



LUND UNIVERSITY

Nonmedical Prescription Drug Use (NMPDU) in the Swedish General Population-Correlates of Analgesic and Sedative Use.

Abrahamsson, Tove; Håkansson, Anders C

Published in:
Substance Use & Misuse

DOI:
[10.3109/10826084.2014.962047](https://doi.org/10.3109/10826084.2014.962047)

2015

[Link to publication](#)

Citation for published version (APA):
Abrahamsson, T., & Håkansson, A. C. (2015). Nonmedical Prescription Drug Use (NMPDU) in the Swedish General Population-Correlates of Analgesic and Sedative Use. *Substance Use & Misuse*, 50(2), 148-155.
<https://doi.org/10.3109/10826084.2014.962047>

Total number of authors:
2

General rights

Unless other specific re-use rights are stated the following general rights apply:
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

Non-Medical Prescription Drug Use (NMPDU) in the Swedish General Population -
Correlates of Analgesic and Sedative Use

Tove Abrahamsson and Anders Håkansson

Lund University

Author Note

Tove Abrahamsson, Division of Psychiatry, Department of Clinical Sciences Lund, Lund University, Sweden; Anders Håkansson, Division of Psychiatry, Department of Clinical Sciences Lund, Lund University, Sweden

The study was made possible by funding from the Swedish National Institute of Public Health and Skåne Regional Council. The authors are grateful to all the staff involved in the study at the National Swedish Institute of Public Health and Statistics Sweden and would especially like to thank Matt Richardson at the National Swedish Institute of Public Health for valuable advice. Special thanks also to Mats Berglund and Jonas Berge at Division for Psychiatry, Department of Clinical Sciences Lund, Lund University, for valuable advice and help in preparation of this manuscript.

Correspondence concerning this article should be addressed to Tove Abrahamsson, Division of Psychiatry, Department of Clinical Sciences Lund, Lund University, Sweden, Baravagen 1, S - 221 85 Lund, Sweden. Email: tove.abrahamsson@med.lu.se

Non-Medical Prescription Drug Use (NMPDU) in the Swedish General Population -
Correlates of Analgesic and Sedative Use

Abstract

Background: Non-medical prescription drug use (NMPDU) is a growing problem in many countries. **Objectives:** The aim of the present study was to report correlates of and compare different subtypes of NMPDU in the Swedish general population. **Methods:** Data were drawn from a Swedish national household survey conducted in 2008-2009. A stratified sample of 58,000 individuals aged 15 to 64 was randomly selected, with a response rate of 38.3%. Hierarchical logistic regression analysis was used to compare sociodemographic, substance use and health correlates of non-medical analgesic use, non-medical sedative use and combined non-medical use of these two types of prescription drugs. **Results:** In the final logistic regression model, all three patterns of NMPDU were equally associated with female gender, hazardous alcohol use, habitual smoking and cannabis use, but there were several significant differences in other demographic, health and drug use correlates between the groups. **Conclusions/Importance:** Non-medical use of prescription analgesics, prescription sedatives and combined non-medical use of these drugs might constitute clinically distinct subgroups of NMPDU. This study is one of few to report correlates of NMPDU from a large, national household survey in a country other than the United States.

Key words: non-medical prescription drug use, prescription drugs, sedatives, hypnotics, tranquilizers, analgesics, epidemiology, general population study, Sweden

Non-Medical Prescription Drug Use (NMPDU) in the Swedish General Population -
Correlates of Analgesic and Sedative Use

Prescription drug misuse is a growing problem in many countries (Casati, Sedefov, & Pfeiffer-Gerschel, 2012), including the United States, where it has been described as a new epidemic (DuPont, 2010; Hernandez & Nelson, 2010). The situation appears to be the same in Sweden, where drug seizure statistics show that scheduled prescription drugs are the most rapidly increasing drugs and now constitute the second most common group of drugs seized, after cannabis (The Swedish Council for Information on Alcohol and Other Drugs, 2012).

Misuse of prescription drugs such as opioid analgesics, benzodiazepines and other tranquilizers and sedative-hypnotics, can lead to severe adverse effects, including life-threatening events such as respiratory depression, epileptic seizures, accidents and overdose (Benyamin et al., 2008; Lader, 2011). In the United States, the numbers of unintentional overdoses of prescription drugs, especially opioid analgesics, are increasing and now cause more deaths than overdoses of heroin and cocaine combined (Okie, 2010).

Prescription drug misuse is a heterogeneous phenomenon and there is currently no consensus in the scientific literature about how it should be defined (Barrett, Meisner, & Stewart, 2008; Hernandez & Nelson, 2010). In the present paper, we will use the term “non-medical prescription drug use” (NMPDU), defined as use without a prescription, or more frequently, or in larger doses, than prescribed by a doctor. This definition closely resembles the definition used in the United States National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), although the NESARC uses a somewhat broader definition, including also use “longer than prescribed or for a reason other than a doctor said you should use them” (Hernandez & Nelson, 2010).

