# The prospective relations of substance use frequency to social distancing behaviors and intentions during the COVID-19 pandemic: the role of social distancing self-efficacy

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## Abstract
To identify factors that increase risk for nonadherence to recommended health protective behaviors during pandemics, this study examined the prospective relations of substance use frequency to both adherence to social distancing recommendations and social distancing intentions during the COVID-19 pandemic, as well as the role of social distancing self-efficacy in these relations. A U.S. community sample of 377 adults completed a prospective online study, including an initial assessment between March 27 and April 5, 2020, and a follow-up assessment one-month later. Results revealed a significant direct relation of baseline substance use frequency to lower adherence to social distancing recommendations one-month later. Results also revealed significant indirect relations of greater substance use frequency to lower levels of both social distancing behaviors and intentions one-month later through lower social distancing self-efficacy. Results highlight the relevance of substance use and social distancing self-efficacy to lower adherence to social distancing during the COVID-19 pandemic.

**Keywords** Substance use · Social distancing · COVID-19 · Pandemic · Self-efficacy · Health behaviors

## Introduction

To cope with the ongoing threat of infectious disease, it is common for governments to implement public health guidelines aimed at preventing or limiting community spread of a pathogen, many of which focus on health protective behaviors (e.g., social distancing, wearing masks). Although adherence to such guidelines is expected to have both societal and individual benefits, evidence suggests that sizable subsets of the population fail to adhere to recommended health protective behaviors during pandemics (often with deleterious consequences; Breitnauer 2020; Taylor & Asmundson, 2021). Thus, it is imperative to identify factors that relate to lower adherence to recommended health protective behaviors in the context of pandemics.

The COVID-19 pandemic provides an ideal context for exploring this question. Specifically, the unprecedented worldwide spread and impact of COVID-19 prompted the implementation of extraordinary social distancing interventions and highlighted the public health importance of widespread adherence to these guidelines. Yet, given that individuals vary considerably in their adherence to social distancing recommendations (Coroiu et al., 2020), making the identification of factors that may increase risk for nonadherence to these recommendations of utmost importance.

One factor that warrants attention in this regard is substance use. Consistent with evidence that substance use increases during periods of disease outbreaks (e.g., Lee et al., 2018), increases in substance use were observed during the early stages of the COVID-19 pandemic (Grossman et al., 2020; Taylor et al., 2021). In addition to the health risks associated with substance use in general, obtaining and using drugs in the context of a pandemic may confer unique risks for contracting and transmitting the virus by interfering with social distancing. For example, some substances can only be obtained through face-to-face interactions, necessitating social contact. Moreover, to the extent

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that substance use is motivated by desires to increase social affiliation (Votaw & Witkiewitz, 2021), individuals may be more willing to violate social distancing recommendations to meet these needs. Substance use may also reduce risk perceptions of disease (Maisto et al., 2002), thereby reducing motivation to adhere to social distancing recommendations. Finally, many substances (e.g., alcohol) have a disinhibiting effect that may interfere with decision making and increase the likelihood of noncompliance with social distancing and other health protective behaviors (Zvolensky et al., 2020).

Notably, one factor that may account for reduced adherence to social distancing recommendations among individuals using substances during this pandemic is low self-efficacy for adhering to these recommendations. Defined as beliefs in one's own ability to engage in a particular behavior, self-efficacy is theorized to play a key role in the initiation of and engagement in subsequent behaviors (Bandura, 1977) and has been identified as a primary factor influencing engagement in protective health behaviors within prominent models of health behavior (Janz & Becker, 1984; Rogers, 1975). Thus, consistent with these theories, perceptions of one's ability to adhere to social distancing recommendations would be expected to influence both actual and intended engagement in these behaviors.

