fact that the CL model is one of the most used model to investigate the preferences of individuals and predict their choices, it has some significant limitations as well. One of the main issues is that the CL model assumes homogeneity among the data, meaning that respondents have the same characteristics. Another drawback is the assumption of independence of irrelevant alternatives (IIA) that states that the relative likelihood of selecting alternative A over alternative B will not change if a third alternative C is presented (Broek-Altenburg et al. 2020).

In the general CL model, the probability of the choice (P_{nj}) can be derived from the following formula (McFadden 1973):

$$P_{nj} = \frac{e^{V_{nj}}}{\sum_{i=1}^{i} e^{V_{ni}}},$$

where utility V_{nj} is assumed linear in its parameters and dependent on the characteristics of the alternatives, as follows:

$$V_{nj} = z'_j X_{nj} = \sum_{k=1}^{k} \beta_k X_{knj},$$

where z_j represents a vector of the j alternative's characteristics, k is the number of predictor variables in our model and X_{knj} shows the value of the kth predictor variable for the n observation of alternative j.

Substituting equation x+1 to x, the probability of the choice (P_{nj}) can be calculated as:

$$P_{nj} = \frac{e^{\sum_{k=1}^{k} \beta_{kj} X_{knj}}}{\sum_{i=1}^{i} e^{\sum_{k=1}^{k} \beta_{ki} X_{kni}}}$$

Heterogeneity Test

According to Kendall B. et al (2011), demographic heterogeneity is a common feature in studies as the real-world population is diverse. Heterogeneity is commonly addressed because of the variation in the ages of the individuals, their gender, their socioeconomic status or other health

conditions. These differences can influence the way individuals respond to an intervention or a policy and affect the study outcomes.

After conducting a conditional logit model that assumes no heterogeneity among the individuals of our population, it is essential to perform a heterogeneity test, as in reality there may be variations in how different subgroups of individuals respond to different policies. Exploring and reporting potential sources of heterogeneity among the population of our research is important in order to identify potential subgroups or patterns or suggest more targeted interventions or policies for the future (Linden et al. 2021). To detect the heterogeneity in our study, we will conduct the statistical Chi^2 test for all the variables that may show some variation, using STATA (Ryan R. 2016).

More specifically we will test the following variables for heterogeneity:
[Demographics]: age, gender, country of residence.

[Health-related factors]: smoking habits, alcohol consuming levels, vas rank, exercise levels, alcohol consuming habits (people who engage in binge drinking and those who do not), mode of transportation (bike, on foot, car/means of transport)

[Socioeconomic factors]: income, educational status, employment status

Particularly, we will test the heterogeneity by comparing two models, one full model that includes the interaction term between the variable with possible variation and the independent variables and one restricted model that does not include the interaction term. In the case where the p-value is very small and the Chi^2 value greater than the degrees of freedom, it is indicated that there is evidence of heterogeneity among the sample (Ryan R. 2016).

In this case, where heterogeneity is being detected, we will use a subgroup analysis to explore the variables with evidence of variation.

Subgroup Analysis

In the field of social, behavioral and health research there has been a valuable approach of implementing intervention programs to entire populations, without considering specific participants' characteristics that might influence how individuals respond to a treatment or choose the most effective treatment. However, the last years, there has been an increasing focus on personalized strategies, aiming to take into consideration the unique characteristics of the

individuals (Lanza et al. 2011). A subgroup analysis is commonly used to investigate sources of preference heterogeneity, when conducting a DCE or other choice models. Participants make choices among different alternatives based on their attributes' levels and the primary aim of a subgroup analysis in our study is to determine whether there are differences in the participants' choice of the most effective intervention between different subgroups (Cornelissen et al. 2020).

To perform a subgroup analysis between individuals living in Greece and in the Netherlands, we first need to identify the young adults' characteristics that may influence the choice of an intervention aiming to improve their physical activity levels.

Conducting separate subgroup analyses for each characteristic is scientifically relevant for our research. We will gain valuable insights into possible variation in policy preferences based on different factors, contributing to answering our research question on the impact of the contextual disparities of two countries on the preferences of policy interventions that aim to promote physical activity.

After conducting the subgroup analyses, it is essential to determine whether the subgroup differences found are statistically significant. Therefore, a test for subgroup differences will be undertaken for each subgroup. If the p-value is lower than the significance level (5%), it indicates that there is statistically significant difference in the effect of choosing the alternative between the subgroups we are comparing (Richardson et al. 2019).

Chapter 4.

Results

4.1. Descriptive statistics

Data of 88 young adults were used in our analysis as shown in the *Appendix A*. Participants are equally distributed between living in Greece (50%) and living in the Netherlands (50%). The scattering of the genders is similar to both countries, with 59% of young adults living in Greece being females and 41% being males, while the 48% of young adults living in the Netherlands being females, 50% being males and 2% non-binary. The mean age of the residents in Greece is 26.7 years, while the mean age in the Netherlands' respondents is 24.9 years. Similar patterns are observed in the bmi levels, with two people being underweight in Greece and zero in the Netherlands, twenty-six having a healthy weight in Greece and thirty-two in the Netherlands, while twelve and eleven young adults have obesity accordingly to both countries. Obesity problems are shown to a small percent of the sample, with four patients living in Greece and one in the Netherlands.

Concerning the most commonly use of transport, the majority of people living in Greece use their car or means of transport (89%), with zero people using a bike, whereas the majority of those living in the Netherlands use their bike (59%). Most participants living in Greece are full-time employees (66%), while most of those living in the Netherlands are either students (61%) or part-time employees and students (23%). 27% of the participants living in Greece and working, belong to the low-income category, 36% to the medium income category, 11% to the medium-high, 5% to the high income category and lastly 21% to the very-high income category. On the other hand, 25% of the young adults living in the Netherlands and working belong to the low-income category, 23% to the medium category, 5% to the medium-high or the high income category and the majority of 44% to the very-high income category. Regarding the smoking habits, most of the participants living in Greece or in the Netherlands are non-smokers with 69% and 64% accordingly, while seven participants in Greece are regular smokers, seven occasional smokers and five participants living in the Netherlands regular smokers and eleven occasional smokers. Differences are observed in the alcohol habits of our sample, with 50% of the young adults living in the Netherlands engaging with the binge drinking, whereas that phenomenon is not observed in the sample of Greece. Regarding the exercise frequency, there are some different patterns observed, with the majority of people

living in Greece exercising 1-2 times a week (43%) or 3-4 times a week (30%), but only the 32% engaging in efficient levels of exercising according to WHO guidelines. For those living in the Netherlands, the 41% engages to physical activity 3-4 times a week and the 30% to 1-2 times a month, with 43% of the sample in that country having efficient levels of exercising. A summary of our sample's characteristics can be found in the *Appendix A.*

4.2. Computing and reporting the Ordinary Least Squares (OLS) Model

<u>Differences among countries:</u>

As shown in *Appendix B,* when a young adult has medium income, the probability of him living in the Netherlands decreases by 6.6 percentage points, compared to when he has low income, keeping all the other variables fixed. This effect is statistically significant at a 5% significance level. When a young adult has medium-high income, the probability of him living in the Netherlands decreases by 7.4 percentage points, compared to when he has low income, keeping all the other variables fixed. This effect is statistically significant at a 5% significance level. When a young adult has high income, the probability of him living in the Netherlands increases by 24.3 percentage points, compared to when he has low income, keeping all the other variables fixed. This effect is statistically significant at a 5% significance level. When a young adult has very high income, the probability of him living in the Netherlands increases by 28.9 percentage points, compared to when he has low income, keeping all the other variables fixed. This effect is statistically significant at a 5% significance level.