Motives for NMPDU vary between users. A commonly suggested motive is self-medication for real or perceived somatic or psychiatric illness, which may or may not be in accordance with treatment indications for the specific drug used. For example, a person may use an analgesic prescribed for someone else for the treatment of pain, or may use an analgesic prescribed for pain to treat anxiety symptoms (Hernandez & Nelson, 2010). Another motive for NMPDU is recreational use, i.e. use with the purpose of achieving intoxicating or euphoric effects. Prescription drugs may also be used in combination with alcohol or illicit drugs, to enhance the effects of these substances or to counteract undesired side effects. (Barrett et al., 2008)

Previous studies reporting risk factors and correlates of NMPDU in the general population have consistently reported an association between NMPDU and use or abuse of other substances, i.e. alcohol, tobacco and illegal drugs (Assanangkornchai, Sam-Angsri, Rerngpongpan, & Edwards, 2010; Back, Payne, Simpson, & Brady, 2010; Becker, Fiellin, & Desai, 2007; Becker, Sullivan, Tetrault, Desai, & Fiellin, 2008; Currie, Schopflocher, & Wild, 2011; Goodwin & Hasin, 2002; Huang et al., 2006; Novak, Herman-Stahl, Flannery, & Zimmerman, 2009; Shield, Ialomiteanu, Fischer, Mann, & Rehm, 2011; Simoni-Wastila, Ritter, & Strickler, 2004). NMPDU has also consistently been associated with poor mental health (Assanangkornchai et al., 2010; Becker et al., 2007; Becker et al., 2008; Goodwin & Hasin, 2002; Huang et al., 2006; Novak et al., 2009; Shield et al., 2011; Tominaga et al., 2009) and some studies have reported an association between NMPDU and poor self-assessed physical and general health (Assanangkornchai et al., 2010; Simoni-Wastila et al., 2004). Most previous studies have also reported an association between NMPDU and younger age (Back et al., 2010; Becker et al., 2008; Huang et al., 2006; Shield et al., 2011; Simoni-Wastila et al., 2004; Tominaga et al., 2009; Wu, Woody, Yang, & Blazer, 2010). When it comes to other sociodemographic factors, such as gender, education and income, results have varied between studies.

With few exceptions (Assanangkornchai et al., 2010; Currie et al., 2011; Shield et al., 2011; Tominaga et al., 2009), most of the studies reporting correlates of NMPDU in the general population have been conducted in the United States. There is thus a lack of knowledge about NMPDU in other countries (Casati et al., 2012; Zacny & Lichtor, 2008). Furthermore, few previous studies have compared correlates of different subgroups of NMPDU. The aim of the present study was therefore to expand the current knowledge about NMPDU by reporting correlates of three patterns of NMPDU in the Swedish general population: non-medical use of prescription analgesics, non-medical use of prescription tranquilizers and sedative-hypnotics (for simplicity this group will henceforth be referred to as “sedatives”) and combined non-medical use of these two groups of prescription drugs. Based on results from previous studies, we hypothesized that all three patterns of NMPDU would be associated with use of other abusable substances, poor mental health and younger age. We also hypothesized that there would be significant differences in demographic, health and substance use correlates between the three patterns of NMPDU. More specifically, based on the fact that prescription analgesics are mainly prescribed for pain, whereas prescription sedatives are prescribed for psychiatric symptoms, such as anxiety and sleep disturbances, we hypothesized that non-medical use of prescription analgesics would be more strongly associated with poor physical health, whereas non-medical use of prescription sedatives would be more strongly associated with poor mental health.

Method

Data Source

Data were drawn from a national household survey designed to assess illicit substance use in the Swedish general population (The Swedish National Institute of Public Health, 2010). The survey was developed by the Swedish National Institute of Public Health in collaboration with

Clinical Alcohol Research, Lund University. A stratified sample of 58,000 individuals aged 15 to 64 was randomly selected from the Swedish population registry, which comprises all registered inhabitants of Sweden. To include a sufficient number of individuals with illicit substance use, a stratification method was used, where sociodemographic groups with a suspected higher risk of illicit drug use were oversampled. Statistics Sweden, the Swedish national agency for population statistics, created the stratification variable, based on results from a previous national health survey (The Swedish National Institute of Public Health, 2008). Variables that were in this study associated with a high risk of cannabis use, and therefore used to create the stratification variable, were: age (age groups 15-29 and 30-44), gender (male), country of birth (Nordic countries), marital status (not married or in a registered partnership), educational level (above high school), urbanicity (living in a larger city, i.e. Stockholm, Gothenburg or Malmo) and social welfare status (social welfare recipient). An overcoverage of 317 individuals who had died or emigrated was discovered, creating a net sample of 57,683 individuals. Surveys were sent out by mail, with an accompanying information letter, between November 2008 and February 2009 and could be answered by mail or on the internet. The surveys were processed by Statistics Sweden and completed with register data on certain demographic variables. The data were then de-identified.

A total of 22,095 people answered the survey, creating an actual response rate of 38.3 percent. The weighted response rate was 52.1 percent. A drop-out analysis, consisting of telephone interviews using a shortened version of the survey, showed no significant differences in drug use between the individuals who completed the original survey and those interviewed by telephone. Of the 1,000 non-respondents randomly selected, 53.0 percent completed the drop-out interview.

