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Measurement of Opioid Problems Among Chronic Pain Patients in a General Medical Population

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Abstract

Introduction—Chronic opioid therapy for non-malignant pain has greatly expanded, increasing the urgency of identifying those experiencing problems related to prescribed opioids. The Prescription Drug Use Questionnaire (PDUQ), which shares substantial content with subsequently developed instruments, was developed within a pain clinic setting designed to identify problematic opioid use. The utility of the PDUQ and its relationship with the DSM-IV approach needs to be established for patients being treated in general medical settings.

Methods—Patients (n=704) from a large HMO prescribed opioids chronically were interviewed using the PDUQ and the Composite International Diagnostic Interview (CIDI) DSM-IV opioid abuse and dependence instrument. The internal reliability of the PDUQ was assessed. Factor analytic procedures were utilized to determine the factor structure of the PDUQ alone and in combination with CIDI DSM-IV.

Results—The internal reliability of the PDUQ in this population was poor (Cronbach's coefficient alpha=0.56) compared to the original development study (alpha=0.81). Factor analysis of a reduced set of PDUQ items yielded three factors: Addictive Behaviors, Addictive Concerns, and Pain Treatment Problems. Factor analysis combining DSM-IV and PDUQ items indicated abuse and dependence were a single, distinct factor.

Conclusions—In this study of chronic pain patients on opioids in a general medical population, the PDUQ performed differently than in previously described pain clinic populations. CIDI DSM-IV items were distinct from a reduced set of PDUQ items, suggesting the need to reconsider approaches to the measurement of opioid problems for these patients. The four factors identified

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deserve further study, as they may signal the need for distinct interventions to improve the care of patients prescribed chronic opioid therapy for pain.

Keywords

prescription opioids; diagnoses; chronic pain; factor analysis; opioid dependence; opioid misuse; measurement

1. Introduction

Trends for prescribed, misuse and addictive use of opioids are up substantially in recent years in the United States (Drug Enforcement Administration, 1998–2006; Substance Abuse and Mental Health Services Administration, 2006; Office of Applied Studies, 2006; Compton and Volkow, 2006) and have been documented to a lesser extent in other areas including Canada, parts of Europe and Australia (Fischer et al., 2008; Fountain et al., 2000; Sjogren and Hojsted, 2007; Degenhardt et al., 2006). Prescription opioid medications can be important tools for the treatment of pain, but they can also be misused, and such misuse makes the proper prescribing of opioids more difficult both for patients in pain as well as for medical providers (Zacny et al., 2003). Discriminating appropriate from inappropriate opioid use is complicated and existing diagnostic criteria are not readily applicable to patients prescribed opioids for pain. The evolving definitions of misuse, abuse and dependence have been explored primarily in samples from specialty pain settings. In contrast, a substantial proportion of chronic opioid use is managed in primary care.

Several researchers have argued that misuse or addiction is a better measure of problematic use of opioids than a diagnosis of abuse or dependence. The literature notes the limitations of diagnostic criteria for determining dependence on prescription opioids among those prescribed these medications, whether using DSM-III-R or DSM-IV standards (American Psychiatric Institute, 1994, 2000). Sees and Clark (1993) note it is possible to meet DSM-III-R criteria for dependence and yet not be “addicted”. This is due to the criteria specific to tolerance and physical dependence, which they argue may be present in patients properly maintained on opioid medications and are therefore insufficient to indicate addiction. Conversely, Compton et al. (1998) report that those not found to be dependent per DSM-IV criteria may still, in fact, be addicted to prescription opioids.

Misuse is a broad, poorly defined and widely used term that encompasses opioid use other than as prescribed, related terms include “not for medical reasons”, “problematic”, “habitual”, “aberrant” or involve “diversion”. Misuse can present in varying ways with different motivations and consequences. Addiction is one form of misuse. Addiction in the context of opioids prescribed for chronic pain has been characterized as “behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving” (American Pain Society, 2001).

While no gold standard exists for determining problems with opioids, particularly among patients using opioids under the direction of a health care professional, work has begun. Recent published reviews of the literature found no single approach or tool that best identifies or predicts opioid misuse by chronic pain patients (Turk et al., 2008; Passik et al., 2008; Chou et al., 2009). Opioid problems may present differently depending upon the clinical setting.

Prescription opioid use and misuse has been examined among several different populations of chronic pain patients. Kouyanou et al. (1997) reported on use patterns among chronic pain patients (n=125) and found 13% “misused” opioids, defined as often using opioid medication above the recommended dose, another 4% met DSM-III-R criteria for abuse and 3%

dependence. Among those seen in a rehabilitation clinic in Sweden (n=265), 19% met DSM-IV criteria for either abuse or dependence (Jonasson, 1998). Chabal and colleagues (1997) created a five item clinical checklist based on observed behaviors indicative of opiate abuse among chronic pain patients (n=76) and found 28% of pain patients who used opioids met three or more of the criteria. In a retrospective chart review, prescription opioid abuse or dependence was present among 24% of VA and 31% of primary care center patients receiving opioid medications for chronic non-cancer pain (total n=98) (Reid et al., 2002). In the course of validating an assessment tool, the Prescription Drug Use Questionnaire (PDUQ), for screening for addiction in patients with chronic pain and referred for having "problematic" medication use, 65% of the subjects (n=52) were assessed to be "addicted" (Compton et al., 1998). These studies, while informative, are mostly based on relatively small numbers of subjects seen in specialty pain management settings.

