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Heavy Use versus Less Heavy Use of sedatives among non-medical sedative users: characteristics and correlates

Prasanthi Nattala[a], **Kit Sang Leung**[a], **Arbi Ben Abdallah**[a], and **Linda B. Cottler**[a]

[a]Epidemiology and Prevention Research Group, Department of Psychiatry, Washington University School of Medicine, St.Louis, MO 63108, USA

Abstract

Non-medical use of sedatives is an ongoing problem. However, very little is known about the characteristics of individuals who use sedatives non-medically, or the motives behind such use. The present analysis, involving a sample of individuals reporting non-medical use of sedatives in the past 12 months (N=188), examined the relationship between socio-demographic variables, past-year use of other licit and illicit drugs, type of non-medical use (use in ways other than as prescribed, use when not prescribed, or both), motives, and past 12-month sedative use. Past 12-month sedative use was dichotomized as Heavy Use (>90 pills in past 12 months) and Less Heavy Use (≤90 pills), using a median split. Multivariate logistic regression analyses indicated that Heavy Use of sedatives was significantly associated with a positive diagnosis for sedative use disorder and prescription opioid use disorder, a higher number of motives for sedative use, and reporting 'sedative use in ways other than as prescribed' and 'both forms of non-medical use, namely, other than as prescribed, and when not prescribed,' compared to non-prescribed use. Although in univariate analyses a positive diagnosis for past 12-month cocaine use disorder, and individual motives for sedative use such as 'to get high' and 'for pain relief', significantly predicted past 12-month Heavy Use, their effects diminished and became non-significant after adjusting for other covariates. Findings underscore the need for considering differential risk factors in tailoring preventive interventions for reducing non-medical sedative use.

Keywords

Non-medical sedative use; sedative misuse; prescription drug misuse; motives

1. Introduction

Non-medical use of prescription drugs (defined as use 'in ways other than prescribed', or 'when not prescribed') in the United States has re-emerged since the late 1970s. Recent data indicate that there were 2.5 million individuals aged 12 or older who have misused prescription drugs for the first time in the past year, which averages out to around 7,000 people initiating prescription drug misuse per day (SAMHSA, 2008). While existing literature has focused on

Corresponding author information: Prasanthi Nattala, 40N Kingshighway, Suite 4, Washington University School of Medicine, St.Louis, MO 63108, USA, PAIDI89@GMAIL.COM; Phone No. 314-286-2252.

prescription drug misuse in general, as well as specific classes of prescription drugs such as opioids and stimulants, non-medical use of sedatives has been relatively under-explored.

Sedatives constitute the most commonly prescribed class of medication in the United States (Goodwin and Hasin, 2002; Caplan et al. 2007). They include benzodiazepines, barbiturates, and non-benzodiazepine anxiolytics, and are commonly prescribed to treat insomnia, anxiety, muscle spasticity, and convulsive disorders. As with other prescription drugs, misuse of sedatives is an ongoing problem.

Sedative compounds interact with the gamma amino butyric acid (GABA) receptors in the brain, which inhibits neuronal activity and slows down nerve impulses in the body. Although in low doses, this inhibitory action is rarely known to cause any adverse effects, using sedatives in increased amounts, including benzodiazepines, which are generally known for their safety profiles, can potentiate their effects on the central nervous system. This can cause life-threatening effects such as respiratory depression, aspiration, and apnea (Caplan et al. 2007). Existing literature documents the dose-dependent toxic effects of sedative compounds, such as cognitive impairment (Hindmarch, 2009), memory deficits (Pomara et al. 2006), while other studies demonstrate the adverse effects due to raised plasma concentrations of sedatives in critically ill in-patient samples (Masica et al. 2007; Horinek et al. 2009). A dose-dependent respiratory depression has been described to be the most significant adverse effect induced by sedative drugs, with possible apnea when used in association with alcohol or other drugs (Arcangeli et al. 2005).

Despite the evidence on the potentially fatal toxic effects associated with the use of sedative agents in increased amounts, the correlates associated with this behavior have been under-studied. In this connection, it is important to look for factors associated with any risky behavior, which might aid in developing interventions aimed at curbing this behavior. In the present report comprising a community sample of individuals reporting past 12-month non-medical sedative use, one such potential correlate of the risky behavior in question - heavy use of sedatives - was ‘motives.’