With regard to the relation of substance use to self-efficacy for adhering to social distancing recommendations, studies have consistently shown that greater substance use frequency is associated with lower self-efficacy in general and for specific health protective behaviors (Kadden & Litt, 2011; Oei et al., 2007). Substance use would also be expected to decrease self-efficacy for adhering to social distancing recommendations in particular. Specifically, the need for face-to-face interactions to obtain certain substances, as well as heightened urges to use substances in social contexts (e.g., due to social affiliation motives), may decrease expectations that one is capable of adherence to social distancing. Likewise, repeated experiences with violating social distancing recommendations due to the disinhibiting effects of substances would also be expected to reduce self-efficacy for social distancing.

Thus, this study examined the explanatory role of social distancing self-efficacy in the relation of substance use frequency to adherence to social distancing recommendations and social distancing intentions during the early stages of the COVID-19 pandemic. To this end, we examined the prospective relations of substance use frequency at the initial assessment (which coincided with the onset of most stay-at-home orders in the U.S.) to both adherence to social distancing recommendations one-month later and intentions to adhere to these recommendations in the following two weeks, as well as the role of social distancing self-efficacy in these relations. We hypothesized that baseline substance use frequency would be negatively associated with social distancing self-efficacy, adherence to social distancing recommendations, and social distancing intentions one-month later. In addition, we hypothesized that social distancing self-efficacy would account for significant variance in the relations of baseline substance use frequency to both social distancing behaviors and intentions one-month later.

## Method

### Participants

Participants included a U.S. nationwide community sample of 377 adults who completed a prospective online study of health and coping in response to COVID-19 through an internet-based platform (Amazon's Mechanical Turk; MTurk). Participants completed an initial assessment from March 27, 2020 through April 5, 2020 (corresponding to the onset of stay-at-home orders in most states), and a follow-up assessment approximately one month later between April 27, 2020 and May 21, 2020 (when strict stay-at-home orders began to ease and were replaced with social distancing orders and recommendations). The study was posted to MTurk via CloudResearch. For the present study, inclusion criteria consisted of: (1) U.S. resident, (2) ≥ 95% approval rating as an MTurk worker, (3) completion of ≥ 5,000 previous MTurk tasks, and (4) valid responses on questionnaires (assessed via multiple attention check items).

Participants (52.3% female; 47.8% male) ranged in age from 20 to 74 years ($M = 41.29$, $SD = 12.01$) and represented 44 states in the U.S. Most participants identified as White (84.9%), followed by Black/African American (9.3%), Asian/Asian-American (4.3%), and Latinx (1.9%). At the time of the initial assessment, 10.9% of participants had graduated from high school or obtained a GED, 38.2% had completed some college or technical school, 41.4% had graduated from college, and 9.1% had advanced graduate/professional degrees. With regard to annual household income, 31.6% of participants reported an income of < \$35,000, 31.6% reported an income of \$35,000 to \$64,999, and 36.9% reported an income of > \$65,000.

### Measures

**Substance use frequency.** The Drug Use Questionnaire (Hien & First, 1991) was used to assess baseline substance use frequency at the initial assessment. Participants indicated the frequency with which they used 12 substances (i.e., marijuana, alcohol, heroin, PCP, ecstasy, cocaine/crack, stimulants, sedatives, hallucinogens, inhalants, [misused] prescription drugs, and crystal meth) during the past

month on a 5-point Likert-type scale (*0 = Never; 4 = 4 or more times per week*). The DUQ demonstrates good construct and convergent validity (Lejuez et al., 2007). Items were summed to create a total score of baseline substance use frequency ($\alpha = 0.76$).

**Social distancing self-efficacy.** Social distancing self-efficacy at one-month follow-up was assessed via a 3-item measure created for this study (derived from Brafford & Beck 1991). Participants were asked to rate three items assessing their perceived ability to follow U.S. social distancing recommendations on a 5-point Likert-type scale (*1 = Not able at all; 5 = Completely able*). Items were summed to create a total score of social distancing self-efficacy ($\alpha = 0.83$).

**Adherence to social distancing recommendations.** Adherence to social distancing recommendations at one-month follow-up was assessed using a 5-item self-report measure created for this study and derived from the theory of planned behavior (Ajzen, 1991). Participants were asked to report on engagement in recommended social distancing behaviors (e.g., avoiding large gatherings, staying 6 feet away from others) over the past two weeks on a 5-point Likert-type scale (*1 = Never; 5 = Always*). Items were summed to create an overall index of adherence to social distancing recommendations at follow-up ($\alpha = 0.88$).

