BRIEF REPORT

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Prevalence and Correlates of Loss of Control Eating among Adults Presenting for Methadone Maintenance Treatment

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Abstract

Background Research suggests that substance use disorders and disordered eating are often comorbid. In light of the ongoing opioid epidemic, the purpose of the current study was to understand the prevalence and health-related correlates of loss of control (LOC) eating in adults seeking methadone maintenance treatment primarily for addiction to heroin and/or painkillers.
Methods Participants were 447 adults surveyed at presentation for methadone maintenance treatment who responded to survey items on LOC eating. Descriptive statistics were used to investigate the prevalence of engaging in LOC eating in the past 2 weeks. Chi-square tests, t tests, and analyses of covariance were used to compare individuals with (LOC+; $n = 164$) and without (LOC-; $n = 283$) recent LOC eating on psychosocial, pain-related, and weight-related characteristics.
Results Approximately one third of respondents endorsed LOC eating in the past 2 weeks. These participants reported greater affective symptoms, interpersonal dysfunction, pain intensity, and pain interference than the LOC- group (Cohen's d effect size range = .24–.94). LOC+ was also more likely to have engaged in recent illicit drug use and to report having concurrent overweight/obesity (φ effect size range = .09–.10).
Conclusion The prevalence of LOC eating in adults seeking methadone maintenance treatment was more than triple what has been reported in previous studies using community samples. Given its associations with other health-related variables, the presence of LOC eating may be a marker for more severe psychopathology in individuals seeking methadone maintenance treatment. Future research is needed to understand mechanisms explaining this comorbidity and to develop novel ways to prevent and treat their co-occurrence.

Keywords Opioid use disorders · Substance use disorders · Methadone · Pain · Loss of control eating · Binge eating

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Introduction

The prevalence of opioid use disorders (OUDs) has risen dramatically in recent decades [1], leading to high rates of mortality [2] and billions of dollars in taxpayer expenditures [3]. This recent epidemic has resulted in part from overprescribing of opioid pain relievers [4]. In recent years, up to 75% of opioid users reported that their first opioid of abuse was a prescription painkiller [5]. Although current recommendations support the use of methadone maintenance in the long-term treatment of OUDs [6], co-occurring addictive behaviors may persist throughout recovery [7], thereby undermining long-term health and well-being.

One behavior with which substance use disorders (SUDs) frequently co-occur is loss of control (LOC) eating, characterized by a sense that one cannot control what or how much one is eating [8]. LOC eating presents in at least 5–10% of adults in the community [9–11] and is associated with obesity, reduced social functioning and quality of life, and psychiatric comorbidity [12]. The association between binge eating (involving consumption

of objectively large amounts of food accompanied by LOC while eating) and SUDs has been well-documented [13], with approximately 20% of individuals diagnosed with SUDs reporting co-occurring binge eating behaviors [14, 15]. Indeed, SUDs are associated with alterations in eating patterns, including taste preferences and response to food, and changes in body weight, which may reflect overlapping neural substrates involved in drug and food reinforcement [16]. However, as most previous research has assessed associations between SUDs and objectively large binge episodes, understanding of the unique associations between LOC eating, independent of episode size, and SUDs is limited. This is a significant limitation given that previous research highlights the importance of LOC while eating in the construct validity of binge eating, and its status as a shared feature of eating- and substance use-related problems [12]. Moreover, little is known about the degree to which LOC eating is present among individuals seeking treatment specifically for OUDs. In light of the current opioid crisis, a clearer understanding of the prevalence and health-related correlates of LOC eating in this population is warranted to improve screening and treatment recommendations.

There are several reasons why OUDs and LOC eating may co-occur. In line with negative reinforcement models, both LOC eating and opioid abuse are hypothesized to be maladaptive methods for modulating negative affect [17, 18]. Individuals with OUDs may substitute food for opioids in coping with acute aversive states related to comorbid depressive/anxious symptoms or social dysfunction, or alternatively, eating may enhance pain management in individuals who abuse opioids to alleviate acute pain. Indeed, in animal models, pain reactions are suppressed during ingestion of palatable foods, extending eating duration and promoting overeating independent of appetite [19]. These animal findings corroborate human data suggesting that LOC eating and binge eating may be a means of coping with pain [20, 21].