The role of motives in substance use behaviors has been documented in prior literature (Cooper, 1994; Cooper et al. 1995; Carey and Correia, 1997; Redman, 2009), as being fundamental to the substance use initiation and perpetuation (Redman, 2009), and that individuals use substances to achieve certain valued outcomes or meet certain needs (Cooper, 1994; Read et al. 2003). For instance, benzodiazepine use has been described as a ‘recreational and thrill-seeking behavior’ (O’Brien, 2005). It has also been found that opiate-dependent individuals reported using benzodiazepines for their therapeutic indication (e.g. relief from anxiety), or for obtaining pleasure (Fatseas et al. 2009); prescription drug misuse for getting high, relieving other drug effects, experimentation, ‘because it’s safer than street drugs’, and ‘because I’m addicted’ were associated with oral and non-oral use of the drug, and co-ingestion of the prescription drug with other drugs (McCabe, 2009); ‘to relieve pain, get high, and to experiment,’ were the three most common motives associated with the non-medical use of prescription opioids (McCabe, 2007). Assuming that drug use is a goal-oriented activity (Carey and Correia, 1997; MacLean and Lecci, 2000), and that motives may mediate drug using behaviors, the present analysis investigating their role in predicting Heavy Use of sedatives is of significant relevance, given the adverse effects associated with such use.

Furthermore, the present analysis, which was conducted with the primary objective of examining the correlates of heavy use of sedatives in a sample of non-medical sedative users, also investigated the relationship between socio-demographic variables, past-year use of other licit and illicit drugs, type of non-medical use (use in ways other than as prescribed, use when not prescribed, or both), and past 12-month heavy use of sedatives. This is also the first known

study to investigate the association between motives and past 12-month heavy use of sedatives, among individuals reporting non-medical use of sedatives. The motives for sedative use identified in this analysis may be particularly important from a public health perspective, given that they were reported by past 12-month non-medical sedative users. This might aid prevention and intervention efforts to reduce non-medical sedative use, and educate the public about the potential risks associated with the use of sedatives for non-medical purposes.

2. Materials and methods

2.1 Sample and recruitment

The present report involved secondary data analysis of the ongoing parent study on Prescription Drug Misuse, Abuse, and Dependence Study, funded by the National Institute on Drug Abuse (NIDA), which examined prescription drug misuse behaviors and test–retest reliability of DSM-IV criteria for prescription drug use disorders in St. Louis (PI: Dr. Linda Cottler). Participants for the parent study (N=379) were recruited employing targeted sampling procedures, an important feature of which is the continued revision of sampling plans during implementation to meet social conditions and enrollment rates (Watters and Biernacki, 1989, p.423). Participants were recruited from the community, through newspaper advertisements, flyers posted in highly visible and relevant areas such as community centers, grocery stores, college/high school campuses, medical centers, doctor/dental offices, and pain management clinics. Specifically, the fliers invited potential respondents to participate in a research study, if they were 18 years or older, had used Adderall (Duramed Res[1]), Xanax (Pharmacia and Upjohn[1]), Vicodin (Abbott Laboratories[1]), or similar prescription drugs, in the last 12 months. The fliers also provided information about the number of interviews, reimbursement, and the contact details of the Project Coordinator. Those who reported currently receiving drug use treatment services, or receiving pain management treatment for cancer, were not enrolled for the study.

Written informed consent was obtained from the participants prior to conducting the interviews, which also conveys that all information collected is protected by a NIDA Certificate of Confidentiality. All the interviewers were trained on the study protocol and assessment tools. The interviewers were professionally trained raters who had been involved in several other studies undertaken by the research team, with extensive experience in conducting one-on-one interviews. Audio recordings of the interviews were regularly reviewed during the study period, to ensure quality and fidelity. Specifically, a professional Quality Control Editor listened to the audio recordings of the first hundred interviews, and then 10% of all subsequent interviews, to check against the data that was entered; any discrepancies were promptly documented and reported to the PI.

For the present analysis, the main objective of which was to examine the correlates of heavy use of sedatives, Time 1 data were used, and the sample included 188 participants who reported non-medical use of sedatives, on more than 5 days, in the past 12 months. For the Time 1 interview, participants were compensated $20 for their time and inconvenience.

