



TRABAJO FIN DE GRADO

**The relationship between the practice of physical activity  
and drug / alcohol consumption in young adults.**

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### **Abstract**

The present study investigated whether levels of physical activity in young adults have an influence over levels of substance consumption, and whether the previous variables are further influenced by sex. Subjects (N = 153) completed a Google Forms including questions pertaining sex, nationality, studies, and questions from two validated questionnaires to evaluate levels of the variables of interest (CRAAFT and IPAQ). A weak negative statistical correlation was found as in higher levels of PA reducing further levels of consumption, but no statistically significant differences were found with respect to sex. Given the limitations of both questionnaires at detecting lower and moderate levels of the variables studied, as well as the lack of additional variables that could be influencing consumption levels, the low number of subjects studied, and the high dispersion found within them, further studies are to be fulfilled taking into consideration the aforementioned as a means to find ways to prevent drug and substance use within society.

*Key words:* PA, physical activity, level of consumption, substance use, MET minutes.

El siguiente estudio investigó si existe una influencia de los niveles de actividad física en jóvenes adultos sobre el consumo de sustancias como el alcohol y las drogas, y si las anteriores se ven a su vez afectadas por el sexo del individuo. 153 participantes completaron un cuestionario a través de Google incluyendo preguntas de dos escalas validadas para la evaluación de las variables de interés (CRAAFT y IPAQ). Se encontró una correlación negativa débil entre ambas, pero no se hallaron diferencias estadísticamente significativas en función del sexo. Dadas las limitaciones en cuánto a sensibilidad de las escalas, el bajo número de sujetos de la muestra y la elevada dispersión entre ellos, estudios futuros han de ser

llevados a cabo con el objetivo de encontrar aquellas variables que previenen y reducen el consumo de sustancias en la sociedad.

*Palabras clave:* Actividad física, nivel de consumo, consumo de sustancias, minutos MET.

## **1. Introduction**

### **1.1. Theoretical background**

We live in a society full of resources and opportunities. However, along with these come many other things, these including high levels of stress, dissatisfaction, anxiety, etc. It is the high availability of certain resources paired with the high levels of stress and anxiety within us that make us vulnerable to substances like alcohol and psychoactive drugs. Studies have showcased that drug use is more than just the mere ingestion of substances to experience physical or psychological reactions, since it involves a wider collection of factors, such as social activities, use with friends, references to illicit drugs in music and social media, youthful rebellion, etc. These factors have indeed been shown to significantly influence this behavior, making it happen naturally within cultural contexts (Golub, Johnson & Dunlap, 2005).

The use of psychoactive substances in teenagers and young adults, especially hallucinogenic and psychostimulants has come to be a public health issue at a global level, due to the problems it has on the individual, negatively impacting quality of life, physical and mental health, personal development, family relationships, social life, etc. Not only this, but the previous behavior has been found to be associated with alcohol, tobacco use, and lack of physical activity. The social and financial costs that come together with the fight against the distribution and consumption of drugs are substantial, especially in those developed countries in which high amounts of money have been devoted to strategies in order to diminish drug use. These reasons, among others, highlight the relevance and necessity of promoting healthy lifestyle conducts, such as health-enhancing activities aiming to reduce the development of physical/mental disorders and the continued exposure to drugs in young adults. In fact, if these patterns of behavior were to be

modified from adolescence on, there would be a higher chance of them being persistent into adulthood, thus having numerous positive benefits both for future generations and for the decrease in the consumption of such substances. (Polo-Gallardo, Rebolledo Cobos, Mendinueta-Martinez & Reniz Acosta, 2017).

### **1.1.1. Psychoactive drugs**

Psychoactive substances are those known for altering specifically the functions of the Central Nervous System (CNS), being capable of modifying consciousness, mood, and cognition. The WHO defines drugs as any substance that, when introduced into the organism by any channel of administration produces an alteration of the normal functioning of the nervous system, further altering the susceptibility of the consumer to become dependent (psychologically, physically, or both) ("World Health Organization", 2022). It also defines the abuse of psychoactive substances as an un-adaptative use of a substance that is characterized by continued use, even as the subject is consciously aware that he/she has a social, work, psychological, or physical problem that is recurrent or persistent, and elicited as a result of the consumption in situations that make it physically dangerous (Di Bona L, Toller J., 2014).

The repercussions of drug abuse are serious both at a personal and societal level. However, even as the negative consequences of drug abuse are often defined according to their costs to society, they enclose others such as aggressive psychosis, paranoia, poor parenting, disintegrated social life resulting in isolation, etc. (McGregor, Callaghan & Hunt, 2008). Overall, most professionals agree on the fact that it is somewhat hard to attribute specific clinical

syndromes/consequences to particular drugs. However, it is relevant to highlight that they share common features elicited that may be related specifically to the drug introduced into the system or that may arise non-specifically as part of other complications. Furthermore, dose, components, and method intake influence the degree to which the individual is affected by the drug consumed in the short and long-term (Enevoldson, 2004).

