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# Social Media and Access to Drugs Online: A Nationwide Study in the United States and Spain among Adolescents and Young Adults

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ABSTRACT

Drugs are sold on both dark web services and on social media, but research investigating these drug purchases online is still emerging. The aim of this study is to analyze risk factors associated with buying drugs online. Utilizing theories of criminology and addiction research, it was hypothesized that social bonds, low levels of self-control, and poor mental health are associated with buying drugs online. Additionally, it was predicted that purchases of drugs online would mediate the relationship between low self-control and regular drug use. Participants of this nationwide study were 15 to 25 years old living in the United States ($N$ = 1,212) and Spain ($N$ = 1,212). Measures of impulsivity, a sense of mastery, social belonging, psychological distress, excessive behaviors (drinking, gambling and internet use) were utilized to predict purchasing drugs online. Two percent of the U.S. and Spanish respondents reported buying drugs online with 77% of them utilizing social media services to buy drugs. Results from multinomial logistic regression, penalized maximum-likelihood logistic regression, and binary mediation regression models indicated that buying drugs online was associated with lower self-control, higher psychological distress, and excessive gambling behavior and excessive Internet use. Having online friends was not a risk factor, but having strong social bonds with offline friends served as a protective factor. Additionally, buying drugs online mediated the relationship between low self-control and regular use of drugs. Results indicate that more focus should be placed on mainstream social media services as sources of drug acquisition as online drug buyers have multiple self-control and mental health problems.

## Redes sociales y acceso online a las drogas: un estudio nacional en EE UU y España entre adolescentes y adultos jóvenes

*Palabras clave:*
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RESUMEN

Las drogas se venden en páginas web oscuras y en las redes sociales, aunque la investigación de estas adquisiciones online está aún en sus comienzos. Este estudio tiene como objetivo examinar los factores de riesgo vinculados a la compra de drogas online. De acuerdo con las teorías de la criminología y la investigación sobre adicciones, se planteó la hipótesis de que los vínculos sociales, el bajo nivel de autocontrol y los problemas de salud mental están relacionados con la compra online de drogas. Además, se postuló que la adquisición online de drogas estaría mediada por la relación entre el bajo autocontrol y el consumo frecuente de drogas. Participaron en el estudio un total de 2,424 jóvenes residentes en Estados Unidos ($N$ = 1,212) y en España ($N$ = 1,212), que fueron evaluados en impulsividad, sensación de dominio, pertenencia social, malestar psicológico, comportamientos abusivos (bebida, juego y utilización de internet) , con el objetivo de predecir la compra online de drogas. El 2% de los participantes de EE UU y España dijeron que compraban drogas online, de los cuales el 77% utilizaba servicios de redes sociales para tal fin. Los resultados de una regresión logística multinomial, regresión logística de máxima verosimilitud penalizada y modelos de regresión de mediación binaria mostraron que la adquisición online de drogas se relaciona con un menor autocontrol y un mayor malestar emocional y abuso del juego, y del uso de internet. El hecho de tener amigos por internet no constituía un factor de riesgo y tener vínculos sociales estrechos con amigos fuera de internet constituía un factor protector. A su vez, la compra online de drogas es un factor que media la relación entre bajo autocontrol y uso habitual de drogas. Los resultados sugieren que debería prestarse mayor atención a las redes sociales como medio habitual de adquisición de drogas, dado que los compradores online de drogas tienen múltiples problemas de salud mental y autocontrol.

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Illegal drug use and trade are persistent public health and safety issues with serious consequences for individuals and societies. The strategies and contexts for the purchase of drugs evolved greatly in the past decade. Nowadays, the Internet offers easy access to legal and illegal activities taking place on open social media services and encrypted services that use, for example, the Tor network. Online drug dealing first caught public attention with the rise of the Silk Road, an online cryptomarket, which operated in Tor, in 2011-2013 (Barratt et al., 2014; Martin, 2014). Although the Internet is now a popular context for drug trade, research on this topic is still in its very early stages. It is crucial to discover if buying drugs online is prevalent and to describe risk and protective factors that can potentially be addressed to prevent this emerging problem behavior.