All participants were informed that the survey was voluntary and anonymous and informed consent for collection of register data was acquired. The study was approved by the Ethics Committee of Lund University, Sweden.

Study Variables

The question used in the survey to assess participants' drug use was: "Have you ever used any of the following substances without a doctor's prescription?" For prescription analgesics and sedatives, information was given that this also included taking more of the substance, or taking it more often, than prescribed by a doctor. For each of the drug classes examined in the survey, examples of qualifying substances were given. Prescription analgesics were in the survey described as "prescription analgesic agent" and exemplified by the brand names "Treo Comp" (acetylsalicylic acid and codeine) and "Citodon" (paracetamol and codeine). Prescription sedatives were described as "prescription sleeping agent or tranquilizing agent" and exemplified by the brand names "Rohypnol" (flunitrazepam), "Stesolid" (diazepam) and "Stilnoct" (zolpidem). Non-medical use of prescription stimulants was assumed to be very limited among the general population in Sweden at the time of the survey (Janols, Liliemark, Klintberg, & von Knorring, 2009), owing to the fact that these drugs are highly regulated; until 2008, stimulants could only be prescribed by specialists in child and adolescent psychiatry or pediatric neurology with habilitation, for the treatment of ADHD in children (The Swedish National Board of Health and Welfare, 2012). Non-medical use of prescription stimulants was therefore not examined in the present study.

In addition to prescription analgesics and prescription sedatives, six other classes of drugs were examined in the survey: cannabis (hashish, marijuana or cannabis oil), amphetamine (including methamphetamine and phenmetrazine), cocaine (crack, powder or coca leaves), opiates (heroin, opium or morphine), ecstasy (MDMA, MDA or MDE) and hallucinogens (LSD,

mescaline, peyote, PCP, hallucinogenic mushrooms and DMT). The possible answers for each of these eight classes of drugs were: “No”, “Yes, during the past 30 days”, “Yes, during the past 12 months” and “Yes, at least once in my life”.

The dependent variable examined in the multinomial logistic regression analysis was created by categorizing the material into four groups: individuals with past-year non-medical use of prescription analgesics (but not sedatives), individuals with past-year non-medical use of prescription sedatives (but not analgesics), individuals with past year non-medical use of both prescription analgesics and sedatives (combined NMPDU) and individuals with no past-year NMPDU.

Independent variables were chosen based on findings from previous studies (Assanangkornchai et al., 2010; Back et al., 2010; Becker et al., 2007; Becker et al., 2008; Currie et al., 2011; Goodwin & Hasin, 2002; Huang et al., 2006; Novak et al., 2009; Shield et al., 2011; Simoni-Wastila et al., 2004; Tetrault et al., 2008; Tominaga et al., 2009; Wu et al., 2010). All variables used in the stratification process were included as independent variables: age (categorized into three groups: 15-29, 30-44 and 45 years and above), gender, country of birth (born in a Nordic country or not), urbanicity (living in a larger city, i.e. Stockholm, Gothenburg or Malmö, or not), educational level (above high school level or not) social welfare status (social welfare recipient or not) and marital status (categorized into three groups: married, unmarried but living with partner and not married or living with partner).

We included four dichotomous variables examining participants' use of other abusable substances. ‘Hazardous alcohol use’ was assessed with the Alcohol Use Disorder Identification Test (AUDIT) (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), which was included in the survey, and was defined as an AUDIT score of six or more for women and eight or more for men (Reinert & Allen, 2007). ‘Habitual smoking’ was defined as current daily tobacco smoking.

The variable ‘cannabis use’ described any past-year cannabis use and the variable “other illicit drug use” described past-year use of any other illicit drug (amphetamine, cocaine, heroin, ecstasy or hallucinogens).

Finally, as indicators of physical and mental health, we included in the analysis two variables based on the questions “For how many of the past 30 days have your physical/mental health been poor?” The answers were categorized into four groups: 0, 1-10, 11-20 and 21-30 days.

Statistical Analysis

A hierarchical, multinomial logistic regression was performed, to determine which of the selected independent variables were significantly associated with past-year non-medical use of prescription analgesics, prescription sedatives and combined NMPDU, after controlling for all other selected independent variables. In the first model, sociodemographic variables (age, gender, country of birth, urbanicity, educational level, social welfare status and marital status) were entered. In the second model, substance use and health variables (hazardous alcohol use, habitual smoking, cannabis use, other illicit drug use and self-assessed physical and mental health) were added. Clients with incomplete data on the dependent variable (3.0%, n= 672) were excluded from all analyses. For the multinomial logistic regression, clients with missing data on any of the variables included in each model were excluded. The item non-response was generally low for the independent variables, ranging from 0-2.6% (weighted item non-response 0- 4.0%). Tests for multicollinearity showed low variance inflation factor (VIF) values for all included variables (highest value 1.538). Adjusted odds ratios (AOR) are reported with a 95% confidence interval (CI). All analyses were performed in SPSS, version 20. Weights were created by Statistics Sweden, to adjust for the sampling design of the survey as well as for non-response. All percentages presented in this paper are weighted, while sample sizes presented in absolute

numbers are unweighted. The multinomial logistic regression analysis was performed with unweighted data, with all the stratification variables included as independent variables.