2.2 Measures

All information for the present analysis was obtained from the Washington University Risk Behavior Assessment (WU-RBA), and the Substance Abuse Module (SAM) for Prescription Drugs. Information about sedative use was obtained from the drug use section of the WU-RBA. Participants were asked about sedative agents such as benzodiazepines (e.g. alprazolam,

[1]US Food and Drug Administration Orange Book, US Department of Health and Human Services. Retrieved from: http://www.accessdata.fda.gov/scripts/cder/ob/default.cfm

chlordiazepoxide, diazepam, lorazepam), non-benzodiazepine hypnotics (e.g. zolpidem, buspirone), barbiturates (e.g. amobarbital, phenobarbital), muscle relaxants (e.g. cyclobenzaprine), and other drugs (e.g. seroquel) that may be used off-label for insomnia.

The SAM for Prescription Drugs was an extended version of the original SAM (Cottler, 2000; Horton et al. 2000), which was revised to include an assessment of DSM-IV criteria adopted to abuse and dependence for prescription drug classes (sedatives, stimulants, opioids). Information about past-year use of other licit and illicit drugs was obtained from the SAM. In the present study, DSM-IV diagnosis for Substance Use Disorder in the past 12 months was assessed for 10 drugs (sedatives, prescription opioids, cannabis, cocaine, stimulants, heroin/opium, ecstasy, PCP/ketamine, hallucinogens, and inhalants). Participants were classified as having a substance use disorder (abuse/dependence: 1), versus no disorder (0), in the past 12 months.

2.2.1 Non-medical sedative use in the past 12 months—Non-medical sedative use in the past 12 months was assessed by asking participants the following questions: (a) How many days in the last 365 days did you use muscle relaxants, sleeping pills, or other sedatives that were prescribed for you, but used them in a way other than prescribed – like by using them more than prescribed, or after your prescription ended, or for a different reason? (b) How many days in the last 365 days did you use muscle relaxants, sleeping pills, or other sedatives, that were not prescribed for you?

Accordingly, 3 mutually exclusive categories of non-medical use were identified: (i) use of sedatives ‘in ways other than prescribed’ (ii) ‘use of sedatives’ ‘when not prescribed’ (iii) both forms of non-medical use.

2.2.2 Heavy Use vs. Less Heavy Use of sedatives in the past 12 months—To determine Heavy Use vs. Less Heavy Use of sedatives, the number of sedative pills used non-medically in the past 12 months was dichotomized using a median split (Paulus et al. 2006; Loeber et al. 2009) due to non-normal distribution of the values, ranging from 1–5325, with the responses scattered across the whole range of values. Participants who reported using >90 sedative pills in the past 12 months were labeled as ‘Heavy Users (n=93),’ and those reporting ≤90, as ‘Less Heavy Users (n=95).’

2.2.3 Motives for non-medical use in the past 12 months—Fifteen motives for non-medical sedative use were assessed using the WU-RBA (Table 1), in a yes/no format. Additionally, responses on these items (coded as ‘0’ for ‘no’ and ‘1’ for ‘yes’) were summed to create a Motive Index, with scores ranging from 0-15, indicating the number of motives endorsed by the participants for non-medical sedative use. Higher scores indicate that the participants had more motives for non-medical use of sedatives in the past 12 months. Previous literature has shown that the total number of motives was significantly associated with drug use. For instance, the number of motives endorsed for the illicit use of prescription stimulants was positively associated with alcohol and other drug use behaviors (Teter et al. 2005), while a recent structural equation model found that the number of motives reported by the participants significantly mediated actual ecstasy use (Ben Abdallah et al. 2007).

2.3 Statistical analysis

For categorical data, chi-square analyses were used to assess for associations between selected variables (socio-demographics, past-year use of other drugs, type of non-medical use, motives for sedative use) and past 12-month Heavy Use of sedatives.

Multivariate logistic regression was used to identify correlates of past 12-month Heavy Use vs. Less Heavy Use. All variables significant in univariate logistic regression were included

in the multivariate model. In addition, we also controlled for age, gender, education (less than high-school/high school and beyond), and ethnicity (Caucasian/non-Caucasian), since they were shown to be significantly associated with drug use in prior research (SAMHSA, 2004; Huang et al. 2006; Allen et al. 2008; Fang et al. 2009). Unadjusted and adjusted odds ratios (OR and aOR) were reported.

