Article

The Association between Dating Apps and Alcohol Consumption in an Italian Sample of Active Users, Former Users, and Non-Users

Luca Flesia [1,*] **, Valentina Fietta** [2] **, Carlo Foresta** [1] **and Merylin Monaro** [2]

[1] Unit of Andrology and Reproductive Medicine, Department of Medicine, University of Padova, 35128 Padova, Italy; carlo.foresta@unipd.it

[2] Department of General Psychology, University of Padova, 35131 Padova, Italy; valefietta.vf@gmail.com (V.F.); merylin.monaro@unipd.it (M.M.)

[*] Correspondence: luca.flesia@ordinepsicologiveneto.it

Abstract: To date, the relationship between alcohol use and dating app use has been investigated mostly in conjunction with sexual activities and in homosexual men. For this reason, the aim of this study was to explore the association between dating app use and alcohol consumption among the general population. A cross-sectional study was conducted including app users, non-users, and former users: 1278 respondents completed an online ad hoc questionnaire assessing dating app use, motivations for installing dating apps, alcohol use, and demographics. Multiple logistic regression analysis was run to investigate the association between dating app use, demographic features, and alcohol consumption. Whereas educational level, age, and gender significantly contributed to the regular consumption of alcohol, dating app use did not account for a significant amount of variance between regular and not regular drinkers. However, people who installed and used dating apps with the motivation of searching for sexual partners were more likely to be regular drinkers. Among the active users, heavy app users were less likely to drink regularly. The study indicates that underlying factors (sexual aspects, motives for using the apps) and the intensity of using the apps may mediate the relationship between dating app use and alcohol use.

Keywords: mobile dating apps; alcohol consumption; casual sex; motives; smartphone applications

1. Introduction

During the last decade, dating apps represented a ground-breaking tool that drastically changed social relationships. Dating apps, also known as geosocial networking (GSN) smartphone applications, are online dating services, usually downloadable on smartphones for free. Taking advantage of the smartphone GPS location capabilities, they show the profiles and photos of people nearby, to enhance the probability of dating. Two of the most used dating apps are Grindr, geared towards men who have sex with men (MSM), and Tinder, geared towards males and females of all sexual orientations.

To date, the main research questions addressed in the literature on dating apps concern their impact on users' sexual behaviors and, more generally, on sexual health (Anzani et al. 2018; Wang et al. 2018; Ciocca et al. 2020). In this regard, many studies highlighted that, compared to non-users, app users are more likely to engage in at-risk sexual behaviors, such as unprotected sexual intercourse (Anzani et al. 2018), promiscuity (Sawyer et al. 2018), and sex with a higher number of partners (Rogge et al. 2020). Furthermore, the literature suggests that dating app users are more likely to receive a diagnosis of sexually transmitted infections (STI) (Wang et al. 2018).

Based on the evidence of a partial overlap between sexual risk behaviors and other jeopardizing health behaviors (Leigh 1990; Benotsch et al. 2013), several researchers also sought to investigate the possible association between dating app use and substance use,

especially alcohol and drug use, in conjunction with sexual experiences (Choi et al. 2017; Rogge et al. 2020). Rogge et al. (2020) found that having used dating apps in the previous two months, compared with having not used dating apps at all, increased the odds of having hook-ups involving alcohol and recreational drugs, both in males and females. On the contrary, Choi et al. (2017) did not identify any association between dating app use and alcohol consumption in conjunction with sexual intercourse among Chinese university students. Andersson et al. (2019) obtained similar results. These inconsistencies among studies could be explained by the intervention of mediating variables (e.g., gender, age, socio-cultural differences) which differ from a sample to another.

The relation between dating app use and alcohol-related behaviors outside of sexual experiences has been poorly investigated. To the best of our knowledge, all the studies that examined the relationship between alcohol consumption and dating app use recruited only MSM users (Winetrobe et al. 2014; Holloway 2015; Rice et al. 2012). This is a strong limitation, given that previous research indicates that heterosexual and non-heterosexual populations might differ in patterns of alcohol use and substance-related behaviors (McCabe et al. 2009; Lehavot and Simoni 2011; Hatzenbuehler et al. 2008). Furthermore, previous studies lacked a control group (i.e., non-users or former users). They found high percentages of binge drinking among app users, outside of sexual experiences; however, given the absence of control groups, there is no evidence of significant differences between app users and non-users. To sum up, the association between dating app use and alcohol use outside of sexual intercourse and in the general population remains unclear.

Despite the paucity of research on this topic, the association between alcohol consumption and dating app use might be worth investigating for many reasons. The literature reports some evidence about associations between social media use and alcohol use (Groth et al. 2017; Moreno and Whitehill 2014; Savolainen et al. 2020). Analyzing the association between electronic media communication with friends and substance use (alcohol, cannabis, and tobacco) among Dutch adolescents, Gommans et al. (2015) found that electronic media communication was uniquely associated with substance use, predominantly with alcohol use (Gommans et al. 2015). Moreover, a recent systematic review on the association between problematic internet use (PIU) and alcohol use among youth indicated that the majority of studies found a positive association between PIU and alcohol use (Lanthier-Labonté et al. 2020). However, although dating apps are one example of electronic media communication, they also have specific features (i.e., geolocation, orientation to dating). According to the "Uses and Gratification" theory, people use different types of media to satisfy a variety of needs (Katz et al. 1973). The theory posits that media technologies allow people to satisfy specific needs and assumes that individuals actively choose specific media to fulfil their needs. Therefore, according to the theory, the use of specific technologies is linked to users' social and psychological motivations. Consistent with this, the literature also reports specific associations between differences in motivations for using and installing the apps and differences in behavioral patterns (Sumter et al. 2017; Flesia et al. 2021). In this regard, within the field of substance-related behaviors, Flesia et al. (2021) found that, overall, active dating app users are more likely to be smokers, light-daily smokers, and heavy smokers than former users and non-users are; however, among users, using apps with the motive of searching for friends accounted for lower odds of smoking, light daily smoking, and moderate-to-heavy smoking. Given these considerations, a broader focus on the links between alcohol consumption and dating app use, even out of sexual activity, might be worth investigating and could pave the way for opening new lines of research.

