

Sexualized drug use among gay, bisexuals, and other men who have sex with men and its association with mental health symptoms

Uso sexualizado de drogas entre homosexuales, bisexuales y otros hombres que tienen sexo con hombres y su asociación con síntomas de salud mental

**Manuel Gámez-Guadix¹, Daniel Incera-Fernández², Francisco J. Román³,
Estíbaliz Mateos-Pérez⁴, Erika Borrajo⁵ & Kenia Martínez⁶**

¹ Universidad Autónoma de Madrid, España. <https://orcid.org/0000-0002-1575-1662>

² Universidad Miguel de Cervantes, España. <https://orcid.org/0000-0002-9767-1892>

³ Universidad Autónoma de Madrid, España. <https://orcid.org/0000-0003-2342-9531>

⁴ Universidad del País Vasco, España. <https://orcid.org/0000-0003-2173-9691>

⁵ Universidad de Deusto, España. <https://orcid.org/0000-0003-0723-6027>

⁶ Universidad Autónoma de Madrid, España. <https://orcid.org/0000-0002-6880-1395>

Received: 03/01/2023 · Accepted: 30/06/2023

Cómo citar este artículo/citation: Gámez-Guadix, M., Incera-Fernández, D., Román, F. J., Mateos-Pérez, E., Borrajo, E., & Martínez, K. (2023). Sexualized drug use among gay, bisexuals, and other men who have sex with men and its association with mental health symptoms. *Revista Española de Drogodependencias*, 48(3), 95-112. <https://doi.org/10.54108/10060>

Abstract

Sexualized drug use (SDU) refers to the intentional use of psychoactive substances before or during a sexual encounter with the aim of improving one's sexual experience. The goals of this study were: (a) to analyze the relationship between SDU and a wide range of mental health symptoms among men who have sex with men (MSM) (e.g., anxiety, somatic symptoms, bipolar disorder, persistent depression, alcohol dependence); and (b) to examine the relationship between SDU and various behavioral addictions while controlling for a set of demographic variables, including serological status. The sample consisted of 493 MSM between 18 and 78 years old ($M_{age} = 32.58$, $SD = 11.05$). The participants completed self-report measures on SDU, mental health symptoms, and behavioral addictions. Significantly higher rates of compulsive sexual behavior and drug and alcohol abuse (large effect sizes) were reported by the SDU participants compared to the non-SDU participants. Moreover, SDU was also significantly related to delusional symptoms and compulsive spending (medium effect sizes). The results suggest a pattern of specific mental health symptoms associated with problematic SDU, rather than a generalized pattern of psychological dysfunction. Risk-reduction strategies should assess, provide information about, and intervene in the specific mental health symptoms associated with SDU.

Keywords

Chemsex; sexualized drug use; men who have sex with men; mental health; behavioral addictions.

Correspondence:

Manuel Gámez-Guadix

Email: manuel.gamez@uam.es



Resumen

El uso sexualizado de drogas (USD) se refiere al uso intencional de sustancias psicoactivas antes o durante un encuentro sexual con el objetivo de mejorar la experiencia sexual. Los objetivos de este estudio fueron: (a) analizar la relación entre el USD y un amplio rango de síntomas de salud mental entre hombres que tienen sexo con hombres (HSH) (p. ej., ansiedad, síntomas somáticos, trastorno bipolar, depresión persistente, dependencia del alcohol); y (b) examinar la relación entre el USD y diversas adicciones conductuales, controlando un conjunto de variables demográficas, incluido el estado serológico. La muestra estuvo compuesta por 493 HSH entre los 18 y 78 años (M edad = 32,58, DE = 11,05). Los participantes completaron medidas de autoinforme sobre USD, síntomas de salud mental y adicciones conductuales. Los participantes que se implicaron en el USD presentaron un significativamente mayor abuso de drogas y alcohol y tasas más altas de comportamiento sexual compulsivo (tamaños de efecto grandes) en comparación con los participantes que no habían practicado USD. Además, el USD también se relacionó significativamente con los síntomas psicóticos y el gasto compulsivo (tamaños del efecto medios). Los resultados sugieren un patrón de síntomas de salud mental específicos asociados al USD problemático, en lugar de un patrón generalizado de disfunción psicológica. Las estrategias de reducción de riesgos deben evaluar, proporcionar información e intervenir sobre los síntomas de salud mental específicos asociados al USD.

Palabras clave

Chemsex; consumo sexualizado de drogas; hombres que tienen sexo con hombres; salud mental; adicciones conductuales.

In recent years, sexualized drug use (SDU) among men who have sex with men (MSM) has received increased empirical attention (Íncera-Fernández et al., 2023a, 2023b; Lafortune et al., 2021; Soriano, 2022; Tomkins et al., 2019). SDU refers to the intentional use of drugs before or during sexual relationships for the purpose of facilitating, intensifying, or prolonging sexual activity (Edmundson et al., 2018; Giorgetti et al., 2017). Substances used for sexual purposes include gamma-hydroxybutyrate/gamma-butyrolactone (GHB/GLB), 4-methylmetcathinone (mephedrone), N-methyl-1-phenylpropan-2-amine (methamphetamine), cocaine, 3,4-methylenedioxy-

methamphetamine (MDMA), alkyl and butyl nitrites (poppers), ketamine, drugs for erectile dysfunction (e.g., Viagra®), hashish/marijuana, and alcohol (Guerras et al., 2021; Sewell et al., 2017; Torres et al., 2020). “Chemsex” is a type of SDU and typically refers to the sexualized use of mephedrone, crystal methamphetamine, or GHB/GLB (Bourne et al., 2014).

The degree and frequency with which SDU substances are used before or during sexual encounters varies widely among MSM. Notably, the prevalence of SDU usage has differed significantly across studies (Íncera-Fernández et al., 2021). The



heterogeneity in study populations and methodologies has also made it difficult to make comparisons across studies. For example, Ruiz-Robledillo et al. (2021) found that 40.6% of the MSM from their Spanish sample had practiced chemsex during the last year. However, Guerras et al. (2022) recently found that 21.9% of MSM reported that they had used substances for sexual purposes in the last 12 months.