Studies have shown that users of cryptomarkets are most commonly males in their 20s. Users of cryptomarkets prioritize them over street markets for quality reasons and personal safety (Barratt et al., 2014; Barratt et al., 2016; Van Hout & Bingham, 2013). Cryptomarket buyers have been considered a technological drug subculture that practices online activism and libertarian ideology (Maddox et al., 2016; Munksgaard & Demant, 2016; Van Hout & Bingham, 2013). Despite much of the focus on cryptomarkets, some indications show that people might use mainstream social media sites, such as Instagram, to buy drugs (Marsh, 2017). Recently, a Nordic project used qualitative interviews and a digital ethnographic approach to analyze the phenomenon in Denmark, Finland, Iceland, Norway, and Sweden. Findings indicated that drugs were sold via Facebook in Denmark, Iceland, and Sweden, but not in Finland and Norway, where other social media services such as Instagram were utilized (Bakken & Demant, 2019; Demant et al., 2019). Additionally, a recent Australian project employing a small sample of online survey and interview respondents collected via r/Drugs subreddit in the American discussion forum Reddit indicated the potential for online drug sales via social media apps (Moyle et al., 2019).

Currently, the literature lacks studies using national datasets and our study aims to fill this gap by investigating buying drugs online from a cross-national perspective. Investigating this phenomenon is important due to the potential of online drug markets for easier access to drugs, which can amplify the various risks that substance use has for young people. Moreover, risk and protective factors for buying drugs online still need to be discovered. We argue that a combination of theories from criminology and addiction research could help researchers to understand the psychological and social risk factors related to buying drugs online. These perspectives include self-control, social bonds, and mental health.

## Self-control

Relevance of self-control and self-regulation in human behavior have been widely noted in both social psychology and criminology (Baumeister & Heatherton, 1996; Gottfredson & Hirschi, 1990; Vazsonyi et al., 2017). Low self-control is often manifested as impulsivity and lack of sense of mastery over one's actions (Forrest et al., 2019). The link between low self-control and delinquency has been widely tested in criminology (Pratt & Cullen, 2000; Vazsonyi et al., 2017), and in relation to digital deviance and crime (Henson et al., 2017; Reyns et al., 2014). Integrative meta-analyses showed that high self-control is widely related to desirable outcomes and low self-control is related to deviant and addictive behaviors (Bendayan & Blanca, 2019; De Ridder & Lensvelt-Mulders, 2018). Thus, we expect that easy access to social media sources for acquiring drugs could lead to more opportunities to engage in daily use of drugs in individuals with low self-control. Furthermore, we expect that buying drugs online would mediate the relationship between low self-control and regular drug use.

## Social Bonds

Peer influence is recognized as a major risk factor for deviant behavior and substance abuse among young people—especially according to social learning theory, which underlines the idea that people learn to commit crime through social interaction (Akers, 1998; Akers & Jensen, 2006; Pratt et al., 2010). Learning takes place in different environments, including friendships of differing quality, frequency, and intensity. Perceived closeness or belonging to friends can have an influence on deviant behaviors. This is particularly the case on the Internet, where it is very easy to get access to harmful and deviant content and form social contacts with like-minded peers (Keipi et al., 2017; Oksanen et al., 2016; Oksanen et al., 2014). Negative influences gained online might be enforced by "social cliques" or "social bubbles" of other similar people (Kaakinen, Sirola, et al., 2018; Keipi et al., 2017; Koivula et al., 2019; Savolainen et al., 2020). However, strong ties with offline friends have been shown to buffer risky online behavior (Kaakinen, Keipi, et al., 2018). Several studies have found that strong social bonds offline are generally related to multiple health and subjective wellbeing benefits (Baumeister & Leary, 1995; Holt-Lunstad et al., 2010; Slatcher & Selcuk, 2017).

## Mental Health

Mental health refers to psychological, emotional, and social stability and wellbeing of individuals. Addiction research widely recognizes that mental health problems coexist and develop with excessive drug use (Orford, 2001). One example of these problems is psychological distress (i.e., unpleasant feelings of depression and anxiety), which has been associated with drug use (Edlund et al., 2015; Grant et al., 2015; Lai et al., 2015). Issues with mental health are also manifested in other types of addictive behaviors, which could further influence drug use. Drug use has high comorbidity with excessive alcohol consumption (Grant et al., 2015), gambling (Peters et al., 2015), and Internet use (Fisoun et al., 2012). All these excessive behaviors are relatively prevalent among young people. For example, 35% of young people aged 15 to 16 in the U.S. and 28% in Spain reported having used illicit drugs (ESPAD, 2016).