This study investigated the prevalence and correlates of LOC eating in adults presenting for methadone maintenance treatment. Based on prior research and theories explaining the overlap between OUDs and LOC eating, it was expected that LOC eating would be more common in this sample than in the general population, and would be associated with an increased prevalence of self-identified overweight/obesity, as well as greater pain intensity/ interference, negative affect, and social dysfunction. Overall, results could support screening for eating pathology in individuals seeking methadone maintenance treatment and related interventions.

Methods

Participants and Procedures

Participants were 484 adults drawn from a convenience sample of individuals seeking methadone maintenance treatment in Southern New England ($n = 383$) and the Pacific Northwest ($n = 101$). Although assessment of disordered eating was not a primary focus of the larger study, the robust methadone treatment-seeking sample provided a unique opportunity to assess LOC eating in the context of other substance use- and health-related constructs. All participants presenting for methadone dosing or group support/counseling as part of their treatment were invited by the investigators and other clinical staff to complete an anonymous survey on substance use patterns, history, treatment, and related sequelae (e.g., legal issues), psychosocial functioning, and health-related behaviors. A consent document delineating the purpose of the study, as described above, was included with each survey. Because participants were assessed in the context of seeking methadone treatment and were not compensated for their time, the survey was brief and consisted of items selected from validated measures based on their clinical relevance (see below). Individuals were excluded if they were under age 18 or not fluent in English. Due to logistical barriers associated with recruiting during methadone administration, response rates could not be determined. The study was approved by the Dartmouth College IRB.

Measures

Demographic Factors Participants were asked to self-report their age, gender, race, relationship status, and level of education completed.

Eating-Related Factors LOC eating was ascertained using a single survey item, adapted for brevity from the well-validated Eating Disorder Examination [22], assessing how often, over the past 2 weeks, respondents "have been bothered by... not being able to stop or control [their] eating." Response options included "0, not at all," "1, several days," "2, more than half the days," and "3, nearly every day."

Substance Use-Related Factors Reasons for seeking methadone treatment included the following: (1) I was first addicted to painkillers and then became addicted to heroin; (2) I was first addicted to heroin and then became addicted to painkillers; (3) I was addicted to painkillers but never used heroin; (4) I was addicted to heroin but never abused painkillers; and (5) I was never addicted—I take methadone only for pain. Current substance use was assessed via three items inquiring about the frequency of illicit drug use (marijuana, opioids, and other illegal drugs) over the past 4 weeks (response options included no use, 1–2 times/month, 1–2 times/week, and almost every day). These items were collapsed across classes of substances, and then dichotomized to represent no/infrequent use, or at least weekly use.

Psychosocial, Pain, and Health-Related Factors Affective symptoms were assessed via four items inquiring about frequency of anxious or depressed mood indicators (response

options ranged from "0, not at all" to "3, nearly every day") drawn from the Generalized Anxiety Disorder-2 scale [23] and the Patient Health Questionnaire-2 [24], respectively, both of which are two-item scales. Both scales have good psychometric properties [25, 26]. The four affective items were averaged into one scale based on their high internal consistency in the current sample ($\alpha = .89$). Social dysfunction was assessed by three items (range = 0–2) inquiring about social isolation and loneliness that were drawn from the Three-Item Loneliness Scale [27]. These items were averaged based on their high internal consistency ($\alpha = .84$). Two items assessing pain intensity and pain interference (range = 0–10) were drawn from the West Haven-Yale Multidimensional Pain Inventory [28], which has good reliability and convergent validity [29]. Finally, participants were asked to indicate whether they were overweight/obese or neither.