Moving on, drugs have some specific effects in those who consume them, which vary according to a variety of factors. For instance, in young individuals currently undergoing development, drug and alcohol use blunt motivation, interfere with cognition, and facilitate mood disorders, also increasing risk of injury or even death. More importantly, added to the personal and societal consequences of adolescent drug use, there are long term implications for those who continue to use drugs into adulthood (Hawkins, Catalano & Miller, 1992). However, we are to be cautious when defining both short and long-term consequences of drug use. In fact, studies have concluded that it is interlaced with other norm-violating attitudes typically observed in adolescents, thus making it a challenge to define those specific to it. Moreover, drug use is one of the many factors implicated in building and modifying a person's behavior and development, given the wide number of forces making up a human being (Locke & Newcomb, 2005).

Drugs have always been a problem and they have been present for a very extended period throughout history. However, there seems to be an increasing problem when it comes to the use of the latter illicit and psychoactive substances in young adults, and teenagers. This worry may be justified partially since in the last decades we have experienced an increase in the amount and types of substances available in the illicit market of drugs, at the same time as the patterns of

leisure have turned to be characterized by broad groups of young adults which, together with alcohol, share and extend the consumption of other drugs (cannabis, MDMA, hallucinogens, cocaine, etc) (Zaldívar Basurto, López Ríos, García Montes & Molina Moreno, 2017). In fact, a monitoring study found that 87.3% of college students have tried alcohol, 82.4% had used it in the past year, 65.8% had used in the past 30 days, and 40.7% had binge drank in the last two weeks (Dunn & Qi Wang, 2003). Furthermore, regarding marijuana and cocaine, 17.7% and 1.6% had used marijuana and cocaine respectively in the past 30 days. The latter data showcase the considerable problem that exists upon collage population that is yet to be handled successfully. Interestingly enough, studies throughout time have shown that the previous data have barely experienced any change over the past 10 years (Dunn & Qi Wang, 2003). Another study on university students reported likewise high amounts of substance and alcohol use, where 20% of the sample consumed cannabis regularly (weekly or more often), 33% indicated they used amphetamines, mostly LSD and ecstasy, and 34% admitted using several drugs. Of relevance is the fact that 46% of the aforementioned students had begun their consumption of illicit substances in school, which increases the need of finding efficient preventive strategies and interventions (Webb, Ashton, Kelly & Kamali, 1996).

With respect to the Spanish population, results showcase that alcohol is the preferred and most consumed substance, as well as the one with which states of intoxication are most frequently reached (approximately 70% of subjects). The second most consumed and preferred substance was Cannabis. In fact, in the last month, 86.2% of college students have consumed alcohol, 32.6% cannabis, and 3% other design drugs. Of interest to this study is the fact that

regarding sex differences, males were found to consume more alcohol and cannabis than women in the past week (Zaldívar Basurto, López Ríos, García Montes & Molina Moreno, 2017).

### **1.1.2. Physical activity**

On the other hand, physical activity (PA) has been defined by the World Health Organization as any bodily movement produced by skeletal muscles requiring energy, including organized sports (World Health Organization, 2017). PA has been proven to influence alcohol and other drug use by means of several psychological mechanisms, these including substantial diminishment of cravings/urges, enhancing positive affect and mood, and providing sustained improvement of comorbid depression and anxiety frequently associated with alcohol and drug use. Therefore, the merge of cognitive and behavioral processes while participating in physical activity interventions may provide a profitable approach to prevent, reduce, and stop alcohol and drug use in young individuals (Thompson et al., 2020). There has been a recent interest in the role of physical activity as an intervention and reduction procedure for alcohol/drug use and in how the latter can be used to enhance other healthy behaviors. In fact, interventions using physical activity could aid in the prevention and reduction of alcohol and other drugs. However, it is important to mention that the relationship between physical activity and other health behaviors is still not conclusively proven. Notwithstanding, regular PA in young individuals has indeed been shown to somewhat influence healthy conducts which in turn induce a reduction in the consumption of drugs and the abandonment of such behaviors (Polo-Gallardo, Robledo Cobos, Mendinueta-Martinez & Reniz Acosta, 2017).