Considering both the significant impact of alcohol use on global health (Peacock et al. 2018; Lim et al. 2012) and the significant spread of dating apps, investigating the potential links between dating app use and alcohol consumption might be of significant interest in terms of health prevention and promotion.

The first aim of the present cross-sectional study was to investigate the association between dating app use and alcohol consumption in the general population, including app users, former users, and non-users.

Hypothesis 1 (H1). *App users would show higher odds of alcohol consumption than former users and non-users.*

The second aim of the present study was to further investigate the role of some demographics (e.g., sexual orientation, age, gender) on alcohol consumption. Previous literature indicates that young adults are more prone both to use dating apps (Sawyer et al. 2018) and to endorse risk behaviors (Jackson et al. 2012). Similar evidence was reported for males compared with the female population (Flesia et al. 2020).

Hypothesis 2 (H2). *In line with the previous literature on alcohol use and misuse (Lehavot and Simoni 2011; Sawyer et al. 2018), the subsample of MSM would show higher odds of alcohol consumption than heterosexual people would; young people would show higher odds of alcohol consumption than old people would; males would show higher odds of alcohol consumption than females would.*

Finally, recent studies highlighted that the intensity of dating app use (e.g., time since the first installation, frequency of use) might be associated with some behavioral patterns. As an example, the literature reports significant associations between alcohol consumption and dating app use only for people who have used the apps for more than 12 months (Choi et al. 2016; Holloway et al. 2015). The literature also suggests that people largely differ in their motives for installing and using dating apps (Griffin et al. 2018) (e.g., sexual encounters, friendship): these differences could reflect different patterns of app-use and, therefore, different probability of engaging in risky behaviors.

The third aim of the present study was to investigate how different patterns of dating app use, in terms of intensity and motives, are related to alcohol consumption. Differentiating app users according to their patterns of use could offer a better understanding of which users are more likely to engage in risk behaviors and, consequently, to implement adequate interventions to reduce health impacts.

Hypothesis 3 (H3). *Dating app users utilizing apps for more years would show higher odds of alcohol consumption than those using them for less time. Participants showing intensive use of dating apps would show higher odds of alcohol consumption. Moreover, motives for installing and using the apps would account for differences in alcohol consumption.*

2. Materials and Methods

2.1. Measures

Participants were required to respond to an anonymous ad hoc questionnaire, which was created using Google Forms. The online questionnaire, originally administered in Italian, consisted of 22 multiple-choice questions, assessing demographic information, alcohol consumption, and dating app use (see Supplementary Materials for the English version of the questionnaire items). The questionnaire was advertised on social media (i.e., Facebook, WhatsApp) and participants were recruited on a voluntary basis via an online link that directed them to the study survey. All participants were informed about the aims of the study and asked to provide their informed consent before starting the questionnaire.

Demographic information: Participants were assessed for gender, age, educational level (years of school), relationship status, and sexual orientation.

Alcohol consumption: Participants were assessed for alcohol consumption (they were asked if they had drunk alcohol in the last 12 months and if yes, how frequently). Alcohol consumption frequency was categorized into the following three groups: teetotalers (participants declaring having not drunk alcohol in the last 12 months), occasional drinkers (participants declaring having drunk only on special occasions or only on the weekend or up to twice a week), regular drinkers (participants declaring having drunk more than twice a week or every day).

Use of dating apps: Participants were asked whether they were currently using (active users), had used but were no longer using (former users), or had never used any dating

apps (non-users). Participants were informed that "dating apps" were referred to "online smartphone dating applications based on geosocial networking".

Patterns of use (intensity and motives of dating app use): Former users were asked about their duration of past use. On the other hand, active users were asked for: the age at which they began using dating apps; the number of years of dating app usage; the number of dating apps installed. Active users were also asked about their primary motive for installing dating apps (the following options were provided: "meet new people", "have casual sex", "begin a relationship", "transgression", "I didn't know"). Response options are in line with those from the study by Fowler and Both (2020). Active users were also assessed for risk of problematic use of dating apps (Bonilla-Zorita et al. 2020). Specifically, they were asked about: number of accesses, frequency of notification checks, frequency of stopping other activities to check dating apps, daily time spent on dating apps, perception of uncontrolled use of dating apps, frequency of unaware accesses to the apps, frequency of giving up hours of sleep to check notifications, desire to reduce the time spent on the apps, and feelings of anxiety if unable to use the apps.

A brief description of each variable is available in the Supplementary Material. Data are available at the following repository: http://doi.org/10.5281/zenodo.4743535 (accessed on 22 June 2021).

2.2. Participants and Procedure

Participants were recruited through an online link that was posted on social media (Facebook and WhatsApp) between 1 June 2019 and 30 September 2019. Accordingly, participation was voluntary. All participants were required to read and provide informed consent before completing the online questionnaire. They received no compensation for participation.

