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Prospective Effects of Loneliness on Frequency of Alcohol and Marijuana Use

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Abstract

BACKGROUND: Loneliness is a widespread problem, with demonstrated negative health effects. However, prospective data on the relationship between loneliness and problem substance use are lacking, and few studies have examined specific commonplace substances, such as alcohol and cannabis. This study used prospective data from a community sample of US adults with problematic alcohol or cannabis use to examine whether loneliness was a predictor of subsequent increased substance use.

METHODS: Participants (N=210) were recruited between 05/2016–06/2019 from a New York City medical center. At baseline, 3-month, and 6-month follow-ups, participants completed identical computerized questionnaires. We used generalized estimating equations to assess the average effect of past 2-week loneliness on subsequent number of days of alcohol or cannabis use, controlling for baseline days of use, demographic characteristics, and past 2-week DSM-5 depression.

RESULTS: Compared with individuals who were never lonely, participants with moderate or severe loneliness had a significantly higher frequency of alcohol or cannabis use at the subsequent assessment (β=0.25 95% CI: 0.08-0.42).

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Contributors

All authors contributed to the design of the study. Sarah Gutkind conducted the statistical analysis, and Deborah Hasin provided supervision. All authors contributed to the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

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Sarah Gutkind: Conceptualization; Data curation; Formal analysis; Project administration; Roles/Writing - original draft; Writing - review & editing. **Lauren Gorfinkel:** Conceptualization; Data curation; Formal analysis; Roles/Writing - original draft; Writing - review & editing. **Deborah Hasin:** Funding acquisition; Resources; Software; Supervision; Conceptualization; Data curation; Formal analysis; Project administration; Roles/Writing - original draft; Writing - review & editing.

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CONCLUSION: Individuals experiencing loneliness at least a few times in the past 2 weeks reported more days of subsequent alcohol or cannabis use compared with individuals who were not lonely. This is cause for concern, as national surveys of US adults indicate increasing rates of loneliness, depression and substance use during the COVID-19 pandemic. These results suggest the need for health care providers to screen for feelings of loneliness and potentially harmful coping behaviors such as substance use, and to offer healthier alternative coping strategies.

Keywords

Loneliness; Alcohol; Marijuana

1. Introduction

Social connection and integration are critical to human well-being. When such connection is lacking, many people experience loneliness, an adverse emotional state resulting from a discrepancy between current and desired relationships.(Ingram et al., 2020a) Loneliness predicts poor physical and mental health outcomes, and is a risk factor for mortality that is comparable in strength to obesity and physical inactivity.(Hawkley & Cacioppo, 2010) Approximately three in five (61%) United States (US) adults reported experiencing loneliness in 2019, an increase from 54% in 2018.(Cigna, 2020) Loneliness and depression often co-occur and these constructs share several characteristics, such as feelings of unhappiness, or helplessness.(Cacioppo et al., 2006; Cacioppo et al., 2015; VanderWeele et al., 2011) However, they are conceptually and statistically distinct constructs, as shown in factor analytic studies. Loneliness is characterized by a deep sense of social isolation, (VanderWeele et al., 2011) while depression is the general experience of unhappiness and is also characterized by somatic symptoms.(Cacioppo et al., 2006; Cacioppo et al., 2015; VanderWeele et al., 2011) Recent increases in reported loneliness and research on its adverse consequences raise concerns around loneliness as an emerging public health problem.(Cacioppo & Cacioppo, 2018; Murthy, 2017)

Cross-sectional studies suggest that among people with substance use problems, loneliness is associated with drinking and marijuana use, (Ingram et al., 2020a) potentially providing temporary relief from loneliness and its mental health sequalae.(Ingram et al., 2020b) Among people who use substances, loneliness is associated with poor physical and mental health outcomes, including poorer self-rated physical health, lower quality of life, increased suicidality, and increased substance use severity.(Ingram et al., 2020a) These associations are concerning, as alcohol and marijuana are two of the most available and frequently used psychoactive substances in the US, and rates of substance use and loneliness in the US increased during the first wave of COVID-19.(Czeisler et al., 2020; Horigian et al., 2020; Killgore et al., 2020) Given the variation in public health measures taken to mitigate the spread of COVID-19, understanding the consequences of prolonged loneliness and isolation has become increasingly important, particularly among vulnerable populations such as those with problematic substance use. However, the few studies that prospectively examined the relationship between loneliness and subsequent drinking or marijuana use among on individuals with problematic substance use were small, older, and not US-based.(Ingram et al., 2020a) Therefore, among a community sample of US adults recruited 05/2016–06/2019

who had problematic substance use at baseline, we investigated whether loneliness was associated with increases in alcohol or marijuana use during the subsequent six months.