Engaging in efficient levels of exercising increases the probability of a young adult living in the Netherlands by 12 percentage points, holding all the other variables fixed. This effect is statistically significant at a 5% significance level.

An additional year in the age of young adults, decreases the probability of a young adult living in the Netherlands by 5.8 percentage points, keeping all the other variables fixed. This effect is statistically significant at a 5% significance level.

Lower ambition of increasing the PA levels decreases the probability of a young adult living in the Netherlands by 1.7 percentage points, keeping all the other variables fixed. This effect is not statistically significant at a 5% significance level.

Lower frequency of smoking and the absence of smoking increases the probability of a young adult living in the Netherlands by 0.8 percentage points, keeping all the other variables fixed. This effect is not significant at a 5% significance level. The results of the OLS model can be found in *Table 2*.

4.3. Computing and reporting the Conditional Logit Model on the Long Data Format

The results of the CLM can be found in the *Appendix C*.

<u>Average Marginal Effects:</u>

Effect of policy intervention. On average, the policy of enhancing the street connectivity and the walking/bicycle lanes increases the probability of influencing young adults PA levels by 2 percentage points, compared to the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus. This effect is not statistically significant at a 5% significance level (*Appendix D*).On average, the policy of using on-site facilities in the workplace that encourage after-work physical activity increases the probability of influencing young adults PA levels by 5 percentage points, compared to the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus. This effect is not statistically significant at a 5% significance level.

Both effects are not statistically significant, so we cannot draw conclusions on whether there are important differences between the three suggested policy interventions and the influence they have on young adults' PA levels. Therefore, we cannot conclude which policy intervention has a statistically significant impact on PA levels of young adults.

Effect of incentives. On average, the incentive of free activity trackers with daily goals increase the probability of the policy influencing young adults PA levels by 4.8 percentage points, compared to the incentive of tax refunds or monetary benefits, ceteris paribus. This effect is statistically significant at a 5% significance level. On average, the absence of incentives decreases the probability of the policy influencing young adults PA levels by 5.6 percentage points, compared to the incentive of tax refunds or monetary benefits, ceteris paribus. This effect is not statistically significant at a 5% significance level.

These findings suggest that different incentives have distinct impact on the PA levels of young adults. Specifically, providing free trackers demonstrates the highest likelihood of influencing PA

levels, followed by the provision of monetary benefits or tax refunds. Conversely, the absence of incentives is associated with the lowest probability of influencing the PA levels of young adults.

Effects of goal setting. On average, the goals of the policy being set by the participant individually increases the probability of the policy influencing young adults PA level by 23.4 percentage points, compared to when the goals are set by the government or the mayor or the company, ceteris paribus. This effect is statistically significant at a 5% significance level. On average, the goals of the policy being set by a group of people increases the probability of the policy influencing young adults PA level by 19.4 percentage points, compared to when the goals are set by the government or the mayor or the company, ceteris paribus. This effect is statistically significant at a 5% significance level.

These results suggest that involving individuals in the goal-setting process of policy interventions, whether individually or as part of a group, has a significant positive impact on their PA levels.

Effects of components. On average, the market campaigns with the expected positive outcomes in individuals' physical activity levels increase the probability of the policy influencing young adults PA level by 7.6 percentage points, compared to the creation of communities in institutions to observe others engaging in the same activity, ceteris paribus. This effect is statistically significant at a 5% significance level. The results of the marginal effects can be found in *Appendix D*.

4.4. Heterogeneity tests for different subgroups

Heterogeneity was tested across several variables of our model that usually show variation, as indicated in the Methods section. Tests resulted in variance across the females and males, the smoking behaviors and the income categories.

4.5. Computing and reporting the Subgroup Analysis on the Long Data Format

Subgroup analysis country:

The subgroup analysis for country of residence is presented in *Table1* and shows the effect of choosing each attributes' level for individuals living in Greece versus individuals living in the Netherlands. The test for the subgroup differences is also presented, indicating a statistically significant subgroup effect (p-value=0.0000), therefore the country of residence significantly affects the choice among the levels.

Effect of policy intervention. There is a non-significant positive association between choosing the policy of enhancing the street connectivity and the walk/bicycle lanes and living in Greece, compared to living in Greece and choosing the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus. The association for the same policies is positive and significant for people living in the Netherlands.

There is also a non-significant positive association between choosing the policy of using on-site facilities in the workplace that encourage after-work physical activity and living in Greece, compared to living in Greece and choosing the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus. The same positive, but significant, association is found for young adults living in the Netherlands as well.

Effect of incentives. There is a significant positive association of living in Greece and choosing the incentive of free activity trackers with daily goals, compared to living in Greece and choosing the monetary benefits or tax refunds, ceteris paribus. The association for people living in the Netherlands is positive but not statistically significant.

There is also a positive but not significant association for those living in Greece and choosing no incentives, compared to living in Greece and choosing monetary benefits or tax refunds, ceteris paribus. For people living in the Netherlands, there is a negative and significant association of choosing no incentives, compared to living in the Netherlands and choosing monetary benefits or tax refunds, ceteris paribus.

Effect of goal setting. There is a significant positive association of living in Greece and choosing the goals of the policy to be set by the participant individually, compared to living in Greece and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is relevant for those living in the Netherlands.

There is a significant and positive association of living in Greece and choosing the goals of the policy to be set by a group of people, compared to living in Greece and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is shown for individuals living in the Netherlands too.

Effect of components. There is a significant and positive association of living in Greece and choosing the component of market campaigns with the expected positive outcomes in individuals' physical activity levels, compared to living in Greece and choosing the creation of communities in

institutions to observe others engaging in the same activity, ceteris paribus. There is also a positive and significant association of this choice for the people living in the Netherlands.

Table 1: Subgroup Analysis for the Country

	Greece	The Netherlands
PI: Enhancing of street connectivity	0.019 ⁻ 95% CI -0.054/0.090	0.082* 95% CI 0.010/0.155
PI: On-site facilities in the workplace	0.050 ⁻ 95% CI -0.025/0.125	0.113* 95% CI 0.038/0.188
Incentive: Free activity trackers	0.078* 95% CI 0.018/0.137	0.048 ⁻ 95% CI -0.012/0.108
Incentive: No incentive	0.014 ⁻ 95% CI -0.045/0.074	-0.103* 95% CI -0.163/-0.043
Goal: Set by the participant	0.283* 95% CI 0.223/0.343	0.241* 95% CI 0.181/0.301
Goal: Set by a group of people	0.227* 95% CI 0.167/0.286	0.203* 95% CI 0.143/0.262
Component: Market campaign	0.067* 95% CI 0.015/0.119	0.109* 95% CI 0.057/0.161

statistical significant at a 5% significance level
⁻ non- significant at a 5% significance level

Test for subgroup differences: p-value=0.0000

Subgroup analysis gender- country:

The subgroup analysis for the genders in each country is presented in *Table 2* and shows the effect of choosing each attributes' level for females versus males living in Greece or in the Netherlands. The test for the subgroup differences is also presented, indicating a statistically significant subgroup effect (p-value=0.0006), therefore the gender significantly affects the choice among the levels in each country.

Effect of policy intervention. There is a significant positive association between choosing the policy of enhancing the street connectivity and the walk/bicycle lanes and being a female living in Greece, compared to having the same characteristics and choosing the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus. The association for the same policies is negative and statistically significant for males living in Greece and positive but not statistically significant for both females and males living in the Netherlands.

There is also a significant positive association between choosing the policy of using on-site facilities in the workplace that encourage after-work physical activity and being a male living in the Netherlands compared to having the same characteristics and choosing the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus. The same positive association is found for females living in the Netherlands and both genders living in Greece, but is not significant.