The association between motives and past 12-month Heavy Use vs. Less Heavy Use was examined by conducting two logistic regression analyses: 1) motive as a composite score (Motive Index), 2) individual motives for sedative use. Conceptualizing that a higher number of motives might be associated with a higher chance of the occurrence of a particular behavior, using the Motive Index in the first logistic regression model would allow us to determine the relationship between the magnitude of the construct 'motive' and non-medical sedative use. Thus, in this model, Motive Index has been regarded as a proxy for the magnitude of 'motive.' Age and Motive Index were entered as continuous variables, while gender, education, ethnicity, past 12-month DSM-IV substance use disorders, and type of non-medical use, were categorical. To further examine the effect of motives on Heavy Use versus Less Heavy Use, in the second logistic regression model, the association between individual motives and past 12-month Heavy Use/Less Heavy Use was examined. In this analysis, except for age, all explanatory variables, including individual motives, were categorical. All analyses were performed using SAS© version 9.1.

3. Results

3.1 Description of the sample

The mean age of the participants (N=188) was 38 years (SD=13). Fifty-seven percent of the sample was male, 48% was Caucasian and 43% was African-American (among the remaining 3% was biracial, 2% Asian-American, 2% Caribbean, 1% American-Indian, 1% Latino/Hispanic), 74% had more than high-school education, and 60% were never married. Past 12-month alcohol use was reported by 89%, cannabis use by 59%, cocaine use by 44%, and heroin/opium use by 26%. A majority of the sample (84%, n=158) also reported misusing prescription opioids, and 11% (n=21) reported exclusive non-medical sedative use.

The sample reported a median of 90 pills (interquartile range 333) in the past 12 months. Of the 188 non-medical users who comprised the sample, 49 (26%) reported using sedatives "in ways other than prescribed" (i.e. using more often than prescribed, or after the prescription ended, or for a different reason), 89 (47%) reported using sedatives "when not prescribed", and the remaining 50 (27%) reported both forms of non-medical use.

For the majority of the participants (78%), benzodiazepines were the most frequently used class of drugs. Among benzodiazepine users, alprazolam was the most frequently reported (62%), followed by diazepam (23%). The remaining 15% reported a combination of clonazepam (8%), lorazepam (4%), chlordiazepoxide (2%), and temazepam (1%) (results not shown).

3.2 Sociodemographics, other drug use, type of non-medical use, and past-12 month Heavy Use vs. Less Heavy Use of sedatives

Bivariate associations between sociodemographics, past-year use of other licit and illicit drugs, type of non-medical use, and past 12-month non-medical sedative use are reported in Table 1. In terms of socio-demographics, participants reporting Heavy Use, compared to Less Heavy Use, were found to be significantly older; no statistically significant differences were observed by gender, education, and ethnicity. With respect to other drug use disorders, Heavy Users

(relative to Less Heavy Users) were more likely to meet the DSM-IV criteria for sedative, prescription opioids, and cocaine use disorders, in the past 12 months.

With regard to type of non-medical use, Heavy Users, relative to Less Heavy Users, appeared to have a lower percentage reporting sedative use 'when not prescribed', and a higher percentage who reported 'both forms of non-medical use (i.e. 'use in ways other than as prescribed', and 'use when not prescribed') (Table 1).

3.3 Motives and past-12 month non-medical sedative use

The mean Motive Index score (N=188) was 5.25 (SD 2.52). There was a significant difference in the Mean Motive Index score between past 12-month Heavy Users and Less Heavy Users: participants reporting Heavy Use had significantly higher Motive Index scores, compared with Less Heavy Users, indicating that Heavy Users endorsed more motives for sedative use. With respect to the association between individual motives and past 12-month Heavy Use/Less Heavy Use, a higher proportion among Heavy Users (compared to Less Heavy Users) reported motives such as 'to get high, to increase/decrease effects of other prescription drugs, to change mood/be happy, to relieve stress, for pain, and 'just because' (Table 1).