2. Methods

2.1 Study Design and Participants

Data for this study were collected as part of a larger study on the reliability and validity of DSM-5 measures of substance use disorders (SUDs), described further elsewhere.(Hasin et al., 2020) Participants in the original study were adults (≥ 18 years) with past 30-day substance use (cannabis, cocaine, or opioids) or binge drinking (defined as ≥5 drinks for men, and ≥4 drinks for women) (National Institute on Alcohol Abuse and Alcoholism, 2020) who endorsed at least one criterion for one or more DSM-5 SUDs as assessed with a highly reliable interview.(Hasin et al., 2020) Binge drinking was selected as the alcohol eligibility criterion because it can increase blood alcohol concentration to 0.08% or higher, (National Institute on Alcohol Abuse and Alcoholism, 2020) and has been shown to increase the risk for alcohol use disorder and other harms.(Dawson et al., 2005; Dawson et al., 2008) These study inclusion criteria were designed to enrich the sample for the prevalence of DSM-5 SUD without requiring that all participants meet full DSM-5 SUD criteria, providing an efficient way to study the reliability and validity of DSM-5 substance-specific SUDs while also providing variance across different substances. Participants were recruited at an urban medical center, and completed interviewer and self-administered questionnaires at baseline, 3 months and 6 months.(Hasin et al., 2020) Participants were asked to identify their primary substance of concern at enrollment. The analytic sample included all participants that reported alcohol or cannabis as their primary substance of concern (n=210), and did not report past-month opioid use. Procedures were approved by Institutional Review Board of the New York State Psychiatric Institute.

2.2 Exposure

The primary exposure in this report was past 2-week loneliness. Loneliness in the past 2 weeks was assessed in a computerized self-administered questionnaire with the question, “How often have you felt lonely and wished for more friends during the past 2 weeks?” Responses included “I have not felt lonely,” “I have felt lonely a few times,” “I felt lonely about half the time,” “I usually felt lonely,” and “I always felt lonely and wished for more friends.” Previous studies have used a similar direct single-item measure to assess loneliness. This measure of loneliness is positively correlated with other frequently used loneliness scales such as the Revised UCLA Scale (unweighted correlation range=0.589-0.777).(Newmyer et al., 2021) Responses were categorized into a dichotomous variable, never lonely vs. all other responses. Participants had up to two measures of loneliness (at baseline and at 3-months).

2.3 Outcome

The outcome was self-reported frequency (i.e., days) of use of the primary substance of concern in the prior 30 days at subsequent 3-month and 6-month visits. For individuals who indicated alcohol as their primary substance of concern, the outcome was the number of days of alcohol use in the prior 30 days, and for individuals who indicated marijuana as their

primary substance of concern the outcome was number of days of marijuana use in the prior 30 days.

2.4 Statistical analysis

To account for within-subject correlation of observations over time, we used generalized estimating equations with robust standard errors to estimate the parameter estimate (β) of the difference in mean days of alcohol or marijuana use associated with loneliness across the analytic sample. We adjusted models for the following covariates: primary substance (alcohol, marijuana), baseline days of its use in the prior 30 days, sex, age, race/ethnicity, marital status, and employment. An additional analysis adjusted for past 2-week DSM-5 major depressive disorder. Depression was assessed in the clinician-administered Psychiatric Research Interview for Substance and Mental Disorders, DSM-5 version (PRISM-5), as described in detail elsewhere.(Hasin et al., 2020) Depression was defined as a dichotomous variable, and was considered positive if participants met criteria for DSM-5 major depression, depression with anxiety, or depression with mixed features within the past 2 weeks.

3. Results

The majority of individuals in the analytic sample were male (72.86%), Non-Hispanic Black (55.24%), never married (63.81%), and unemployed (71%). The never lonely and loneliness subgroups differed significantly in mean age at baseline (45.99 and 40.49 years old, respectively), and in mean days of past-month use of primary substance of concern at baseline (18.13 days of alcohol use; 21.74 days of marijuana use; p=0.007) (Table 1). The never lonely and loneliness subgroups also differed significantly in race/ethnicity, marital status, primary substance of concern (marijuana more likely in the loneliness group), and depression. Among individuals reporting past 2-week loneliness, 62% reported loneliness a few times and approximately 38% reported loneliness at least half the time. These subgroups (defined by loneliness frequency) did not differ by sociodemographic characteristics (Supplemental table 1). However, those who reported more frequent loneliness had higher rates of past 2-week depression.