Given the prevalence of long term opioid prescribing in general patient populations (VonKorff et al., 2008) it is important to determine the nature of problems with prescription opioids outside of the pain clinic setting where much of the existing research has been conducted. Fleming et al. (2007) evaluated substance use disorders in a similar population of primary care patients receiving daily opioid therapy. However, their goals were ostensibly to generate a prevalence estimate of opioid abuse or dependence (they found a 30 day point prevalence of 4%) and the association between aberrant behaviors and these opioid disorders. They used traditional DSM-IV abuse and dependence criteria for opioids as their outcome measure and found that four aberrant behaviors were significantly associated with opioid substance use disorders in a multivariate regression analyses: over-sedating oneself, using opioids for non-pain reasons, increasing dose without authorization and having felt intoxicated when using opioids. Morasco and Dobscha (2008) described the relationship between any substance use disorder and prescription medication misuse in a small population of VA primary care patients managed with chronic opiate therapy. They found that two aberrant behaviors were significantly associated with any substance use disorder in multivariate analyses: borrowing pain medications and requesting an early refill of opioids. Opioid use problems may differ both in their nature and their prevalence depending upon the patient population and clinical setting.

At the time this study was conceived there were few instruments designed to screen for addiction among those prescribed opioids. The PDUQ, unlike alternative instruments, was carefully validated by an expert clinician assessment. Subsequent instruments have included many similar items or have used the PDUQ in their validation analyses including the Pain Medication Questionnaire (PMQ; Adams et al., 2004), the Screener and Opioid Assessment for patients with Pain-Revised (SOAPP-R; Butler et al., 2008) and the Current Opioid Misuse Measure (Butler et al., 2007). The original intent of the PDUQ was "to assess for the presence of addictive disease in the context of chronic pain" and was used in conjunction with American Society of Addiction Medicine and DSM-IV criteria for pain patients with opioid use problems.

Given the continuing challenges of identifying opioid problems among those prescribed them and the fact that most chronic opioid treatment does not occur in specialty pain clinics, the purpose of this study was to: 1) examine the psychometric properties of the PDUQ in a population of integrated group practice patients and 2) examine the factor structure of the PDUQ and its relation to DSM-IV opioid abuse and dependence diagnoses.

2. Methods

2.1 Study design, setting and population

Patients aged 21–79 who were continuously enrolled for at least three years in a large (more than 500,000 enrolled during the study period) integrated group practice (also known as a Health Maintenance Organization) in Washington State and who were prescribed opioids

chronically participated in a single telephone interview. Chronic opioid use was defined as either: a) filling ten or more opioid prescriptions (excluding emergency room visits) during the 12 month period, or b) filling a prescription for at least a 120 day supply of opioids and six or more opioid prescriptions during the 12 month period. This definition was based on preliminary data that showed a majority of patients meeting these thresholds continued with chronic use in the subsequent year. Chronic opioid use was identified in the 12 month period one year prior to the time of the interview to allow adequate time for subjects to develop any opioid use problems. Patients with cancer, except skin cancer, and patients reporting reasons other than pain for opioid use were excluded. Patients reporting no opioid use in the 90 days prior to the interview were excluded from these analyses. Primary data were collected via a structured phone interview by trained interviewers. Patients gave verbal informed consent to participate in the phone interviews and to have their automated medical records reviewed. The Group Health Cooperative human subjects review committee approved all research procedures in June of 2006.

2.2 Study instruments and variables

2.2.1 Prescription Drug Use Questionnaire—Opioid use behaviors were assessed with items from the PDUQ (Compton et al., 1998). Wording was slightly modified for phone interviewing purposes and to reflect the types of care settings in the integrated group practice; for instance, we added language about “urgent care” to the question about emergency departments. See Table 1 for exact wording of DSM-IV and PDUQ based questions. We did not include items evaluating pain and mental health from the PDUQ as these were assessed with other, more comprehensive instruments for analyses reported elsewhere (Banta-Green et al., 2009). The 25 items used had the same content as those on the PDUQ patient version (PDUQp) that was under development at the time of this study and which has subsequently been published (Compton et al., 2008). Missing data values were imputed using the estimated response based on logistic regression analysis of each variable as an outcome with the remaining variables as predictors.

2.2.2 DSM-IV opioid abuse and dependence—Trained interviewers administered the CIDI diagnostic interview for lifetime opioid abuse and dependence DSM-IV diagnoses (Kessler and Ustun, 2004). Certified CIDI trainers conducted the training and evaluation of interviewers. The opioid abuse item “used in situations in which you could get hurt” was excluded from analyses because the question specifically refers to use of opioids while driving. This question is inappropriate in this setting, as persons using stable doses of opioids are generally safe when driving (Fishbain et al., 2002). Furthermore, this criterion has been shown to be less relevant to the latent construct of abuse for most substances (Nelson et al., 1999).

2.3 Statistical Analyses

An exploratory, multi-step approach was utilized to evaluate the performance and utility of the PDUQ in this patient population. If the PDUQ performance was found to be similar to prior findings then use of the previously established cutpoint based on all 25 items was planned. However, if the instrument did not perform similarly other approaches to using the PDUQ would need to be considered. When data collection was completed several meetings were held at which the study team and other clinicians and researchers reviewed the content of the PDUQ, the endorsement levels for each item and Cronbach’s coefficient alpha for the PDUQ. These meetings resulted in a set of potential item exclusion criteria described in section 2.3.2. A series of factor analyses were planned to determine: 1) the number and content of factors for the PDUQ and 2) the factor structure of the PDUQ and CIDI DSM-IV when assessed together.