It is important to note that some studies have pointed out the importance of considering SDU as a complex behavior instead of focusing only on its negative correlates (Melendez-Torres & Bourne, 2016; Nimbi et al., 2020). To this end, researchers have differentiated between “recreational” and “problematic” forms of SDU (Nimbi et al., 2020; Platteau et al., 2019). SDU is recreational when users maintain control over their drug use, have healthy coping strategies and emotional regulation, and do not experience problems in their lives as a result of their drug use. On the other hand, SDU become problematic when certain circumstances or conditions (e.g., adverse childhood events or HIV+ discrimination) lead to substance abuse in users, which can be related to a loss of control over SDU and negative consequences for those users (e.g., regarding their family relationships, work responsibilities, STIs, or overdoses). Altogether, this could lead to more negative consequences for users’ mental health, but these consequences are not yet well known (Íncera et al., 2021). Due to the limited information available on the associated symptomatology of mental health concerns related to SDU, this study focused on analyzing the mental health outcomes associated specifically with problematic SDU.

SDU and Mental Health

Although research on the mental health symptoms associated with SDU has increased in recent years (Íncera et al., 2021; Lafortune et al., 2021), data on the relationship between mental health and SDU remain unclear. Research has shown that SDU is associated with psychotic symptoms (Batisse et al., 2018; Dolengevich-Segal et al., 2019), depression (Nöstlinger et al., 2020; Schecke et al., 2019), anxiety (Brogan et al., 2019; Card et al., 2019), and addiction (Gertzen et al., 2021). A study by Gavín et al. (2021) found that 72.1% of participants who engaged in substance use in the context of chemsex presented with psychiatric comorbidity, with psychotic symptoms being the most frequent concern (37.2%). In contrast, Bohn et al. (2020) found higher depression and anxiety scores in a group of MSM who practiced chemsex compared to those who did not. Similarly, Miltz et al. (2021) found that SDU was associated with symptoms of anxiety and depression among MSM, and Sewell et al. (2017) found a higher risk of alcohol use among MSM who used chemsex drugs compared to those who did not. Dolengevich-Segal et al. (2019) also found that people who participated in “slamsex” (intravenous substance use) were more likely to have a substance addiction disorder. Moreover, in a recent study by Li et al. (2021), nearly half of the MSM who had practiced chemsex showed signs of methamphetamine dependence. Other studies, however, have found no relationship between participation in SDU and poorer mental health (Demant & Oviedo-Trespalacios, 2019; Hammoud et al., 2017; Vaccher et al., 2020).

Bearing this in mind, broader measures of mental health outcomes that include and



control for the shared variance between different problems (e.g., depression and anxiety, substance abuse, or psychotic symptoms) may be required. It is also possible that the results of some of these studies may be confounded, at least in part, by the participants' serological status. Serological status can play an important role in mental health symptoms. There is evidence to suggest that being HIV+ is associated with a greater probability of presenting negative mental health symptoms (Hoare et al., 2021), as being HIV+ is considered a stressful life experience that is in itself related to poorer mental health outcomes (Algarin et al., 2020). In this sense, the social stigma and discrimination that continue to be associated with being HIV+ could increase the probability of HIV+ MSM presenting with mental health symptoms (Li et al., 2020). The prevalence of chemsex is also higher among MSM diagnosed with HIV+ than among HIV-negative (Ruiz-Robledillo et al., 2021). However, most prior evidence has not controlled for the serological status of SDU participants. Controlling for serological status can help elucidate the extent to which mental health outcomes may be associated with sexualized drug use per se or, rather, with the social stigma of being HIV+.

Although most of the studies carried out to date have focused on general symptoms (e.g., depression), preliminary evidence suggests that SDU could also be associated with more specific conditions, such as behavioral addictions. Behavioral addictions are characterized by the inability to prevent or control a behavior that is repeated over time despite its harmful effects, often with the aim of generating a feeling or state of pleasure or managing feelings of physical or mental discomfort (Karim & Chaudhri,

2012). Behavioral addictions can be related to gambling, internet use, compulsive eating, compulsive spending, and video games, among others (Robbins & Clark, 2015). To the best of our knowledge, few studies have analyzed the relationship between behavioral addictions and SDU. Some preliminary empirical evidence suggests that SDU might be related to compulsive sexual behavior (Blomquist et al., 2020; Evers et al., 2020; Pakianathan et al., 2018), which has itself been found to co-occur with other behavioral addictions, such as internet addiction or compulsive spending (Pedrero-Pérez et al., 2007). Also, a relationship has been found between problematic substance use and other behavioral addictions, such as compulsive internet use (e.g., Gámez-Guadix et al., 2015). Thus, problematic SDU (as opposed to recreational SDU) could progress toward a constellation of maladaptive and addictive behaviors and a loss of control over daily activities (Platteau, 2020), such as compulsive Internet use or compulsive spending.

The Present Study

As noted above, most previous studies on the relationship between SDU and mental health have focused on the evaluation of a limited number of mental health symptoms. Therefore, the first objective of this study was to analyze the relationship between SDU among MSM and a wide range of mental health indicators. Therefore, the first research question in this study was: To what extent is SDU associated with the wide range of general mental health symptoms present among MSM? Given that the empirical evidence to date has been fragmentary (i.e., analyzing a limited number of symptoms without controlling for each symptom)



and that the findings have been mixed, we proceeded in an exploratory way. The empirical evidence regarding participation in SDU and behavioral addictions is also scant. Given that various studies have suggested that SDU could be associated with increased compulsive behavior, which, in turn, could be associated with other behavioral addictions, it seems important to examine this relationship to inform SDU participants about the risks associated with the practice of problematic SDU. Thus, the second objective and research question of this study was: To what extent is SDU associated with various behavioral addictions (e.g., internet addiction, sex addiction, or compulsive spending)? Due to the inconsistency of previous research, we proceeded in an exploratory manner to answer this question.