## This Study

In this study, we focused on factors related to buying drugs online, an understudied and emerging problem behavior among young people. Our first aim was to evaluate the prevalence of social media drug acquisition in a population of the United States and Spanish young people. These countries were selected due to their high percentage of drug use among young people (ESPAD, 2016; Savolainen, 2020). These countries are otherwise comparable in the usage of Internet among young people (Savolainen et al, 2020) and provide a good starting point for comparative research on buying drugs online.

Our second aim was to investigate how drug acquisition online is associated with self-control, social bonds, and issues with mental health. We predicted that strong social bonds online, low self-control, and mental health issues such as psychological distress and excessive behavior, including excessive drinking, gambling and internet use, would be associated with drug use and buying drugs online. We also expected strong bonds offline to function as a protective factor against drug use and buying drugs online.

# Method

## Participants

The participants of the study were 15-25-year-olds from the U.S. ($n$ = 1,212, $M$ = 20.05, $SD$ = 3.19, 49.83% male) and Spain ($n$ = 1,212,

**Table 1.** Descriptive Statistics

| | U.S. | | | | Spain | | | |
|---|---|---|---|---|---|---|---|---|
| Categorical variables | Coding | % | *N* | | % | *N* | | |
| Drug use | No | 79.13 | 959 | | 78.63 | 953 | | |
| | Yes | 20.87 | 253 | | 21.37 | 259 | | |
| Bought drugs online | No | 97.85 | 1,186 | | 98.27 | 1,191 | | |
| | Yes | 2.15 | 26 | | 1.73 | 21 | | |
| Regular cannabis use | No | 92.49 | 1,121 | | 93.98 | 1,139 | | |
| | Yes | 7.51 | 91 | | 6.02 | 73 | | |
| Regular other drug use | No | 97.36 | 1,180 | | 98.27 | 1,191 | | |
| | Yes | 2.64 | 32 | | 1.73 | 21 | | |
| Continuous variables | Range | *M* | *SD* | Ω | *M* | *SD* | Ω | |
| Self-control | | | | | | | | |
| Sense of mastery | 7-28 | 19.09 | 3.88 | .77 | 19.06 | 3.61 | .72 | |
| Impulsivity | 0-5 | 1.90 | 1.61 | .70 | 2.05 | 1.59 | .67 | |
| Social bonds | | | | | | | | |
| Friends offline | 1-10 | 6.58 | 2.41 | - | 7.04 | 2.06 | - | |
| Friends online | 1-10 | 5.38 | 2.69 | - | 4.91 | 2.75 | - | |
| Social media identity bubble | 1-10 | 6.03 | 2.11 | .93 | 5.87 | 1.88 | .90 | |
| Mental health | | | | | | | | |
| Psychological distress | 0-12 | 3.32 | 3.48 | .88 | 3.84 | 3.33 | .86 | |
| Excessive drinking | 0-13 | 2.29 | 2.69 | .87 | 2.91 | 2.51 | .81 | |
| Excessive gambling | 0-20 | 1.26 | 2.54 | .88 | 1.81 | 2.93 | .86 | |
| Excessive internet use | 0-56 | 21.73 | 13.54 | .95 | 22.18 | 12.66 | .94 | |

*Note.* Categorical variables are presented as frequencies (*n*) and relational proportions (%). Continuous variables are presented as means (*M*), standard deviations (*SD*) and McDonald's omegas (Ω).

*M* = 20.07, *SD* = 3.16, 51.24% male). We recruited the U.S. respondents in January 2018 and the Spanish respondents in January 2019 by using online panels administrated by Dynata (formerly Survey Sampling International), which offer access to demographically balanced panels for research purposes. Using such panels has become commonplace in social sciences and they are considered a good alternative due to the difficulty of recruiting participants by traditional means. The limitation of such datasets is that they are mostly restricted to people using the Internet (Lehdonvirta et al., 2020). However, research panels have the benefit of getting access to hard-to-reach populations such as emerging adults in many countries. In our case, the data were collected using similar procedure via Dynata in both countries to guarantee the comparability of data samples. The samples were stratified to mirror the United States' and Spain's population of 15-25-year-olds in terms of age, gender, and residential area structure. Comparisons of the country datasets to the U.S. and Spanish population of 15-25-year-olds showed good resemblance (Oksanen et al., 2018; Savolainen et al., 2020).