Effect of incentives. There is a significant positive association of being a female living in Greece and choosing the incentive of free activity trackers with daily goals, compared to having the same characteristics and choosing the monetary benefits or tax refunds, ceteris paribus. The association for males living in Greece and both genders in the Netherlands is not statistically significant.

There is also a negative and significant association for males living in the Netherlands and choosing no incentives, compared to having the same characteristics and choosing monetary benefits or tax refunds, ceteris paribus. All the other associations presented are not significant.

Effect of goal setting. There is a significant positive association of being a female living in Greece and choosing the goals of the policy to be set by the participant individually, compared to having the same characteristics and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is relevant for males living in Greece and both genders living in the Netherlands.

There is a significant and positive association of being a female living in Greece and choosing the goals of the policy to be set by a group of people, compared to having the same characteristics and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is shown for males in Greece and both genders in the Netherlands.

Effect of components. There is a significant and positive association of being a female who lives in the Netherlands and choosing the component of market campaigns with the expected positive outcomes in individuals' physical activity levels, compared to having the same characteristics and choosing the creation of communities in institutions to observe others engaging in the same activity, ceteris paribus. There is also a positive and significant association of this choice for males who live in the Netherlands, while for individuals living in Greece this association is positive but not significant.

Table 2: Subgroup Analysis for the Country and the Gender

	Greece		The Netherlands	
	Female	Male	Female	Male
PI: Enhancing of street connectivity	0.098* 95% CI 0.005/0.190	-0.095 ⁻ 95% CI - 0.210/0.020	0.091 ⁻ 95% CI - 0.015/0.196	0.060 ⁻ 95% CI - 0.043/0.163
PI: On-site facilities in the workplace	0.076 ⁻ 95% CI - 0.021/0.173	0.010 ⁻ 95% CI - 0.108/0.128	0.086 ⁻ 95% CI - 0.022/0.195	0.154* 95% CI - 0.049/0.258
Incentive: Free activity trackers	0.114* 95% CI 0.037/0.191	0.027 ⁻ 95% CI - 0.068/0.122	0.016 ⁻ 95% CI - 0.070/0.102	0.055 ⁻ 95% CI - 0.030/0.140

Incentive: No incentive	0.070 ⁻ 95% CI -0.006/0.146	-0.063 ⁻ 95% CI -0.158/-0.031	-0.047 ⁻ 95% CI -0.132/0.038	-0.168* 95% CI -0.254/-0.081
Goal: Set by the participant	0.283* 95% CI 0.207/0.359	0.279* 95% CI 0.184/0.375	0.294* 95% CI 0.208/0.380	0.198* 95% CI 0.112/0.285
Goal: Set by a group of people	0.232* 95% CI 0.156/0.307	0.217* 95% CI 0.122/0.312	0.238* 95% CI 0.152/0.324	0.180* 95% CI 0.095/0.264
Component: Market campaign	0.059 ⁻ 95% CI -0.008/0.126	0.074 ⁻ 95% CI -0.009/0.157	0.134* 95% CI 0.060/0.207	0.077* 95% CI -0.003/0.151

*statistical significant at a 5% significance level

⁻non- significant at a 5% significance level

Test for subgroup differences: p-value=0.0006

Subgroup analysis income - country:

The subgroup analysis for the income level in each country is presented in *Table 3* and *Table 4* and shows the effect of choosing each attributes' level for individuals belonging to low income category versus those in the medium category versus those in the medium-high versus those in the high category and lastly versus those in the very high income category, living in Greece or in the Netherlands. The test for the subgroup differences is also presented, indicating a statistically significant subgroup effect (p-value=0.0000), therefore the income significantly affects the choice among the levels in each country.

Effect of policy intervention. There is a significant positive association between choosing the policy of enhancing the street connectivity and the walk/bicycle lanes and being in the low-income level while living in Greece, compared to having the same characteristics and choosing the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus. The same positive and significant association is relevant for those that belong in the very high-income level and are living in the Netherlands. There is also a significant negative association of choosing the

same policy and being in the medium-high income level while living in Greece, while all the other associations for this policy are not significant.

There is also a significant negative association between choosing the policy of using on-site facilities in the workplace that encourage after-work physical activity and being in the medium-high-income level in Greece, compared to having the same characteristics and choosing the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus. Also there is observed a positive significant association of the on-site facilities policy for residents of Greece who belong to the very high-income level and for residents of the Netherlands who belong to the medium income level, compared to having the same characteristics and choosing the replacing of parking spaces policy.

Effect of incentives. There is a significant positive association of living in Greece while belonging to the low-income level and choosing the incentive of free activity trackers with daily goals, compared to having the same characteristics and choosing the monetary benefits or tax refunds, ceteris paribus. The association for those belonging in the medium level category and living in Greece is likewise positive.

There is also a positive and significant association for low-income individuals living in Greece and choosing no incentives, compared to having the same characteristics and choosing monetary benefits or tax refunds, ceteris paribus. A negative and significant association is found for the very-high income level Greek residents for choosing no incentives, compared to having the same characteristics and choosing monetary benefits, ceteris paribus. For those living in the Netherlands, there is found a negative association for the medium-high income level individuals and the choice of no incentives.

Effect of goal setting. There is a significant positive association of being in the low-income level and living in Greece and choosing the goals of the policy to be set by the participant individually, compared to having the same characteristics and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is relevant for Greek residents who belong to the medium-income level or the very high-income level and the Netherlands' residents who belong in the low or the medium or the very high-income levels.

 There is also a significant and positive association of being in the low-income category and living in Greece and choosing the goals of the policy to be set by a group of people, compared to having

the same characteristics and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is shown for Greek residents in the medium income level, the high and the vey-high income level, as well as for the individuals living in the Netherlands with low, medium, or very high income.

Effect of components. Lastly, there here is a significant and positive association of being in the medium income level in Greece and choosing the component of market campaigns with the expected positive outcomes in individuals' physical activity levels, compared to having the same characteristics and choosing the creation of communities in institutions to observe others engaging in the same activity, ceteris paribus. There is also a positive and significant association of this choice for the medium-high earners in this country and for the very-high earners who live in the Netherlands.

Table 3: Subgroup Analysis for Greece and Income Levels

	Greece				
	Low Income	Medium Income	Medium-High Income	High Income	Very High Income
PI: Enhancing of street connectivity	0.152* 95% CI 0.017/0.278	-0.065 ⁻ 95% CI -0.183/0.054	-0.382* 95% CI -0.612/-0.153	0.211 ⁻ 95% CI -0.176/0.597	0.137 ⁻ 95% CI -0.021/0.296
PI: On-site facilities in the workplace	0.138 ⁻ 95% CI -0.003/0.278	0.014 ⁻ 95% CI -0.109/0.137	-0.319* 95% CI -0.543/-0.095	0.248 ⁻ 95% CI -0.152/0.648	0.174* 95% CI 0.004/0.343
Incentive: Free activity trackers	0.123* 95% CI 0.006/0.239	0.106* 95% CI 0.010/0.202	0.050 ⁻ 95% CI -0.134/0.234	-0.073 ⁻ 95% CI -0.383/0.236	-0.015 ⁻ 95% CI -0.143/0.114