METHODS

Participants

A total of 493 participants between 18 and 78 years of age ($M_{age} = 32.58$, $SD = 11.05$) were assessed using a convenience sampling method. Among them, the majority ($n = 415$, 84.2%) self-identified as gay, while others identified as bisexual ($n = 61$, 12.4%), pansexual ($n = 13$, 2.6%), or other sexual orientation ($n = 4$, 1%). Most of the participants ($n = 405$, 83%) were born in Spain. Regarding education level, 55.8% had completed university studies, 21.3% had completed secondary studies, 17.2% had completed technical studies, 5.1% had completed primary education, and 0.4% had not completed formal studies. Approximately 1 out of 5 ($n = 106$, 21.8%) participants had been diagnosed with HIV. Although the ma-

jority were HIV-negative ($n = 324$, 66.7%), approximately 1 out of 10 participants had never been tested for HIV ($n = 56$, 11.5%).

Measurements

Sociodemographic Questionnaire

The participants were asked to indicate their gender identity, age, education level, monthly income, country of birth, place of residence, and HIV status (positive, negative, never tested for HIV).

Sexualized Drug Use

We asked participants if, during the last 18 months, they had used any of the following substances before or during sexual intercourse to facilitate, intensify, or prolong sexual activity: alcohol, cannabis, cocaine, poppers, ecstasy, erectile dysfunction medication, MDMA, GHB/GBL, methamphetamine, mephedrone, heroine, benzodiazepines, or other substances (yes/no item). As suggested by various studies (Bourne et al., 2014; Evers et al., 2020b; Torres et al., 2020), we used this definition to study both chemsex substances and a broader set of drugs. Also, to explore the participants' perceptions of how SDU compares to sex without substances, we included the following open question: "What differences do you perceive between practicing sex without drugs and sex with drugs?"

Clinical Symptoms

Clinical symptoms were assessed using the Millon Clinical Multiaxial Inventory III (MCMI-III; Millon, 1997). Specifically,



the clinical subscales of anxiety, somatic symptoms, bipolar disorder, persistent depression, alcohol dependence, drug dependence, post-traumatic stress, thought disorder, major depression, and delusional disorder were included. Each subscale contained 12–17 true/false items, in response to which participants indicated whether they agreed with each sentence (i.e., “Much of the time I feel weak and tired”). The MCMI-III has been shown to have good psychometric properties among the Spanish population (Cardenal et al., 2007). In this sample, the MCMI-III showed adequate internal consistency, with an alpha ranging from 0.68 for the alcohol subscale to 0.89 for the persistent depression subscale.

Behavioral Addictions

To examine behavioral addictions, we used the six behavioral addiction scales included in the MULTICAGE-CAD-4 questionnaire (Pedrero-Pérez et al., 2007). These scales include pathological gambling, compulsive eating, internet addiction, video game addiction, compulsive spending, and compulsive sexual behavior. Each subscale is comprised of four dichotomous items (24 yes/no items), in response to which participants indicated whether they agreed with certain questions about addictive behaviors (i.e., “Is it hard for you to remain away from the internet for several days in a row?”). The MULTICAGE-CAD-4 has demonstrated good psychometric properties among Spanish samples (Pedrero-Pérez et al., 2007). In this sample, internal consistency was appropriate, with an alpha ranging from 0.67 for the compulsive sexual subscale to 0.80 for the video game subscale.

Data Analyses

We analyzed the data using IBM SPSSTM Statistics 26. First, we identified the participants who had practiced SDU in the past 18 months. The SDU and non-SDU groups were then compared in terms of their demographic variables (age, educational level, income, and immigration status) and serological status (HIV+ or HIV-) using the chi-square test (χ^2). Likewise, we calculated the Spearman correlation (Spearman r_s) as a measure of the effect size of the relationship between the variables, with .10, .30, and .50 indicating small, medium, and large effect sizes, respectively. Next, we used multivariate analysis of variance (MANOVA) to examine group differences in our mental health variables (anxiety, somatic symptoms, bipolar symptoms, persistent depression, alcohol use, drug use, post-traumatic stress, thought disorder, major depression, and delusional symptoms) and addictive behaviors (gambling, eating, internet, video game usage, spending, and sexual behavior). The MANOVA allowed us to simultaneously include several dependent variables and to consider the relationship between these variables (Field, 2013). Listwise deletion was used to deal with missing values. Differences in effect sizes between variables were also computed ($\eta_p^2 = 0.01$ represented a small effect; $\eta_p^2 = 0.06$ represented a medium effect; $\eta_p^2 = 0.14$ represented a large effect). Control variables (e.g., HIV status) were included in the models as covariates.

Procedure

HIV+ and HIV- MSM aged 18 years or older were invited to participate through social networks, gay dating apps, and information distributed through various LGBTIQ+ asso-



ciations and NGOs. The inclusion criteria for participation in the present study required respondents to self-report as follows: (1) at least 18 years old; (2) gay, bisexual, transgender men, or other MSM; and (3) resided in Spanish territory for most of the last 24 months. While transgender men were invited to participate, none of the respondents self-identified as a transgender man. Data were collected anonymously from February to June 2021 using an online, self-administered, cross-sectional survey. After providing all the information about the study, we requested the participants' explicit and voluntary informed consent to take part in the research. No compensation was provided for participating in the study. The participants were informed that their participation was completely voluntary. They were also told that they could choose not to answer the questions and that their participation in the study could be discontinued at any time and for any reason without consequences. The researchers' email addresses were given in case the participants had any additional questions. An additional online interview with the researchers was offered to the participants upon their completion of the questionnaire. The survey took approximately 35–45 minutes to complete. This study followed the ethical standards and norms of the Declaration of Helsinki. The study was approved by the Research Ethics Committee of [masked for peer review].

RESULTS

Descriptive analyses

The relationship between SDU and demographic variables and serological status

are presented in Table 1. We also explored participants' perceptions of how SDU compares to drug-free sex at a descriptive level. Of the participants who reported that they had practiced SDU, 211 provided comments about the differences they perceived between sex without drugs and sex with drugs (see Table 2). Responses to the open question were reviewed by the authors to identify recurring patterns. Most of the answers centered around recurring themes, with the most repeated themes being higher intensity of sexual experiences ($n = 65$), disinhibition ($n = 44$), longer duration of sexual experiences ($n = 34$), increased pleasure ($n = 27$), and increased sexual desire and excitement ($n = 24$).