3.4 Correlates of past 12-month non-medical sedative use (with Motive Index as a composite score in the multivariate model)

Univariate analyses showed that age, past 12-month substance use disorders (sedatives, prescription opioids, and cocaine), type of non-medical use, Motive Index, and individual motives were significantly associated with past 12-month non-medical sedative use (unadjusted ORs ranging from 1.32-9.10) (Table 2). In multivariate logistic regression analyses, it was found that participants who met the DSM-IV criteria for past 12-month sedative use disorders, and prescription opioid disorders (compared to those with no disorders), were more likely to report Heavy Use. Although past 12-month sedative or prescription opioid use disorder was strongly associated with Heavy Use in univariate analyses (unadjusted ORs= 9.10 and 6.62, respectively), their effects decreased markedly in the multivariate model (adjusted ORs= 4.16 and 3.56, respectively). The statistically significant effects of cocaine use disorder in predicting past 12-month Heavy Use also diminished and became non-significant after adjusting for other covariates.

Compared to non-prescribed users, participants who reported 'use in ways other than prescribed,' were nearly three times as likely to report Heavy Use, while those reporting 'both forms of non-medical use' were more than three times more likely to report Heavy Use. Furthermore, participants endorsing a higher number of motives for sedative use (vs. lesser number of motives), were more than twice as likely to report past 12-month Heavy Use, after adjusting for the effects of other covariates (Table 2).

3.5 Correlates of past 12-month non-medical sedative use (with individual motives in the multivariate model)

The association between individual motives and past 12-month non-medical sedative use was determined by estimating separate univariate logistic regression models with each of the 15 individual motives and non-medical sedative use. In these models, six of the fifteen motives were found to be significantly associated with past 12-month non-medical sedative use (to get high, to increase/decrease effects of other prescription drugs, to change mood/be happy, to relieve stress, for pain, and 'just because'). Next, multivariate logistic regression analysis was conducted with 'to get high' and 'for pain' and other covariates. Although six motives were significant in univariate analyses, only 'to get high' and 'for pain' were included in the multivariate model, as the remaining were significantly associated with the other motives. In

multivariate analyses however, the effects of 'to get high' and 'for pain' diminished and became non-significant after adjusting for other variables (Table 2).

With regard to past 12-month substance use diagnoses, similar to the findings of the first model (which used Motive Index as a composite score), a positive substance related diagnoses for sedatives or prescription opioids was found to be strongly associated with Heavy Use, while the diagnosis for cocaine use disorder – a significant predictor in the univariate analysis - was no longer significant after adjusting for the effects of other covariates. With respect to 'type of non-medical use,' compared to non-prescribed use, participants reporting 'use in ways other than prescribed' were nearly three times as likely, and those reporting 'both forms of non-medical use' more than three times as likely, to report Heavy Use. Additionally, after adjusting for other covariates in the multivariate model, age was no longer a significant predictor of Heavy Use (Table 2).

4. Discussion

This is the first study to report the correlates associated with Heavy Use, among individuals who reported non-medical use of sedatives in the past 12 months. The findings indicated that being older, having a higher number of motives for sedative use, and reporting 'use in ways other than prescribed' and 'both forms of non-medical use' were significantly associated with past 12-month Heavy Use of sedatives.

An important finding of the present analysis was that, although nearly half of the sample reported 'use when not prescribed,' participants who reported 'use in ways other than prescribed' were more likely to report Heavy Use. This might suggest that the presence of a prescription can be an important factor in determining whether or not an individual might be a Heavy User. Although the reason for Heavy Use among those who had a prescription, compared to non-prescribed users, is not clear, it may be that having a medical prescription may be associated with increased availability and greater opportunity to procure the drug, which might increase the quantity of the drug used. These findings might supplement earlier literature showing that benzodiazepines are inappropriately prescribed (Ashton, 2005), and that individuals who are on benzodiazepine prescription are not advised about the risk of dependence and reduction of dose (Dhahan and Mir, 2005). Other authors, while highlighting the risk associated with benzodiazepine prescriptions, have demonstrated that a letter from the health professionals to individuals on benzodiazepine prescription was an effective method of reducing long-term benzodiazepine use (reviewed by Lader et al. 2009). Although further research is needed to examine our findings in other samples, keeping in mind that sedative use can have a dose-dependent effect and negative health consequences (Arcangeli et al. 2005; Caplan et al. 2007; Hindmarch, 2009), including the risk of dependence in high doses (de las Cuevas et al. 2003), they might however highlight the need for prescribing sedatives only when essential, with a careful consideration of the health benefits, and the risks involved, in the long run.