2.3.1 Internal reliability of the PDUQ—The internal reliability of the PDUQ was assessed with Cronbach’s coefficient alpha (Cronbach, 1951). Adequate internal reliability would add

support to the single factor structure previously reported in the development of the PDUQ (Compton et al., 1998). With insufficient internal consistency to substantiate a single dimension, factor analysis could be used to determine whether multiple factors, or subscales, represented a better fit to the PDUQ.

2.3.2 PDUQ item reduction—If the PDUQ was not found to have a single factor structure, items would be considered for removal based upon the following exclusion criteria developed by the study team and external experts: item content was a poor fit with the clinical population of chronic opioid users or the clinical setting of an integrated group practice, or endorsement levels were so high or so low, i.e. low item variance, that the item would not contribute to the ability to discriminate individuals (DeVellis, 1991). Preliminary factor analyses (procedures described in 2.3.3.) with a reduced set of items was conducted to determine if any items should be removed due to a lack of loading on any common factors.

2.3.3 PDUQ factor analysis (Factor Analysis 1)—An exploratory factor analysis was conducted to determine the number of factors with the remaining PDUQ items and a final factor solution was obtained. A matrix of tetrachoric correlations for all item pairs (all of which were binary) was constructed. The tetrachoric correlation between two binary items estimates the Pearson correlation obtained if the two constructs were measured continuously. Alpha factor analysis was selected because it is a psychometric factor extraction procedure that maximizes the alpha generalizability coefficient (Cronbach, Rajaratnam, and Gleser, 1963) of the common factors by standardizing the common parts into the common metric. The number of common factors to extract was based on multiple criteria: the scree plot, values of successive eigenvalues, parallel analysis (Horn, 1965; O'Connor, 2000), coefficient alpha prior to rotation, and interpretation of the underlying factors. Extracted factors were allowed to be correlated by rotating to an oblique solution, using the direct quartimin procedure (Jennrich and Sampson, 1966).

2.3.4 CIDI/DSM-IV factor analysis (Factor Analysis 2)—A factor analysis using the reduced set of PDUQ items and CIDI DSM-IV dependence and abuse items was conducted to assess whether they measured similar or different constructs as the PDUQ items. This was evaluated by whether CIDI items loaded with PDUQ items. Missing data values on the items were imputed using the estimated response based on logistic regression analysis of each variable as an outcome with the remaining variables as predictors. This larger item pool was factor analyzed in the same manner, utilizing tetrachoric correlations and an alpha factor analysis with oblique rotation.

3. Results

3.1 Subject characteristics

A total of 1,365 potential subjects who met inclusion criteria were contacted via phone, and 778 were interviewed, for a response rate of 57%. Non-respondents were more likely to be male, younger and to have a higher prescribed average daily dose of opioids. All analyses were conducted with a sample size of 704 of the 778 respondents; 74 subjects who reported no use of opioids in the prior 90 days were excluded. Subjects were 62% female, with an average age of 55 (standard deviation 10). The majority of the subjects were non-Hispanic white (89%), with 4% African American, 1% Native American, 1% Asian, and 5% of other ethnicity; 74% were at least a high school graduate; and 68% were married or cohabitating. In this sample, 40% were employed, 33% not in the paid work force or unemployed, 2% other and 25% are unable to work. Education level, employment, ethnicity and marital status were obtained during the interview and age and gender were from automated enrollment data.

3.2 PDUQ internal reliability

Cronbach's coefficient alpha for the original set of 25 items from the PDUQ was 0.56, indicating poor internal consistency for the instrument when considered as a single dimension. Thus, the use of a single cut-point in scoring the PDUQ would be inappropriate in this population because a cut-point depends upon internal consistency of the items which compose the scale.

3.3 PDUQ item reduction

Based upon the item exclusion criteria six items were removed prior to the preliminary factor analysis of the PDUQ (See Table 1 column 2 for items removed). The preliminary factor analysis with the remaining 19 PDUQ items (data not shown) resulted in 3 factors and 4 items that did not load on the common factors (See Table 1 column 3 for the 4 items removed at this step). This resulted in a reduced set of 15 PDUQ items which were included in the subsequent exploratory factor analyses (Table 2). The CIDI DSM-IV abuse item related to using in "situations in which you could get hurt" was removed for reasons described in section 2.2.2. Missing PDUQ data values totaled 0.2% of the data and were imputed. Since the initial matrix of tetrachoric correlations was ill-conditioned with respect to inversion, a smoothing procedure was used (Fleming, 2005).

3.4 PDUQ factor structure

Results of the PDUQ factor analysis are shown in Table 2 under the column heading "Factor Analysis 1". A salient loading was defined as a pattern coefficient $\geq .30$, a common rule-of-thumb for a minimum loading for interpretation (Gorsuch, 1983). The analysis indicated 3 common factors which were labeled Addictive Behaviors, Addictive Concerns, and Pain Treatment Problems. The Addictive Behaviors scale included items such as buying opioids on the street, borrowing opioid medicines, using for other symptoms and a history of alcohol or other drug problems and treatment. The Addictive Concerns scale included items indicating concerns on the part of the patient, family or provider as well as reporting lost meds. Pain Treatment Problems included increasing dose in the prior 90 days, being angry with your doctor, believing your pain was inadequately treated and a doctor ever refusing to prescribe due to abuse concerns. Inter-correlations of the 3 factors were small in value, ranging from 0.17 to 0.25.