Statistical Analyses

Statistical analyses were conducted using SPSS 19.0 (Chicago, IL). Participants with and without complete LOC eating data did not differ on gender or marital status ($ps > .05$), but those with complete LOC eating data were younger, $t(466) = 3.03$, $p = .003$, reported more education, $\chi^2(3, N = 482) = 8.15$, $p = .04$, and were more likely to be White, $\chi^2(1, N = 436) = 7.89$, $p = .005$, than those without complete LOC eating data. Only those with complete LOC eating data were included in further analyses ($n = 447$; 92.4%). These participants were categorized as those who did (LOC+) or did not (LOC-) report any LOC eating in the past 2 weeks. Groups were compared on demographics, perceived overweight/ obese status, reasons for seeking methadone maintenance, and past month substance use using chi-square and t tests. Four ANCOVAs (adjusting for site) were conducted to assess differences between LOC+ and LOC- on affective, social, and pain-related symptoms. Race and education level were considered as covariates, but neither variable contributed to any of the models and both were dropped from final analyses.

Results

Participants were 43.3% women, and aged 41.1 ± 11.6 y, on average (range = 20-70 y; see Table 1). Of those with complete LOC eating data, 164 (33.9%) were categorized as LOC+. These participants were more likely to belong to a racial minority group, $\chi^2(1, N = 409) = 5.55$, $p = .02$, and reported less education, $\chi^2(3, N = 445) = 9.94$, $p = .02$, than LOC-. There were no other group demographic differences.

LOC+ had greater levels of depression symptoms, social dysfunction, pain severity and interference, and higher prevalence of past-month recurrent illicit drug use ($ps < .05$; see Table 1). LOC+ was also more likely to report being

overweight/obese (18.9%; $n = 31$) relative to LOC- (11.7%; $n = 33$; $p = .04$). Groups did not differ with respect to reasons for seeking methadone maintenance treatment ($p = .65$).

Discussion

This study investigated the prevalence and health-related correlates of LOC eating in adults seeking methadone maintenance treatment. One third of respondents reported engaging in LOC eating within the past 2 weeks (more than triple the prevalence of ~ 5–10% that has been reported in previous community-based studies) [9–11], indicating that healthcare providers should consider screening for this behavior in individuals seeking treatment for OUDs. Moreover, individuals who reported LOC eating had higher levels of psychosocial dysfunction (including recent illicit drug use) and pain, and greater prevalence of perceived overweight/obesity. Although cross-sectional, these findings suggest that the presence of LOC eating may be associated with a more severe psychological presentation.

Practitioners treating individuals with OUDs should be aware of the high likelihood of co-occurring LOC eating. Although longitudinal studies are needed to clarify whether LOC eating impacts the course of OUDs, the current data suggest that LOC eating is associated with elevated levels of psychosocial and pain-related dysfunction. As such, LOC eating may be a marker for poorer treatment outcomes and/or decreased long-term health-related outcomes. Thus, clinicians should be prepared to assess these behaviors in patients seeking methadone maintenance treatment. Future research is needed to understand whether treating comorbid LOC eating will improve functioning in other health-related domains that co-occur with OUDs, as well as whether sequential interventions are needed to treat comorbid LOC eating and OUDs or whether singular treatments can be adjusted to treat both simultaneously.

Although opioid abuse and LOC eating are both impulsive/ addictive behaviors that may share common etiologies [e.g., 30], it is unclear if they serve the same functional purpose (e.g., modulating aversive mood or pain). Prospective studies of momentary processes involved in the occurrence of these behaviors (e.g., ecological momentary assessment) are required to understand whether they have distinct or shared antecedents and consequences, which could inform interventions for individuals in whom OUDs and LOC eating co-occur.

These novel results add to the existing literature on substance abuse and disordered eating [13] by expanding findings to a geographically diverse sample of individuals seeking methadone maintenance treatment (primarily for abuse of heroin and/or painkillers), and by examining LOC eating, a transdiagnostic eating disorder construct that is common in both community and clinical samples. Study strengths include

Table 1. Demographic and psychosocial characteristics of participants with and without loss of control eating ($M \pm SD$ unless otherwise indicated)