**Intentions to adhere to social distancing recommendations in the future.** Intentions to adhere to social distancing recommendations in the two weeks after the one-month follow-up were assessed via a 5-item measure created for this study and derived from the theory of planned behavior (Ajzen, 1991). Participants were asked to report their intentions to engage in the aforementioned recommended social distancing behaviors over the next two weeks on a 5-point Likert-type scale (*1 = Intend to never do the behavior; 5 = Intend to always do the behavior*). Items were summed to create a total score representing social distancing intentions ($\alpha = 0.87$).

**Clinical covariates.** The Depression Anxiety Stress Scales-21 (DASS-21; Lovibond & Lovibond 1995) was used to assess symptoms of depression and anxiety at the initial assessment ($\alpha s \geq 0.89$ in this sample). Participants rate items on a 4-point Likert-type scale. The DASS-21 has adequate reliability and convergent and discriminant validity (Lovibond & Lovibond, 1995).

## Procedures

All procedures received approval from the university's Institutional Review Board. To ensure the study was not being completed by a bot, participants responded to a Completely Automatic Public Turing test to Tell Computers and Humans Apart prior to providing informed consent. Initial data were collected in blocks of nine participants at a time

and all data, including attention check items and geolocations, were examined by researchers before compensation was provided. Participants who failed one or more attention check items were removed from the study ($n = 53$ of 553 completers). Those whose data were considered valid (based on attention check items and geolocations; $N = 500$) were compensated $3.00.

One-month following completion of the initial assessment, participants were contacted via CloudResearch to complete the follow-up assessment. Of the 500 participants who completed the initial assessment, 77% ($n = 386$) completed the follow-up. Participants who failed two or more attention check items were removed from the study ($n = 3$); the rest were compensated $3.00. In addition, two participants were excluded for invalid data and four were excluded for extensive missing data on the measures of interest, resulting in a final sample size of 377.

## Results

### Preliminary analyses

Descriptive statistics for and correlations among all variables of interest are presented in Table 1. The most frequently reported substances at the initial assessment were alcohol (53.8%), followed by marijuana (18%), prescription sedatives (8.2%), and prescription opioids (7.7%), with 44% of participants reporting regular use of alcohol and 13.3% reporting regular use of marijuana. To identify covariates for primary analyses, we examined associations of relevant demographic and clinical characteristics to the outcome variables (Table 1). Given significant associations of age, sex, and depression and anxiety symptoms to adherence to social distancing recommendations at follow-up, these variables were included as covariates in this model.

Consistent with hypotheses, baseline substance use frequency was significantly negatively associated with social distancing self-efficacy and adherence to social distancing recommendations at the one-month follow-up; however, it was not significantly associated with intentions to adhere to social distancing recommendations at follow-up. Additionally, social distancing self-efficacy was significantly positively associated with both adherence to social distancing recommendations and intentions to adhere to social distancing recommendations.

### Primary analyses

Next, we examined the indirect relations of baseline substance use frequency to both adherence to social distancing recommendations and social distancing intentions at