SDU and Clinical Symptoms

Next, the relationship between SDU and clinical symptoms was analyzed. The results of this analysis are shown in Table 3. The variables that were significantly associated with SDU (age, income level, immigrant status, and HIV status) were included in the models as control variables. Overall, using Pillai's trace, SDU was found to have a significant effect on the number of clinical symptoms ($V = 0.098$, $F [10, 433] = 4.11$, $p < .001$, $\eta_p^2 = .098$). The participants who had engaged in SDU were found to have a significantly higher score on the drug use, alcohol use, and delusional symptoms scales than the non-SDU participants. The effect sizes representing the difference between SDU and non-SDU participants were large for drug use and medium to large for alcohol use and delusional symptoms. The remaining differences between the SDU and non-SDU groups for clinical symptoms were not statistically significant ($p > .05$).

**Table 1.** Demographic variables and serological status based on the sexualized use of drugs

	SDU	Non SDU	F	p	Effect size (Spearman r_s)
Age			87,81	< .001	.415
18–25	16,0%	44,1%			
26–35	26,7%	34,6%			
36–45	26,7%	16,3%			
> 46	30,5%	4,9%			
Education level			8.57	.127	.025
No studies	1,1%	0,0%			
Primary studies	5,3%	4,9%			
Secondary studies	17,1%	23,9%			
Technical studies	19,8%	15,7%			
University studies	56,1%	55,6%			
Monthly income (€)			15.8	.003	.148
Less than 1,000	33,7%	46,0%			
1,000–1,500	17,1%	23,0%			
1,500–2,000	26,3%	15,3%			
2,000–4,000	18,3%	11,1%			
More than 4,000	4,6%	4,6%			
Immigrant status			13.03	< .001	.163
No	75,1%	87,8%			
Yes	24,9%	12,2%			
HIV status			90,60	< .001	.428
Positive	42,7%	9,0%			
Negative	55,7%	73,4%			
I never got tested for HIV	1,6%	17,6%			

Note: Bold values = Frequency higher than expected with standardized residuals > 1.96.

**Table 2.** Perceived differences between SDU and sex without drugs

	Number of Participants	Examples
Increased intensity	65	"More intense orgasms." "All the positive feelings are intensified." "Sex with drugs is more fun, in addition to the peaks of intensity."
Disinhibition	44	"If it's with a stranger, it's easier; you feel more uninhibited." "Sex with drugs is much more uninhibited, more animalistic." "With drugs and alcohol, it is more uninhibited and dirtier."
Longer duration during the sexual encounter	34	"You can go longer without ejaculating." "More endurance." "The duration of the sexual encounter is much longer."
Pleasure enhanced	27	"Sex with drugs is much more pleasant." "You enhance pleasure." "It's easier to feel pleasure."
Desire, excitement, and feeling turned on	24	"Super excited." "In my case, sexual desire occurs when I use drugs." "I get more turned on."
Others	39	"Being bottom, the sensitivity of my rectum goes to the limit." "Doing everything you can think of and being willing to do anything." "I didn't notice a big difference." "I am more social."

SDU and Behavioral Addictions

Finally, we analyzed the relationships between SDU and various behavioral addictions. The results of this analysis are shown in Table 4. Again, age, income level, immigrant status, and HIV status were included in the models as control variables. Using Pillai's trace, SDU was not found to have a significant effect on the number of addictive behaviors ($V = 0.24$, $F[6, 444] = 1.84$, $p = .09$, $\eta_p^2 = .024$). However, separate univariate ANOVAs on the outcome variables showed statistically significant differences between the SDU and non-SDU groups for compulsive sexual behavior and compulsive spending. The effect size was large for compulsive sexual behavior ($\eta_p^2 = .17$) and medium to large for compulsive spending ($\eta_p^2 = .10$).

The remaining differences in behavioral addictions between the groups were not significant ($p > .05$).

DISCUSSION

The aim of this study was to analyze a wide range of mental health outcomes and behavioral addictions among MSM who practice SDU. While previous studies have analyzed types of SDU practices and STIs (Guerras et al., 2021; Ruiz-Robledillo et al., 2021), our study is the first to analyze a broad set of mental health outcomes among MSM involved in SDU. The results of this study suggest the presence of a specific psychopathological pattern related to problematic drug and alcohol use and compulsive



Table 3. Differences in mental health symptoms among SDU and non-SDU participants

	Non-SDU	SDU	F	p	η_p^2
Anxiety	1,31 (0,24)	1,26 (0,25)	.036	.849	.000
Somatic Symptom	1,23 (0,22)	1,22 (0,24)	.137	.711	.000
Bipolar Disorder	1,33 (0,23)	1,33 (0,27)	3.377	.067	.009
Persistent Depression	1,29 (0,27)	1,25 (0,28)	.048	.827	.000
Alcohol Abuse	1,22 (0,16)	1,24 (0,17)	4.774	.029	.012
Drug Abuse	1,18 (0,16)	1,28 (0,23)	23.234	.000	.057
Post-Traumatic Stress	1,27 (0,25)	1,23 (0,25)	.002	.967	.000
Thought Disorder	1,28 (0,26)	1,24 (0,26)	.943	.332	.002
Major Depression	1,22 (0,22)	1,22 (0,23)	1.132	.288	.003
Delusional symptoms	1,15 (0,16)	1,17 (0,19)	4.582	.033	.012

Note. Age, income, immigrant status, and HIV status were included in the model as covariates.

Table 4. Differences in behavioral addictions among SDU and non-SDU participants

	Non-SDU	SDU	F	p	η_p^2
Pathological gambling	1,01 (0,08)	1,03 (0,14)	1.348	.246	.003
Compulsive eating	1,23 (0,30)	1,20 (0,29)	.926	.336	.002
Compulsive Internet use	1,53 (0,34)	1,48 (0,35)	.927	.336	.002
Video game addiction	1,13 (0,27)	1,08 (0,20)	.001	.973	.000
Compulsive spending	1,19 (0,29)	1,26 (0,33)	4.438	.036	.010
Compulsive sexual behavior	1,15 (0,29)	1,19 (0,27)	7.907	.005	.017

Note. Age, income, immigrant status, and HIV status were included as in the model covariates..

sex among SDU users when compared to non-SDU users, even after controlling for a number of demographic variables, including participants' serological status. Delusional symptoms and compulsive spending were related to SDU to a lesser degree. It should be emphasized that these mental health symptoms could be both a consequence of problematic SDU and a risk factor that leads to such SDU.