## Procedure

Both samples were part of a larger international comparative project on young people and addictions. A survey designed in English and translated into Spanish included validated measures that have been widely used in comparative research. Additional items were translated by proficient English and Spanish speakers. The accuracy and comparability of items was guaranteed by the back-translation process in December 2018. The surveys were pre-tested with university students and mechanical Turk respondents. The surveys were conducted with LimeSurvey software that was run on the Tampere University server. Survey format and layout was identical for all respondents and optimized for both computers and mobile devices. Median response time for the survey was 14:49 minutes in the U.S. and 16:47 in Spain.

Participation was anonymous, voluntary, and participants were informed about their right to withdraw from the survey at any time. The participants were informed about the project web page including all the necessary information in case the participants had any concerns regarding the study. The participants gave consent to make data open access and available for research purposes. All the participants that finalized the survey were included in the study and there were no missing data on the items used in the study. The Academic Ethics Committee of the Tampere Region in Finland stated that the study does not include any ethical issues (decision 62/2016).

## Instruments

**Drug use.** We asked the participants about their drug use with a yes/no question inquiring about whether they had "used or experimented with substances other than alcohol or tobacco to get high." (yes/no). We then asked to specify the types of drugs used and the frequency of the use. Drug types included 1) cannabis, 2) synthetic cannabinoids, LSD, magic mushrooms, or other comparable hallucinogens, 3) amphetamines, ecstasy, cocaine or other stimulants, 4) opiates, 6) pharmaceutical opioids, 7) gamma, GBL, and other similar drugs, and 8) other pharmaceuticals. The frequency of drug use included the options: 1 = *I have not tried or experimented with,* 2 = *I have sometimes tried or experimented with,* 3 = I *have used but not anymore,* and 4 = *I use regularly.* The user types were then categorized into regular cannabis users and regular users of other drugs (e.g., stimulants, opiates, and hallucinogens).

**Drug purchases online.** After the questions concerning drug use, participants were asked whether they had bought substances other than alcohol or tobacco online: "Did you use the Internet for purchasing these drugs?" (yes/no). Next, respondents were asked to identify different online resources for purchasing drugs, including darknet marketplaces and various social media platforms such as Facebook, Instagram, online dating services, and general discussion forums.

**Self-control.** Self-control was measured with two different scales. The first of these self-control measures was Pearlin's seven-item Mastery Scale (Pearlin & Schooler, 1978; Schieman et al., 2003), where a higher number indicated a higher sense of mastery (i.e., self-control). Response options were in 4-point Likert scale giving scores from 1 to 4 per each item. The other self-control measure utilized was

**Table 2.** Predictors of Drug Use and Buying Drugs Online

| | No Drug Use $n$ = 1912 | Drug Use Only $n$ = 465 | | | | Drugs Online $n$ = 47 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *M* | *M* | RRR | 95% | CI | *M* | RRR | 95% | CI |
| Self-control | | | | | | | | | |
| Sense of mastery | 19.14 | 19.01 | 0.99 | 0.97 | 1.02 | 17.23 | 0.87*** | 0.79 | 0.94 |
| Impulsivity | 1.89 | 2.24 | 1.15*** | 1.08 | 1.22 | 3.15 | 1.68*** | 1.38 | 2.06 |
| Social bonds | | | | | | | | | |
| Friends offline | 6.90 | 6.54 | 0.94** | 0.89 | 0.98 | 6.06 | 0.83** | 0.73 | 0.95 |
| Friend online | 5.27 | 4.54 | 0.90*** | 0.87 | 0.94 | 6.06 | 1.07 | 0.96 | 1.20 |
| Social media identity bubble | 5.95 | 5.89 | 0.97 | 0.92 | 1.02 | 6.36 | 1.03 | 0.88 | 1.21 |
| Mental health | | | | | | | | | |
| Psychological distress | 3.37 | 4.16 | 1.06*** | 1.03 | 1.09 | 6.47 | 1.25*** | 1.15 | 1.35 |
| Excessive drinking | 2.18 | 3.96 | 1.31*** | 1.25 | 1.37 | 6.13 | 1.56*** | 1.40 | 1.74 |
| Excessive gambling | 1.35 | 1.63 | 1.03 | 0.99 | 1.08 | 8.04 | 1.38*** | 1.29 | 1.47 |
| Excessive internet use | 21.48 | 22.71 | 1.01 | 1.00 | 1.01 | 33.77 | 1.06*** | 1.04 | 1.09 |

*Note.* *M* = mean; RRR = relative risk ratio based on multinomial logistic regression models; CI = confidence interval. All regression models are adjusted for age, gender, social media activity and country. *N* = 2,424 for all regression models.
*$p$ < .05, **$p$ < .01, ***$p$ < .001.