3.5 DSM-IV factor structure

Prior to the final exploratory factor analysis data were imputed for the 0.6% missing PDUQ and CIDI values. The results of the exploratory factor analysis of the 15 PDUQ items along with the 9 CIDI DSM-IV dependence and abuse items are presented under the column heading "Factor Analysis 2" in Table 2. The results of this analysis indicated that the 9 dependence and abuse items reflected a single factor and that this factor was largely distinct from PDUQ derived factors.

4. Discussion

In this study of chronic pain patients sampled from an integrated group practice population, a complex structure of opioid problems was revealed that indicate four distinct factors: Addictive Behaviors, Addiction Concerns, Pain Treatment Problems and Opioid Abuse and Dependence. This differs from both the established approach of the DSM-IV and the newer approach of assessing addiction with the PDUQ and similar tools. In contrast to its performance in the population where it was developed, the PDUQ did not have a single factor in this population, rather three distinct factors were identified with a reduced set of items: Addictive Behaviors, Addiction Concerns and Pain Treatment Problems. Abuse and dependence items were found

to be a distinct and single factor that did not load with the three factors derived from the PDUQ. While these findings are preliminary, they suggest a need to reconsider approaches to the measurement of problems with prescription opioids in chronic pain patients in primary-care patient population samples.

4.1 The Prescription Drug Use Questionnaire

The PDUQ was shown to have good internal consistency in the sample used for development (Cronbach's alpha= 0.81), supporting a single factor structure and the use of a single cut-point for scoring (Compton et al., 1998). However, in the general integrated group practice population studied here, the PDUQ performed differently, with low internal reliability (Cronbach's alpha= 0.56). The clinical populations used to develop the PDUQ (n=52) and the subsequent self-report "patient" version, the PDUQp (n=135; Compton et al., 2008) were patients referred to specialty pain clinics. Both of these study populations had much higher item endorsement levels than in this study population, indicating higher rates of problems. However, endorsement levels alone do not explain our finding of lower internal reliability, given our much larger sample size (n=704). This suggests that the overall meaning of PDUQ item responses and the latent constructs they measure may differ across clinical settings. It is also possible that patients in the PDUQ development studies were more homogeneous given their higher acuity; this could reduce variability in response patterns and lead to a higher Cronbach alpha than in this study with a broader population.

An exploratory factor analysis on a reduced set of PDUQ items resulted in a three factor solution that was deemed a good fit statistically as well as clinically. The first factor identified was labeled Addictive Behaviors and included items such as buying opioids on the street, using for other symptoms and having a history of alcohol or other drug problems. Similar behaviors have been characterized by others as "aberrant medication behaviors" (Kirsh et al., 2002) and have been shown to be associated with various measures of substance use disorders in other samples (Fleming et al., 2007; Morasco and Dobscha, 2008).

Addiction Concerns characterized another factor that included concerns on the part of patients, their doctor and/or family and the related behavior of losing medications, a behavior that might lead a doctor to suspect a patient is addicted. Interestingly, these concerns represented a factor distinct from addictive behaviors and may be more related to opioid, pain and addiction pre-conceptions on the part of the patient, family and providers than actual behaviors of the patient. Corresponding constructs and research literature about addiction concerns for chronic pain patients prescribed opioids is very limited beyond that in the initial development study by Compton et al. (1998). Haller (2006) reported preliminary results of a study of pain patients prescribed opioids who had a diagnosis of opioid abuse or dependence and noted a potential content scale related to "concerns of others". A patient's own concern about opioid addiction was among the strongest predictors of addiction in the PDUQ development study; however, this item did not load with the Addictive Behaviors factor in our study. The area of addiction concerns seems a worthwhile area for further study as these concerns, whatever their basis, may have a substantial impact on decisions regarding the course of pain treatment and referrals for addiction screening, warranted or not.

The third PDUQ derived factor was Pain Treatment Problems, which included believing that pain was inadequately treated, increasing dose and being angry with one's doctor. A fourth item which cross-loaded with addictive behaviors was reporting that a doctor had "ever refused to prescribe due to abuse concerns" which could logically be related to being angry with one's doctor. These items and this factor collectively may relate to the notion of "pseudo addiction", a term that has been proposed based upon the notion that a person with poor pain control may show behavioral patterns that look very much like addiction. However, these behaviors may not be driven by addiction to opioids, but instead may be motivated by poor pain control

(Weissman and Haddox, 1989) and may be only "superficially" similar to addiction (Lusher et al., 2006). Many providers are concerned about addiction among their patients, however it is important to distinguish true addiction from pseudo-addiction to ensure that patients' pain is not exacerbated by withdrawal of services or opioids that are medically indicated (Compton, 2008). Passik and Kirsh (2006) in an editorial on opioid screening instruments note the outstanding issue and major confounding role of pseudo-addiction in addiction assessment. This Pain Treatment Problems factor may further our understanding of measurement issues related to pseudo-addiction.

Given the findings in this current study, caution seems warranted in the use of the PDUQ, or PDUQp, with scoring based upon a single cut-point in populations dissimilar to the pain clinic population in which they were developed. To our knowledge the PDUQ has not been previously utilized in research with non-pain clinic populations. However, several instruments include items similar to the PDUQ e.g. the PMQ (Adams et al., 2004) and the SOAPP-R (Butler et al., 2008).