We found that those who were involved in SDU presented with more substance-related symptoms, including the abuse of alcohol and other drugs. These findings are consistent with the results of previous studies (Sewell et al., 2017). Substance abuse symptoms can include craving symptoms, difficulty with controlling substance use, and family, social, or work-related problems resulting from substance use (Lucet & Olié, 2020). Interventions (e.g., those based on



harm reduction) should assess and inform individuals about the drug-related disorders that may be associated with problematic SDU. This could help prevent the psychological, social, and physical consequences that can arise from SDU.

Moreover, those who had practiced SDU presented significantly more delusional symptoms. Delusional symptoms usually involve an exaggerated or erroneous interpretation of perceptions or experiences (Greenblatt & Davis, 2013). Consistent with these results, some of the substances commonly involved in SDU (e.g., mephedrone, MDMA, and GHB) have been related to psychotic symptoms (Donnadieu-Rigole et al., 2020). Furthermore, although the research to date has been scant, some previous studies have reported a link between SDU and psychotic symptoms (Batisse et al., 2018; Dolengevich-Segal et al., 2019). However, it is possible that these delusional symptoms are temporary and due to the direct effects of substance use. Alternatively, people with delusional symptoms may turn to SDU as a way to escape their disturbing beliefs. Another possible explanation is that people who report psychotic symptoms may have executive deficits (i.e., inhibitory control, impulsivity, and reward seeking) that can increase their vulnerability to drug use (García-Laredo et al., 2021). Future longitudinal studies should investigate the temporal order of these variables.

Contrary to some prior research (i.e., Bohn et al., 2020; Brogan et al., 2019), SDU was not found to be related to other, more general mental health symptoms, such as anxiety, depression, or post-traumatic stress. One possible explanation for these results is that the present study controlled

for a broader range of potentially confounding variables, including participants' serological status. The results suggest that these more general symptoms (e.g., related to depression or anxiety) could be linked more to individual characteristics than to the practice of SDU itself.

Regarding behavioral addictions, the SDU participants were more likely to exhibit compulsive spending, which is characterized by difficulty controlling behaviors related to spending (Goslar et al., 2020). Furthermore, we found that the participants who practiced SDU had symptoms related to compulsive sexual behavior more frequently than the non-SDU group. These symptoms include difficulty controlling sexual behaviors with negative consequences (e.g., engaging in unprotected sex). Consistent with this finding, other studies have found that people who practice SDU have significantly more sexual partners (Blomquist et al., 2020; Evers et al., 2020; Pakianathan et al., 2018). Compulsive sexual behavior could be both a cause and consequence of SDU. On the one hand, SDU could be a reinforcing factor that increases the practice of compulsive sexual behavior with negative consequences. On the other hand, it is possible that people with compulsive sexual behavior engage in a greater variety of sexual practices, including SDU. Beyond one-way explanations, recursive and reciprocal influences between SDU and compulsive sexual behavior are also possible. Future longitudinal studies should explore this hypothesis.

This study has several limitations. The first concerns the use of self-report measures to assess participants. This could have increased the shared variance and associa-



tion between some of the variables in the study. Future studies should include additional assessment strategies, such as in-depth interviews and, when possible, participant medical records. Second, although the sample is large, it is not representative of the group of MSM who practice SDU. Future studies should attempt to replicate the present results with additional samples in other cultural and social contexts. Moreover, in this study, we analyzed the full set of SDU substances without differentiating between specific substances. This was done because the small proportion of the sample that had consumed each of the substances separately prevented us from analyzing the substances individually. Future studies with larger samples should include an analysis of the differing relationships between each substance and mental health outcomes. Third, the period prior to the evaluation coincided with some of the lockdowns and restrictions imposed due to COVID-19, which considerably restricted social contact. For this reason, we decided to use the previous 18 months as our focal period with the aim of more accurately identifying SDU. Longer periods, however, can be associated with recall bias, which can distort the accuracy of information over time. Finally, the results of this study are of a cross-sectional nature; therefore, temporal relationships between the variables cannot be established. As it has been previously pointed out, mental health symptoms could be both a cause and consequence of SDU. Future longitudinal studies should clarify the temporal order between these variables and explore the possible reciprocal relationships between mental health outcomes and SDU.

CONCLUSION

This is one of the first studies to analyze the relationship between SDU and a wide range of mental health symptoms and behavioral addictions. The results showed a specific pattern of mental health symptoms characterized by problematic substance use (alcohol and drugs) and compulsive sexual behavior. Furthermore, significant associations were found between SDU and both delusional symptoms and compulsive spending, albeit with smaller effect sizes. These findings indicate that, rather than presenting a generalized pattern of psychological dysfunction, MSM who practice SDU may present problems related to the very components of SDU (i.e., drugs and sex) or to closely related aspects of their experience (e.g., difficulty controlling spending or experiencing perceptual effects derived from substance use). Vulnerability factors for the problematic use of SDU could include so-called minority stressors, such as experiences of victimization or internalized homophobia (Gámez-Guadix & Íncera, 2021; Dolengevich-Segal et al., 2010).

Intervention efforts should pay particular attention to risk-reduction strategies relating to substance use in SDU sessions. An informed and empirically based approach can help public health decision making to minimize the risks and negative consequences of SDU. The detection of negative mental health symptoms and their appropriate treatment can also prevent the possible physical and mental consequences of SDU among MSM. Additionally, harm reduction-based approaches may be more effective in people who are unwilling to stop practicing SDU. Ultimately, there is a need to create



empirical, evidence-informed approaches aimed at preventing and treating potential risk factors and health-related problems related to SDU.

Funding

This research was funded by Ministerio de Sanidad, Consumo y Bienestar Social (Spanish Government) through the program “National Plan on Drugs”, grant number 2020I060.

Disclosure of Potential Conflicts of Interest

The authors report no conflicts of interest.