Eysenck Impulsiveness Scale (EIS; Dussault et al., 2010; Eysenck & Eysenck, 1978) with higher numbers indicating higher impulsiveness. Response options were EIS were no (0) and yes (1) in all questions. Both measures showed acceptable inter-item reliability based on McDonald's omega (Table 1). However, omega for impulsivity in Spain was only .67 and remaining under the .70 threshold.

**Social bonds.** We used belonging to friends online and offline as measures of social bonds. We asked respondents three questions about how strongly they felt they belonged to friendship groups, groups of school or work friends, or online communities. The scale was from 1 (*not at all*) to 10 (*very strongly*). Questions on belonging to friendship groups and school or work friends were highly correlated ($r$ = .66 in the U.S. and $r$ = .57 in Spain) and were combined into a measure of offline friends. Question on belonging to online communities was used as a single item for online friends. These questions have been previously validated in studies on deviant online behavior (Minkkinen et al., 2016; Savolainen et al., 2018). Additionally, we used the nine-item Identity Bubble Reinforcement scale (IBRS-9) to measure perceived similarity and identification with other social media users (Kaakinen, Sirola, et al., 2018). The IBR-9 had a very high inter-item reliability in both sample (McDonald's omega, U.S. = .93, Spain = .90) with a higher IBR-9 number indicating a higher subjective involvement in an online social media identity bubble.

**Mental health.** We measured psychological distress with the 12-item General Health Questionnaire (GHQ-12), which has been widely used in general population studies (Goldberg et al., 1997; Pevalin, 2000). In addition, we used three measures for excessive appetites: the AUDIT-C for hazardous drinking (Bush et al., 1998), South Oaks Gambling Screen for problem gambling (Lesieur & Blume, 1987), and Compulsive Internet Use Scale for Internet use (Meerkerk et al., 2009). All of these scales had good inter-item reliability (see Table 1).

**Control factors.** We used gender, age, and social media activity as controls. We measured social media activity with a set of 12 questions involving how often respondents used the most popular social media sites. Then, a dummy variable was constructed on the basis of the median (0 = low, 1 = high).

## Data Analysis

Analyses for this study were run with Stata 15.1. A multinomial regression analysis was carried out to examine the associations among the covariates, drug use, and buying drugs online. We used an aggregated U.S.-Spanish dataset ($N$ = 2,424) for this due to the low number of cases involving purchasing drugs online. The group of people who had not used drugs was set as the reference category for those who had used drugs but not bought them online and for those who had also bought them online. Table 2 reports relative risk ratios (RRR) that are interpreted as odds ratios (OR) in binary logistic regression (RRR > 1 indicates higher risk, and RRR < 1 lower risk). In Table 2 we also report the means of the covariates as raw unstandardized figures for descriptive purposes.

Table 3 reports additional analyses that were run including only the participants who had experimented with drugs (U.S., $n$ = 253, Spain, $n$ = 259). These analyses were conducted by using penalized maximum likelihood logistic regression (i.e., Firth method) to reduce potential small-sample bias (Firth, 1993; Greenland & Mansournia, 2015; King & Zeng, 2001). Using the Firth method provides more robust findings in cases when either sample size or events are low. As our sample sizes were over 200 and the events presenting more than 10%, our analyses could have been done with standard logistic regression. Despite this, we aimed to keep the estimation strategy as robust as possible and utilized the Firth method. The analyses were run with the Firthlogit-command (Coveney, 2008) and age, gender, and social media activity were used as controls. We also report chi-square tests for categorical variables and mean comparison based on Kruskal-Wallis test.

Mediation analysis (Figures 1 and 2) was conducted with binary mediation command with a 2000-replication bootstrap. These analyses focused on young people who had used drugs in both US and Spain ($n$ = 512). We used aggregated US-Spain data here due to the low number of people buying drugs online. Impulsivity and sense of mastery were independent variables, buying drugs online was the mediating variable, and regular drug use was the dependent variable. Mediation analysis included age and gender as controls.