Physical activity has been linked to both health and social profits, and a common belief exists within society that it is related to the participation in positive health behaviors (Johnson Moore & Werch, 2008). Indeed, there is a substantial link between physical activity, positive health outcomes and mood, functional capacity, and wellbeing (Plante & Rodin, 1990). In fact, this is the reason behind promoting young individuals to participate in physical activities as an approach to prevent them from engaging in risk-taking behaviors, among them substance use. Physical activity has been shown to be a potential non-pharmacological intervention for addiction given it influences systems involved in both early and late stages of the addiction process and it also involves subsidiary health benefits. The previous has been proposed to be due to exercise and drugs activating the same reward pathways in the brain, by boosting dopamine concentration and dopamine receptor-binding. Not only this, but decreases in the level of glutamate in the striatum have also been associated to the practice of physical activity, which may prevent the overstimulation of glutamatergic receptors following chronic drug use. Of interest is the fact that it may be especially effective at the prevention of drug use and diminishing initial vulnerability to it (Lynch, Peterson, Sanchez, Abel & Smith, 2013). Similarly, Eccles and Gootman found that extracurricular activities, these including the participation in sports, provide the latter with opportunities to interact with positive peers, build competencies and skills, and exercise autonomy, thus enhancing a broad variety of health behaviors, among which we find lower levels of drug use (Peck, Vida & Eccles, 2008).

### **1.1.3. Relationship between drug use and physical activity**

Moving on, research on the relationship between physical activity and substance and alcohol use in the college population is quite scarce since it is mainly oriented towards athletes. In fact, the few studies on the latter have documented ostensibly antagonistic results (Johnson Moore & Werch, 2008). Given the known benefits of physical exercise in a wide array of health domains, one may jump to the conclusion that participation in the latter subdues drug use. Nonetheless, there is a significant rift in the present literature on the relationship between these variables and thus no conclusive evidence exists regarding such an affair (Lisha & Sussman, 2010).

Some studies have even found alcohol consumption to be higher in those with high levels of physical activity (Lisha & Sussman, 2010), whereas others have found just the opposite effect, with lower alcohol consumption in those with high levels of physical activity (Korhonen, Kujala, Rose & Kaprio, 2009). Moreover, findings have found sedentary lifestyles to be a predictor of intoxication and substance use problems (Korhonen, Kujala, Rose & Kaprio, 2009). However, most studies have found likewise results regarding cigarette smoking. For example, in a systematic review of the available research on the relationship between sport participation and substance use, 14 out of 15 studies found an inverse relationship between participation in physical activity and tobacco use (Lisha & Sussman, 2010). This same study also found that 9 out of 16 studies studying illicit drug use (marijuana, cocaine, crack, inhalants, barbiturate, amphetamines, tranquilizers, heroin, LSD, etc.) revealed an inverse relationship between sport participation and substance use (Lisha & Sussman, 2010). Likewise, epidemiological data

collected from adolescents (particularly vulnerable to the initiation in drug use) has showcased a negative association between these two variables. By way of illustration, results from school/community-based, and national cross-sectional studies indicate that those teens who are highly active are less likely than those who are not active to use cigarettes and illicit drugs (Lynch, Peterson, Sanchez, Abel & Smith, 2013). Moreover, the authors of a cohort sequential study aiming to determine the degree to which participation in sports/exercise co-varied with substance abuse in young adults found that increases in physical activity were associated to substantially lower substance use at age 18 and throughout early adulthood. Thus, they concluded that enhancing and promoting these physical activities could prompt lower rates of the use of illicit substances in late adolescence and young adulthood (Terry-McElrath & O'Malley, 2011). Longitudinal studies reveal likewise findings where high levels of physical activity predict diminished cigarette and illicit drug use both in adolescence and early adulthood. More importantly, the latter studies have also indicated that an increase in exercise participation in the transition from adolescence to adulthood forecasts a decrease in rates of the use of drugs during adulthood. Equally, twin studies have showcased that in within pairs of adolescent twins with divergent levels of physical activity, the more active one has a decreased risk of further smoking and illicit drug use during adulthood than does the less active one (Lynch, Peterson, Sanchez, Abel & Smith, 2013). Antagonistically, other studies have found contradicting results. For example, a study aiming to examine the association between physical activity and health behaviors in a sample of US adolescents found that little or no engagement in physical activity was associated with tobacco smoking and marijuana use, but this pattern was inconsistent for other health behaviors, as low physical activity seemed to be mismatched to cocaine use (Pate, Heath, Dowda & Trost, 1996).

In conclusion, research has clearly demonstrated the high problem that exists currently with substance abuse, especially in adolescents and young adults or students. Therefore, available data raise the relevance of studying those activities or interventions that could prevent and thus improve the aforementioned issue. Throughout this correlational study, the main aim is to examine whether physical activity in college students (early adults) ranging from 18 to 25 years of age is negatively correlated to the engagement in substance abuse, thus making it something to enhance and promote.

### **1.2. General objectives**

The general objective of this study is to find whether there is an inverse correlation between physical activity and the engagement in substance and alcohol use in college students.