4.2 DSM-IV abuse and dependence

The American Society of Addiction Medicine (ASAM) suggested a revised approach to DSM-IV criteria among pain patients prescribed opioids that de-emphasizes the physiologically based criteria (endorsed by about 40% of patients in this study) and emphasizes compulsion and adverse consequences. The ASAM approach to assessment was the foundation for the clinical assessment utilized in the initial validation study of the PDUQ and informed the items included on the PDUQ (Compton et al., 1998). DSM-IV includes specifiers indicating the presence or absence of physiological dependence and no respondent meeting diagnostic criteria for opioid dependence in this study met dependence criteria without physiological dependence (data not shown). Items such as wanting to stop or cut down on medications, the most highly endorsed DSM-IV item in this study at 55%, are feelings expressed by many persons taking a range of medications chronically and may not have the same meaning compared to responses about one's use of alcohol or cocaine. These problems with DSM-IV diagnoses in this population have been noted elsewhere (Compton et al., 1998; Ballantyne and LaForge, 2007; Kirsh et al., 2002).

In contrast to some other substances, there are no additional specific criteria sets for opioid abuse and dependence in DSM-IV. Criteria are not modified for the use of "abuse-able" substances that are being prescribed. This approach is problematic for determining abuse and dependence because it does not differentiate problems associated with opioid medications from those associated with the painful conditions for which they are prescribed. It is clear that physiological responses to opioids of tolerance and withdrawal are a natural sequelae of chronic use, are not necessarily problematic (Sees and Clark, 1993), and are of limited use in defining dependence.

DSM-IV abuse and dependence represented a single factor in this population. The factor structure of abuse and dependence have been explored previously in general population samples (e.g. Nelson et al., 1999; Gillespie et al., 2007) with the number of factors found, one or two, sometimes varying by substance. However, a search of the literature failed to provide information concerning the DSM-IV or DSM-III factor structure for the use of prescription type opioids specifically, nor opioids in the context of prescribed use for chronic pain management. It appears that in this study population, abuse and dependence are measuring a single latent construct.

4.3 Limitations

The findings in this study are limited to those receiving opioids for pain from an integrated group practice in which they were enrolled continuously for at least 3 years. This is a relatively stable group of patients and likely under-represents those with the most severe addiction issues who may be unlikely to be able to remain employed or consistently enrolled. The integrated group practice from which the study population was sampled is generally representative of Washington State's population as a whole (Saunders et al., 2005). However, those with obvious misuse problems may have already had their opioids discontinued and would therefore not have met study eligibility criteria. The response rate was relatively low, however it was similar to other studies of patients with co-morbid, chronic conditions (Katon et al., 2004). Demographic, pharmacy and health care utilization characteristics of non-respondents were available and analzyed (data not shown). In other analyses of these data, it was found that variables associated with non-response were also associated with potential opioid use problems, suggesting that persons with such behaviors may be under-represented in the study population (Banta-Green et al., 2009). The aim of this study was not to estimate the prevalence of various opioid use problems and the results should not be interpreted with this as a goal.

As with any self-report survey there was the potential for response bias. Respondents were told their providers would not be told of their participation in the study or the answers to any questions. The study was conducted by a survey research group affiliated with the integrated group practice to which respondents belonged. As opposed to most studies that address issues of substance abuse, it is possible that respondents were less concerned about legal consequences than fears that their involvement could somehow impact their continuing treatment with prescribed opioids. Though study materials and interview scripts stressed the confidentiality of data and other safeguards, participant concerns could have led to under-reporting on some items. These biases would likely lead to lower endorsement levels on concerning items, however this would be most likely to lead to weaker findings (due to less statistical power), not inflated or invalid results.

PDUQ item reduction procedures involved a mixture of statistical and clinical considerations. The item reduction procedure was iterative and subjective and it is possible that the final item set would have differed for others; further exploration of the utility of these 25 PDUQ derived items is needed. The PDUQ was not explicitly designed for use by non-clinician interviewers. However, the instrument is highly structured and items used were modified only slightly from the original PDUQ for this study. The method of administration with trained interviewers in this study seems a reasonable extension of these other methods.

The analysis presented here focused on opioid use behaviors and addiction in order to explore the nature of problematic opioid use in this population. However, it is acknowledged that addiction cannot be assessed in a vacuum. In a subsequent analysis of these study data, a patient typology was developed which incorporated the four opioid use factors detailed here along with anxiety, depression and pain (Banta-Green et al., 2009).

5. Conclusions

Study findings provide further evidence of the limitations of the DSM-IV approach for patients prescribed long-term opioid therapy for chronic pain outside of specialty clinics. This analysis incorporated items from the PDUQ and led to the identification of four factors: Addictive Behaviors, Addiction Concerns, Pain Treatment Problems and Opioid Abuse and Dependence. This multidimensional conceptualization may benefit treatment services planning for pain, mental health and addiction, as well as a more sophisticated framing of public health and medical policy responses to the increases in opioid use and associated problems.

References

Adams LL, Gatchel R, Robinson RC, Polatin P, Gajraj N, Deschner M, Noe C. Development of a self-report screening instrument for assessing potential opioid medication misuse in chronic pain patients. J Pain Symptom Manage 2004;27:440–459. [PubMed: 15120773]

American Pain Society, American Academy of Pain Medicine, American Society of Addictions. Consensus statement: Definitions related to the use of opiates in the treatment of pain. AAPM/APS, Glenviw, IL and ASAM; Chevy Chase, MD: 2001.

American Psychiatric Institute. Diagnostic and statistical manual of mental disorder-Fourth Edition. American Psychiatric Institute; Washington D.C: 1994.

American Psychiatric Institute. Diagnostic and statistical manual of mental disorder-Fourth Edition- Text Revision. American Psychiatric Institute; Washington D.C: 2000.