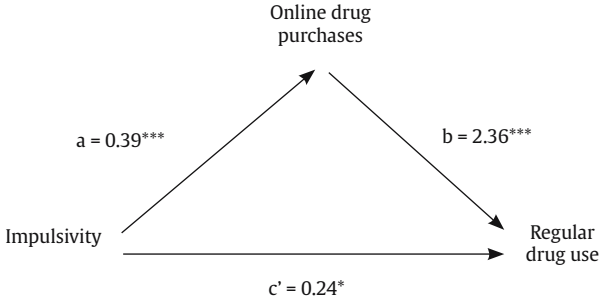


**Figure 1.** The Mediating Role of Buying Drugs Online in Relationship between Impulsivity and Regular Drug Use.

**Table 3.** Predictors of Buying Drugs Online among Drug Users in the U.S. and Spain

| | U.S. ($n$ = 253) | | | | | Spain ($n$ = 259) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Buying drugs online | | | | | Buying drugs online | | | | |
| | No | Yes | | | | No | Yes | | | |
| | % | % | $p$ | *OR* 95% CI | $p$ | % | % | $p$ | OR 95% CI | $p$ |
| Regular drug use type | | | | | | | | | | |
| Cannabis | 37.00 | 26.92 | .310 | 0.55 [0.21, 1.40] | .208 | 28.15 | 19.05 | .370 | 0.70 [0.24, 2.07] | .523 |
| Other drugs | 7.93 | 53.85 | < .001 | 6.91 [2.64, 18.05] | < .001 | 4.62 | 47.62 | < .001 | 15.26 [5.31, 43.79] | < .001 |
| | Buying drugs online | | | | | Buying drugs online | | | | |
| | No | Yes | | | | No | Yes | | | |
| | *M* | *M* | $p$ | *OR* 95% CI | $p$ | *M* | *M* | $p$ | *OR* 95% CI | $p$ |
| Self-control | | | | | | | | | | |
| Sense of mastery | 19.03 | 15.54 | < .001 | 0.79 [0.69, 0.90] | < .001 | 18.99 | 19.33 | .946 | 1.02 [0.91, 1.14] | .724 |
| Impulsivity | 2.09 | 3.27 | < .001 | 1.58 [1.61, 2.15] | .004 | 2.38 | 3.00 | .104 | 1.30 [0.98, 1.73] | .065 |
| Social bonds | | | | | | | | | | |
| Friends offline | 6.16 | 5.31 | .133 | 0.81 [0.68, 0.96] | .015 | 6.89 | 7.00 | .854 | 1.02 [0.81, 1.30] | .846 |
| Friend online | 4.82 | 5.73 | .144 | 1.03 [0.87, 1.20] | .753 | 4.28 | 6.48 | < .001 | 1.38 [1.14, 1.67] | .001 |
| Social media identity bubble | 6.10 | 6.23 | .898 | 0.97 [0.80, 1.19] | .802 | 5.70 | 6.52 | .045 | 1.25 [0.96, 1.62] | .091 |
| Mental health | | | | | | | | | | |
| Psychological distress | 4.05 | 6.88 | < .001 | 1.19 [1.06, 1.33] | .004 | 4.27 | 5.95 | .010 | 1.19 [1.04, 1.37] | .013 |
| Excessive drinking | 3.71 | 6.00 | < .001 | 1.15 [0.99, 1.35] | .073 | 4.21 | 6.29 | < .001 | 1.34 [1.12, 1.60] | .002 |
| Excessive gambling | 1.32 | 8.54 | < .001 | 1.34 [1.20, 1.50] | < .001 | 1.94 | 7.43 | < .001 | 1.36 [1.20, 1.52] | < .001 |
| Excessive internet use | 23.35 | 32.12 | .006 | 1.04 [1.01, 1.07] | .023 | 22.10 | 35.81 | < .001 | 1.11 [1.06, 1.17] | < .001 |

*Note.* *M* = mean, *p*-values are based on Kruskal-Wallis test. *OR* = odds ratio. *OR*s are based on penalized maximum likelihood logistic regression models. All regression models are adjusted for age, gender and social media activity.