Results

The weighted prevalence of past year non-medical use of prescription analgesics, prescription sedatives and combined NMPDU was 2.7 %, 1.1 % and 1.2 %, respectively, resulting in a total prevalence of 5.0 % for any past-year NMPDU.

Weighted frequency distributions for variables included in the multinomial logistic regression analysis are presented in Table 1.

Hierarchical Logistic Regression Analysis - Model 1

In the first logistic regression model, where only sociodemographic variables were entered, non-medical use of prescription analgesics was significantly associated with female gender and being a social welfare recipient. Non-medical use of prescription sedatives was in this model positively associated with female gender, being born in a Nordic country, living in a larger city, being a social welfare recipient and negatively associated with living with one's partner. Combined NMPDU was associated with older age, female gender, being born in a Nordic country, low educational level, being a social welfare recipient and not being married or living with one's partner.

Hierarchical Logistic Regression Analysis - Model 2

In the final logistic regression model, the association between non-medical use of prescription analgesics and female gender remained, but the association with social welfare status disappeared. Instead, there was in this model a weak association between non-medical use of prescription analgesics and being unmarried but living with one's partner. Furthermore, all of the new variables entered in this model, i.e. hazardous alcohol use, habitual smoking, cannabis use,

other illicit drug use and more days with poor self-assessed physical and mental health, were significantly associated with non-medical use of prescription analgesics. For non-medical prescription sedative use, the associations with female gender, living in a larger city and being a social welfare recipient remained, while the associations with country of birth and marital status disappeared. Hazardous alcohol use, habitual smoking, cannabis use, other illicit drug use and more days with poor self-assessed mental health were also associated with non-medical prescription sedative use. For combined NMPDU, the association with female gender remained, the associations with older age and being a social welfare recipient remained, but were weakened and the associations with country of birth, educational level and marital status disappeared. Combined NMPDU was in the final model also significantly associated with all the new variables added in the model (hazardous alcohol use, habitual smoking, cannabis use, other illicit drug use and more days with poor self-assessed physical and mental health).

Discussion

The present study adds to previous epidemiological studies on NMPDU by reporting correlates of NMPDU in the general Swedish population. To our best knowledge, no previous study has compared correlates of non-medical prescription analgesic and sedative use in an analysis that controls for combined use of these two groups of prescription drugs. All three patterns of NMPDU were equally associated with female gender, hazardous alcohol use, habitual smoking and cannabis use. There were, however, also several significant differences in demographic, health and drug use correlates between the groups. These findings are further discussed below.

Prevalence of NMPDU in Sweden

In the present study, any past-year NMPDU was reported by 5.0% of the Swedish population aged 15-64, which would correspond to approximately 300,000 individuals. The prevalence of past-year non-medical use of prescription analgesics was 2.7%, while 1.1% reported non-medical use of sedatives and 1.2% reported non-medical use of both these groups of prescription drugs. These prevalence rates are comparable to previous studies from other countries. Any past-year NMPDU has been reported in 1.9% of the Japanese population (Tominaga et al., 2009), 3.17% of the U.S. population (McCabe, Cranford, & Boyd, 2006) and 8.2% of the population in Alberta, Canada (Currie et al., 2011). Past-year non-medical analgesic use has been reported in 1.8-5.1% of the U.S. population (Back et al., 2010; Becker et al., 2008; McCabe et al., 2006; Tetrault et al., 2008) and in 2.0-4.9% of the Canadian population (Currie et al., 2011; Shield et al., 2011). Past-year non-medical sedative use has been reported in 2.3% of the U.S. population (Becker et al., 2007).

Findings from Logistic Regression Analysis - Sociodemographic Variables

In the present study, all three patterns of NMPDU were associated with female gender. A possible explanation to this finding might be that women are more likely than men to be prescribed drugs with an abuse potential (Simoni-Wastila, 2000; The Swedish National Board of Health and Welfare, 2009). In 2009, 59% of patients who received a prescription for opioid analgesics and 64 % of patients who received a prescription for tranquilizers or sedatives in Sweden were women (The Swedish National Board of Health and Welfare, 2010). Furthermore, women are more likely than men to report pain and psychiatric symptoms (The Swedish National Board of Health and Welfare, 2009), which might also make them more likely to self-medicate with analgesics and psychotherapeutics obtained without a prescription. The findings on gender and NMPDU have not been consistent in the previous literature, with some studies showing an

association between NMPDU and male gender (Back et al., 2010; Goodwin & Hasin, 2002; Huang et al., 2006; Wu et al., 2010), others showing an association between NMPDU and female gender (Assanangkornchai et al., 2010; Becker et al., 2007; Simoni-Wastila et al., 2004) and others still showing no significant associations between gender and NMPDU (Becker et al., 2008; Shield et al., 2011).