Incentive: No incentive	0.116* 95% CI -0.039/0.074	0.016 ⁻ 95% CI -0.079/0.111	-0.032 ⁻ 95% CI -0.214/0.151	0.250 ⁻ 95% CI -0.058/0.557	-0.146* 95% CI -0.274/-0.018
Goal: Set by the participant	0.187* 95% CI 0.072/0.302	0.308* 95% CI 0.210/0.406	0.162 ⁻ 95% CI -0.016/0.341	0.283 ⁻ 95% CI -0.014/0.579	0.426* 95% CI 0.297/0.554
Goal: Set by a group of people	0.182* 95% CI 0.068/0.297	0.302* 95% CI 0.207/0.397	0.019 ⁻ 95% CI -0.164/0.203	0.338* 95% CI 0.044/0.633	0.255* 95% CI 0.126/0.386
Component: Market campaign	-0.034 ⁻ 95% CI -0.135/0.068	0.133* 95% CI 0.029/0.197	0.185* 95% CI 0.022/0.347	-0.061 ⁻ 95% CI -0.345/0.224	0.066 ⁻ 95% CI -0.046/0.178

Table 4: Subgroup Analysis for the Netherlands and Income Levels

	The Netherlands				
	Low Income	Medium Income	Medium-High Income	High Income	Very High Income
PI: Enhancing of street connectivity	0.004 ⁻ 95% CI -0.146/0.154	0.038 ⁻ 95% CI -0.121/0.197	0.096 ⁻ 95% CI -0.267/0.456	0.197 ⁻ 95% CI -0.127/0.521	0.121* 95% CI 0.012/0.230
PI: On-site facilities in the workplace	0.111 ⁻ 95% CI -0.033/0.257	0.184* 95% CI 0.028/0.340	0.205 ⁻ 95% CI -0.146/0.557	0.163 ⁻ 95% CI -0.236/0.563	0.059 ⁻ 95% CI -0.058/0.177
Incentive: Free activity trackers	0.116 ⁻ 95% CI -0.001/0.233	-0.040 ⁻ 95% CI -0.165/0.085	0.122 ⁻ 95% CI -0.163/0.407	0.021 ⁻ 95% CI -0.274/0.315	0.045 ⁻ 95% CI -0.048/0.138

Incentive: No incentive	-0.111 ⁻ 95% CI -0.229/0.008	-0.075 ⁻ 95% CI -0.200/0.048	-0.334* 95% CI -0.630/-0.038	-0.274 ⁻ 95% CI -0.569/0.021	-0.070 ⁻ 95% CI -0.163/0.023
Goal: Set by the participant	0.328* 95% CI 0.211/0.445	0.343* 95% CI 0.217/0.470	0.215 ⁻ 95% CI -0.073/0.504	0.182 ⁻ 95% CI -0.119/0.483	0.152* 95% CI 0.057/0.246
Goal: Set by a group of people	0.332* 95% CI 0.216/0.449	0.269* 95% CI 0.147/0.391	-0.008 ⁻ 95% CI -0.287/0.271	0.059 ⁻ 95% CI -0.253/0.371	0.129* 95% CI 0.036/0.222
Component: Market campaign	0.046 ⁻ 95% CI -0.054/0.146	0.089 ⁻ 95% CI -0.017/0.196	0.234 ⁻ 95% CI -0.008/0.475	0.167 ⁻ 95% CI -0.091/0.426	0.140* 95% CI 0.058/0.221

*statistical significant at a 5% significance level

⁻non- significant at a 5% significance level

Test for subgroup differences: p-value=0.0000

<u>Subgroup analysis smoking habits- country:</u>

The subgroup analysis for the smoking habits in each country is presented in *Table 5* and shows the effect of choosing each attributes' level for individuals belonging to regular smokers versus occasional smokers versus non-smokers, living in Greece or in the Netherlands. The test for the subgroup differences is also presented, indicating a statistically significant subgroup effect (p-value=0.0000), therefore the smoking habits significantly affect the choice among the levels in each country.

Effect of policy intervention. There are not any significant associations among the choice of a policy intervention and the specific smoking characteristics of young adults living either in Greece or in the Netherlands.

Effect of incentives. There is a significant negative association of living in the Greece while being non-smoker and choosing the incentive of free activity trackers with daily goals, compared to having the same characteristics and choosing the monetary benefits or tax refunds, ceteris paribus.

There is a negative and significant association for regular smokers living in the Netherlands and choosing no incentives, compared to having the same characteristics and choosing monetary benefits or tax refunds, ceteris paribus. A negative and significant association is also found for the occasional smokers living in the Netherlands and choosing no incentives, compared to having the same characteristics and choosing monetary benefits, ceteris paribus.

Effect of goal setting. There is a significant positive association of being a regular smoker, living in Greece and choosing the goals of the policy to be set by the participant individually, compared to having the same characteristics and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is relevant for Greek occasional smoker or non-smoker and for all the participants living in the Netherlands and having different smoking habits. .

There is also a significant and positive association of being a regular smoker and living in Greece and choosing the goals of the policy to be set by a group of people, compared to having the same characteristics and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is shown for Greek occasional smoker and non-smokers as well as all respondents living in the Netherlands.

Effect of components. There here is a significant and positive association of being an occasional smoker or a non-smoker, living in the Netherlands and choosing the component of market campaigns with the expected positive outcomes in individuals' physical activity levels, compared to having the same characteristics and choosing the creation of communities in institutions to observe others engaging in the same activity, ceteris paribus.

Table 5: Subgroup Analysis for the Country and the Smoking Habits

	Greece			The Netherlands		
	Regular Smoker	Occasional Smoker	Non-Smoker	Regular Smoker	Occasional Smoker	Non-Smoker
PI: Enhancing	-0.111 ⁻	0.116 ⁻	0.024 ⁻	0.086 ⁻	0.114 ⁻	0.054 ⁻

of street connectivity	95% CI - 0.293/0.072	95% CI - 0.067/0.299	95% CI - 0.063/0.112	95% CI - 0.117/0.289	95% CI - 0.025/0.253	95% CI - 0.040/0.148
PI: On-site facilities in the workplace	-0.001 ⁻ 95% CI - 0.190/0.189	0.033 ⁻ 95% CI - 0.174/0.241	0.066 ⁻ 95% CI - 0.023/0.155	0.154 ⁻ 95% CI - 0.076/0.384	0.126 ⁻ 95% CI - 0.022/0.273	0.093 ⁻ 95% CI - 0.001/0.187
Incentive: Free activity trackers	0.066 ⁻ 95% CI - 0.086/0.218	-0.011 ⁻ 95% CI - 0.171/0.149	0.100* 95% CI 0.029/0.172	0.077 ⁻ 95% CI - 0.099/0.252	-0.016 ⁻ 95% CI - 0.133/0.102	0.064 ⁻ 95% CI - 0.011/0.140
Incentive: No incentive	-0.074 ⁻ 95% CI - 0.227/0.078	0.002 ⁻ 95% CI - 0.152/0.157	0.031 ⁻ 95% CI - 0.040/0.103	-0.329* 95% CI -0.507/-0.151	-0.255* 95% CI - 0.374/-0.136	-0.004 ⁻ 95% CI - 0.079/0.071
Goal: Set by the participant	0.344* 95% CI 0.186/0.501	0.199* 95% CI 0.043/0.356	0.293* 95% CI 0.222/0.364	0.290* 95% CI 0.111/0.470	0.266* 95% CI 0.146/0.386	0.224* 95% CI 0.148/0.299
Goal: Set by a group of people	0.168* 95% CI 0.017/0.319	0.198* 95% CI 0.041/0.355	0.248* 95% CI 0.178/0.319	0.222* 95% CI 0.050/0.394	0.161* 95% CI 0.046/0.276	0.216* 95% CI 0.140/0.292
Component: Market campaign	0.060 ⁻ 95% CI - 0.071/0.191	0.105 ⁻ 95% CI - 0.0233/0.243	0.057 ⁻ 95% CI - 0.006/0.120	0.082 ⁻ 95% CI - 0.067/0.230	0.188* 95% CI 0.085/0.292	0.091* 95% CI 0.026/0.156

*statistical significant at a 5% significance level

⁻non- significant at a 5% significance level

Test for subgroup differences: p-value=0.0000

Subgroup analysis alcohol habits - country:

The subgroup analysis for the alcohol habits in each country is presented in *Table 6* and shows the effect of choosing each attributes' level for individuals engaging or not in binge drinking and living in Greece or in the Netherlands. The test for the subgroup differences is also presented, indicating a statistically significant subgroup effect (p-value=0.0000), therefore the alcohol habits significantly affect the choice among the levels in each country.