**Table 1** *Correlations among and Descriptive Statistics for Primary Variables of Interest (N = 377)*

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. SU frequency | - | | | | | | | | | |
| 2. SD self-efficacy | $-0.22^{**}$ | - | | | | | | | | |
| 3. SD adherence | $-0.20^{**}$ | $0.61^{**}$ | - | | | | | | | |
| 4. SD intentions | $-0.03$ | $0.15^{**}$ | $0.14^{**}$ | - | | | | | | |
| 5. Age | $-0.10^{*}$ | $0.07$ | $0.18^{**}$ | $0.06$ | - | | | | | |
| 6. Sex | $-0.09$ | $0.10$ | $0.19^{**}$ | $-0.02$ | $0.17^{**}$ | - | | | | |
| 7. Race/ethnicity | $0.02$ | $0.01$ | $0.04$ | $0.01$ | $0.16^{**}$ | $-0.003$ | - | | | |
| 8. Income | $-0.01$ | $0.08$ | $0.08$ | $0.02$ | $0.04$ | $-0.07$ | $0.05$ | - | | |
| 9. Depression | $0.28^{**}$ | $-0.16^{**}$ | $-0.11^{*}$ | $-0.03$ | $-0.18^{**}$ | $-0.03$ | $-0.11^{*}$ | $-0.19^{**}$ | - | |
| 10. Anxiety | $0.25^{**}$ | $-0.17^{**}$ | $-0.24^{**}$ | $-0.02$ | $-0.21^{**}$ | $-0.02$ | $-0.10$ | $-0.06$ | $0.67^{**}$ | - |
| Mean | 2.65 | 13.23 | 22.80 | 19.36 | 41.29 | 0.52 | 0.85 | 4.50 | 7.90 | 4.77 |
| Standard deviation | 4.39 | 2.21 | 3.11 | 2.25 | 12.01 | 0.50 | 0.36 | 1.91 | 9.89 | 7.40 |

*Note.* SU Frequency = Baseline substance use frequency at the initial assessment; SD self-efficacy = social distancing self-efficacy; SD adherence = adherence to social distancing recommendations at one-month follow-up; SD intentions = intentions to adhere to social distancing recommendations in the two weeks after the one-month follow-up; Sex (0 = male assigned at birth; 1 = female assigned at birth); Race/ethnicity = racial/ethnic background (0 = racial/ethnic minority, 1 = non-minority); Income = annual household income (0 = < \$50,000/year; 1 = ≥ \$50,000/year); Depression = depression symptoms; Anxiety = anxiety symptoms.

$^{*}p < .05.$ $^{**}p < .01.$

one-month follow-up through social distancing self-efficacy using the PROCESS (version 3.0) macro for SPSS (Model 4; Hayes 2018). Indirect relations were evaluated using bias-corrected 95% confidence intervals based on 5,000 bootstrap samples. Providing partial support for study hypotheses, results revealed a significant direct relation between baseline substance use frequency and adherence to social distancing recommendations one month later (although not to social distancing intentions; see Table 2). Consistent with hypotheses, results revealed significant indirect relations of greater baseline substance use frequency to both lower adherence to social distancing recommendations and lower social distancing intentions at the one-month follow-up through lower social distancing self-efficacy (see Table 2).

## Discussion

To extend extant research on the factors associated with nonadherence to recommended health protective behaviors during pandemics, this study aimed to examine the prospective relations of substance use frequency to both adherence to social distancing recommendations and future social distancing intentions one-month later during the early stages of the COVID-19 pandemic in the U.S., as well as the explanatory role of social distancing self-efficacy in these relations. Consistent with study hypotheses, results revealed a significant direct relation of baseline substance use frequency to lower adherence to social distancing recommendations one-month later. This finding provides support for the premise that substance use may increase noncompliance with social distancing recommendations during the COVID-19 pandemic and is consistent with past research suggesting that frequent substance use is associated with poor adherence to protective behaviors in other contexts (Lasser et al., 2011; Liu et al., 2006). Notably, however, and contrary to predictions, substance use frequency did not have a significant direct relation to intentions to engage in social distancing behaviors in the weeks following the one-month follow-up. Thus, findings suggest that substance use may interfere with adherence to social distancing recommendations despite intentions to engage in such behaviors. This discrepant pattern of findings may capture the difficulties complying to social distancing recommendations posed by substance use, which may prompt engagement in risky behaviors that go against one's self-interest for the purpose of obtaining or using substances.