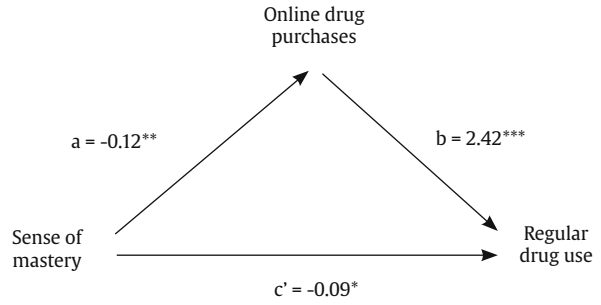


**Figure 2.** The Mediating Role of Buying Drugs Online in Relationship between Sense of Mastery and Regular Drug Use.

## Results

Of the respondents, about every fifth (20.87% in the U.S. and 21.37% in Spain) reported the use of or experimentation with substances other than alcohol or tobacco to get high. Cannabis was clearly the drug most experimented with by respondents with fewer respondents reporting use of other types of drugs. Out of the United States young people, 7.67% reported regular use of cannabis and 2.56% regular use of other drugs. In Spain the numbers were slightly lower with respective figures of 6.02% and 1.73%.

About 10% of those who had used drugs reported having used online sources to buy drugs (10.28% in the U.S. and 8.10% in Spain). This figure represents about 2% of the whole sample in both countries. In the U.S., young males reported more often that they had bought drugs online ($p$ < .001), whereas in Spain gender differences were not significant. In the U.S., buyers were more likely to be older ($t$-test, $p$ < .001), but in the Spanish data the age difference was not statistically significant.

In total, 69% of U.S. and 86% of Spanish respondents who bought drugs online used social media sites. The remainder of those who purchased drugs online (31% in the U.S. and 14% in Spain) did so only through darknet services. Additionally, respondents were given the opportunity to indicate several services where they purchased drugs online. In the U.S., the most common sites were Instagram (42%), Facebook (38%), and Craigslist (19%), with one respondent indicating use of an online legal cannabis delivery service. In Spain, the most common sites for buying drugs online were Instagram (48%) and Facebook (43%). About half of all the respondents in both the U.S. and Spain used several of these means to acquire drugs.

Multinomial logistic regression analysis revealed that those buying drugs online reported more self-control issues (a lower sense of mastery and higher impulsivity) compared with non-users as well as those who had used drugs but not bought them online (Table 2). We found that having offline friends was a protective factor against drug use (RRR = 0.94, $p$ =.004) and buying drugs online (RRR = 0.89, $p$ =.005). Buying drugs online was associated with psychological distress and excessive forms of drinking, gambling, and Internet use.

Additional analyses were conducted in order to check the robustness of the results. Table 3 shows the descriptive statistics comparing those who have bought drugs online and those who have only experimented with drugs. These results further confirm the findings shown in Table 2, comparing only the participants who experimented with drugs with the participants who reported buying drugs online. In the U.S. and Spain, online drug buyers were commonly regular users of other drugs, but not cannabis. Self-control factors were only statistically significant in the U.S. In Spain, belonging to online friends was associated with buying drugs online. All mental health factors remained significant in the descriptive findings (Kruskal-Wallis test) and in penalized maximum likelihood logistic regression models.

The last part of the analysis investigated buying drugs online as a mediator between the relationship of low self-control and regular drug use (see Figures 1 and 2). Statistically significant mediation was found. Figure 1 presents the coefficients when treating impulsivity as an independent variable. The indirect effect was statistically significant ($p$ < .001) and the bootstrapped indirect effect was 0.12 (95% CI [0.05, 0.18]). The proportion of total effect mediated was .37 and the indirect/direct effect ratio was .58. Figure 2 presents the coefficients when treating sense of mastery as an inde-

pendent variable. The indirect effect was statistically significant ($p < .001$) and the bootstrapped indirect effect was -0.07 (95% CI [-0.139, -0.009]). The proportion of total effect mediated was .31 and the indirect/direct effect ratio was .45.

## Discussion

This study analyzed the behavior of buying drugs online among young people in the U.S. and Spain and provided new evidence on using social media sources to buy drugs online. The results indicated that buying drugs online is a rare phenomenon among young adults and adolescents, with only 2% using online resources to buy drugs. Still, on average every tenth person who had experience using drugs had bought them online. Moreover, even a low percentage of individuals reporting criminal behaviors is concerned, given that around 5 to 10% of individuals commit around 50 to 60% of crimes (Farrington & West, 1993). Thus, a low percentage of users purchasing drugs online could represent a more developed drug trade, especially given that current research on online buying indicates that a large share is intended for reselling (Demant et al., 2018).