The final sample consisted of 1278 Italian-speaking participants, 814 females and 464 males. The average age was 27.94 (SD = 7.85), range 18–54. The average years of education was 15.20 (SD = 2.59). Most of the sample consisted of cisgender people (just 3.60% declared to be transgender or other). Concerning sexual orientation, 64.87% of participants identified as heterosexual, 16.04% homosexual, and 19.09% other (bisexual, fluid, pansexual, asexual, heteroflexible, demisexual, queer, etc.). Regarding relationship status, 59.62% of the participants reported being in a relationship (stable or informal), whereas 40.38% reported being single. Concerning dating app use, 46.79% of participants never used dating apps (non-users), 30.75% were former users, and 22.46% were active users. Detailed information about the demographic features of the three subsamples (active users, non-users, and former users) is reported in Table 1.

Table 1. Demographic characteristics among active users, former users, and non-users. Percentages were rounded up from 0.05.

	Non-Users	**Former Users**	**Active Users**	**Overall Sample**
Number of subjects	598	393	287	1278
Age	Average = 26.35 (SD = 7.29)	Average = 27.70 (SD = 7.19)	Average = 31.60 (SD = 8.62)	Average = 27.94 (SD = 7.85)
Gender	Males = 127 (21.24%) Females = 471 (78.76%)	Males = 146 (37.15%) Females = 247 (62.85%)	Males = 191 (66.55%) Females = 96 (33.45%)	Males = 464 (36.31%) Females = 814 (63.69%)
Educational level (years)	Average = 15.02 (SD = 2.59)	Average = 15.19 (SD = 2.59)	Average = 15.57 (SD = 2.56)	Average = 15.20 (SD = 2.59)
Sexual orientation	Heterosexual = 85.12% Non-heterosexual = 14.88% — Homosexual = 2.68% — Other = 12.21%	Heterosexual = 56.49% Non-heterosexual = 43.51% — Homosexual = 20.61% — Other = 22.90%	Heterosexual = 34.15% Non-heterosexual = 65.89% — Homosexual = 37.67% — Other = 28.22%	Heterosexual = 64.87% Non-heterosexual = 35.13% — Homosexual = 16.04% — Other = 19.09%
Relationship status	In a relationship = 71.40% Single = 28.60%	In a relationship = 63.36% Single = 36.64%	In a relationship = 29.97% Single = 70.03%	In a relationship = 59.62% Single = 40.38%

The current project was designed in accordance with the Declaration of Helsinki and was approved by the Ethical Committee for Psychological Research of the University of Padova (Prot. n. 3049).

3. Results

3.1. Data Analysis

Data analysis was run using JASP and R (JASP Team 2020; R Core Team 2020). The significance threshold of the *p* value was set at 0.05, making it explicit when the value was <0.01 and <0.001. The Pearson's product-moment correlation (*r*) was adopted to investigate the association between continuous variables; the point-biserial correlation (r_{pb}) was adopted when one of the two variables was dichotomous.

Between-group comparisons were performed by calculating chi-squared (χ^2). Where results were statistically significant, we calculated the odds ratio (*OR*) or the standardized residuals (*z*) (if the value of *z* lies outside ±1.96, then it is significant at $p < 0.05$; if it lies outside ±2.58, then it is significant at $p < 0.01$; if it lies outside ±3.29, then it is significant at $p < 0.001$) (Field et al. 2012).

To address the problem of multiple testing, the Bonferroni correction was applied where needed, dividing the *p*-value by the number of tested variables.

Finally, multiple logistic regression was run to investigate the association between alcohol consumption and multiple independent variables. The collinearity assumption was checked before running the model. The analysis was performed using the stepwise variable selection method, which retains in the model only the predictors with a significant ($p < 0.05$) individual association with the outcome.

3.2. Descriptive Statistics about Alcohol Consumption

In the whole sample, 90.3% of participants reported having consumed alcohol in the past year, whereas only 9.7% were teetotalers. However, just 15.42% declared drinking regularly (with a frequency of 3–5 times per week or daily). Table 2 reports the distribution of participants between active users, non-users, and former users, who declared consuming alcohol occasionally or regularly.

Table 2. Percentage of participants who declared using alcohol occasionally or regularly.

	Non-Users	Former Users	Active Users	Overall Sample
Being a teetotaler	10.70%	8.14%	9.76%	9.7%
Drinking alcohol occasionally [1]	76.92%	75.06%	70.38%	74.88%
Drinking alcohol regularly [1]	12.38%	16.79%	19.86%	15.42%

[1] Occasionally means up to twice a week, only on the weekend, or only on special occasions; regularly means 2–5 times per week, or every day.

3.3. Association between Alcohol Consumption and Dating App Use (Hypothesis 1)

In terms of having consumed alcohol in the last year, as opposed to being a teetotaler, the results did not show any statistically significant difference between non-users, active users, and former users ($\chi^2 = 1.78$, $p = 0.412$). However, a statistically significant association emerged between drinking alcohol regularly (2–5 times per week or daily) and dating app use (non-users vs. former users vs. active users) ($\chi^2 = 9.16$, $p < 0.05$). Indeed, the standardized residuals indicated that among the active users there were more regular drinkers than expected ($z = 1.92$). Comparing the active users with the other groups (non-users and former users), the odds of regular drinking were 1.51 times higher among the active users than among the others ($\chi^2 = 5.61$, $p < 0.05$, $OR = 1.51$).

3.4. Association between Alcohol Consumption and Demographics (Hypothesis 2)

Note that when the association between alcohol consumption and demographics was analyzed, the Bonferroni correction was applied, dividing the p-value by the number of tested variables (=5) and setting the significance level at 0.01.