Compared with those who were never lonely, participants reporting loneliness in the prior 2 weeks at baseline had a higher mean days of alcohol or marijuana use (β=0.25 95% CI: 0.08- 0.42) after adjusting for gender, age, race/ethnicity, marital status, employment status, primary substance, and baseline days of primary substance use (Table 2). An additional analysis adjusting for past 2-week DSM-5 depression showed that compared with those who were never lonely, participants reporting loneliness in the prior 2 weeks at baseline reported 0.25 days more of substance use on average compared with people who did not experience loneliness (β =0.25 95% CI: 0.07- 0.42).

4. Discussion

This is one of the first prospective studies of the relationship between loneliness and subsequent alcohol or marijuana use. In a community sample of individuals acknowledging problems with either alcohol or marijuana, those who felt lonely in the prior 2 weeks

reported significantly more days of alcohol or marijuana use compared with those who were not lonely. When we additionally adjusted for depression to explore whether it mediated or confounded the relationship between loneliness and substance use, loneliness remained a significant predictor of increased substance use. These findings suggest that the effect of loneliness on substance use may be independent of depression. Individuals with problematic substance use who experience loneliness may be vulnerable to further elevated rates of substance use.

These findings are consistent with previous studies of loneliness and alcohol use,(Ingram et al., 2020a) in addition to a recent cross-sectional study reporting a dose-response relationship between frequency of marijuana use and loneliness.(Rhew et al., 2021) Collectively, these results are concerning, as COVID-19 related stay-at-home orders and social isolation measures have been associated with increased rates of loneliness, psychological distress, and substance use in the general population.(Pollard et al., 2020; Stanton et al., 2020) Although these data were collected prior to the COVID-19 pandemic, these results offer an important insight toward understanding the effect of loneliness on individuals who may engage in harmful rates of substance use, and suggest a potential link between the increased rates of loneliness and substance use reported during the COVID-19 pandemic.(Bartel et al., 2020; Czeisler et al., 2020; Horigian et al., 2020; Killgore et al., 2020)

Following an large-scale traumatic event such as the global COVID-19 pandemic, alcohol and marijuana use may be used as a means of coping for vulnerable individuals.(Stanton et al., 2020) Literature from previous disasters reports that among people who used alcohol, exposure to disasters exacerbated alcohol use.(Beseler et al., 2011; Hasin et al., 2007) These changes in alcohol use appear to persist even after disaster conditions are mitigated or ceased.(North et al., 2011) Thus, increases in alcohol or marijuana use may persist as a long-term consequence of pandemic-related loneliness, even after easing of COVID-19 restrictions. Among individuals with problematic substance use, long-term effects of pandemic-related loneliness may further elevate already-increased risk for adverse events, including substance-related injuries, emergency room visits and inpatient hospitalizations. (Hasin, 2018; Rehm et al., 2009) During and after the pandemic, health care providers should screen patients for loneliness and substance use, particularly among those with a history of problematic substance use, asking about feelings of isolation and unhealthy coping behaviors. Among patients reporting such problems, providers could then offer advice regarding healthier alternative coping strategies.

This study was conducted among people with substance use who endorsed at least one DSM-5 substance use disorder criteria in the past 30 days at baseline. The results are therefore not generalizable to individuals with non-problematic substance use. However, since approximately roughly 19.3 million individuals in the US ages 12 or older met criteria for either alcohol or marijuana use disorder in 2019,(Substance Abuse and Mental Health Services Administration, 2020) results may be informative about the substantial segment of the US population experiencing problems related to their use of psychoactive substances.

Limitations of the current study are noted. Firstly, there is potential underreporting of alcohol or marijuana use due to stigma and social desirability bias. If study participants underreported their substance use, differential misclassification of the outcome would likely bias our results toward the null, making our estimates conservative. Participants may also have underreported their loneliness, resulting in some misclassification of participants as never lonely. This too would cause bias toward the null, making our estimates conservative. Secondly, we were limited to using a single question to classify our loneliness exposure. Although loneliness is a multi-dimensional construct, (Ingram et al., 2020a) single-item measures can provide information regarding loneliness in diverse settings and populations. (Fokkema et al., 2012; Newmyer et al., 2021; Shiovitz-Ezra & Ayalon, 2012) Future studies should confirm these findings using additional multi-item loneliness scales. Thirdly, the study used a convenience sample of community participants from New York City, and thus may not be generalizable to all other populations of alcohol or marijuana-using adults. Future studies should aim to examine additional samples and populations. Lastly, the present study did not address racial differences in the effects of loneliness on substance use. This is a topic planned for future analyses. Despite these limitations, the prospective design of this study makes a compelling argument that loneliness predicts future substance use among those already experiencing problems related to their use.