### **1.3. Specific Objectives**

- Study the levels of substance/alcohol use and physical activity in young adults.
- Investigate whether there are differences in substance/alcohol use with respect to sex.
- Study whether there are differences in physical activity with respect to sex.

## **1.4. Hypothesis**

Given the general and specific objectives established for this study, the hypotheses raised relating to the latter are the following.

- A higher level of physical activity is related to lower engagement in substance and alcohol use in young adults, thus indicating a negative correlation between both variables.
- A higher level of substance use is related to males despite level of physical exercise.

## **2. Methodology**

### **2.1. Design**

This study is a correlational research design aiming to look at the relationship between level of physical activity and engagement in substance and alcohol use in college students.

### **2.2. Procedure**

The participants received a link through which they were given access to a Google Forms. The latter included questions from two different validated questionnaires on substance use and alcohol use (CRAAFT) and physical exercise (IPAQ), aiming to determine the frequency and intensity with which the different participants engage in these activities. Before initiating the questionnaire, they had to consent the use of the information for the purpose of the study, and they were informed of the confidentiality of the data provided through signing an informed consent (see Annex 1). The participants did not have to indicate their names at any point throughout the study, and they only had to indicate their sex, age, nationality, and level of studies, as they are relevant for the study.

Once all participants had answered the questionnaire, the results were downloaded and scored according to their respective manuals in order for statistical analysis to be performed. The respective data was analyzed through the use of JASP. The different statistical analyses that were performed on the data obtained are explained in further detail in the data analysis section.

### **2.3. Participants**

The participants will include college students ranging from 18 to 25 years of age. No inclusion criteria are applied other than age, which is to be between the previously mentioned range, and for the latter to be students from either universities or superior studies. The highest amount of participants is to be obtained by asking them to share the link with other colleagues with similar characteristics to theirs (age and students).

Several sociodemographic characteristics of the sample were collected, these including age, sex, nationality, and level of studies. Regarding age, participants of the study displayed a mean age of 22 years of age, with a  $SD = 2$ . Additionally, age was normally distributed with a skewness of 0.32 ( $SE = 0.196$ ), but kurtosis was 1.28 ( $SE = 0.390$ ), making age leptokurtic. Secondly, out of the 153 subjects, 12 nationalities were included other than the Spanish one. When grouping participants into Spanish and non-Spanish nationality groups, 81.5% were Spanish, and 18.5% were of non-Spanish nationalities. For sex, 53.6% were females, 42.5% were males, and 4% preferred not to say. Moreover, the highest frequency on the variable level of

studies was found for those currently fulfilling a bachelor's degree (57.5%), the least belonging to the secondary education group (1.961%).

#### **2.4. Instruments/materials**

This study made use of two validated questionnaires respectively. One of them was pertaining physical exercise practice, aiming to look at the frequency and level of engagement in physical exercise activities of the individual. In addition, the second questionnaire pertained substance use and the frequency and intensity at which participants consume the latter. In order to administer questions from both questionnaires, the tool used was "Google Forms" (see Annex 2), given its accessibility and availability.

With respect to substance use, the questionnaire used is the CRAFFT (CARLOS in Spain). The CRAFFT Substance Abuse Screening tool (see Annex 3) was developed by the Center for Adolescents Substance Abuse Research (CeASAR). It is a screening tool for alcohol and drug consumption built for its use with adolescents. It has been translated and validated in different countries, populations, and contexts and has been shown to have significant potential for the detection of drug/alcohol use. One of the countries in which it has been validated is Spain, and in fact a version in Spanish is available. Studies aimed to determine the range of psychometric performance in the Spanish population have showcased that the Spanish version of the CRAFFT has strong psychometric properties, and it has been found to have good internal consistency, sensitivity, and specificity (Rial et al., 2018). This questionnaire is divided into two parts, both requiring a simple dichotomic yes or no response from the individual's side. It is composed of 6 items with a dichotomic response (yes/no), preceded by an additional 3 items

which act as a filter, scored with a 1 or 0 depending on whether the individual answers affirmatively or not. The score of the scale ranges from 0 to 2, 2 being the threshold established by its original authors when it comes to determining risk of consumption (Knight, et al., 1999). Thus, the results can be categorized into 1) Low, 2) Moderate; and 3) High risk of substance abuse ("The CRAFFT 2.1 Manual", n.d.)