Contrary to most previous studies (Back et al., 2010; Becker et al., 2008; Huang et al., 2006; McCabe et al., 2006; Shield et al., 2011; Simoni-Wastila et al., 2004; Tominaga et al., 2009; Wu et al., 2010), we found no association between NMPDU and younger age in the present study. Instead, for combined NMPDU, we found an association with older age in the first model of the hierarchical logistic regression analysis, which was weakened, but remained, in the final model. Despite the discrepancy between the present and previous studies, this finding is not surprising, since, as with the gender differences, it might partially be explained by the fact that older people are more likely to report pain and psychiatric symptoms and to be prescribed drugs with abuse potential (The Swedish National Board of Health and Welfare, 2009, 2010).

Many of the associations between NMPDU and sociodemographic variables in the first logistic regression model disappeared or were weakened once we included health variables and other substance use variables in the final model. For example, in the final model, neither country of birth, nor educational level, were significantly associated with any of the three patterns of NMPDU, implying that these and other associations only seen in the first model were confounded or mediated by variables entered in the second model.

Findings from Logistic Regression Analysis - Other Substance Use and Health Variables

Consistent with previous similar studies, we found that all three patterns of NMPDU were significantly associated with other patterns of substance use. While odds ratios for hazardous alcohol use, daily tobacco smoking and past-year cannabis use were similar for all three patterns

of NMPDU, the odds ratio for other past-year illicit drug use was significantly higher for sedatives than for analgesics, and even higher for combined NMPDU. Similar to our findings, a study by Simoni-Wastila et al. (2004) reported higher odds ratios of illicit drug use for non-medical sedative and tranquilizer use than for non-medical narcotic analgesic use. In another study, Huang et al. (2006) reported higher odds ratios of illicit drug use disorders for people with sedative disorders than for people with opioid analgesic disorders. Prescription sedative misuse thus seems to be more strongly associated with illicit drug use than prescription analgesic misuse.

The most interesting finding was the differences between non-medical prescription analgesic and sedative use in associations with self-assessed physical and mental health, an aspect which has not been examined in other general population studies. For non-medical use of prescription analgesics, we found a significant association with poor physical health, with higher odds ratios for more days with poor physical health, whereas there was no significant association between non-medical use of prescription sedatives and physical health. Conversely, for non-medical use of prescription sedatives, we found a significant association with poor mental health, with higher odds ratios for more days with poor mental health. For non-medical use of prescription analgesics, there was also a significant association with poor mental health, but odds ratios were significantly lower than for prescription sedatives, and there was no significant increase in odds ratios with more days of poor mental health. For combined NMPDU, odds ratios for poor physical health were similar to those for analgesics and odds ratios for poor mental health were similar to those for sedatives. These findings support the theory that many people with non-medical use of prescription analgesics and sedatives actually use these drugs in accordance with their respective indications, to self-medicate for real or perceived physical or mental illness (Becker et al., 2007; Becker et al., 2008; Chutuape & de Wit, 1995;).

Limitations

First of all, comparison between findings from the present and previous studies is limited by the aforementioned lack of consensus regarding the definition of prescription drug misuse (Barrett et al., 2008; Hernandez & Nelson, 2010). In the present study, we report data on non-medical prescription drug use, defined as use without a prescription, or more frequently, or in larger doses, than prescribed by a doctor, while in previous studies several other definitions have been used. Furthermore, definitions of the various prescription drug classes also vary between studies. In the present survey, prescription drug classes were not clearly specified by brand or generic names. Only a few examples of qualifying drugs were given for each class and no clear distinction was made between scheduled drugs, such as those used in the examples, and other types of prescription sedatives and analgesics, such as antihistamines and NSAIDs. The terminological differences imply that somewhat different cohorts of prescription drug misusers are included and excluded in this and previous studies, which might explain some of the variation in findings from different studies. For example, most previous studies on non-medical prescription drug use have included only opioid analgesics, whereas in this study, it cannot be excluded that the wording of the questionnaire may have been understood as including non-medical use of non-opioid prescription analgesics as well.

The present study did not include data on non-medical prescription stimulant use. As mentioned earlier, this type of NMPDU is thought to be very limited in the Swedish general population, because of the limited prescription and strict regulations of these drugs (Janols et al., 2009). However, prescription of stimulants for ADHD is increasing (Janols et al., 2009) and furthermore, a recent study (Helander, Al-Saffar, Heidenfors, & Kuttim, 2013) found that misuse of methylphenidate was common among heroin addicts in opiate maintenance treatment. Thus,

while this type of substance use was assumed to be limited in Sweden at the time of the present survey, it would be of interest to include data on prescription stimulant use in future studies.

The unweighted response rate of 38 percent (52 percent weighted) is another limitation. The drop-out analysis showed no significant differences in drug use between responders and non-responders, but the drop-out analysis itself had a fairly low response rate of 53 percent (unweighted). This study is based on a self-report survey, and may thus be affected by report bias. The cross-sectional design of the study furthermore prevents any conclusions of causal relationships from the findings. Because the survey only included participants aged 15-64, our findings may not generalize to older or younger individuals. The survey did neither include questions about motives for or severity of NMPDU, nor how prescription drugs were obtained. Future studies should assess these questions, in order to increase the knowledge and understanding of NMPDU.