With regard to the theorized role of social distancing self-efficacy in the relations between substance use frequency and both adherence to social distancing and social distancing intentions, results provided support for study hypotheses, revealing significant indirect relations of greater substance

**Table 2** *Models Examining the Explanatory Role of Social Distancing Self-Efficacy in the Relations of Baseline Substance Use Frequency to Adherence to Social Distancing Recommendations and Social Distancing Intentions One-Month Later (N = 377)*

| Independent Variable | Explanatory Variable | Dependent Variable | Effect of IV on EV | | Effect of EV on DV | | Direct Effect | | Indirect Effect | | | Total Effect | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | a (p) | SE | b (p) | SE | c' (p) | SE | a x b | SE | 95% CI | c (p) | SE |
| SU frequency | SDSE | Adherence to social distancing | −0.171 (0.01) | 0.033 | 0.571 (0.001) | 0.072 | −0.044 (0.306) | 0.03 | −0.098 | 0.042 | −0.184, −0.019 | −0.142 (0.03) | 0.046 |
| | | Social distancing intentions | −0.22 (0.001) | 0.032 | 0.145 (0.04) | 0.071 | −0.0003 (0.997) | 0.034 | −0.031 | 0.018 | −0.071, −0.001 | −0.032 (0.589) | 0.03 |

*Note.* IV = Independent variable. EV = Explanatory variable. DV = Dependent variable. SU Frequency = Baseline substance use frequency at the initial assessment; SDSE = social distancing self-efficacy; Adherence to social distancing = adherence to social distancing recommendations at one-month follow-up; Social distancing intentions = intentions to adhere to social distancing recommendations in the two weeks after the one-month follow-up

use frequency to lower levels of both social distancing behaviors and intentions one-month later through lower social distancing self-efficacy. These findings are consistent with recent research highlighting the role of self-efficacy in both social distancing behaviors and intentions during the COVID-19 pandemic (Charles et al., 2020; Hamilton et al., 2020), and extend this research to a substance use context.

Several limitations of this study warrant consideration. First, the generalizability of our findings to more severe substance use or the use of illicit substances like heroin or cocaine remains unclear. Another limitation is the exclusive reliance on self-report questionnaire data, which may be influenced by social desirability biases or recall difficulties. Future research should incorporate other assessment methods (e.g., ecological momentary assessment, timeline follow-back procedures) to further clarify the nature of the relation of substance use and social distancing during this pandemic. Further, although our use of a prospective design facilitates examination of the associations of baseline substance use frequency to both adherence to social distancing recommendations and social distancing intentions one-month later, we were not able to examine the interrelations of substance use, social distancing self-efficacy, and social distancing behaviors and intentions over time. Likewise, we cannot speak to the temporal relations among these factors and whether social distancing self-efficacy predicts social distancing behaviors or intentions. Research incorporating the repeated assessment of these factors over more extended time periods is needed to clarify the precise interrelations among these factors over time, including their likely reciprocal influences. Future research should also examine adherence to other health protective behaviors, such as mask-wearing and vaccinations.

Beyond the risks associated with substance use in general, substance use in the context of a pandemic may be particularly risky insofar as it interferes with adherence to recommended health protective behaviors. Results of this study identify substance use as one factor that may negatively influence adherence to social distancing during the COVID-19 pandemic via lower social distancing self-efficacy. As the COVID-19 pandemic remains an ongoing public health crisis and evidence suggests the increased likelihood of future pandemics of this kind (Bernstein et al., 2022), identifying promising targets for interventions aimed at increasing engagement in health protective behaviors in the context of pandemics is critical. Results of this study highlight the potential utility of interventions targeting substance use and social distancing self-efficacy.

**Authors' contributions** All authors contributed to the study conception and design. Material preparation and data collection was performed by all authors. Data analysis was performed by Kayla Scamaldo, Kim Gratz, and Matthew Tull. The first draft of the manuscript was written by Kayla Scamaldo and Kim Gratz. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

**Data Availability** Data for this study is available upon reasonable request to Drs. Matthew T. Tull or Dr. Kim L. Gratz.

## Declarations

**Conflicts of interest/Competing interests** The authors have no competing interests to declare that are relevant to the content of this article.

**Ethics approval** All procedures performed in this study were in accordance with ethical standards of the institutional research committee and with the 19634 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the University of Toledo Institutional Review Board (300607-UT).

**Consent to participate** Informed consent was obtained from all individual participants included in this study.

**Consent for publication** Not applicable.

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