	Full sample (n = 447)	LOC+ (n = 164)	LOC- (n = 283)	Test statistic	Effect size
Demographic characteristics					
Age, y	41.1 ± 11.6	40.8 ± 11.0	40.5 ± 11.7	$t(431) = -.24; p = .81$	Cohen's $d = .03$
Women, % (n)	43.3 (210)	42.9 (69)	46.8 (131)	$\chi^2(2, N = 441) = 0.76; p = .68$	$\varphi = .04$
Race, % (n)					
White	78.9 (382)	83.9 (125)	91.5 (238)	$\chi^2(1, N = 409) = 5.55; p = .02$	$\varphi = -.12$
Non-white	11.2 (54)	16.1 (24)	8.5 (22)		
Marital status, % (n)					
Single	57.9 (280)	56.4 (92)	60.5 (170)	$\chi^2(2, N = 444) = 0.81; p = .67$	$\varphi = .04$
Married	13.6 (66)	13.5 (22)	13.2 (37)		
Divorced/separated/widowed	27.5 (133)	30.1 (49)	26.3 (74)		
Level of education, % (n)					
Less than high school	18.0 (87)	22.7 (37)	13.1 (37)	$\chi^2(3, N = 445) = 9.94; p = .02$	$\varphi = .15$
Completed high school	29.8 (144)	31.3 (51)	29.4 (83)		
Some college	37.2 (180)	35.6 (58)	39.7 (112)		
Completed college	14.7 (71)	10.4 (17)	17.7 (50)		
Weight-related and psychosocial characteristics					
Overweight/obesity status, % (n)	13.2 (64)	18.9 (31)	11.7 (33)	$\chi^2(1, N = 447) = 4.44; p = .04$	$\varphi = .10$
Affective symptoms	1.34 ± 0.91	1.82 ± 0.78	1.05 ± 0.86	$F(2,439) = 85.86; p < .001$	Cohen's $d = .94$
Social dysfunction	0.77 ± 0.66	1.04 ± 0.62	0.63 ± 0.64	$F(2,436) = 41.68; p < .001$	Cohen's $d = .65$
Pain intensity	4.61 ± 2.87	5.02 ± 2.79	4.34 ± 2.90	$F(2,426) = 4.92; p = .03$	Cohen's $d = .24$
Pain interference	4.00 ± 3.10	4.42 ± 3.05	3.67 ± 3.10	$F(2,431) = 4.96; p = .03$	Cohen's $d = .24$
Illicit drug use, % (n)	52.5 (254)	59.8 (98)	49.6 (139)	$\chi^2(1, N = 444) = 4.25; p = .04$	$\varphi = .09$
Reasons for seeking treatment, % (n)					
First addicted to painkillers, later to heroin	60.3 (292)	65.4 (104)	63.9 (177)	$\chi^2(4, N = 436) = 2.47; p = .65$	$\varphi = .08$
First addicted to heroin, later to painkillers	6.6 (32)	6.9 (11)	5.4 (15)		
Addicted to painkillers, never used heroin	9.3 (45)	6.9 (11)	11.2 (31)		
Addicted to heroin, never abused painkillers	18.2 (88)	19.5 (31)	18.1 (50)		
Pain management only	1.7 (8)	1.3 (2)	1.4 (4)		

the large sample size, and the assessment of multiple health-related markers with theoretical relevance to both LOC eating and OUDs. Limitations included the cross-sectional design; the constrained sample of individuals seeking methadone maintenance treatment (versus other forms of treatment for OUDs such as buprenorphine/naloxone) without a comparable control group of individuals without OUDs; and the use of brief, self-report measures (most of which represented portions of validated scales and thus could have introduced measurement biases) to assess psychosocial and health-related characteristics, including use of perceived weight status as a proxy for actual BMI. Furthermore, results may be skewed by demographic difference between participants who did and did not respond to the survey item on LOC eating, and by an inability to infer whether participants were seeking additional treatment for psychosocial concerns outside of opioid use. Finally, the methodology precludes speculation as to whether LOC eating and OUD are distinct comorbid conditions, or if perceived difficulties regulating eating reflect greater overall addiction severity. Future studies should explore mechanisms explaining the co-occurrence and long-term effects of these behaviors in order to develop evidence-based prevention and treatment recommendations.

Compliance with Ethical Standards

Conflict of Interest   The authors declare that they have no conflicts of interest.

Ethical Approval   All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent   An informed consent document was provided to all individual participants included in the study, and participants were instructed to read the document prior to answering any survey questions.

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