Effect of policy intervention. There is a significant positive association between choosing the policy of enhancing the street connectivity and the walk/bicycle lanes and not engaging in binge drinking while being a resident in the Netherlands, compared to having the same characteristics and choosing the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus.

There is also a significant positive association between choosing the policy of using on-site facilities in the workplace that encourage after-work physical activity and engaging in binge drinking while living in the Netherlands, compared to having the same characteristics and choosing the policy of replacing the parking spaces in the neighborhood by green areas, ceteris paribus.

Effect of incentives. There is a significant positive association of living in Greece while non engaging in binge drinking and choosing the incentive of free activity trackers with daily goals, compared to having the same characteristics and choosing the monetary benefits or tax refunds, ceteris paribus. The association for those not engaging in binge drinking and living in the Netherlands is likewise positive.

There is also a negative and significant association for those engaging in binge drinking, living in the Netherlands and choosing no incentives, compared to having the same characteristics and choosing monetary benefits or tax refunds, ceteris paribus.

Effect of goal setting. There is a significant positive association of not engaging in binge drinking, living in Greece and choosing the goals of the policy to be set by the participant individually, compared to having the same characteristics and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is relevant for all Netherlands' residents of our sample, either engaging in binge drinking or not.

There is also a significant and positive association of not engaging in binge drinking, living in Greece and choosing the goals of the policy to be set by a group of people, compared to having the same characteristics and choosing the goals to be set by the government or the mayor or the company, ceteris paribus. The same positive and statistically significant association is shown for all the Netherlands' residents with different alcohol habits as well.

Effect of components. Lastly, there is a significant and positive association of not engaging in binge drinking, living in Greece and choosing the component of market campaigns with the expected positive outcomes in individuals' physical activity levels, compared to having the same characteristics and choosing the creation of communities in institutions to observe others engaging in the same activity, ceteris paribus. The same positive association is depicted for those living in the Netherlands and either engage in binge drinking or not.

Table 6: Subgroup Analysis for the Country and the Alcohol Habits

	Greece		The Netherlands	
	Binge Drinking	No Binge Drinking	Binge Drinking	No Binge Drinking
PI: Enhancing of street connectivity	0.027 ‾ 95% CI -0.277/0.331	0.012 ‾ 95% CI -0.064/0.087	0.045 ‾ 95% CI -0.054/0.145	0.123* 95% CI 0.018/0.229
PI: On-site facilities in the workplace	-0.078 ‾ 95% CI -0.388/0.232	0.052 ‾ 95% CI -0.027/0.130	0.256* 95% CI 0.150/0.262	-0.027 ‾ 95% CI -0.132/0.078
Incentive: Free activity trackers	-0.098 ‾ 95% CI -0.342/0.141	0.092* 95% CI 0.029/0.154	0.008 ‾ 95% CI -0.076/0.092	0.088* 95% CI 0.003/0.172
Incentive: No incentive	-0.008 ‾ 95% CI -0.269/0.254	0.013 ‾ 95% CI -0.049/0.075	-0.130* 95% CI -0.214/-0.046	-0.070 ‾ 95% CI -0.155/0.016

Goal: Set by the participant	0.201 ⁻ 95% CI -0.059/0.461	0.288* 95% CI 0.226/0.350	0.232* 95% CI 0.147/0.316	0.255* 95% CI 0.169/0.341
Goal: Set by a group of people	0.185 ⁻ 95% CI -0.057/0.428	0.236* 95% CI 0.175/0.298	0.223* 95% CI 0.139/0.306	0.185* 95% CI 0.099/0.269
Component: Market campaign	0.039 ⁻ 95% CI -0.179/0.258	0.071* 95% CI 0.016/0.125	0.110* 95% CI 0.037/0.182	0.105* 95% CI 0.032/0.178

*statistical significant at a 5% significance level

⁻non- significant at a 5% significance level

Test for subgroup differences: p-value=0.0000

4.6. Result research question

The objective of this research was to investigate how policy interventions for physical activity influence the young adults' physical activity levels in Greece and in The Netherlands.

We compared the impact of policy interventions considering the heterogeneity among the populations. We conducted several subgroup analyses with those characteristics, testing on how the gender, the income level, the alcohol consumption habits and the smoking habits affect the young adults' choices in each country.

In Greece, our analysis reveals a preference of females towards interventions that enhance street connectivity, while in the Netherlands, males lean towards workplace-focused interventions. Additionally, lower income individuals living in Greece favored policies promoting street improvement, while higher income individuals showed preferences for workplace-based interventions. On the other hand, in the Netherlands, those with medium income preferred the on-site workplace facilities, while those higher income preferred the enhancement of street connectivity and improves walking and bicycle lanes. Greek females preferred the free activity trackers with daily goal as an incentive of the policy interventions, whereas males in the Netherlands favored the monetary benefits over the absence of incentives. Among non-smoker in

Greece, activity trackers were selected, while respondents living in the Netherlands leaned more towards the monetary benefits or the tax refunds. The setting of goals showed a gender-based similarity in both nations, with both genders preferring the individual and group goal setting, indicating their inclination to active participation. Similarly, the impact of smoking habits was consistent in both countries.

These findings suggest that policy interventions hold the potential to influence young adults' choices and contribute to increased levels of physical activity. Further research is needed to explore the long-term health outcomes resulting from these interventions.

Chapter 5.

Conclusion and Discussion

5.1. Discussion

In this study, data from 88 young adults were analyzed to understand the factors influencing their choice of the most preferred policy intervention aiming to improve their PA levels. The participants were almost equally distributed between males and females, with an average age of 25.8 years. The sample consisted of individuals living both in Greece and in the Netherlands. Our analysis sought to identify individual characteristics that might predict the individuals' response, with a particular focus on their gender, their smoking and alcohol consuming habits, and their income levels.

A particularly remarkable aspect of our analysis was the subgroup analysis, where we examined the influence of the aforementioned significant variables, the income category, the smoking habits, the alcohol habits, as well as the gender, on the choices of policy interventions for individuals living in Greece or in the Netherlands. Particularly, those three variables were found to contain some variation in the heterogeneity test, therefore they were used for the subgroup analyses. Our results showed some statistically significant subgroup effects for these characteristics. This means that the effect of various attribute levels on the choices made by young adults of our sample, significantly differed between males and females, between different income categories, between regular smokers, occasional smokers and non-smokers and between people who engage in binge drinking and those who do not.

Specifically, our analysis of the **effect of intervention** choice among young adults indicated some interesting differences across subgroups. As for *gender-based differences*, females living in Greece indicated a significant positive association with the policy of enhancing street connectivity and the provision of walk and bicycle lanes, showing a higher likelihood of choosing this policy compared to the policy of replacing parking spaces with green areas. This suggests that females in Greece may have a preference for interventions that promote active transportation and urban accessibility. It is also worth noting that males living in the Netherlands showed a significant positive association with the policy of using on-site facilities in the workplace to encourage after-work physical activity, concluding that they are more interested in workplace-based interventions that promote physical activity.

As for *different smoking habits*, there were not reported any significant associations among residents of Greece or the Netherlands, indicating that there are no important differences among their choices of policy interventions context.