Ballantyne JC, LaForge KS. Opioid dependence and addiction during opioid treatment of chronic pain. Pain 2007;129:235–255. [PubMed: 17482363]

Banta-Green C, Merrill J, Doyle S, Boudreau D, Calsyn D. Opioid use behaviors, mental health and pain-Development of a typology of chronic pain patients. Drug Alcohol Depend. 2009in press

Butler SF, Budman SH, Fernandez KC, Houle B, Benoit C, Katz N, Jamison RN. Development and validation of the Current Opioid Misuse Measure. Pain 2007;130:144–156. [PubMed: 17493754]

Chabal C, Erjavec MK, Jacobson L, Mariano A, Chaney E. Prescription opiate abuse in chronic pain patients: clinical criteria, incidence, and predictors. Clin J Pain 1997;13:150–155. [PubMed: 9186022]

Chou R, Fanciullo GJ, Fine PG, Miaskowski C, Passik SD, Portenoy RK. Opioids for chronic noncancer pain: Prediction and identification of aberrant drug-related behaviors: A review of the evidence for an American Pain Society and American Academy of Pain Medicine clinical practice guideline. J Pain 2009;10:131–146. [PubMed: 19187890]

Compton P, Darakjian J, Miotto K. Screening for addiction in patients with chronic pain and "problematic" substance use: evaluation of a pilot assessment tool. J Pain Symptom Manage 1998;16:355–63. [PubMed: 9879160]

Compton P. Should opioid abusers be discharged from opioid-analgesic therapy? Pain Medicine 2008;9:383–390. [PubMed: 18489627]

Compton P, Wu SM, Schieffer B, Pham Q, Naliboff BD. Introduction of a Self-report Version of the Prescription Drug Use Questionnaire and Relationship to Medication Agreement Noncompliance. J Pain Symptom Manage 2008;36:383–395. [PubMed: 18508231]

Compton W, Volkow N. Major increases in opioid analgesic abuse in the United States: Concerns and strategies. Drug and Alcohol Depend 2006;81:103–107.

Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika 1951;16:297–334.

Cronbach LJ, Rajaratnam N, Gleser G. Theory of generalizability: A liberation of reliability theory. Br J Psychol Stat Sect 1963;16:137–163.

Devellis, RF. Scale development: Theory and applications. Sage; London: 1991.

Drug Enforcement Administration. Department of Justice, Drug Enforcement Administration ARCOS 2- Report 1 Retail drug distribution by zip code. 1998–2006 [Accessed 3/12/08]. at: http://www.deadiversion.usdoj.gov/arcos/retail_drug_summary/index.html

Fishbain DA, Cutler RB, Rosomoff HL, Rosomoff RS. Can patients taking opioids drive safely? A structured evidence-based review. J Pain Palliat Care Pharmacother 2002;16:9–28. [PubMed: 14650448]

Fleming JS. TETCORR: A computer program to compute smoothed tetrachoric correlation matrices. Behav Res Methods 2005;37:59–64. [PubMed: 16097344]

Fleming MF, Balousek SL, Klessig CL, Mundt MP, Brown DD. Substance use disorders in a primary care samples receiving daily opioid therapy. J Pain 2007;8:573–582. [PubMed: 17499555]

Gillespie NA, Neale MC, Prescott CA, Aggen SH, Kendler KS. Factor and item-response analysis DSM-IV criteria for abuse of and dependence on cannabis, cocaine, hallucinogens, sedatives, stimulants and opioids. Addiction 2007;102:920–930. [PubMed: 17523987]

Gorsuch, RL. Factor Analysis. Vol. 2. Lawrence Erlbaum Associates; Hillsdale, NJ: 1983.

Haller, DL. Treatment of Pain and Rx Opioid Abuse: Project Pain. Presented at the NIDA Blending Conference-10/16&17/2006; Seattle, WA. 2006 [Accessed on April 10, 2009]. Available at: http://www.sei2003.com/blendingseattle/agenda1017.htm

Horn JL. A rationale and test for the number of factors in factor analysis. Psychometrika 1965;30:179–185. [PubMed: 14306381]

Jennrich RI, Sampson PF. Rotation for simple loadings. Psychometrika 1966;31:313–323. [PubMed: 5221128]

Jonasson U, Jonasson B, Wickstrom L, Andersson E, Saldeen T. Analgesic use disorders among orthopedic and chronic pain patients at a rehabilitation clinic. Subst Use Misuse 1998;33:1375–1385. [PubMed: 9603276]

Katon WJ, Lin EHB, Russo J, Von Korff M, Ciechanowski P, Simon G, Ludman E, Bush T, Young B. Cardiac Risk Factors in Patients with Diabetes Mellitus and Major Depression. J Gen Intern Med 2004;19:1192–1199. [PubMed: 15610329]

Kessler RC, Ustun TB. The World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). Int J Methods Psychiatr Res 2004;13:122–139. [PubMed: 15297907]

Kirsh KL, Whitcomb LA, Donaghy K, Passik SD. Abuse and Addiction Issues in Medically Ill Patients With Pain: Attempts at Clarification of Terms and Empirical Study. Clin J Pain 2002;18:S52–S60. [PubMed: 12479254]

Kouyanou K, Pither CE, Wessely S. Medication misuse, abuse and dependence in chronic pain patients. J Psychosom Res 1997;43:497–504. [PubMed: 9394266]

Lusher J, Elander J, Bevan D, Telfer P, Burton B. Analgesic addiction and pseudoaddiction in painful chronic illness. Clin J Pain 2006;22:316–24. [PubMed: 16514333]

Morasco BJ, Dobscha SK. Prescription medication misuse and substance use disorder in VA primary care patients with chronic pain. Gen Hosp Psychiatry 2008;30:93–99. [PubMed: 18291290]

Nelson CB, Rehm J, Bedirhan T, Grant B, Chatterji S. Factor structures for DSM-IV substance disorder criteria endorsed by alcohol, cannabis, cocaine and opiate users: results from the WHO reliability and validity study. Addiction 1999;94:843–855. [PubMed: 10665074]

O'Connor BP. SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. Behav Rsch Methods, Instru Comp 2000;32:396–402.