Results showed a statistically significant association between gender and drinking regularly, as males were more likely to drink alcohol regularly than females were ($\chi^2 = 8.86$, $p < 0.01$; $OR = 1.59$). There were no associations between drinking regularly and sexual orientation (heterosexual vs. non-heterosexual orientation: $\chi^2 = 0.08$, $p = 0.772$). A positive significant correlation was found between age and being a teetotaler ($r_{pb} = 0.14$, $p < 0.001$), but a significant positive correlation also emerged between age and drinking regularly ($r_{pb} = 0.11$, $p < 0.001$). In other words, there were fewer young teetotalers; however, as age increased, people were more likely to become regular drinkers. Concerning educational level, results showed a significant positive correlation between drinking alcohol regularly and years of school ($r_{pb} = 0.11$, $p < 0.001$). No associations have been found between drinking alcohol regularly and relationship status (single vs. being in a relationship) ($\chi^2 = 1.04$, $p = 0.308$).

As it emerged that drinking alcohol regularly was associated with gender, age, educational level, and dating app use, a multiple logistic regression analysis was run to investigate the role of each predictor when multiple testing. Drinking regularly was set as the dependent variable, and gender (male), age, educational level, and dating app use were entered as covariates. Results are reported in Table 3.

Table 3. Output of multiple logistic regression model entering gender, age, educational level, and dating app use (non-user vs. former user vs. active user) as predictors for drinking alcohol regularly.

	B	SE	OR	Wald	df	p	Lower Bound	Upper Bound
				Wald Test			**95% Confidence Interval**	
(Intercept)	−4.196	0.541	0.015	60.100	1	9.016×10^{-15}	−5.257	−3.135
Educational level	0.113	0.035	1.120	10.406	1	0.001	0.044	0.182
Gender (male)	0.458	0.161	1.581	8.066	1	0.005	0.142	0.774
Age	0.019	0.010	1.020	3.593	1	0.058	-6.623×10^{-4}	0.040

Note: $R^2 = 0.03$ (McFadden), 0.04 (Nagelkerke), 0.02 (Tjur), 0.02 (Cox and Snell). Model Deviance = 1068.056, AIC = 1076.056, BIC = 1096.668, df = 1274, $\Delta\chi^2 = 3.45$, $p = 0.063$, AUC = 0.63. Step 1 (education): df = 1276, $\Delta\chi^2 = 16.874$, $p = 3.995 \times 10^{-5}$, $R^2 = 0.015$ (McFadden), 0.023 (Nagelkerke), 0.048 (Tjur), 0.013 (Cox and Snell); Step 2 (education + gender): df = 1275, $\Delta\chi^2 = 10.281$, $p = 0.001$, $R^2 = 0.025$ (McFadden), 0.036 (Nagelkerke), 0.019 (Tjur), 0.021 (Cox and Snell).

The final model (Step 3: education + gender + age) did not account for a significant proportion of the variance (McFadden $R^2 = 0.03$, Nagelkerke $R^2 = 0.04$, Tjur $R^2 = 0.02$, Cox and Snell $R^2 = 0.02$, $p = 0.063$). However, educational level and gender (male) significantly contributed to the regular consumption of alcohol. Age was included in the model, but it did not reach the significance level. Dating app use (non-user vs. former user vs. active user) was excluded from the model steps by the stepwise variable selection method, as this variable did not reach a significant ($p < 0.05$) individual association with the outcome.

3.5. Association between Alcohol Consumption and Patterns of Use (Intensity and Motives of App Use, Hypothesis 3)

Note that when the association between alcohol consumption and intensity of app use was analyzed, the Bonferroni correction was applied, dividing the *p*-value by the number of tested variables (=9) and setting the significance level at 0.006.

Considering just the former users, no statistically significant associations were found between drinking alcohol regularly (2–5 times per week or daily) and the usage of dating apps for a long time in the past ($\chi^2 = 2.50$, $p = 0.114$).

Active users were on average 24.56 years old (SD = 7.52) when they started using the dating apps and, at the time of the study, they had been using them, on average, for 7.05 years (SD = 6.13). The average number of dating apps installed among active users was

2.29 (SD = 1.20). Considering just the active users, no statistically significant correlations were found between drinking alcohol regularly (2–5 times per week or daily) and the age at which they began using the dating apps (r_{pb} = 0.08, p = 0.187), the number of years of dating app usage (r_{pb} = −0.03, p = 0.587), and the number of dating apps currently installed (r_{pb} = 0.07, p = 0.241).

Concerning the questions that investigated the problematic use of dating apps, the distribution of the active users' responses is reported in Table 4.

Table 4. Distribution of responses to questions that investigated the problematic use of dating apps among active users. Percentages were rounded up from 0.05.

Problematic Use of Dating Apps	% of Active Users
Daily time spent on dating apps	0.70% from three to six hours (problematic use) 7.67% from one to three hours (problematic use) 13.24% from half an hour to one hour 17.07% from 15 min to half an hour 24.74% from 5 to 15 min 29.62% less than 5 min 6.97% of active users could not quantify it [1]
Number of accesses	23.00% more than 3 times per day (problematic use) 11.50% two or three times a day 23.35% once a day 24.04% once or twice a week 11.50% once or twice per month 6.62% almost never
Frequency of stopping other activities to check dating apps	3.14% very often (problematic use) 5.23% often (problematic use) 17.42% sometimes 28.92% rarely 45.30% never
Frequency of notification check	11.15% very often even without hearing the notification signal or vibration (problematic use) 7.32% often even without hearing the notification signal or vibration (problematic use) 40.77% sometimes also without hearing the notification signal or vibration 40.77% rarely without hearing the notification signal or vibration or only hearing the signal or vibration.
Perception of uncontrolled use of dating apps	27.53% often (problematic use) 25.09% rarely 47.39% never
Frequency of unaware accesses to the apps	8.71% often (problematic use) 21.60% rarely 69.69% never
Frequency of giving up hours of sleep to check notifications	3.48% often (problematic use) 12.20% rarely 84.32% never
Desire to reduce the time spent in the apps	13.59% often (problematic use) 20.91% rarely 65.51% never
Anxiety feelings if unable to use the apps	2.44% often (problematic use) 18.19% rarely 79.44% never

[1] Participants who gave this response were excluded from the subsequent analysis.