Income levels also play a role in shaping individuals' preferences for different policies. Individuals living in Greece with low income, have a positive and statistically significant association, indicating a preference for the policy of enhancing street connectivity, whereas those living in the same country with medium-high income prefer the policy replacing parking spaces. Meanwhile, young adults in Greece with very high income show a preference for the policy of on-site facility in the workplace. In contrast, individuals living in the Netherlands and belonging to the medium income category prefer the policy of on-site facilities, while those belonging to the very high-income category the policy of enhancing the street connectivity and improving the walking/bicyle lanes.

Alcohol consuming habits influence the choices of the individuals at a level. Specifically, Netherlands' residents who do not engage in binge drinking seem to be inclined to the policy of enhancing the street connectivity, whereas those who engage in binge drinking to the policy of on-site facilities. For Greece, all result were not statistically significant to further explain.

Concerning the **effect of incentives** on policy choices among our population, there are indicated the following findings. Regarding the *gender disparities*, females living in Greece demonstrate a significant positive association with the incentive of free activity trackers with daily goals, revealing a higher likelihood of choosing this option over monetary benefits or tax refunds. This suggests that they may be more sensitive to incentives that provide personalized tracking and goal-setting features to enhance their engagement on physical activity. Whereas for males living in the Netherlands, the association with the absence incentives is negative, indicating that they prefer the monetary benefits or the tax refunds over no incentive of the policy.

Regarding the insights for *different smoking habits*, among regular smokers, occasional smokers, and non-smoker who live in the Netherlands there is a preference of the monetary benefits or tax refunds compared to no incentives. This indicates that all Netherlands' respondents may have a preference for interventions that offer tangible rewards. On the other side, non-smokers in Greece indicate a selection of the activity trackers as their preferred choice of incentive. All the other associations observed are non-significant, therefore further research is crucial to better understand the underlying factors that influence their choices.

The results also suggest that the influence of the *income level* on the incentives for the policy intervention choices is more pronounced and significant for young adults living in Greece than those in the Netherlands. More specifically, for those living in Greece with low income, there is a significant positive association with choosing the incentive of free activity trackers with daily goals and the absence of incentives compared to opting for monetary benefits or tax refunds. Furthermore, for medium earners in Greece there is a preference for the activity trackers and for those in the very high-income category a preference for the monetary benefits compared to the absence of the incentives. On the other hand, for young adults living in the Netherlands, the only significant association was found between those belonging to the medium-high income level and preferring the monetary benefits over the absence of incentives.

Concerning the *alcohol consuming habits*, those who not engage in binge drinking, regarding their country of residence, prefer the activity trackers over the monetary benefits, whereas those who engage in binge drinking and live in the Netherlands choose the monetary benefits compared to the absence of incentives of the policy.

The **effect of goal setting** on policy intervention choices among young adults shows no important *gender-based differences*. Particularly, both females and males in both countries exhibit a significant positive association with choosing the goals of the policy to be set by the participant individually or by a group of people, indicating a higher likelihood of opting for personalized goal-setting over goals set by externals such as the government, mayor, or company. This suggests that both genders are more receptive to interventions that allow them to actively participate in setting their own physical activity goals.

Similarly, we observed the same similarity across young adults with different *smoking habits,* living in Greece or in the Netherlands. Regular smokers, occasional smokers and non-smokers all have a a significant positive association with choosing the policy goals to be set individually by the participant or by a group of people, compared to selecting goals set by the government, mayor, or company. This suggests that they all prefer interventions that allow them to have a more personalized and active role in setting their goal, while they also value the benefits of group-oriented goal setting.

Also, the results demonstrate that young adults across *different income levels* show a significant positive association with goal setting policies that involve individual or group decision-making, compared to policies where goals are set by external entities. Specifically, respondents with low,

medium and very high income living either in Greece or in the Netherlands indicate significant preference for individual or group goal setting.

The results also demonstrate that people who do not engage in *binge drinking*, in both countries, seem to prefer the goals to be set individually or by a group of people, while the same behavior is observed in those engaging in binge drinking and living in the Netherlands.

Our analysis of the **effect of components** on policy choices acknowledge *gender-based similarity*. Females who live in the Netherlands, demonstrate a significant and positive association with choosing the component of market campaigns that promote expected positive outcomes in individuals' physical activity levels, indicating a higher likelihood of selecting interventions focused on personalized marketing and messaging. Similarly, males in the Netherlands also exhibit a positive and significant association with choosing market campaigns over the creation of communities. This suggests that both genders in the Netherlands are more interested for interventions that employ persuasive marketing and communication strategies to promote physical activity, whereas we cannot conclude the same for young adults living in Greece.

In examining the effect of *various smoking habits* on the different components, our analysis indicated the following insights. For both ccasional smokers and non-smokers living in the Netherlands, there is a positive and significant association with choosing the market campaigns component. While the observed positive association for regular smokers with the market campaigns component is not statistically significant, the significant associations for occasional smokers and non-smokers suggest that market campaigns may be an effective strategy to promote physical activity among young adults.

The results also indicate that the effect of components on physical activity choices differs based on *income levels* across countries. There is a positive association with market campaigns for those with medium and medium-high income living in Greece, while the same association is found only for the very high earners in the Netherlands. These findings suggest that income level may play a role in determining the effectiveness of certain components in promoting physical activity among young adults.

Lastly, in the context of engaging to *binge drinking* there are found similarities across both countries. Particularly, in both countries, those who do not engage in that behavior show a preference for the market campaigns. Similarly, those who engage in binge drinking and live in the Netherlands have the same preference.

These results emphasize the importance of tailoring strategies based on subgroup-specific preferences when designing interventions to promote physical activity among young adults. Understanding the differential responses to various choices can enhance the effectiveness of interventions and encourage greater participation in physical activity, contributing to improved public health outcomes.

Regarding the alignment between our formulated hypotheses and the empirical findings that were found from our analysis, we will indicate the differences that derived. Our first hypothesis was that individuals living in Greece will prefer the policy of enhancing the street connectivity, while those living in the Netherlands the policy of on-site facilities. After our analysis, we concluded that indeed females and people with low income living in Greece prefer that policy of street connectivity, but people belonging to higher income groups in Greece preferred either the replacing of parking areas or the on-site workplace facilities. Regarding the hypothesis for individuals living in the Netherlands, our results confirmed it, with males, medium income earners and young adults despite their alcohol consuming habits preferring the on-site policy. The second hypothesis showcased that Greece's residents will prefer the component of local communities, while the Netherlands' residents the marketing campaigns. Young adults living in the Netherlands confirmed the hypothesis, with both genders preferring that component, with no different effect among the alcohol or the smoking habits, and with significant evidence of people with very high income. While for Greece the hypothesis was not confirmed as we did not obtain significant associations. The third hypothesis concerned the preference for goal setting done by a group of people for those living in Greece and individually for those living in the Netherlands. Our results showed a preference for both individually and group goal setting for both countries, with no distinct effect among the gender and the smoking habits. Lastly, the fourth hypothesis regarding the incentives of the policies, indicated that Greece's residents will be more inclined to the free activity trackers, while the Netherlands' residents with the monetary benefits. Our analysis showed that indeed females in Greece prefer the activity trackers and males in the Netherlands the monetary benefit against the no incentives. However, those who are engaging in binge drinking in the Netherlands showed a preference for the activity trackers and those who do not engage inclined more to the monetary benefits.