In order to assess physical activity, the International Physical Activity Questionnaire (IPAQ) was used. The IPAQ (see Annex 4) is a self-report measure of physical activity composed of 12 items (Sember et al., 2020) and was built as a standardized self-report questionnaire which can provide professionals with an estimate of physical activity and sedentary behavior (Cleland, Ferguson, Ellis & Hunter, 2018). The IPAQ has questions which involve reflecting on previous 7 days' activities according to domain, these including: 1) occupational; 2) transportation; 3) housework/house maintenance; 4) recreational, sport, and leisure time physical activity; and 5) time spent sitting (Craig, C. L., et. Al, 2003). The results obtained from this tool can be scored in two ways. They can be classified into three categories: low activity levels, moderate activity levels, or high activity levels. Additionally, results can also be interpreted by means of continuous variables known as MET minutes a week. MET minutes symbolize the amount of energy depleted while carrying out physical activity. One MET is a multiple of the estimated resting energy expenditure of an individual. In other words, it is what you expend when at rest (no activity being carried out). To obtain a continued variable score from the IPAQ or the number of MET minutes a week, the authors of the later consider the following: 1) Walking=3.3 METS; 2) Moderate physical activity=4 METS; and 3) Vigorous physical activity=8 METS (Forde, 2018). To calculate MET minutes a week, the procedure is

multiplying the MET value given (walking = 3.3, moderate activity = 4, vigorous activity = 8) by the minutes the activity was performed for and again by the number of days in which the activity was undertaken. Finally, to obtain the total MET minutes, the MET minutes achieved in each category are to be added up (Forde, 2018).

Overall, those individuals participating in the study completed a single questionnaire containing questions from the CRAFFT and IPAQ respectively. The form was composed of a total of 23 questions, the first three pertaining age, sex, level of studies, nationality, the following 9 regarding substance use, and the last 11 on physical activity.

## **2.5. Data analysis**

In the first place, univariate statistical analysis was performed on each variable in order to find the characteristics of the sample studied. Qualitative variables were expressed as frequencies and percentages. Quantitative variables were expressed through central tendency measurements (mean and median) and measures of dispersion (standard deviation and range). In addition, bivariate descriptive analyses were fulfilled to study levels of consumption with respect to sex.

Moreover, statistical testing and correlational analysis were carried out to assess how each of the study variables influenced the outcome of interest (substance use in young adults). The variable of level of consumption was represented both by categorical and continuous values. Resulting values extracted from the questionnaire represented a total number of points, which were later categorized into high, moderate, or low. The variable for levels of PA applied for the results obtained from the IPAQ, as the total MET minutes a week was categorizing subjects into

high, moderate, or low levels of physical activity. On the other side, secondary analyses were performed as a means to explore whether sex had some influence over the variables of interest.

Specifically, to study the association/relationship between categorical variables for both level of consumption (high, moderate, and low categories) and level of physical activity (High, Moderate, and Low categories), the association statistical Chi-square test were performed. Moreover, given the ordinal nature of such variables, to measure the strength of the possible relationship, the correlation measures Gamma and Kendall's Tau were computed. Percentages were calculated by columns, given one of the main goals of the study is to find whether level of consumption is influenced by level of physical activity. Additionally, considering the continuous numerical variables for substances' consumption and physical activity (variables "*TOTAL level of Consumption*" and "*TOTAL level of PA*", respectively), the Pearson and Spearman's rho correlations were calculated.

Lastly, in order to check whether there were significant differences with between males and females with respect to levels of consumption and PA, the one-way analysis of variance (ANOVA) was conducted. The Shapiro-Wilk test was used to evaluate the normality in all three groups corresponding to the sex of the participant. In addition, Levene's test was used to validate the hypothesis of equality of variances between these different groups. Pairwise post-hoc testing was used to identify significantly different pairs.

All statistical analyses were conducted with statistical software/program JASP version 0.16.2 (JASP, 2022) and a p-value lower than 0.05 was considered as statistically significant.

## 2.6. Ethical issues

The study conducted will include answering a questionnaire including information that might be sensitive, especially related to the consumption of psychoactive substances. This is why each participant will have to approve the use of the information for the purpose of the study (see Annex 1), and they will be informed of the confidentiality and complete anonymity of the latter prior to their participation. Moreover, they will not be required to provide their names or any personal information that could identify them. In order to obtain their consent, the "informed consent" provided within the materials of the TFG will have to be signed by each of the participants.

## 3. Results

Looking at categorical results for levels of consumption (high, moderate, and low), 79.7% had high levels, 12.4% scored low, and 7.84% displayed moderate levels of drug use. On the other hand, 85% of the individuals had high levels of physical activity, 9.15% moderate levels, and 5.88% were classified as having low levels of activity.

Table 1 displays the contingency table representing the relationship between both variables studied (levels of consumption and PA).

**Table 1**

*Contingency Table Level of PA and level of consumption.*

Level of consumption	Level of PA			Total
	High	Low	Moderate	
High	102.00 78.47%	9.00 100.00%	11.00 78.58%	122.00 79.74%
Low	16.00 12.31%	0.00 0.00%	3.000 21.43%	19.00 12.42%
Moderate	12.00 9.23%	0.00 0.00%	0.00 0.00%	12.00 7.84%
Total	130.00	9.00	14.00	153.00

Substance use and physical exercise were inversely correlated. Pearson and Spearman coefficients between total levels of consumption and PA were of -.230 and -.205 respectively (( $p < 0.05$  in both cases) (Table 2).