Office of Applied Studies, (2006). Treatment Episode Data Set (TEDS) 2004 National Admissions to Substance Abuse Treatment Services, Table 2.5a. Substance Abuse and Mental Health Services Administration, DASIS Series S-33, DHHS Publication No. (SMA)06-4180.

Passik S, Kirsh KL, Casper D. Addiction-related assessment tools and pain management: Instruments for screening, treatment planning and monitoring compliance. Pain Medicine 2008;9(Suppl 2):S145–S166.

Passik SD, Kirsh KL. An opioid screening instrument: Long-term evaluation of the utility of the Pain Medication Questionnaire by Holmes et al. Pain Medicine 2006;6:69–71.

Reid MC, Engles-Horton LL, Weber MB, Kerns RD, Rogers EL, O'Connor PG. Use of opioid medications for chronic noncancer pain syndromes in primary care. J Gen Intern Med 2002;17:173–179. [PubMed: 11929502]

Saunders, KW.; Davis, RL.; Stergachis, A. Group Health Cooperative. In: Strom, B., editor. Pharmacoepidemiology. John Wiley and Sons; West Sussex, England: 2005. p. 223-239.

Sees KL, Clark HW. Opioid use in the treatment of chronic pain: assessment of addiction. J Pain Symptom Manage 1993;8:257–264. [PubMed: 7963767]

Substance Abuse and Mental Health Services Administration. Results from the 2006 National Survey on Drug Use and Health: National Findings (Office of Applied Studies). Rockville, MD: 2006.

Turk DC, Swanson KS, Gatchel RJ. Predicting opioid misuse by chronic pain patients: A systematic review and literature synthesis. Clin J Pain 2008;24:497–508. [PubMed: 18574359]

Von Korff M, Saunders K, Ray GT, Boudreau D, Campbell C, Merrill J, Sullivan MD, Rutter CM, Silverberg M, Banta-Green C, Weisner C. De-facto long-term opioids therapy for non-cancer pain. Clin J Pain 2008;24(6):521–527. [PubMed: 18574361]

Weissman DE, Haddox JD. Opioid pseudoaddiction- an iatrogenic syndrome. Pain 1989;36:363–366. [PubMed: 2710565]

Zacny J, Bigelow G, Compton P, Foley K, Iguchi M, Sannerud C. College on Problems of Drug Dependence taskforce on prescription opioid non-medical use and abuse: position statement. Drug Alcohol Depend 2003;69:215–232. [PubMed: 12633908]

Table 1

Prescription Drug Use Questionnaire (PDUQ) and CIDI DSM-IV opioid items utilized in factor analyses

INSTRUMENT **Interview question wording**	**Items removed prior to preliminary PDUQ factor analysis**	**Items removed prior to Factor Analyses 1**
PRESCRIPTION DRUG USE QUESTIONNAIRE		
1. Have you tried any non-medication treatments for your pain problem, for example physical therapy, chiropractic, acupuncture, behavioral or psychotherapy? [reverse coded]	x	
2. Has your pain been adequately treated over the past 3 months? [reverse coded]		
3. Have you ever felt angry or mistrustful toward any of your doctors (or other health care providers who prescribed opiate medicines?)		
4. Have you ever been given opiate medicines from more than one doctor (or other health care provider who prescribed opiate medicines) at the same time?		x
5. Have you ever been, or do you think you might be, addicted to opiate medicines?		
6. Has a doctor (or other health care provider who prescribed opiate medicines) ever told you that you were addicted to opiate medicines?		
7. Over the past 3 months, have you had to increase the amount of opiate medicines you take?		
8. Have you had to request more opiate medicines because your prescription ran out early?		
9. Have you used the opiate medicines to help other symptoms such as problems sleeping, anxiety, or depression?		
10. Do you save up unused opiate medicines in case you might need them in the future?		x
11. Do you ever use alcohol to help relieve some of the pain?		
12. Do you think certain opiate medicines work better for you, such as Vicodin, codeine, or Percocet, so that you prefer to take them and not others?	x	
13. Have you ever lost your opiate medicines and needed them replaced?		
14. Have you had to visit the emergency room or urgent care in the past 3 months because of your pain problem?		x
15. Have you ever had to buy opiate medicines on the street?		
16. Have doctors (or other health care provider who prescribed opiate medicines)ever refused to give you the opiate medicines you felt you needed because of fear that you might abuse them?		
17. Is anyone in your family or among your friends concerned that you might be addicted to pain medicines?		
18. Does your family understand and agree with your use of opiate medicines?	x	
19. Does anyone in your family help to take care of you due to your pain problem?	x	
20. Have you ever borrowed opiate medicines from a friend or family member?		
21. Has your father, mother, or siblings ever had a problem with drugs or alcohol?	x	
22. Has your father, mother, or siblings ever had a problem with chronic pain?	x	
23. Have you ever had an alcohol or drug addiction problem?		
24. Have you ever been treated for an alcohol or drug abuse problem?		
25. Have you ever been taken partially or completely off opiate medicines to decrease your tolerance?		x
ABUSE		
1. In your lifetime, did using opiate medicines frequently interfere with your work at school, on a job or at home?		
2. In your lifetime, has your use of any of these opiate medicines ever led to problems with your family, friends, at work, at school or with the police?		
3. Did you continue to use opiate medicines after you knew that it was causing you any of these problems?		
4. Have there been times when you used opiate medicines in situations where you could get hurt-- for example, when riding a bicycle, driving a car or boat, operating a machine, or anything else?		x
DEPENDENCE		