The present analysis also showed that participants with higher number of motives were more likely to report Heavy Use of sedatives in the past 12 months. Although individual motives such as 'to get high' and 'for pain relief' were found to be statistically associated with past 12-month Heavy Use in the univariate analyses, these effects were no longer significant after adjusting for other covariates. However, in contrast to individual motives, Motive Index remained statistically significant even after adjusting for the effects of other covariates, suggesting that Motive Index may be a stronger, as well as a better predictor of Heavy Use of sedatives.

Cox and Klinger (1988) in their motivational model have proposed the importance of the motivational basis for alcohol use behavior in identifying points for intervention. However, the role of motives in non-medical sedative use, or the consideration of motives in the treatment of these individuals, has rarely been explored. The present findings indicated that having a higher number of motives for sedative use was associated with their Heavy Use in the past 12 months. This underscores the importance of directing efforts toward decreasing the magnitude of the underlying motive for sedative use, thus reducing Heavy Use. For instance, although a majority of the sample reported using sedatives 'to get high' (59%), indicating that it was a common motive for using sedatives, and this specific motive was significantly associated with Heavy Use when used as a sole predictor (as in univariate analyses), its effects were not significant in the multivariate model, when adjusted for other covariates. These findings suggest that it may be equally important to focus on the number of motives, as well as the type of motive reported by the individual.

Furthermore, these findings may be considered in conjunction with the fact that motives such as 'stress relief, for sleep, to change mood or be happy, to get high, and 'just because,' were reported by more than 60% of this sample of non-medical sedative users (except 'to get high - 59%, and 'just because' - 54%, calculated from Table 2). For instance, the findings might highlight the need for physicians to alert patients about the risks involved when sedatives are used for non-medical purposes (e.g. to change mood), which increases the possibility of toxic drug reactions. This may also be of significance because of the likely notion that sedatives such as benzodiazepines are not as dangerous as for example, barbiturates, which the former largely replaced in the 60s when they were first introduced. While this may be true, their misuse, as well as escalation of dose for their sedating or mood-altering effects, can adversely impact health in the long run (Griffiths and Weerts, 1997;Griffiths and Johnson, 2005).

The findings may also inform practicing physicians that although a sedative (e.g. a benzodiazepine) might have been initially prescribed for a medical condition, it is possible that the individual might find its effects rewarding, and use the drug for such reasons as to get high, obtaining relief from stress, to sleep, etc. (Ashton, 2005; O'Brien, 2005). Thus, refilling a prescription for sedatives should be done only after a careful scrutiny of the patient's past medical record, and renewed assessment of current health status to determine his/her continued need for the drug. Furthermore, individuals reporting use of sedatives for such motives may use them in erratic ways such as discontinuing them abruptly, and be unaware of the potential adverse effects that can occur in such instances, for example, withdrawal seizures, which can be life-threatening if untreated. All this speaks to the need for physicians to improve their dialogue with their patients in cautioning them about the attendant risks associated with the use of sedatives for non-medical purposes.

From a public health standpoint, these findings highlight the need for considering underlying motives when targeting preventive interventions to reduce non-medical sedative use, working on the proposition that individual variations in motivations can be the result of exposure to different environments, and that individuals can be influenced by external factors (Neighbors, 2007). In light of the present findings that increased number of motives significantly increased the risk of Heavy Use, such preventive efforts might help to target such modifiable risk factors as motives and thereby decrease the strength of the underlying motive, and its association with non-medical sedative use.