**Table 2**

*Pearson and Spearman's rho correlations between total levels of consumption and PA.*

Total Consumption	Pearson's r	---	
	p-value	---	
	Spearman's rho	---	
	p-value	---	
Total PA	Pearson's r	-0.230	---

p-value	0.002	---
Spearman's rho	-0.205	---
p-value	0.006	---

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No statistically significant differences were detected for the total mean level of consumption of substance depending on sex ( $p = .191$ ). Table 3 showcases descriptive statistics of the ANOVA performed for levels of consumption with respect to sex. The same happened when analyzing levels of physical activity depending on sex, as no statistically significant results were obtained ( $p = .076$ ).

**Table 3**

*Descriptive statistics ANOVA (levels of consumption depending on sex)*

Sex	Mean	SD
Female	4.02	2.30
Male	3.31	2.71
Prefer Not to Say / Other	4.33	3.14

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#### 4. Discussion

The present study aimed to test whether there is a correlation between physical activity and drug consumption in young adults, hypothesizing higher levels of physical activity were to prevent or reduce levels of consumption. A variety of statistical analyses were performed on the data from the questionnaires, these including descriptive statistics, and tests for correlation on

both the categorical and continuous variables retracted from the subject's responses to both questionnaires.

Regarding the sociodemographic factors of the sample, the vast majority of the participants were 22 years of age, they were currently university / bachelor's degree students, and were of Spanish nationality. With respect to sex, it was almost equative, having similar quantities of females and males respectively, and the lowest number of participants belonging to the group preferring not to mention their sex. These results limit the interpretation of certain tests found within the study. For instance, when studying the descriptive statistics for level of consumption with respect to age and sex, the *Standard deviations* were quite close to the values for the *Means* (Table 3), thus putting at risk the significance of such, showcasing high dispersion and variability among subjects.

In order to test the main hypothesis of the study, the first analysis to search for correlation between levels of consumption and physical activity was done on the categorical levels of the latter (High, Moderate, and Low). Just as was mentioned in the results section, contingency tables were carried out in order to look deeper into all the possible combinations between variables. Specifically, and given the fact that the present study aimed to see the influences of PA over drug use, "within column" percentages were calculated. Just as the results display, the vast majority of subjects fall under both high levels of PA and consumption, making it a challenge to analyze whether a real correlation exists. In fact, this was proven when looking at the p value of .325 resulting when performing the chi-square test for categorical variables. Thus, given the previously mentioned issue, and the fact that by only performing analyses on the categorical values relevant information might be ignored and missed, correlation analyses were additionally carried out on the numerical continuous total points for both levels of physical activity and levels

of consumption. Pearson's  $r$  and Spearman's  $\rho$  displayed values depicting that there was indeed a negative correlation between variables, even as it was weak. Of interest is the fact that the values for both coefficients were similar and that the  $p$  values indicated they are reliable and significant. Thus, a negative correlation has been found between levels of consumption and levels of physical activity, as in higher levels of the latter showcasing lower levels of substance/alcohol use. Moving on, given the weak negative correlation coefficient obtained, a model of linear regression was carried out on an informative level, even as it is not included within this study, and it is to be included within future lines of investigation. However, briefly directing attention towards the value for  $r^2$  obtained ( $r^2 = .0053$ ), the possibility of further non-studied variables having an influence on the variability of consumption levels is raised. Otherwise stated, there is indeed a relationship between the variables analyzed, but we cannot conclude that variability in levels of consumption is solely dependent on variabilities in levels of activity. Therefore, this lifts an interesting future line of investigation in which additional variables are included into the study by performing a multivariate regression analysis. Upon these additional variables we could include socio-economic status, place of residence, the type of sport performed, etc.

Pertaining to the second hypothesis that was to be tested, in which males were predicted to have higher levels of consumption than females despite levels of physical activity, ANOVA analysis were carried out, and results indicated that there were no statistically significant differences ( $p = .091$ ). In fact, results advertised slightly higher levels of consumption in females when compared to males. Thus, the second hypothesis of the study cannot be proven nor supported. Additionally, descriptives for ANOVA were not considered as significant given the

fact that the *M* and *SD* for groups were very close, indicating high dispersion and variability among the sample.

Overall, the present study did indeed confirm through statistically significant results the main hypothesis of the study, in which a weak negative correlation was found between levels of physical activity and consumption in the sample studied. However, the model of linear regression raised the need for future lines of investigation aiming to study additional variables that could in fact be influencing levels of consumption aside from physical activity. Therefore, future lines of investigation should consider these results and fulfill the analysis with a higher number of subjects in the sample and considering further possible variables as influential over the level of consumption.