No associations were found between drinking alcohol regularly and a high number of accesses (more than three) in dating apps during the day (χ^2 = 3.23, p = 0.072) or frequently stopping other activities to check the apps (χ^2 = 0.89, p = 0.345). A trend emerged showing that there were fewer regular drinkers than expected among people who

frequently control the dating apps notifications (checking notifications often or very often, even if the notification signal or vibration was not heard; $\chi^2 = 4.44$, $p < 0.05$; $OR = 0.37$) and among people who declared spending more than an hour on dating apps daily ($\chi^2 = 4.35$, $p < 0.05$, $OR = 0.15$). However, this trend did not reach statistical significance ($p < 0.006$). For all the other variables regarding the problematic use of dating apps, we did not find any significant association with drinking alcohol regularly (perception of uncontrolled use of dating apps: $\chi^2 = 0.79$, $p = 0.373$; frequency of unaware accesses to the apps: $\chi^2 = 2.42$, $p = 0.120$; frequency of giving up hours of sleep to check notifications: $\chi^2 = 0.63$, $p = 0.426$; desire to reduce time spent on the apps: $\chi^2 = 0.57$, $p = 0.451$; feelings of anxiety if unable to use the apps: $\chi^2 = 0.14$, $p = 0.708$).

Regarding the role of motives, the analysis highlighted a positive association between drinking alcohol regularly and seeking for casual sex (see Table 5).

Table 5. Results from chi-squared analysis investigating the association between drinking alcohol regularly and motives for installing dating apps. Note that when applying the Bonferroni correction, the significance level is set at 0.01.

Motives for Installing Dating Apps	χ^2	*df*	*p*	*OR*
Meet new people	0.19	1	0.666	1.23
Begin a relationship	6.53	1	<0.05	0.33
Have casual sex	7.45	1	<0.01	2.31
Transgression	0.00	1	0.987	1.01
I don't know	0.27	1	0.605	0.85

4. Discussion and Conclusions

This cross-sectional study explored the association between the use of mobile dating apps and alcohol consumption. The novelty of the study consists of investigating this association not in conjunction with sexual activities and in a sample including all sexual orientations. First, we tested the differences between app users, non-users, and former users concerning drinking alcohol regularly. Then, we investigated the role of demographic features and of patterns of dating app use (duration of use, intensity of use, motives for use).

It emerged that only a small percentage of participants (15.42%) reported using alcohol regularly (several times per week or daily). This result is consistent with findings from a recent national survey on alcohol consumption by the National Institute of Statistics (ISTAT—Italian National Institute of Statistics 2020).

Although dating app use was associated with regular alcohol consumption, this effect disappeared in the regression model, indicating that there is not a direct relationship between alcohol consumption and dating app use. This result does not support our Hypothesis 1; however, it gives strength to our aforementioned considerations about the need for control groups in studies regarding possible associations between drinking and dating app use.

Regarding demographic variables, only being male and having a higher level of education accounted for higher odds of regular drinking. In this regard, it is worth noting that the study sample's gender distribution was not homogenous among the three subsamples (non-users, former users, active users): indeed, about two-thirds of the active users were male, whereas males were only one-third of former users and one-fifth of non-users. Therefore, it could be assumed that gender might be a common latent variable between alcohol consumption and dating app use. This result is consistent with previous literature: several studies indicated that men are more prone to drinking than women are (Erol and Karpyak 2015; Flesia et al. 2020). Research on the interplay between educational attainment and alcohol use also indicate that, while people with a lower level of education seem to bear more negative alcohol-related consequences, alcohol consumption tends to increase with the years of school (and level of income) (Strand and Steiro 2003; Christensen

et al. 2017; Collins 2016). Regarding sexual orientation, being heterosexual or belonging to a sexual minority did not account for different odds of alcohol consumption. This result partially unconfirms our Hypothesis 2 and diverges from previous studies finding that non-heterosexual people are more likely to drink, smoke, or use drugs than heterosexuals, as an effect of minority stress (Parent et al. 2019).

Regarding the role of intensity of dating app use, we found a trend suggesting that "heavy app users" (those who declared spending more time on the apps and frequently checking their notifications) were less likely to drink alcohol regularly. This is consistent with other studies suggesting to diversify users depending on the intensity of the use of dating apps (Orosz et al. 2016), as psychological factors might be implicated in adaptive or "problematic" dating app use (Rochat et al. 2019). On the other hand, however, this result unconfirms our Hypothesis 3, based on previous studies indicating a positive association between PIU and problematic alcohol use (Alacam et al. 2015; Ko et al. 2008). Investigating possible common underlying mechanisms between PIU and alcohol consumption within the framework of the "problem-behavior" theory (Jessor 1987), Ko et al. (2008) found that PIU and problematic alcohol use shared the same psychosocial proneness to engage in approach behavior for stimuli with reward, resulting in negative outcomes. Our diverging findings suggest differentiating between problematic dating app use and problematic internet use, considering them as separate entities (Orosz et al. 2016). Compared with internet and other social media, dating apps are specifically used as a tool for interpersonal relationships, and no other activity can be performed through them; moreover, they are available on smartphones and, through geolocation capacity, they allow users to find local, and therefore more readily available, mates (Rochat et al. 2019). These unique features of dating apps might impact common underlying psychological and relational factors, such as loneliness or attachment orientation, differently than other social media (Rochat et al. 2019; Timmermans and Alexopoulos 2020).