REFERENCES

- Algarin, A. B., Sheehan, D. M., Varas-Diaz, N., Fennie, K. P., Zhou, Z., Spencer, E. C., Cook, R. L., Morano, J. P., & Ibanez, G. E. (2020). Health Care-Specific Enacted HIV-Related Stigma's Association with Antiretroviral Therapy Adherence and Viral Suppression Among People Living with HIV in Florida. *AIDS Patient Care and STDs*, 34(7), 316–326. <https://doi.org/10.1089/apc.2020.0031>
- Batisse, A., Peyrière, H., Cazanave, C., & Donnadieu-Rigole, H. (2018). « Chem-Sex », consommation en contexte sexuel: Quelles substances ? Quelle prévention ? Données du réseau français d'addictovigilance. *Thérapies*, 73(6), 559. <https://doi.org/10.1016/j.therap.2018.09.068>
- Blomquist, P. B., Mohammed, H., Mikhail, A., Weatherburn, P., Reid, D., Wayal, S., Hughes, G., & Mercer, C. H. (2020). Characteristics and sexual health service use of MSM engaging in chemsex: Results from a large online survey in England. *Sexually Transmitted Infections*, 96(8), 590–595. <https://doi.org/10.1136/sextrans-2019-054345>
- Böthe, B., Potenza, M. N., Griffiths, M. D., Kraus, S. W., Klein, V., Fuss, J., & Demetrovics, Z. (2020). The development of the Compulsive Sexual Behavior Disorder Scale (CSBD-19): An ICD-11 based screening measure across three languages. *Journal of Behavioral Addictions*, 9(2), 247–258.
- Bohn, A., Sander, D., Köhler, T., Hees, N., Oswald, F., Scherbaum, N., Deimel, D., & Shecke, H. (2020). Chemsex and Mental Health of Men Who Have Sex With Men in Germany. *Frontiers in Psychiatry*, 11. <https://doi.org/10.3389/fpsy.2020.542301>
- Bourne, A., Reid, D., Hickson, F., Torres Rueda, S., & Weatherburn, P. (2014). *The Chemsex study: Drug use in sexual settings among gay and bisexual men in Lambeth, Southwark and Lewisham* [Monograph]. Sigma Research, London School of Hygiene & Tropical Medicine. <https://researchonline.lshtm.ac.uk/id/eprint/2197245/>
- Brogan, N., Paquette, D. M., Lachowsky, N. J., Blais, M., Brennan, D. J., Hart, T. A., & Adam, B. (2019). Canadian results from the European Men-who-have-sex-with-men Internet survey (EMIS-2017). *Canada Communicable Disease Report = Relevé Des Maladies Transmissibles Au Canada*, 45(11), 271–282. <https://doi.org/10.14745/ccdr.v45i11a01>



- Card, K. G., Armstrong, H. L., Wang, L., Bacani, N., Moore, D. M., Roth, E. A., Hogg, R. S., & Lachowsky, N. J. (2019). Escape expectancies and sexualized substance use among gay, bisexual, and other men who have sex with men. *AIDS Care*, 1–9. <https://doi.org/10.1080/09540121.2019.1705961>
- Cardenal, V., Sánchez, M. ^a P., & Ortiz-Tallo, M. (2007). Los trastornos de personalidad según el modelo de Millon: Una propuesta integradora. *Clínica y Salud*, 18(3), 305–324.
- Demant, D., & Oviedo-Trespalcacios, O. (2019). Harmless? A hierarchical analysis of poppers use correlates among young gay and bisexual men. *Drug and Alcohol Review*, 38(5), 465–472. <https://doi.org/10.1111/dar.12958>
- Dolengevich-Segal, H., Gonzalez-Baeza, A., Valencia, J., Valencia-Ortega, E., Cabello, A., Tellez-Molina, M. J., Perez-Elias, M. J., Serrano, R., Perez-Latorre, L., Martin-Carbonero, L., Arponen, S., Sanz-Moreno, J., Fuente, S. D. la, Bisbal, O., Santos, I., Casado, J. L., Troya, J., Cervero-Jimenez, M., Nistal, S., ... Study, on B. of the U.-S. G. 9416. (2019). Drug-related and psychopathological symptoms in HIV-positive men who have sex with men who inject drugs during sex (slamsex): Data from the U-SEX GESIDA 9416 Study. *PLOS ONE*, 14(12), e0220272. <https://doi.org/10.1371/journal.pone.0220272>
- Donnadieu-Rigole, H., Peyrière, H., Benyamina, A., & Karila, L. (2020). Complications Related to Sexualized Drug Use: What Can We Learn From Literature? *Frontiers in Neuroscience*, 14, 548704. <https://doi.org/10.3389/fnins.2020.548704>
- Edmundson, C., Heinsbroek, E., Glass, R., Hope, V., Mohammed, H., White, M., & Desai, M. (2018). Sexualised drug use in the United Kingdom (UK): A review of the literature. *The International Journal on Drug Policy*, 55, 131–148. <https://doi.org/10.1016/j.drugpo.2018.02.002>
- Evers, Y. J., Hoebe, C. J. P. A., Dukers-Muijers, N. H. T. M., Kampman, C. J. G., Kuizenga-Wessel, S., Shilue, D., Bakker, N. C. M., Schamp, S. M. a. A., Van Buel, H., Van Der Meijden, W. C. J. P. M., & Van Liere, G. a. F. S. (2020a). Sexual, addiction and mental health care needs among men who have sex with men practicing chemsex—A cross-sectional study in the Netherlands. *Preventive Medicine Reports*, 18, 101074. <https://doi.org/10.1016/j.pmedr.2020.101074>
- Evers, Y. J., Hoebe, C. J. P. A., Dukers-Muijers, N. H. T. M., Kampman, C. J. G., Kuizenga-Wessel, S., Shilue, D., Bakker, N. C. M., Schamp, S. M. A. A., Van Buel, H., Van Der Meijden, W. C. J. P. M., & Van Liere, G. A. F. S. (2020b). Sexual, addiction and mental health care needs among men who have sex with men practicing chemsex – a cross-sectional study in the Netherlands. *Preventive Medicine Reports*, 18, 101074. <https://doi.org/10.1016/j.pmedr.2020.101074>
- Gámez-Guadix, M., Calvete, E., Orue, I., & Las Hayas, C. (2015). Problematic Internet use and problematic alcohol use from the cognitive-behavioral model: A longitudinal study among adolescents. *Addictive behaviors*, 40, 109–114. <https://doi.org/10.1016/j.addbeh.2014.09.009>