The present findings also indicated that past 12-month DSM-IV prescription opioid use disorder, and sedative use disorder, were significantly associated with Heavy Use in the past 12 months. Prior literature has documented that the opioid system and the GABA system are closely related (Van Ree et al. 1999; De Vries & Shippenberg, 2002). One possible reason as to why prescription opioid disorder should be associated with Heavy Use of sedatives could

be that the latter, in some way, help to reduce any discomfort associated with opioid use. For instance, previous authors have suggested that opioid withdrawal causes craving for opioids, and if they are not available, individuals can search for alternate drugs (Hermann et al. 2005). They found that benzodiazepines, along with tricyclic antidepressants, had a moderately positive effect on opioid withdrawal related symptoms. Whatever the underlying mechanism, the finding that prescription opioid use disorder significantly increased sedative use in the past 12 months, is a cause for concern, given the detrimental effects of both the drugs when misused during a given time period, with potentially fatal consequences, if consumed together/within a short time. For instance, previous literature has documented the adverse drug interactions and case fatalities that can occur with opioid and benzodiazepine use, due to their combined inhibitory effects (e.g. Cone et al. 2003; Wolf et al. 2005; Chan et al. 2006). Continued efforts at monitoring sedative drug misuse trends therefore require a consideration of the cumulative impact on individuals when such misuse occurs with other drugs such as opioids, during a given time period. From a clinical perspective, the present findings might also suggest that all prescriptions for sedative drugs should be accompanied by a careful enquiry into the patient's past drug use history, or if he/she is currently using any other substances.

With regard to the association between past 12-month sedative use diagnoses and sedative Heavy Use, it is highly possible that substance use diagnosis such as abuse or dependence, would be associated with increased use of the substance. This is also specified in DSM-IV, as 'continued use' and 'use in larger amounts or for longer periods …," as one of the criteria for substance abuse and dependence, respectively, including for sedative abuse and dependence. Thus, it is not surprising that the findings indicated a significant association between sedative use diagnoses and their Heavy Use, in the past 12 months.

The findings of the present analysis however need to be interpreted in light of some limitations. First, causal relationships cannot be inferred due to the cross-sectional nature of the study. Second, further research is needed to validate the motives used in this study among non-medical sedative users, for instance, by using Motive Index, which was used as a composite score representing the number of motives endorsed, to predict future drug use. Third, although the analysis involved non-medical sedative users, a majority (84%) were also reportedly misusing prescription opioids. Since the proportion of the sample who reported only non-medical sedative use was small (11%, n=21), it was not possible to isolate the effect of other prescription drug misuse from non-medical sedative use. Future studies using larger samples are required that would allow the formation of a group that misused only sedatives, to examine the correlates of heavy use in this group. Fourth, it is possible that our sample may not be representative of the prescription drug misuser population because of the potential biases in the targeted sampling procedures adopted (Magnani et al. 2005). Although targeted sampling is not convenience sampling (Watters and Biernacki, 1989), and the sample obtained from targeted sampling has been shown to be similar to Census data in terms of many demographic characteristics (Robinson et al. 2006), these findings need to be further examined in expanded samples. Despite these limitations, the findings provide some preliminary evidence about the correlates of non-medical sedative use; this is also the first known study to explore the motives prevalent among those reporting past-year non-medical sedative use.

4.1 Conclusion

The present findings showed that type of non-medical use, having higher number of motives for sedative use, and a positive diagnosis for past 12-month sedative use disorder, and prescription opioid use disorder, were independently associated with Heavy Use of sedative drugs in the past 12 months. These findings might help to tailor preventive interventions aimed at reducing non-medical use based on differential risk factors identified among non-medical sedative users. Future studies employing larger samples would help to clarify these associations

further, and facilitate the development of preventive efforts to reduce non-medical sedative use.

RESEARCH HIGHLIGHTS

Sedative Heavy Use associated with:

- Higher number of motives for sedative use
- Use of sedatives with prescription
- DSM-IV Sedative use disorders
- DSM-IV Prescription Opioid Disorders

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Table 1

Past 12-month Heavy Use vs. Less Heavy Use of sedatives, by sociodemographics, non-medical use type, and other drug use/DSM-IV diagnoses in past 12 months, and motives (N=188)