Despite these limitations, this study expands the current knowledge on NMPDU, by being one of few to report correlates of NMPDU from a large, national household survey in a country other than the United States.

Conclusions

Consistent with previous general population studies on NMPDU, we found that illicit substance use, hazardous alcohol use and habitual smoking were associated with all patterns of NMPDU. However, we also found several differences in correlates between non-medical use of prescription analgesics, prescription sedatives and combined NMPDU, suggesting that these might constitute clinically distinct subgroups of NMPDU. The association between non-medical use of analgesics and poor self-assessed physical health, as well as the stronger association between non-medical use of sedatives and poor mental health, supports the theory that NMPDU might in many cases be motivated by a subjective need to self-medicate for pain or psychiatric

symptoms. This might additionally imply a need to investigate and adequately treat any somatic and psychiatric symptoms in patients with NMPDU. Additional research is needed to confirm and further explore the findings of this study.

Declaration of interest

The authors declare that there are no conflicts of interest.

References

- Assanangkornchai, S., Sam-Angsri, N., Rerngpongpan, S., & Edwards, J. G. (2010). Anxiolytic and hypnotic drug misuse in Thailand: findings from a national household survey. *Drug Alcohol Rev*, 29(1), 101-111.
- Back, S. E., Payne, R. L., Simpson, A. N., & Brady, K. T. (2010). Gender and prescription opioids: findings from the National Survey on Drug Use and Health. *Addict Behav*, 35(11), 1001-1007.
- Barrett, S. P., Meisner, J. R., & Stewart, S. H. (2008). What constitutes prescription drug misuse? Problems and pitfalls of current conceptualizations. *Curr Drug Abuse Rev*, 1(3), 255-262.
- Becker, W. C., Fiellin, D. A., & Desai, R. A. (2007). Non-medical use, abuse and dependence on sedatives and tranquilizers among U.S. adults: psychiatric and socio-demographic correlates. *Drug Alcohol Depend*, 90(2-3), 280-287.
- Becker, W. C., Sullivan, L. E., Tetrault, J. M., Desai, R. A., & Fiellin, D. A. (2008). Non-medical use, abuse and dependence on prescription opioids among U.S. adults: psychiatric, medical and substance use correlates. *Drug Alcohol Depend*, 94(1-3), 38-47.
- Benyamin, R., Trescot, A. M., Datta, S., Buenaventura, R., Adlaka, R., Sehgal, N., . . . Vallejo, R. (2008). Opioid complications and side effects. *Pain Physician*, 11(2 Suppl), S105-120.
- Casati, A., Sedefov, R., & Pfeiffer-Gerschel, T. (2012). Misuse of medicines in the European Union: a systematic review of the literature. *Eur Addict Res*, 18(5), 228-245.
- Chutuape, M. A., & de Wit, H. (1995). Preferences for ethanol and diazepam in anxious individuals: an evaluation of the self-medication hypothesis. *Psychopharmacology (Berl)*, 121(1), 91-103.
- Currie, C. L., Schopflocher, D. P., & Wild, T. C. (2011). Prevalence and correlates of 12-month prescription drug misuse in Alberta. *Can J Psychiatry*, 56(1), 27-34.

- DuPont, R. L. (2010). Prescription drug abuse: an epidemic dilemma. *J Psychoactive Drugs*, 42(2), 127-132.
- Goodwin, R. D., & Hasin, D. S. (2002). Sedative use and misuse in the United States. *Addiction*, 97(5), 555-562.
- Helander, A., Al-Saffar, Y., Heidenfors, C., & Kuttim, C. (2013). ["You will only get answers to the questions you ask". New drugs require new testing procedures]. *Lakartidningen*, 110(6), 256-257.
- Hernandez, S. H., & Nelson, L. S. (2010). Prescription drug abuse: insight into the epidemic. *Clin Pharmacol Ther*, 88(3), 307-317.
- Huang, B., Dawson, D. A., Stinson, F. S., Hasin, D. S., Ruan, W. J., Saha, T. D., . . . Grant, B. F. (2006). Prevalence, correlates, and comorbidity of nonmedical prescription drug use and drug use disorders in the United States: Results of the National Epidemiologic Survey on Alcohol and Related Conditions. *J Clin Psychiatry*, 67(7), 1062-1073.
- Janols, L. O., Liliemark, J., Klintberg, K., & von Knorring, A. L. (2009). Central stimulants in the treatment of attention-deficit hyperactivity disorder (ADHD) in children and adolescents. A naturalistic study of the prescription in Sweden, 1977-2007. *Nord J Psychiatry*, 63(6), 508-516.
- Lader, M. (2011). Benzodiazepines revisited--will we ever learn? *Addiction*, 106(12), 2086-2109.
- McCabe, S. E., Cranford, J. A., & Boyd, C. J. (2006). The relationship between past-year drinking behaviors and nonmedical use of prescription drugs: prevalence of co-occurrence in a national sample. *Drug Alcohol Depend*, 84(3), 281-288.
- Novak, S. P., Herman-Stahl, M., Flannery, B., & Zimmerman, M. (2009). Physical pain, common psychiatric and substance use disorders, and the non-medical use of prescription analgesics in the United States. *Drug Alcohol Depend*, 100(1-2), 63-70.