- Gámez-Guadix, M., & Incera, D. (2021). Homophobia is online: Sexual victimization and risks on the internet and mental health among bisexual, homosexual, pansexual, asexual, and queer adolescents. *Computers in Human Behavior*, 119, 106728. <https://doi.org/10.1016/j.chb.2021.106728>
- García-Laredo, E., Castellanos, M. Á., Badaya, E., Paúl, N., Yubero, R., Maestú, F., Molina, J. D., & Chacón, J. (2021). Executive Functions Influence on Memory Process in Patients with Paranoid Schizophrenia and Bipolar Disorders with and without Psychotic Symptoms. A Pilot Study. *The Spanish Journal of Psychology*, 24, e40. <https://doi.org/10.1017/SJP.2021.38>
- Gavín, P., Arbelo, N., Monràs, M., Nuño, L., Bruguera, P., de la Mora, L., Martínez-Rebollar, M., Laguno, M., Blanch, J., & Miquel, L. (2021). [Methamphetamine use in chemsex and its consequences on mental health: A descriptive study.]. *Revista Española De Salud Pública*, 95, e202108108.
- Gertzen, M., Strasburger, M., Geiger, J., Rosenberger, C., Gernun, S., Schwarz, J., Rabenstein, A., & Rüther, T. (2021). [Chemsex: A new challenge in addiction medicine and infectious diseases]. *Der Nervenarzt*. <https://doi.org/10.1007/s00115-021-01116-x>
- Giorgetti, R., Tagliabracchi, A., Schifano, F., Zaami, S., Marinelli, E., & Busardò, F. P. (2017). When “Chems” Meet Sex: A Rising Phenomenon Called “ChemSex”. *Current Neuropharmacology*, 15(5), 762–770. <https://doi.org/10.2174/1570159X15666161117151148>
- Goslar, M., Leibetseder, M., Muench, H. M., Hofmann, S. G., & Laireiter, A.-R. (2020). Treatments for internet addiction, sex addiction and compulsive buying: A meta-analysis. *Journal of Behavioral Addictions*, 9(1), 14–43. <https://doi.org/10.1556/2006.2020.00005>
- Greenblatt, & Davis. (2013). *The Millon Clinical Multiaxial Inventory: A Clinical Research Information Synthesis*. Routledge.
- Guerras, J.-M., Hoyos Miller, J., Agustí, C., Chanos, S., Pichon, F., Kuske, M., Cigan, B., Fuertes, R., Stefanescu, R., Ooms, L., Casabona, J., de la Fuente, L., Belza, M.-J., & Euro HIV EDAT Working Group. (2021). Association of Sexualized Drug Use Patterns with HIV/STI Transmission Risk in an Internet Sample of Men Who Have Sex with Men from Seven European Countries. *Archives of Sexual Behavior*, 50(2), 461–477. <https://doi.org/10.1007/s10508-020-01801-z>
- Hammoud, M. A., Bourne, A., Maher, L., Jin, F., Haire, B., Lea, T., Degenhardt, L., Grierson, J., & Prestage, G. (2017). Intensive sex partying with gamma-hydroxybutyrate: Factors associated with using gamma-hydroxybutyrate for chemsex among Australian gay and bisexual men – results from the Flux Study. *Sexual Health*, 15(2), 123–134. <https://doi.org/10.1071/SH17146>
- Hoare, J., Sevenoaks, T., Mtukushe, B., Williams, T., Heany, S., & Phillips, N. (2021). Global Systematic Review of Common Mental Health Disorders in Adults Living with HIV. *Current HIV/AIDS Reports*. <https://doi.org/10.1007/s11904-021-00583-w>



- Íncera-Fernández, D., Gámez-Guadix, M., & Moreno-Guillén, S. (2021). Mental Health Symptoms Associated with Sexualized Drug Use (Chemsex) among Men Who Have Sex with Men: A Systematic Review. *International Journal of Environmental Research and Public Health*, 18(24), 13299. <https://doi.org/10.3390/ijerph182413299>
- Íncera-Fernández, D., Román, F. J., Moreno-Guillén, S., & Gámez-Guadix, M. (2023a). Understanding Sexualized Drug Use: Substances, Reasons, Consequences, and Self-Perceptions among Men Who Have Sex with Other Men in Spain. *International Journal of Environmental Research and Public Health*, 20(3), 2751. <http://dx.doi.org/10.3390/ijerph20032751>
- Íncera-Fernández, D., Román-González, F. J., Moreno-Guillén, S., & Gámez-Guadix, M. (2023b). Sexualized drug use, risky sexual behaviors, and prevention strategies among gay, bisexual, and other men who have sex with men. *Drugs: Education, Prevention and Policy*, 1-13. <https://doi.org/10.1080/09687637.2023.2225245>
- Karim, R., & Chaudhri, P. (2012). Behavioral Addictions: An Overview. *Journal of Psychoactive Drugs*, 44(1), 5-17. <https://doi.org/10.1080/02791072.2012.662859>
- Lafortune, D., Blais, M., Miller, G., Dion, L., Lalonde, F., & Dargis, L. (2021). Psychological and Interpersonal Factors Associated with Sexualized Drug Use Among Men Who Have Sex with Men: A Mixed-Methods Systematic Review. *Archives of Sexual Behavior*, 50(2), 427-460. <https://doi.org/10.1007/s10508-020-01741-8>
- Li, C.-W., Ku, S. W.-W., Huang, P., Chen, L.-Y., Wei, H.-T., Strong, C., & Bourne, A. (2021). Factors associated with methamphetamine dependency among men who have sex with men engaging in chemsex: Findings from the COMET study in Taiwan. *International Journal of Drug Policy*, 103119. <https://doi.org/10.1016/j.drugpo.2021.103119>
- Li, L., Lin, C., Feng, N., Nguyen, D. B., Cao, W., Le, A. T., & Nguyen, A. T. (2020). Stigma Related to HIV and Drug Use: Layers, Types, and Relations to Mental Health. *AIDS and Behavior*, 24(8), 2347-2354. <https://doi.org/10.1007/s10461-020-02794-5>
- Lucet, C., & Olié, J. P. (2020). Addictive behaviors: Clinical facts. *Bulletin De l'Academie Nationale De Medecine*. <https://doi.org/10.1016/j.banm.2020.04.005>
- Melendez-Torres, G. J., & Bourne, A. (2016). Illicit drug use and its association with sexual risk behaviour among MSM: More questions than answers? *Current Opinion in Infectious Diseases*, 29(1), 58-63. <https://doi.org/10.1097/QCO.0000000000000234>
- Millon, T. (1997). Millon Clinical Multiaxial Inventory-III [Manual Second Edition]. Bloomington, MN: Pearson Assessments.
- Miltz, A. R., Rodger, A. J., Sewell, J., Gilson, R., Allan, S., Scott, C., Sadiq, T., Farazmand, P., McDonnell, J., Speakman, A., Sherr, L., Phillips, A. N., Johnson, A. M., Collins, S., & Lampe, F. C. (2021). Recre-