As another limitation of the study, we find the scales used and their sensitivity detecting both levels of PA and consumption accurately. For instance, the IPAQ considers that anyone reaching a minimum of 3000 METS per week through 7 days of any combination of walking, moderate or vigorous-intensity activities has high levels of activity. Given the age range of the sample studied, this level of activity is easily achieved, which might be falsely inflating PA levels in the results (especially for the categorical values). Of interest is the fact that some studies have found the IPAQ to frequently overestimate physical activity, just as is depicted through the current study, making it a weak indicator of parallel levels of such variables (Lee, Macfarlane, Lam & Stewart, 2011). Therefore, future studies should seek to make use of scales that are sensible to moderate and low levels of PA and consumption as well, in order to be able to make reliable comparisons upon groups. To finish, a higher number of subjects would be needed as well as an equative distribution between nationalities and level of studies as a means to perform

other types of analyses and search for differences upon these variables and levels of PA/consumption respectively.

To finish, given the previously mentioned limitations, future lines of study should seek to overcome and thus improve the results and their significance. Future research on these variables and their association in young adults should firstly be performed on a larger sample where similar numbers of participants are found with respect to sex, age range, nationality, and level of studies. Additionally, as aforementioned, supplementary variables are to be collected within the information of interest with the objective of studying which other factors influence levels of consumption in young adults aside from levels of physical activity (which have already been found to somewhat have influence over consumption). Lastly, a need has been raised to make use of more sensitive scales, especially in the case of PA, as young individuals tend to display high levels of activity even as they may not be so active, thus putting at risk the significance of the results further interpreted.

Overall, the research paper started by raising the relevance of studying those factors that could prevent consumption in young adults, and given the fact that levels of physical activity have been found to be weakly negatively correlated with consumption, it should serve as motivation to improve future research overcoming the present limitations and seek for further factors doing the same, as a means to decrease this problem within our society and prevent individuals from engaging in these activities in the first place.

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## Annexes

### Annex 1: Informed consent.



#### Informed consent statement

I declare that I have read and understood the information sheet that has been given to me; the characteristics and the objective of the study have been explained to me, as well as the possible benefits and risks of the same. I have had the time and opportunity to ask questions and raise any concerns that I had. All questions were answered to my satisfaction.

I understand that my participation is completely voluntary, that I can withdraw from the study at any time without having to give explanations and without this having an impact on future participations.

I freely give my consent to participate in the Research Project of the Final Year Degree Project entitled "The relationship between the practice of physical activity and drug / alcohol consumption in young adults.", carried out by Jessie Valera Outlaw, a student at the European University of Madrid.

I have also been informed that the confidentiality of my data will be maintained and that these will be protected and included in a file that must be subject to and with the guarantees of the General Data Protection Regulation (RGPD), which came into force on the 25th May 2018, which supposes the repeal of Organic Law 15/1999, of December 13, referring to the protection of natural persons with regard to the processing of personal data.

Taking this into consideration, I GIVE my CONSENT to cover the objectives specified in the project.

---

Participant signature

In Madrid, \_\_\_\_\_ 202\_

**Annex 2: Google Form questionnaire.**

<https://docs.google.com/forms/d/e/1FAIpQLSfbhA9IM->

[AAjq\\_PwXDLVLiCMnJ6ZAwuM0EV0mp0ZKKGJqPKHjA/viewform?usp=sf\\_lin](https://docs.google.com/forms/d/e/1FAIpQLSfbhA9IM-AAjq_PwXDLVLiCMnJ6ZAwuM0EV0mp0ZKKGJqPKHjA/viewform?usp=sf_lin)

[k](#)

**Annex 3: CRAAFT questionnaire.**

<b>Part A: During the PAST 12 MONTHS, did you:</b>		No	Yes
1.	Drink any <u>alcohol</u> (more than a few sips)? (Do not count sips of alcohol taken during family or religious events.)		
2.	Smoke any <u>marijuana or hashish</u> ?		
3.	Use <u>anything else to get high</u> ? ("anything else" includes illegal drugs, over the counter and prescription drugs, and things that you sniff or "huff")		
<b>Part B: CRAAFT</b>		No	Yes
1.	Have you ever ridden in a <b>CAR</b> driven by someone (including yourself) who was "high" or had been using alcohol or drugs?		
2.	Do you ever use alcohol or drugs to <b>RELAX</b> , feel better about yourself, or fit in?		
3.	Do you ever use alcohol or drugs while you are by yourself, or <b>ALONE</b> ?		
4.	Do you ever <b>FORGET</b> things you did while using alcohol or drugs?		
5.	Do your <b>FAMILY or FRIENDS</b> ever tell you that you should cut down on your drinking or drug use?		
6.	Have you ever gotten into <b>TROUBLE</b> while you were using alcohol or drugs?		