Okie, S. (2010). A flood of opioids, a rising tide of deaths. *N Engl J Med*, 363(21), 1981-1985.

Reinert, D. F., & Allen, J. P. (2007). The alcohol use disorders identification test: an update of research findings. *Alcohol Clin Exp Res*, 31(2), 185-199.

Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993).

Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO

Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II.

Addiction, 88(6), 791-804.

Shield, K. D., Ialomiteanu, A., Fischer, B., Mann, R. E., & Rehm, J. (2011). Non-medical use of prescription opioids among Ontario adults: data from the 2008/2009 CAMH Monitor. *Can J Public Health*, 102(5), 330-335.

Simoni-Wastila, L. (2000). The use of abusable prescription drugs: the role of gender. *J Womens Health Gend Based Med*, 9(3), 289-297.

Simoni-Wastila, L., Ritter, G., & Strickler, G. (2004). Gender and other factors associated with the nonmedical use of abusable prescription drugs. *Subst Use Misuse*, 39(1), 1-23.

Tetrault, J. M., Desai, R. A., Becker, W. C., Fiellin, D. A., Concato, J., & Sullivan, L. E. (2008). Gender and non-medical use of prescription opioids: results from a national US survey. *Addiction*, 103(2), 258-268.

The Swedish Council for Information on Alcohol and Other Drugs. (2012). *Drogutvecklingen i Sverige [The drug development in Sweden]*. (130). Stockholm: Centralförbundet för alkohol- och narkotikaupplysning (CAN). In Swedish.

The Swedish National Board of Health and Welfare. (2009). *Folkhälsorapport 2009 [Public health report 2009]*. Västerås, Sweden: The Swedish National Board of Health and Welfare. In Swedish.

The Swedish National Board of Health and Welfare. (2010). *Läkemedel - Statistik för år 2009* [Medical products – Statistics for the year 2009]. Stockholm, Sweden: The Swedish National Board of Health and Welfare. In Swedish.

The Swedish National Board of Health and Welfare. (2012). *Förskrivning av centralstimulerande läkemedel vid adhd* [Prescription of central stimulant drugs for adhd]. Stockholm: The Swedish National Board of Health and Welfare. In Swedish.

The Swedish National Institute of Public Health. (2008). *Hälsa på lika villkor - Resultat från nationella folkhälsoenkäten 2007* [Health on equal terms - Results from the national public health survey 2007]. Stockholm: The Swedish National Institute of Public Health. In Swedish.

The Swedish National Institute of Public Health. (2010). *Narkotikabruket i Sverige* [Drug use in Sweden] Östersund, Sweden: The Swedish National Institute of Public Health. In Swedish.

Tominaga, M., Kawakami, N., Ono, Y., Nakane, Y., Nakamura, Y., Tachimori, H., . . . Kikkawa, T. (2009). Prevalence and correlates of illicit and non-medical use of psychotropic drugs in Japan: findings from the World Mental Health Japan Survey 2002-2004. *Soc Psychiatry Psychiatr Epidemiol*, 44(9), 777-783.

Wu, L. T., Woody, G. E., Yang, C., & Blazer, D. G. (2010). Subtypes of nonmedical opioid users: results from the national epidemiologic survey on alcohol and related conditions. *Drug Alcohol Depend*, 112(1-2), 69-80.

Zacny, J. P., & Lichtor, S. A. (2008). Nonmedical use of prescription opioids: motive and ubiquity issues. *J Pain*, 9(6), 473-486.

Table 1 Weighted frequencies of sociodemographic, health and substance use characteristics of subjects reporting past-year non-medical prescription analgesic use, non-medical prescription sedative use, combined NMPDU and subjects with no past-year NMPDU.

Selected characteristics	Analgesics only (n = 669)	Sedatives only (n = 455)	Combined NMPDU (n = 416)	No NMPDU (n = 19883)
Age in years (mean, S.D.)	40.4 (15.5)	41.4 (15.4)	38.3 (13.7)	39.7 (14.6)
Male gender (%)	54.8	58.2	50.6	50.6
Born in Nordic country (%)	86.5	96.0	79.7	86.3
Living in a larger city (%)	27.6	12.3	22.4	16.2
Educational level above high school (%)	24.4	23.1	15.4	33.3
Married or living with partner (%)	62.0	50.7	58.3	63.4
Social welfare recipient (%)	1.9	37.0	41.4	3.1
Days with poor physical health (mean)	3.8	3.7	11.3	3.8
Days with poor mental health (mean)	8.0	9.3	13.2	4.1
AUDIT hazardous alcohol use (%)	39.7	59.5	38.0	19.7
Habitual smoking (%)	10.7	27.6	35.7	11.7
Cannabis use (%)	12.8	8.0	22.8	2.1
Other illicit substance use (%)	1.0	29.3	22.8	0.6

Table 2 Factors associated with past-year non-medical prescription analgesic use, non-medical prescription sedative use and combined NMPDU. Model 1.