- ational drug use and use of drugs associated with chemsex among HIV-negative and HIV-positive heterosexual men and women attending sexual health and HIV clinics in England. *International Journal of Drug Policy*, 91, 103101. <https://doi.org/10.1016/j.drugpo.2020.103101>
- Nimbi, F. M., Rosati, F., Esposito, R. M., Stuart, D., Simonelli, C., & Tambelli, R. (2020). Chemsex in Italy: experiences of men who have sex with men consuming illicit drugs to enhance and prolong their sexual activity. *The Journal of Sexual Medicine*, 17(10), 1875-1884. <https://doi.org/10.1016/j.jsxm.2020.07.001>
- Nöstlinger, C., Reyniers, T., Smekens, T., Apers, H., Laga, M., Wouters, K., & Vuylsteke, B. (2020). Drug use, depression and sexual risk behaviour: A syndemic among early pre-exposure prophylaxis (PrEP) adopters in Belgium? *AIDS Care*, 32(sup2), 57-64. <https://doi.org/10.1080/09540121.2020.1739218>
- Pakianathan, M., Whittaker, W., Lee, M. J., Avery, J., Green, S., Nathan, B., & Hegazi, A. (2018). Chemsex and new HIV diagnosis in gay, bisexual and other men who have sex with men attending sexual health clinics. *HIV Medicine*. <https://doi.org/10.1111/hiv.12629>
- Palamar, J. J., Griffin-Tomas, M., Acosta, P., Ompad, D. C., & Cleland, C. M. (2018). A comparison of self-reported sexual effects of alcohol, marijuana, and ecstasy in a sample of young adult nightlife attendees. *Psychology and Sexuality*, 9(1), 54-68. Scopus. <https://doi.org/10.1080/19419899.2018.1425220>
- Platteau, T., Pebody, R., Dunbar, N., Leb-
acq, T., & Collins, B. (2019). The prob-
lematic chemsex journey: a resource
for prevention and harm reduction.
Drugs and Alcohol Today. <https://doi.org/10.1108/DAT-11-2018-0066>
- Pedrero Pérez, E. J., Rodríguez Monje, M. T., Gallardo Alonso, F., Fernández Girón, M., Pérez López, M., & Chicharro Romero, J. (2007). Validación de un instrumento para la detección de trastornos de control de impulsos y adicciones: El MULTICAGE CAD-4. *Trastornos Adictivos*, 9(4), 269-279.
- Robbins, T. W., & Clark, L. (2015). Be-
havioral addictions. *Current Opinion in
Neurobiology*, 30, 66-72. <https://doi.org/10.1016/j.conb.2014.09.005>
- Ruiz-Robledillo, N., Ferrer-Cascales, R., Portilla-Tamarit, I., Alcocer-Bruno, C., Clement-Carbonell, V., & Portilla, J. (2021). Chemsex Practices and Health-Related Quality of Life in Spanish Men with HIV Who Have Sex with Men. *Journal of Clinical Medicine*, 10(8). <https://doi.org/10.3390/jcm10081662>
- Schecke, H., Lea, T., Bohn, A., Köhler, T., Sander, D., Scherbaum, N., & Deimel, D. (2019). Crystal Methamphetamine Use in Sexual Settings Among German Men Who Have Sex With Men. *Frontiers in Psychiatry*, 10, 886. <https://doi.org/10.3389/fpsy.2019.00886>
- Sewell, J., Miltz, A., Lampe, F. C., Cambiano, V., Speakman, A., Phillips, A. N., Stuart, D., Gilson, R., Asboe, D., Nwokolo, N., Clarke, A., Collins, S., Hart, G., Elford, J., & Rodger, A. J. (2017). Poly drug use, chemsex drug use, and associations with



- sexual risk behaviour in HIV-negative men who have sex with men attending sexual health clinics. *International Journal of Drug Policy*, 43, 33–43. <https://doi.org/10.1016/j.drugpo.2017.01.001>
- Soriano Ocón, R. (2022). El fenómeno del chemsex: claves para mejorar la respuesta institucional. *Revista Española de Drogodependencias*, 47(3), 5–13.
- Tomkins, A., George, R., & Kliner, M. (2019). Sexualised drug taking among men who have sex with men: A systematic review. *Perspectives in Public Health*, 139(1), 23–33. <https://doi.org/10.1177/1757913918778872>
- Torres, T. S., Bastos, L. S., Kamel, L., Bezer-ra, D. R. B., Fernandes, N. M., Moreira, R. I., Garner, A., Veloso, V. G., Grinsztejn, B., & De Boni, R. B. (2020). Do men who have sex with men who report alcohol and illicit drug use before/during sex (chemsex) present moderate/high risk for substance use disorders? *Drug and Alcohol Dependence*, 209, 107908. <https://doi.org/10.1016/j.drugalcdep.2020.107908>
- Vaccher, S. J., Hammoud, M. A., Bourne, A., Lea, T., Haire, B. G., Holt, M., Saxton, P., Mackie, B., Badge, J., Jin, F., Maher, L., & Prestage, G. (2020). Prevalence, frequency, and motivations for alkyl nitrite use among gay, bisexual and other men who have sex with men in Australia. *International Journal of Drug Policy*, 76, 102659. <https://doi.org/10.1016/j.drugpo.2019.102659>