The most remarkable finding is that mainstream social media services, such as Facebook and Instagram, were used for buying drugs in both countries. This study expands the recent qualitative findings on social media drug markets by utilizing national level data in two countries (Bakken & Demant, 2019; Demant et al., 2019; Moyle et al., 2019). The results underline that research on online drugs sales should not only focus on darknet services. From a broader perspective, the results are in line with current social media and cybercrime research underlining that mainstream public Internet platforms give easy access to varying types of illicit and harmful content (Keipi et al., 2017). In addition to drugs, communities and contents that promote other forms of harmful or addictive behaviors, such as problem gambling, disordered eating, or self-harm, are easily accessible and among the most visited social media sites by youth (Keipi et al., 2017; Savolainen, 2020; Savolainen et al., 2018).

Our study was grounded on previous research on low self-control (De Ridder & Lensvelt-Mulders, 2018; Pratt & Cullen, 2000). In our study, both impulsivity and a low sense of mastery were associated with both drug use and buying drugs online, especially in the U.S. This result highlights that researchers should continue investigating impulsivity in an online setting. Although cultural aspects remain unclear, previous studies on drug users in Spain have shown that drug users differ in impulsivity and there are also drug users who report low general impulsivity (Martínez-Loredo et al., 2018). This could partially explain why our results were stronger in the U.S. Also, results indicated that online drug purchases mediated the relationship between low self-control and regular drug use. These results are an important contribution to the literature, as previous studies described online buyers as technologically savvy users who can regulate themselves (Barratt et al., 2016; Maddox et al., 2016). In contrast to these studies, our results indicate that existing self-control problems can lead to spontaneous drug purchases that may later on worsen the potential problems with regular use of drugs.

Social norms and group processes within online social networks could be important in many ways. However, in our study we did not find results related to the potential influence of friend groups online. The only exception was the result from Spain indicating that those who bought drugs online expressed higher belonging to online friends. Due to this difference from the U.S., more research is needed to understand the contextual and cultural differences potentially explaining these results. For example, scholarship on online cliques and bubbles has shown that they vary culturally and topically (Keipi et al., 2017; Koivula et al., 2019). Additionally, negative peer influence on deviant behavior has been widely demonstrated (Cutrín et al., 2019). We found, however, evidence that strong offline social ties were a protective factor against both drug use and buying drugs online. This finding is in line with previous studies showing that positive offline social ties can buffer potential risks encountered online (Kaakinen, Keipi, et al., 2018). These findings are also consistent with social control aspects noted in criminology (LaFree et al., 2018).

Those buying drugs online had multiple mental health problems, as they reported psychological distress as well as excessive forms of gambling and Internet use. These findings confirmed previous research results on the associations of drug use in general (Edlund et al., 2015; Grant et al., 2015; Lai et al., 2015; Peters et al., 2015). Therefore, it would be misleading to portray users of online drug markets as only a technologically savvy and a self-controlled subculture. Our results indicate that these youth may have many mental health issues and comorbidity of different addictions.

Our analysis was cross-sectional and limited to two countries. Future studies should continue investigating this phenomenon in other countries as well. Although our models included risk and protective factors, and a mediation analysis, on a strong theoretical basis, causal relations need to be confirmed in future longitudinal studies. Additionally, stronger measures of impulsivity should be explored. The strength of the study was that it used two nationwide samples, but additional studies in other cultures and contexts are needed.

This is one of the first studies focused on buying drugs online, an emerging problem behavior that might be especially harmful given that it is very difficult to control online behaviors. Online drug buyers have multiple self-control and mental health problems, and drug availability online might worsen their situations. Impulsive decisions are especially easy to make on social media. In light of this, more focus should be placed on youth behavior on mainstream social media services. Implications for policy and practice underline the need to work with youth on their social media use, since young people spend a considerable amount of time online. Social media platforms are linked to a wide variety of deviant behavior (Nasaescu et al., 2020), including access to drugs which should be included in educational campaigns targeting youth online behavior. The wide availability of illicit drugs is a larger problem area that needs to be tackled through legal enforcement efforts, especially online. Most importantly, the results suggest that there is a need to provide therapeutic interventions and support for those youth buying drugs online. As strong offline social ties could help protect from drug-related risks and harms, it is necessary to promote face-to-face interactions among young people. Comprehensive school-based interventions against substance use should include components related to buying drugs online, increasing its protective factors and decreasing risks.

## Conflict of Interest

The authors of this article declare no conflict of interest.

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