5.2. Relevant studies

The study conducted by Health et al. (2012) highlighted the recognition of the patterns of regional and cultural variation in the approaches to promote PA worldwide. Distinct strategies are usually observed between high income and low-income countries, like Latin America, where community-based interventions are common. These differences might come from sociocultural or geographical influences, indicating the significance of local adaptation when shaping an intervention. The study focused on the need of well-trained public health workforce to build the necessary incentives for each country and promote effectively the PA. Overall, the study underscored the value of the tailored interventions and the relevance of local context in shaping successful PA promotion strategies.

Another study conducted by the National Institute for Health Research (2019), underscores the important role of physical activity in maintaining a good health, while reducing the risk of diseases and enhances the well-being. However, despite its benefits, a large part of our population remains inactive and that emphasizes the need to understand how the strategies can be more effective in promoting PA. The research focus around the evaluation of interventions funded by the institute and acknowledged the inequalities in PA levels among different subgroups. Overall, the study calls for tailored interventions to address the specific population needs.

5.3. Limitations

Our study has several limitations that should be acknowledged. Beginning with the sample size of 88 participants which might be considered relatively small and restricted the use of more flexible in real-world decision-making models like the mixed logit model. What is more, while the conditional logit model was utilized with the assumption of homogeneity across the individuals, the heterogeneity tests captured heterogeneity among some of our variables. However, as for the comparison of the two countries, it should be noted that, the expected variance of the choice making between individuals living in Greece and those living in the Netherlands was not found in our results. Between these two countries there are several cultural, economic, geographical, and social differences that were not captured in the preferences of the policy interventions. Additionally, the study's focus on those two countries may restrict the broader applicability and generalizability of the findings to other contexts.

Lastly, likewise with any self-reported survey research, there might be a risk of social desirability bias or hypothetical bias or information bias as mentioned in the theoretical part. These biases might have influenced the young adults' stated preferences and responses and altered the results. Overall, these limitations highlight the need for further future research to address these constraints and advance the understanding of the factors that influence the choice making among the most efficient policy interventions to improve the physical activity levels.

5.4. Future Research

Concerning future research, several interesting paths emerge from the current's study findings and limitations. These recommendations can lead to improvement in how policies are used and structured in order to encourage physical activity among young adults.

Particularly, for a more accurate study of the long-term impact of policy interventions on physical activity behaviors, future research could adopt longitudinal study designs, such as a panel-data study. By observing participants' choices and behaviors for an extended period of time, can help researchers capture the effects of following such policy interventions. Therefore, longitudinal insights would record the health outcomes or changes in perceptions and attitudes towards physical activity among individuals and guide researchers for more effective strategies.

Furthermore, to achieve a better comprehension of the underlying motivations that influence young adults' preferences for specific policy interventions, a mixed methods approach could be integrated in future research. Using qualitative methods, such as interviews or group advocacies alongside with the quantitative analysis would provide a better understanding of the decision-making process in choosing the most effective policy intervention related to physical activity.

Future research could also benefit from an expanded cross-country analysis with a larger sample that broadens the boundaries of this study from the focus in Greece and in the Netherlands. With the inclusion of more diverse countries in the study, researchers can gain insights for the cultural and environmental contexts or the socioeconomic disparities of the populations. This broad perspective would provide a more comprehensive understanding of how these factors influence and shape the choices and preferences of young adults across the world.

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Appendix A.

Table A: Descriptive Statistics

Unweighted n (weighted %)	Greece	The Netherlands	Total
Sociodemographics			
Gender:			
Female	26 (59.09%)	21 (47.73%)	47 (53.4%)
Male	18 (40.91%)	22 (50%)	40 (45.46%)
Non-binary	0	1 (2.27%)	1 (1.14%)
Age:			
Mean age (std. dev)	26.7 (3.74)	24.9 (2.53)	25.8 (3.29)
Country of residence:			
Greece	44 (100%)		44 (50%)
The Netherlands		44 (100%)	44 (50%)
Bmi:			
Underweight	2 (4.55%)	0 (0%)	2 (2.27%)
Healthy weight	26 (59.09%)	32 (72.73%)	58 (65.91%)
Overweight	12 (27.27%)	11 (25%)	23 (26.14%)
Obese	4 (9.09%)	1 (2.27%)	5 (5.68%)
Social determinants of health indicators			

Commonly used mode of
transportation:

Foot	5 (11.36%)	4 (9.09%)	9 (10.22%)
Car/Means of transportation	39 (88.64%)	14 (31.82%)	53 (60.23%)
Bike	0 (0%)	26 (59.09%)	26 (29.55%)

Employment:

Part-time employee	2 (4.55%)	0 (0%)	2 (2.27%)
Full-time employee	29 (65.91%)	6 (13.64%)	35 (39.77%)
Student	7 (15.91%)	27 (61.36%)	34 (38.64%)
Part-time employee & Student	1 (2.27%)	10 (22.73%)	11 (12.5%)
Full-time employee & Student	3 (6.82%)	1 (2.27%)	4 (4.55%)
None of the above	2 (4.55%)	0 (0%)	2 (2.27%)

Income:

Low income	12 (27.27%)	11 (25%)	23 (26.13%)
Medium income	16 (36.36%)	10 (22.73%)	26 (29.55%)
Medium-high income	5 (11.36%)	2 (4.55%)	7 (7.95%)
High income	2 (4.55%)	2 (4.55%)	4 (4.54%)
Very-high income	9 (20.45%)	19 (43.18%)	28 (31.82%)

Smoking habits:

Regular smoker	7 (15.91%)	5 (11.36%)	12 (13.64%)
Occasional smoker	7 (15.91%)	11 (25%)	18 (20.45%)
Non-smoker	30 (68.18%)	28 (63.64%)	58 (65.91%)

Alcohol frequency:

1-2 times a week	20 (45.45%)	18 (40.91%)	38 (43.18%)
3-5 times a week	4 (9.09%)	12 (27.27%)	16 (18.18%)
Everyday	0 (0%)	1 (2.27%)	1 (1.14%)
On special occasions	16 (36.36%)	10 (22.73%)	26 (29.55%)
Never	4 (9.09%)	3 (6.82%)	7 (7.95%)

Alcohol habits:

Binge drinking	3 (6.82%)	22 (50%)	25 (28.74%)
No binge drinking	41 (93.19%)	22 (50%)	63 (71.26%)

Exercise frequency:

Never	5 (11.36%)	4 (9.09%)	9 (10.23%)
1-2 times a month	6 (13.64%)	13 (29.55%)	19 (21.59%)
1-2 times a week	19 (43.18%)	8 (18.18%)	27 (30.68%)
3-4 times a week	13 (29.55%)	18 (40.91%)	31 (35.23%)
Everyday	1 (2.27%)	1 (2.27%)	2 (2.27%)

Exercise dummy:

Efficient levels of exercising	14 (31.83%)	19 (43.18%)	33 (37.5%)
Non-efficient levels of exercising	30 (68.18%)	25 (56.82%)	55 (62.5%)

Appendix B.

Table B: Ordinary Least Squares Model

Country	Coefficient	Robust std. err.	t	P > |t|	[95% conf. interval]	
Income Category:						
Medium Income	-0.066	0.221	-2.99	0.003	-0.110	-0.023
Medium-High Income	-0.074	0.030	-2.43	0.015	-0.134	-0.014
High Income	0.243	0.035	6.92	0.000	0.174	0.312
Very High Income	0.289	0.024	12.16	0.000	0.243	0.336
Exercise	0.120	0.018	6.71	0.000	0.085	0.155
Age	-0.058	0.003	-21.92	0.000	-0.064	-0.053
Gender	0.184	0.016	11.60	0.000	0.153	0.215
Ambition	-0.017	0.022	-0.76	0.446	-0.060	0.026
Smoker	0.008	0.014	0.61	0.544	-0.018	0.035
Constant	2.610	0.086	30.52	0.000	2.443	2.778

Appendix C.