5. Conclusion

This is among the first studies to prospectively examine the effect of loneliness on increases in alcohol or marijuana use. We found that among a community sample of people with problematic alcohol or marijuana use, loneliness was associated with an increased frequency of substance use. These results are particularly troubling in light of the growing public health concern around loneliness,(Cacioppo & Cacioppo, 2018; Murthy, 2017) and established association between loneliness, substance-related severity, and physical and mental health outcomes.(Ingram et al., 2020a) Our findings suggest a potential relationship between loneliness and substance use, which warrants further investigation especially as it may be exacerbated by long-term consequences of pandemic-related conditions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Loneliness is associated with an increased rate of alcohol or marijuana use
- The relationship between loneliness and substance use is independent of depression

Table 1.

Baseline Characteristics of Study Participants with Alcohol or Marijuana as Primary Substance by Self-Reported Loneliness in the Past 2 Weeks (n=210)

Variable		Total (n=210) No. (%)	Never Lonely (n=70) No. (%)	Lonely (n=140) No. (%)	p-value[a]
Gender					
	Male	153 (72.86)	55 (78.57)	98 (70.00)	0.188
	Female	57 (27.14)	15 (21.43)	42 (30.00)	
Age (mean, SD)		42.32, 15.09	45.99, 14.41	40.49, 15.14	0.01*
Race					
	Non-Hispanic White	24 (12.38)	3 (4.29)	23 (16.43)	0.01*
	Non-Hispanic Black	116 (55.24)	48 (68.57)	68 (48.57)	
	Hispanic	48 (22.86)	15 (21.43)	33 (23.57)	
	Other	20 (9.52)	4 (5.71)	16 (11.43)	
Marital status					
	Never married	134 (63.81)	40 (57.14)	94 (67.14)	0.01*
	Married or living together	32 (15.24)	18 (25.71)	14 (10.00)	
	Widowed, Divorced or Separated	44 (20.95)	12 (17.14)	32 (22.86)	
Employed		61 (29.05)	19 (27.14)	42(30.00)	0.67
Past 30-Day Use of Primary Substance (mean, SD)		20.54, 9.25	18.13, 9.62	21.74, 8.85	0.007*
Primary Substance of concern					
	Alcohol	104 (33.33)	42 (60.00)	62 (44.29)	0.032*
	Marijuana	106 (66.66)	28 (40.00)	78 (55.71)	
Depression in Past 2 Weeks					
	No Depression	181 (86.19)	69 (98.57)	112 (80.00)	0.0002*
	Depression	29 (13.81)	1 (1.43)	28 (20.00)	
Frequency of Loneliness in Past 2 Weeks					
	Never Lonely	70 (33.33)	70 (100.00)	0 (0.00)	<0.0001*
	Lonely a few times	87 (41.43)	0 (0.00)	87 (62.14)	
	Lonely at least half the time[b]	53 (25.24)	0 (0.00)	53 (37.86)	

SD=Standard deviation

[a] P-values for categorical or dichotomous variables were estimated using a chi square test. We used an independent sample t-test to compare the means of continuous variables in the two substance use subgroups. The F-test for the assumption of equal variances suggested that the variances of both subgroups were equal, and we report the p-value for the pooled method for equal variances.

[b] Lonely at least half the time includes individuals who felt lonely half the time (n=26), individuals who reported usually feeling lonely (n=18), and individuals who reported always feeling lonely and wishing they had more friends (n=9).

* p-value <.05

Table 2.

Difference in Mean Days of Use of Primary Substance (alcohol or cannabis, n=210)

	Difference in Mean Days of Alcohol or Marijuana Use β (95% CI)		
	Unadjusted [a]	**Adjusted for Demographic Characteristics** [b]	**Adjusted for Demographic Characteristics and Depression** [c]
Loneliness			
Never Lonely	Reference	Reference	Reference
Lonely at least a few times	0.22 (0.08-0.38) *	0.25 (0.08-0.42) *	0.25 (0.07-0.42) *

β=parameter estimate in the model associated with difference in mean days of alcohol or marijuana use associated with a unit increase in loneliness (lonely at least a few times compared with never lonely)

Note: Depression was assessed with the clinician-administered Psychiatric Research Interview for Substance and Mental Disorders, DSM-5 version (PRISM-5). Depression was defined as major depression, depression with anxiety, and depression with mixed features within past 2 weeks. Loneliness in the past 2 weeks was assessed in a computerized self-administered questionnaire. Primary substance at enrollment was self-defined by participants.

[a] Control covariates: primary substance, baseline days of substance use

[b] Control covariates: gender, age, race/ethnicity, marital status, employment status, primary substance, baseline days of substance use

[c] Control Covariates: gender, age, race/ethnicity, marital status, employment status, primary substance, baseline days of substance use, past 2-week DSM-5 major depression, depression with anxiety and depression with mixed features at previous assessment (either baseline or 3-month assessment)

* p-value <.05