**Annex 4: IPAQ.**

**International Physical Activity Questionnaire (IPAQ)**

**The following questions are about physical activity. Please read carefully and answer to the best of your knowledge.**

1. When you are at work, which of the following describes what you do? (If you have more than one job, answer for each job.)

<u>Job 1</u>	<u>Job 2</u>	<u>Job 3</u>
<input type="checkbox"/> Mostly sitting or standing	<input type="checkbox"/> Mostly sitting or standing	<input type="checkbox"/> Mostly sitting or standing
<input type="checkbox"/> Mostly walking	<input type="checkbox"/> Mostly walking	<input type="checkbox"/> Mostly walking
<input type="checkbox"/> Mostly heavy labor or physically demanding work	<input type="checkbox"/> Mostly heavy labor or physically demanding work	<input type="checkbox"/> Mostly heavy labor or physically demanding work
<input type="checkbox"/> Don't know/not sure	<input type="checkbox"/> Don't know/not sure	<input type="checkbox"/> Don't know/not sure

**The next 3 questions are about vigorous physical activity. Vigorous physical activity causes your heart to beat faster and makes you breathe hard.**

2. Now thinking about **vigorous physical activities** you did in the **last 7 days**, did you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, sports, heavy yard work, or anything else?

<sub>1</sub> Yes

<sub>0</sub> No → **Skip to 15 on the next page →**

3. How many days per week do you do these vigorous activities for at least 10 minutes at a time?

Days per week:    1    2    3    4    5    6    7

4. On the days when you do vigorous activity for at least 10 minutes, how long do you do those activities?

<input type="checkbox"/> <sub>1</sub> About 10 minutes	<input type="checkbox"/> <sub>4</sub> About 40 minutes
<input type="checkbox"/> <sub>2</sub> About 20 minutes	<input type="checkbox"/> <sub>5</sub> About 50 minutes
<input type="checkbox"/> <sub>3</sub> About 30 minutes	<input type="checkbox"/> <sub>6</sub> 1 hour or more

**The next 3 questions are about moderate physical activity. Moderate physical activity causes small increases in breathing or heart rate.**

5. Now thinking about **moderate physical activities** you did in the **last 7 days**, did you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling at regular pace, vacuuming, gardening, or anything else?

<sub>1</sub> Yes

<sub>0</sub> No → **Skip to 18 on the next page** →

6. How many days per week do you do these moderate activities for at least 10 minutes at a time?

Days per week:    1    2    3    4    5    6    7

7. On the days when you do moderate activity for at least 10 minutes, how long do you do those activities?

<sub>1</sub> About 10 minutes      <sub>4</sub> About 40 minutes

<sub>2</sub> About 20 minutes      <sub>5</sub> About 50 minutes

<sub>3</sub> About 30 minutes      <sub>6</sub> 1 hour or more

**The next 3 questions are about time spent walking.**

8. Now thinking about the amount of time you spent **walking** in the **last 7 days**, that lasted for at least 10 minutes at a time. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

<sub>1</sub> Yes

<sub>0</sub> No → **Skip to 22 on the next page** →

9. How many days per week do you do spend walking for at least 10 minutes at a time?

Days per week:    1    2    3    4    5    6    7

10. On the days when you do walk for at least 10 minutes, how long do you do those activities?

- |                                       |                  |                                       |                  |
|---------------------------------------|------------------|---------------------------------------|------------------|
| <input type="checkbox"/> <sub>1</sub> | About 10 minutes | <input type="checkbox"/> <sub>4</sub> | About 40 minutes |
| <input type="checkbox"/> <sub>2</sub> | About 20 minutes | <input type="checkbox"/> <sub>5</sub> | About 50 minutes |
| <input type="checkbox"/> <sub>3</sub> | About 30 minutes | <input type="checkbox"/> <sub>6</sub> | 1 hour or more   |

**The next 3 questions are about you sitting.**

11. Now thinking about the amount of time you spent **sitting** in the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

12. How many hours per day do you spend sitting?

- |                                       |                          |                                       |                      |
|---------------------------------------|--------------------------|---------------------------------------|----------------------|
| <input type="checkbox"/> <sub>1</sub> | About 30 minutes or less | <input type="checkbox"/> <sub>4</sub> | About 3 hour         |
| <input type="checkbox"/> <sub>2</sub> | About 1 hour             | <input type="checkbox"/> <sub>5</sub> | About 4 hour         |
| <input type="checkbox"/> <sub>3</sub> | About 2 hour             | <input type="checkbox"/> <sub>6</sub> | About 5 hour or more |