Despite the fact that the general use of dating apps was not a good predictor for regular alcohol consumption, an association emerged between drinking regularly and the motives for dating app use, consistent with Hypothesis 3. More specifically, active users who declared installing the apps with the motivation of looking for casual sex were significantly more likely to be regular drinkers. This result suggests that installing dating apps for seeking sexual partners is related to regular alcohol consumption, giving interesting cues for targeted preventive interventions. For instance, dating apps' registration or login pages could ask users their primary motive for installing or using the app. Then, dating apps could promote, especially for users searching for sex, advertisements related to alcohol-related behaviors or links to information regarding health risks associated with alcohol consumption, given that active users searching for sex are more likely to use alcohol regularly. A consistent body of research highlights the relationship between substance use and multiple casual sexual partners, as well as the common association with sensation seeking (Hittner and Swickert 2006). Further research is needed to explore this relationship. These motive-dependent results might explain the low predictive power of the dating app use *per se* on regular alcohol consumption. The literature indicates the significant role of personal identity features in influencing people's interactions with the media: in line with the "Media Practice Model" (Steele and Brown 1995) individual inclinations and motivations determine activities and routines of media consumption. According to the "Uses and Gratification" theory, media users are not passive consumers, but they actively seek out specific media to satisfy specific needs (Katz et al. 1973). Our results are consistent with this theoretical framework.

The present study contributes to existing literature regarding the association between electronic media communication and alcohol consumption, providing new and specific information about the specific topic of the relationship between dating app use and alcohol use. The findings regarding the role of sexual motives in influencing the association between dating app use and alcohol consumption provide interesting information for

planning promotion and prevention programs and can serve as a guide for the planning of future related lines of research.

Some limitations should be considered when interpreting the findings of this study. First, participants were recruited through a link posted on social media: this guarantees the possibility of recruiting large samples, but it might not guarantee the sample representativeness and the quality of the data (it does not allow for verifying the reliability of responses and the understanding of questions by participants). Second, the self-report questionnaire was implemented ad hoc for the present research, thus future works could benefit from integrating our questions with validated and standardized assessment scales. Moreover, in the present study, alcohol consumption is only assessed in terms of frequency of use: although this measure provides overall information about alcohol consumption, a further assessment about severity of use (e.g., quantity of alcohol, getting drunk, etc.), could offer a better understanding of the association between dating app use and alcohol use. Finally, the use of categorical questions has limited the possibility to run certain sophisticated analyses (e.g., SEM).

Future researchers should consider variables with a clinical value, such as the history of alcohol consumption and the severity of alcohol use, which could impact the results. Future researchers could also invest effort into investigating the interplay and mutual interrelationships between dating app use, alcohol use, and other substance-related behaviors (e.g., smoking, drugs). Finally, further research is needed to understand the role of common psychological and relational factors underlying the associations between dating app use and alcohol consumption (i.e., sensation seeking, attachment orientation, etc.).

To conclude, this research sheds light on some patterns concerning the relationship between alcohol consumption and dating app use, indicating the role of intensity of use and of motives for use, especially sexual motives. The study findings can give interesting cues for targeted and tailored preventive interventions.

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References

Alacam, Huseyin, Figen Culha Atesci, A. Cem Sengul, and Selim Tumkaya. 2015. The Relationship between Smoking and Alcohol Use and Internet Addiction among the University Students/Universite Ogrencilerinde Internet Bagimliliginin Sigara ve Alkol Kullanimi Ile Iliskisi. *Anadolu Psikiyatri Dergisi* 16: 383–89. [CrossRef]

Andersson, Nirina, Isabella Preuss, Jens Boman, and Elisabet Nylander. 2019. Chlamydia Infection Among Digital Daters and Nondigital Daters. *Journal of Lower Genital Tract Disease* 23: 230–34. [CrossRef]

Anzani, A., M. Di Sarno, and A. Prunas. 2018. Using Smartphone Apps to Find Sexual Partners: A Review of the Literature. *Sexologies* 27: e61–e65. [CrossRef]

Benotsch, Eric G., Daniel J. Snipes, Aaron M. Martin, and Sheana S. Bull. 2013. Sexting, Substance Use, and Sexual Risk Behavior in Young Adults. *Journal of Adolescent Health* 52: 307–13. [CrossRef] [PubMed]

Bonilla-Zorita, Gabriel, Mark D. Griffiths, and Daria J. Kuss. 2020. Online Dating and Problematic Use: A Systematic Review. *International Journal of Mental Health and Addiction*. [CrossRef]

Choi, Edmond P. H., Janet Y. H. Wong, Herman H. M. Lo, Wendy Wong, Jasmine H. M. Chio, and Daniel Y. T. Fong. 2016. The Association between Smartphone Dating Applications and College Students' Casual Sex Encounters and Condom Use. *Sexual and Reproductive Healthcare*. [CrossRef]

Choi, Edmond P. H., Janet Y. H. Wong, Herman H. M. Lo, Wendy Wong, Jasmine H. M. Chio, and Daniel Y. T. Fong. 2017. Association Between Using Smartphone Dating Applications and Alcohol and Recreational Drug Use in Conjunction With Sexual Activities in College Students. *Substance Use and Misuse*. [CrossRef] [PubMed]

Christensen, Helene Nordahl, Finn Diderichsen, Ulla Arthur Hvidtfeldt, Theis Lange, Per Kragh Andersen, Merete Osler, Eva Prescott, Anne Tjønneland, Naja Hulvej Rod, and Ingelise Andersen. 2017. Joint Effect of Alcohol Consumption and Educational Level on Alcohol-Related Medical Events. *Epidemiology* 28: 872–79. [CrossRef]

Ciocca, Giacomo, Antonella Robilotta, Lilybeth Fontanesi, Andrea Sansone, Laura D'Antuono, Erika Limoncin, Filippo Nimbi, Chiara Simonelli, Giorgio Di Lorenzo, Alberto Siracusano, and et al. 2020. Sexological Aspects Related to Tinder Use: A Comprehensive Review of the Literature. *Sexual Medicine Reviews*. [CrossRef]

Collins, Susan E. 2016. Associations between Socioeconomic Factors and Alcohol Outcomes. *Alcohol Research: Current Reviews* 38: 83.