	Heavy Use (>90 pills) *(%)* (n=93)	**Less Heavy Use (≤90 pills) *(%)* (n=95)**	**p-value**
Age (mean, SD)	40.9 (12.1)	36.1 (13.6)	0.01*
Male	55	59	0.56
≥ High school education	75	73	0.68
Caucasian	42	54	0.12
Positive diagnoses for DSM-IV Substance Use Disorder (abuse/dependence) in the past 12 months:			
Sedative	52	18	<0.001*
Prescription opioids	50	13	<0.001*
Cocaine	26	13	0.02*
Heroin/opium	21	11	0.06
Cannabis	15	21	0.29
Ecstasy	2	2	0.98
Amphetamine	1	0	-
PCP/Ketamine	0	0	-
Hallucinogens	0	0	-
Inhalants	0	0	-
Mean number of other drugs (licit and illicit) used in past 12 months (mean, SD)	2.09 (1.37)	2.05 (1.15)	0.81
Number of sedative pills used in past 12 months (median, interquartile range)	360 (480)	28 (26)	<0.0001*
Type of non-medical use:			
Use in ways other than prescribed	26	26	
Use when not prescribed	35	59	0.0004*
Both forms of non-medical use	39	15	
Motives for sedative use:			
To get high	66	51	0.04*
Curiosity/to experiment	25	29	0.49
Pressured by others	5	4	0.74
To function	46	35	0.16
Increase/decrease effects of other prescription drugs	35	20	0.02*
To change mood, be happy	74	51	0.001*
To stay awake	8	4	0.32
To study/concentrate	10	6	0.38
To increase energy	15	11	0.33
To relieve stress	93	77	0.001*
For pain	40	23	0.01*
To sleep	77	65	0.07
Just because	63	45	0.01*

	Heavy Use (>90 pills) *(%)* (n=93)	**Less Heavy Use (≤90 pills) *(%)* (n=95)**	**p-value**
To party	39	33	0.35
To lose weight	1	1	1.0
Motive Index (mean, SD)[2]	5.96 (2.49)	4.55 (2.37)	0.001*

[1] Proportion of participants meeting DSM-IV disorders in the past 12 months;

[2] Number of motives endorsed; mean Motive Index score for the entire sample: 5.25 (SD 2.52);

* Statistically significant; p≤0.05 (Chi-square/Fisher/t-test/Wilcoxon)

Table 2

Univariate and multivariate logistic regression predicting past 12-month Heavy Use of sedatives (N=188)

	Unadjusted model				Adjusted model with Motive Index [a]				Adjusted model with individual motives [b]			
	OR	95%CI			aOR	95%CI			aOR	95%CI		
Age [c]	1.32	1.06	-	1.66	1.02	0.99	-	1.05	1.32	1.00	-	1.76
Male	0.84	0.47	-	1.50	1.12	0.54	-	2.30	1.12	0.54	-	2.32
< High-school education [d]	1.14	0.59	-	2.20	1.34	0.57	-	3.16	1.33	0.57	-	3.14
Caucasian [e]	0.63	0.35	-	1.13	0.69	0.33	-	1.47	0.69	0.33	-	1.47
Positive diagnoses for Substance Use Disorder in the past 12 months:												
- Sedative	9.10	3.60	-	23.02	4.16	1.46	-	11.81	4.51	1.58	-	12.88
- Prescription Opioids	6.62	3.19	-	13.75	3.56	1.47	-	8.62	3.54	1.41	-	8.81
- Cocaine	2.44	1.14	-	5.24	1.62	0.59	-	4.42	1.67	0.61	-	4.59
Type of non-medical sedatives use: [f]												
- use in ways other than prescribed	1.62	0.80	-	3.30	2.90	1.14	-	7.37	2.85	1.12	-	7.29
- both forms of non-medical use [g]	4.36	2.05	-	9.26	3.34	1.35	-	8.25	3.61	1.44	-	9.07
Motive Index [c]	*3.34*	*1.75*	-	*6.36*	*2.36*	*1.11*	-	*5.03*	-	-		-
Individual motives:												
- to get high	*1.84*	*1.02*	-	*3.33*	-	-		-	*2.13*	*0.96*	-	*4.72*
- for pain relief	*2.23*	*1.18*	-	*4.20*	-	-		-	*1.29*	*0.59*	-	*2.84*

[a] Individual motives not included;

[b] Motive Index not included.

[c] Entered as continuous variables; for age, the aOR represents a significant increase in risk, for every 10 years increment; for Motive Index, the aOR indicates a significant increase in risk when the number of motives increases by 5.

[d] Beyond high-school as the referent group;

[e] Non-Caucasian as the referent group;

[f] Use when not prescribed as the referent group;

[g] Reporting both 'use in ways other than prescribed' and 'when not prescribed.'

OR: Odds Ratio; aOR: adjusted Odds Ratio; 95% CI: 95% Confidence Interval.