Table C: Conditional Logit Model

Dependent variable: choice of attribute

Y	Coefficient	Robust std. err.	z	P > |z|	[95% conf. interval]	
PI: Enhancing of street connectivity	0.093	0.133	0.70	0.482	-0.167	0.353
PI: On-site facilities in the workplace	0.230	0.157	1.46	0.144	-0.079	0.538
Incentive: Free activity trackers	0.221	0.115	1.92	0.055	-0.004	0.446
Incentive: No incentive	-0.258	0.138	-1.87	0.061	-0.529	0.012
Goal: Set by the participant	1.084	0.133	8.18	0.000	0.824	1.344
Goal: Set by a group of people	0.898	0.113	7.96	0.000	0.677	1.119
Component: Market campaign	0.353	0.092	3.82	0.000	0.172	0.534

Appendix D.

Table D: Average Marginal Effects

	dy/dx	Delta-method std. err.	z	P > |z|	[95% conf. interval]	
PI: Enhancing of street connectivity	0.020	0.029	0.70	0.482	-0.036	0.076
PI: On-site facilities in the workplace	0.050	0.034	1.46	0.144	-0.017	0.116
Incentive: Free activity trackers	0.048	0.024	1.95	0.051	0.000*	0.095
Incentive: No incentive	-0.056	0.030	-1.86	0.062	-0.114	0.003
Goal: Set by the participant	0.234	0.026	8.85	0.000	0.182	0.286
Goal: Set by a group of people	0.194	0.023	8.57	0.000	0.149	0.238
Component: Market campaign	0.076	0.020	3.88	0.000	0.038	0.114

*zero by rounding (0.0003)

Appendix E.

<u>Subgroup analysis gender:</u>

The subgroup analysis for gender presented in Appendix Table E and shows the effect of choosing each attributes' level for females versus males. The test for the subgroup differences is also presented, indicating a statistically significant subgroup effect (p-value=0.0006), therefore the gender significantly affects the choice among the levels.

Table E: Subgroup Analysis for Gender

	Female	Male
PI: Enhancing of street connectivity	0.090* 95% CI 0.021/0.159	-0.012 [−] 95% CI -0.088/0.065
PI: On-site facilities in the workplace	0.077* 95% CI 0.005/0.149	0.085* 95% CI 0.007/0.164
Incentive: Free activity trackers	0.069* 95% CI 0.012/0.126	0.044 [−] 95% CI -0.019/0.107
Incentive: No incentive	0.017 [−] 95% CI -0.039/0.074	-0.119* 95% CI -0.183/-0.055
Goal: Set by the participant	0.289* 95% CI 0.232/0.346	0.238* 95% CI 0.174/0.302
Goal: Set by a group of people	0.235* 95% CI 0.178/0.291	0.197* 95% CI 0.134/0.260

Component:	0.095*	0.077*
Market campaign	95% CI 0.117/0.179	95% CI 0.022/0.132

*statistical significant at a 5% significance level

¯non- significant at a 5% significance level

Test for subgroup differences: p-value=0.0006

Appendix F.

<u>Subgroup analysis smoking habits:</u>

The subgroup analysis for the smoking habits is presented in Appendix Table F and shows the effect of choosing each attributes' level for regular smokers versus occasional smokers versus non-smokers. The test for the subgroup differences is also presented, indicating a statistically significant subgroup effect (p-value=0.0000), therefore the smoking habits significantly affects the choice among the levels.

Table F: Subgroup Analysis for Smoking Habits

	Regular Smoker	Occasional Smoker	Non-smoker
PI: Enhancing of street connectivity	-0.033 ⁻ 95% CI -0.168/0.103	0.116* 95% CI 0.005/0.226	0.037 ⁻ 95% CI -0.027/0.101
PI: On-site facilities in the workplace	0.059 ⁻ 95% CI -0.087/0.205	0.088 ⁻ 95% CI -0.031/0.208	0.078* 95% CI 0.014/0.143
Incentive: Free activity trackers	0.077 ⁻ 95% CI -0.037/0.192	-0.012 ⁻ 95% CI -0.107/0.083	0.082* 95% CI 0.030/0.134
Incentive: No incentive	-0.173* 95% CI -0.289/-0.058	-0.150* 95% CI -0.244/-0.056	0.015 ⁻ 95% CI -0.037/0.066
Goal: Set by the participant	0.326* 95% CI 0.208/0.444	0.235* 95% CI 0.140/0.330	0.260* 95% CI 0.208/0.312
Goal: Set by a group of people	0.187* 95% CI 0.074/0.301	0.174* 95% CI 0.081/0.267	0.233* 95% CI 0.182/0.285

| Component: | 0.066 ⁻ | 0.158* | 0.073* |
| Market campaign | 95% CI -0.032/0.163 | 95% CI 0.075/0.241 | 95% CI 0.029/0.118 |

statistical significant at a 5% significance level

⁻*non-statistical significant at a 5% significance level*

Test for subgroup differences: p-value=0.0000

Appendix G.

<u>Subgroup analysis income categories:</u>

The subgroup analysis for the income categories is presented in Appendix Table G and shows the effect of choosing each attributes' level for young adults with low income versus medium income versus medium-high income versus high income versus very high income. The test for the subgroup differences is also presented, indicating a statistically significant subgroup effect (p-value=0.0000), therefore the income levels significantly affect the choice among the levels.

Table G: Subgroup Analysis for Income Levels

	Low Income	Medium Income	Medium-High Income	High Income	Very High Income
PI: Enhancing of street connectivity	0.079 ⁻ 95% CI - 0.021/0.179	-0.030 ⁻ 95% CI - 0.125/0.065	-0.246* 95% CI -0.439/- 0.052	0.148 ⁻ 95% CI - 0.090/0.387	0.132* 95% CI 0.042/0.222
PI: On-site facilities in the workplace	0.122* 95% CI 0.021/0.179	0.075 ⁻ 95% CI - 0.021/0.170	-0.149 ⁻ 95% CI - 0.339/0.040	0.117 ⁻ 95% CI - 0.156/0.391	0.087 ⁻ 95% CI - 0.009/0.184
Incentive: Free activity trackers	0.123* 95% CI 0.040/0.205	0.052 ⁻ 95% CI - 0.023/0.128	0.101 ⁻ 95% CI - 0.054/0.256	-0.038 ⁻ 95% CI - 0.246/0.170	0.028 ⁻ 95% CI - 0.048/0.103
Incentive: No incentive	0.009 ⁻ 95% CI - 0.074/0.091	-0.013 ⁻ 95% CI - 0.089/0.062	-0.111 ⁻ 95% CI - 0.267/0.045	-0.032 ⁻ 95% CI - 0.240/0.175	-0.092* 95% CI - 0.168/- 0.017

Goal: Set by the participant	0.254*	0.317*	0.187*	0.218*	0.239*
	95% CI	95% CI	95% CI	95% CI	95% CI
	0.172/0.336	0.240/0.394	0.035/0.340	0.010/0.427	0.163/0.315
Goal: Set by a group of people	0.249*	0.108*	0.010 ⁻	0.215*	0.166*
	95% CI	95% CI	95% CI -	95% CI	95% CI
	0.167/0.330	0.042/0.173	0.144/0.165	0.005/0.424	0.090/0.242
Component: Market campaign	0.008 ⁻	0.150*	0.171*	0.096 ⁻	0.117*
	95% CI -	95% CI	95% CI	95% CI -	95% CI
	0.063/0.079	0.107/0.192	0.190/0.362	0.091/0.282	0.051/0.183

*statistical significant at a 5% significance level

⁻non-statistical significant at a 5% significance level

Test for subgroup differences: p-value=0.0000