Erol, Almila, and Victor M. Karpyak. 2015. Sex and Gender-Related Differences in Alcohol Use and Its Consequences: Contemporary Knowledge and Future Research Considerations. *Drug and Alcohol Dependence* 156: 1–13. [CrossRef]

Field, Andy P., Miles Jeremy, and Zoë Field. 2012. *Discovering Statistics Using R*. New York: SAGE Publications Ltd.

Flesia, Luca, Francesca Cavalieri, Stefano Angelini, Gioia Bottesi, Marta Ghisi, Enrico Tonon, Agustina Perez Roldan, Andrea Di Nisio, Andrea Garolla, Alberto Ferlin, and et al. 2020. Health-Related Lifestyles, Substance-Related Behaviors, and Sexual Habits Among Italian Young Adult Males: An Epidemiologic Study. *Sexual Medicine*. [CrossRef]

Flesia, Luca, Valentina Fietta, Carlo Foresta, and Merylin Monaro. 2021. Cigarette Smoking and Dating App Use: Findings from a Survey in a Sample of Adults in Italy. *European Journal of Investigation in Health, Psychology and Education* 11: 40. [CrossRef]

Fowler, Samantha A., and Lilly E. Both. 2020. The Role of Personality and Risk-Taking on Tinder Use. *Social Sciences & Humanities Open* 2: 100067. [CrossRef]

Gommans, Rob, Gonneke W. J. M. Stevens, Emily Finne, Antonius H. N. Cillessen, Meyran Boniel-Nissim, and Tom F. M. ter Bogt. 2015. Frequent Electronic Media Communication with Friends Is Associated with Higher Adolescent Substance Use. *International Journal of Public Health* 60: 167–77. [CrossRef] [PubMed]

Griffin, Meredith, Amy Canevello, and Richard D. McAnulty. 2018. Motives and Concerns Associated with Geosocial Networking App Usage: An Exploratory Study among Heterosexual College Students in the United States. *Cyberpsychology, Behavior, and Social Networking*. [CrossRef] [PubMed]

Groth, Gabrielle G., Laura M. Longo, and Jessica L. Martin. 2017. Social Media and College Student Risk Behaviors: A Mini-Review. *Addictive Behaviors*. [CrossRef]

Hatzenbuehler, Mark L., Susan Nolen-Hoeksema, and Sarah J. Erickson. 2008. Minority Stress Predictors of HIV Risk Behavior, Substance Use, and Depressive Symptoms: Results from a Prospective Study of Bereaved Gay Men. *Health Psychology* 27: 455. [CrossRef] [PubMed]

Hittner, James B., and Rhonda Swickert. 2006. Sensation Seeking and Alcohol Use: A Meta-Analytic Review. *Addictive Behaviors* 31: 1383–401. [CrossRef]

Holloway, Ian W. 2015. Substance Use Homophily among Geosocial Networking Application Using Gay, Bisexual, and Other Men Who Have Sex with Men. *Archives of Sexual Behavior* 44: 1799–811. [CrossRef]

Holloway, Ian W., Craig A. Pulsipher, Jeremy Gibbs, Anamika Barman-Adhikari, and Eric Rice. 2015. Network Influences on the Sexual Risk Behaviors of Gay, Bisexual and Other Men Who Have Sex with Men Using Geosocial Networking Applications. *AIDS and Behavior*. [CrossRef]

ISTAT—Italian National Institute of Statistics. 2020. *Il Consumo Di Alcol in Italia*. Available online: https://www.istat.it/it/archivio/244222 (accessed on 30 June 2021).

Jackson, Caroline, Rosemary Geddes, Sally Haw, and John Frank. 2012. Interventions to Prevent Substance Use and Risky Sexual Behaviour in Young People: A Systematic Review. *Addiction*. [CrossRef]

JASP Team. 2020. JASP (Version 0.13.1). Available online: https://jasp-stats.org/ (accessed on 30 June 2021).

Jessor, Richard. 1987. Problem-Behavior Theory, Psychosocial Development, and Adolescent Problem Drinking. *British Journal of Addiction*. [CrossRef] [PubMed]

Katz, Elihu, Jay G. Blumler, and Michael Gurevitch. 1973. Uses and Gratifications Research. *Public Opinion Quarterly*. [CrossRef]

Ko, Chih-Hung, Ju-Yu Yen, Cheng-Fang Yen, Cheng-Sheng Chen, Chih-Chi Weng, and Cheng-Chung Chen. 2008. The Association between Internet Addiction and Problematic Alcohol Use in Adolescents: The Problem Behavior Model. *CyberPsychology & Behavior* 11: 571–76.