	Analgesics only (n = 658)	Sedatives only (n = 446)	Combined NMPDU (n = 407)
Selected characteristics	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age in years			
15-29 vs 45 or older	1.12 (0.68-1.85)	0.91 (0.51-1.63)	0.36 (0.24-0.54)*
30-44 vs 45 or older	1.28 (0.77-2.13)	1.25 (0.70-2.24)	0.45 (0.30-0.68)*
Gender			
Male vs female	0.60 (0.51-0.72)*	0.49 (0.39-0.60)*	0.56 (0.45-0.70)*
Country of birth			
Nordic country vs other	1.13 (0.86-1.48)	1.75 (1.22-2.51)*	1.58 (1.11-2.24)*
Urbanicity			
Larger city vs other	1.03 (0.88-1.20)	1.47 (1.21-1.79)*	1.13 (0.92-1.38)
Educational level			
Above high school vs not	0.86 (0.73-1.02)	0.92 (0.75-1.13)	0.70 (0.56-0.87)*
Social welfare status			
Social welfare recipient vs not	1.38 (1.09-1.75)*	2.86 (2.26-3.62)*	3.96 (3.14-5.00)*
Marital status			
Married vs other	0.87 (0.46-1.66)	0.42 (0.15-1.17)	0.30 (0.11-0.84)*
Living with partner vs other	1.15 (0.98-1.36)	0.80 (0.65-0.99)*	0.71 (0.57-0.89)*

Clients included in analysis: 21,009

* p= <0.05

AOR = adjusted odds ratio; CI = confidence interval.

Table 3 Factors associated with past-year non-medical prescription analgesic use, non-medical prescription sedative use and combined NMPDU. Model 2.

	Analgesics only (n = 622)	Sedatives only (n = 426)	Combined NMPDU (n = 360)
Selected characteristics	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age in years			
15-29 vs 45 or older	1.23 (0.71-2.16)	0.76 (0.39-1.47)	0.41 (0.23-0.71)*
30-44 vs 45 or older	1.59 (0.91-2.77)	1.39 (0.72-2.67)	0.66 (0.38-1.15)
Gender			
Male vs female	0.77 (0.64-0.92)*	0.56 (0.45-0.71)*	0.55 (0.42-0.72)*
Country of birth			
Nordic country vs other	0.92 (0.69-1.23)	1.22 (0.83-1.80)	1.14 (0.74-1.78)
Urbanicity			
Larger city vs other	0.93 (0.78-1.10)	1.27 (1.03-1.57)*	0.99 (0.78-1.25)
Educational level			
Above high school vs not	0.93 (0.78-1.11)	0.95 (0.76-1.18)	0.87 (0.67-1.13)
Social welfare status			
Social welfare recipient vs not	1.01 (0.79-1.30)	1.81 (1.40-2.33)*	1.69 (1.28-2.24)*
Marital status			
Married vs other	1.29 (0.66-2.53)	0.88 (0.31-2.46)	1.00 (0.33-2.99)
Living with partner vs other	1.26 (1.06-1.49)*	1.00 (0.81-1.25)	0.94 (0.72-1.21)
Hazardous alcohol use			
Yes vs no	1.57 (1.32-1.87)*	1.72 (1.38-2.14)*	1.80 (1.39-2.33)*
Habitual smoking			
Yes vs no	1.80 (1.47-2.21)*	1.41 (1.11-1.79)*	1.87 (1.45-2.42)*
Cannabis use			
Yes vs no	2.03 (1.54-2.67)*	2.64 (1.97-3.55)*	3.13 (2.26-4.34)*
Other illicit substance use			
Yes vs no	2.60 (1.86-3.65)*	6.16 (4.50-8.42)*	14.28 (10.33-19.73)*
Days with poor physical health			
1-10 vs 0	1.91 (1.59-2.31)*	1.24 (0.99-1.56)	1.43 (1.07-1.91)*
11-20 vs 0	2.93 (2.11-4.09)*	1.34 (0.88-2.03)	2.98 (1.93-4.60)*
21-30 vs 0	3.34 (2.43-4.59)*	1.27 (0.85-1.89)	3.74 (2.53-5.52)*
Days with poor mental health			
1-10 vs 0	1.26 (1.03-1.53)*	2.27 (1.70-3.03)*	1.54 (1.09-2.17)*
11-20 vs 0	1.47 (1.09-1.97)*	3.89 (2.71-5.60)*	3.01 (1.99-4.58)*
21-30 vs 0	1.60 (1.18-2.18)*	6.31 (4.42-8.99)*	5.17 (3.48-7.66)*

Clients included in analysis: 19,436

* p= <0.05

AOR = adjusted odds ratio; CI = confidence interval.