Lanthier-Labonté, Stéphanie, Magali Dufour, David Martin Milot, and Julie Loslier. 2020. Is Problematic Internet Use Associated with Alcohol and Cannabis Use among Youth? A Systematic Review. *Addictive Behaviors*. [CrossRef]

Lehavot, Keren, and Jane M. Simoni. 2011. The Impact of Minority Stress on Mental Health and Substance Use among Sexual Minority Women. *Journal of Consulting and Clinical Psychology* 79: 159. [CrossRef]

Leigh, Barbara Critchlow. 1990. The Relationship of Substance Use during Sex to High-risk Sexual Behavior. *Journal of Sex Research* 27: 199–213. [CrossRef]

Lim, Stephen S., Theo Vos, Abraham D. Flaxman, Goodarz Danaei, Kenji Shibuya, Heather Adair-Rohani, Markus Amann, H Ross Anderson, Kathryn G. Andrews, Martin Aryee, and et al. 2012. A Comparative Risk Assessment of Burden of Disease and Injury Attributable to 67 Risk Factors and Risk Factor Clusters in 21 Regions, 1990–2010: A Systematic Analysis for the Global Burden of Disease Study 2010. *The Lancet* 380: 2224–60. [CrossRef]

McCabe, Sean Esteban, Tonda L. Hughes, Wendy B. Bostwick, Brady T. West, and Carol J. Boyd. 2009. Sexual Orientation, Substance Use Behaviors and Substance Dependence in the United States. *Addiction* 104: 1333–45. [CrossRef]

Moreno, Megan A., and Jennifer M. Whitehill. 2014. Influence of Social Media on Alcohol Use in Adolescents and Young Adults. *Alcohol Research: Current Reviews* 36: 91–100.

Orosz, Gábor, István Tóth-Király, Beáta Bőthe, and Dóra Melher. 2016. Too Many Swipes for Today: The Development of the Problematic Tinder Use Scale (PTUS). *Journal of Behavioral Addictions* 5: 518–23. [CrossRef]

Parent, Mike C., Andrew S. Arriaga, Teresa Gobble, and Lexie Wille. 2019. Stress and Substance Use among Sexual and Gender Minority Individuals across the Lifespan. *Neurobiology of Stress* 10: 100146. [CrossRef]

Peacock, Amy, Janni Leung, Sarah Larney, Samantha Colledge, Matthew Hickman, Jürgen Rehm, Gary A. Giovino, Robert West, Wayne Hall, Paul Griffiths, and et al. 2018. Global Statistics on Alcohol, Tobacco and Illicit Drug Use: 2017 Status Report. *Addiction*. [CrossRef]

R Core Team. 2020. *R: A Language and Environment for Statistical Computing*. Vienna: R Foundation for Statistical Computing.

Rice, Eric, Ian Holloway, Hailey Winetrobe, Harmony Rhoades, Anamika Barman-Adhikari, Jeremy Gibbs, Adam Carranza, David Dent, and Shannon Dunlap. 2012. Sex Risk among Young Men Who Have Sex with Men Who Use Grindr, a Smartphone Geosocial Networking Application. *Journal of AIDS and Clinical Research* 84: 1–6. [CrossRef]

Rochat, Lucien, Francesco Bianchi-Demicheli, Elias Aboujaoude, and Yasser Khazaal. 2019. The Psychology of 'Swiping': A Cluster Analysis of the Mobile Dating App Tinder. *Journal of Behavioral Addictions* 8: 804–13. [CrossRef]

Rogge, Ronald D., Dev Crasta, and Nicole Legate. 2020. Is Tinder–Grindr Use Risky? Distinguishing Venue from Individuals' Behavior as Unique Predictors of Sexual Risk. *Archives of Sexual Behavior*. [CrossRef] [PubMed]

Savolainen, Iina, Atte Oksanen, Markus Kaakinen, Anu Sirola, Bryan Lee Miller, Hye Jin Paek, and Izabela Zych. 2020. The Association between Social Media Use and Hazardous Alcohol Use among Youths: A Four-Country Study. *Alcohol and Alcoholism*. [CrossRef] [PubMed]

Sawyer, Ashlee N., Erin R. Smith, and Eric G. Benotsch. 2018. Dating Application Use and Sexual Risk Behavior among Young Adults. *Sexuality Research and Social Policy* 15: 183–91. [CrossRef]

Steele, Jeanne R., and Jane D. Brown. 1995. Adolescent Room Culture: Studying Media in the Context of Everyday Life. *Journal of Youth and Adolescence*. [CrossRef]

Strand, Bjørn Heine, and Asbjørn Steiro. 2003. Alcohol Consumption, Income and Education in Norway, 1993-2000. *Tidsskrift for Den Norske Laegeforening: Tidsskrift for Praktisk Medicin, Ny Raekke* 123: 2849–53.

Sumter, Sindy R., Laura Vandenbosch, and Loes Ligtenberg. 2017. Love Me Tinder: Untangling Emerging Adults' Motivations for Using the Dating Application Tinder. *Telematics and Informatics* 34: 67–78. [CrossRef]

Timmermans, Elisabeth, and Cassandra Alexopoulos. 2020. Anxiously Searching for Love (Among Other Things): Attachment Orientation and Mobile Dating Application Users' Motives and Outcomes. *Cyberpsychology, Behavior, and Social Networking*. [CrossRef] [PubMed]

Wang, Haidong, Lu Zhang, Ying Zhou, Keke Wang, Xiaoya Zhang, Jianhui Wu, and Guoli Wang. 2018. The Use of Geosocial Networking Smartphone Applications and the Risk of Sexually Transmitted Infections among Men Who Have Sex with Men: A Systematic Review and Meta-Analysis 11 Medical and Health Sciences 1117 Public Health and Health Services. *BMC Public Health*. [CrossRef]

Winetrobe, Hailey, Eric Rice, Jose Bauermeister, Robin Petering, and Ian W. Holloway. 2014. Associations of Unprotected Anal Intercourse with Grindr-Met Partners among Grindr-Using Young Men Who Have Sex with Men in Los Angeles. *AIDS Care—Psychological and Socio-Medical Aspects of AIDS/HIV*. [CrossRef] [PubMed]