INSTRUMENT Interview question wording	Items removed prior to preliminary PDUQ factor analysis	Items removed prior to Factor Analyses 1
1. Did you ever find you began to need much more opiate medicine to get the same effect or that the same amount had less effect than it once had?		
2. Did you ever have such a strong desire for opiate medicines that you couldn't keep from using them or want them so badly, that you couldn't think of anything else?		
3. Have there been times in your life when you wanted to stop or cut down on any opiate medicines? Were you always able to cut down for at least one month?		
4. Have you ever spent a lot of your time using, getting, or getting over the effects of opiate medicines?		
5. Have you often used opiate medicines in larger amounts or for a longer period than you intended or found it difficult to stop using them before you became intoxicated or high?		
6. Think back to a time when you either stopped or cut down on using opiate medicines. I'm going to read you a list of problems. Let me know if you ever had any of these problems within a few hours or days of stopping or cutting down on opiate medicines. Please don't tell me which symptom, just whether you have had any of these…. Think about the list I just read. Did you ever use opiate medicines to keep from having problems like those?		
7. Have you ever had any medical problems like an accidental overdose, a persistent cough, a seizure, an infection, hepatitis, abscesses, HIV, heart trouble, or an injury as a result of using opiate medicines? Please don't tell me which one, just if you have had any. Did you continue to use opiate medicines after you knew that it was causing you any of these health problems?		
8. Have you ever had any emotional or psychological problems from using these opiate medicines, such as being uninterested in your usual activities, being depressed, suspicious or distrustful of people, or having strange thoughts? Did you continue to use opiate medicines after you knew that it was causing you any of these emotional problems?		
9. Have you ever given up or greatly reduced important activities in order to get or to use opiate medicines, activities like sports, work, or meeting with friends or relatives?		

Table 2

Prescription Drug Use Questionnaire (PDUQ) and CIDI DSM-IV opioid item endorsements and results of exploratory factor analyses

FACTORS Items Paraphrased	Item Endorsement % (n=704)	Factor Analysis 1 PDUQ				Factor Analysis 2 PDUQ & CIDI DSM-IV			
ADDICTIVE BEHAVIORS									
Requested early refill	21 (148)	**0.42**	0.1	0.21	0.17	**0.44**	0.22	−0.04	
Used for other symptoms e.g. sleep, anxiety	13 (88)	**0.35**	0.06	0.04	0.09	**0.38**	0.01	0.02	
Used alcohol for pain	6 (44)	**0.54**	−0.23	0.16	0.12	**0.48**	0.16	−0.25	
Ever bought opioids on the street	2 (13)	**0.88**	0.22	0.16	0.08	**0.81**	0.27	0.14	
Doctor ever refused Rx due to abuse concern	7 (47)	**0.36**	**0.32**	**0.41**	−0.02	**0.39**	**0.48**	**0.31**	
Ever borrowed opiate medicines	11 (74)	**0.41**	0.09	0.28	−0.08	**0.44**	**0.33**	0.11	
You had any AOD problem	19 (135)	**0.69**	0.06	−0.26	0.08	**0.67**	−0.19	0.04	
You have been treated for any AOD problem	13 (95)	**0.75**	0.05	−0.14	0.03	**0.72**	−0.07	0.04	
ADDICTIVE CONCERNS									
You think you might be addicted	14 (102)	0.15	**0.76**	−0.09	**0.31**	0.11	−0.03	**0.56**	
Doctor told you were addicted	6 (45)	0.22	**0.85**	−0.13	0.28	0.22	0	**0.63**	
Lost meds and needed replaced	15 (105)	−0.13	**0.35**	0.06	0.2	−0.16	0.07	**0.33**	
Family concerned about your being addicted	7 (48)	0.12	**0.66**	0.06	0.3	0.11	0.11	**0.51**	
PAIN TREATMENT PROBLEMS									
Pain been inadequately treated past 90 days	31 (215)	0	−0.02	**0.48**	−0.05	0	**0.47**	0	
Angry or mistrustful of doctor	17 (117)	−0.06	0.27	**0.58**	−0.14	0.01	**0.62**	**0.34**	
Increase amount used past 90 days	21 (151)	−0.03	−0.14	**0.58**	0.22	−0.15	**0.63**	**−0.35**	
Doctor ever refused Rx due to abuse concern	7 (47)	**0.36**	**0.32**	**0.41**	−0.02	**0.39**	**0.48**	**0.31**	
OPIOID ABUSE AND DEPENDENCE									
Use despite psych/med consequences	9 (64)				**0.55**	0.2	0.02	0.1	
Lifetime interference opioids work, job, home	10 (70)				**0.68**	−0.07	0	−0.04	
Lifetime problems with family/friends, work, cops	5 (37)				**0.73**	0.19	0.13	−0.01	
Need more opiates to get same effect	38 (271)				**0.46**	0.03	**0.33**	0.02	

FACTORS Items Paraphrased	Item Endorsement % (n=704)	Factor Analysis 1 PDUQ	Factor Analysis 2 PDUQ & CIDI DSM-IV		
Wanted to stop or cut down	55 (384)	**0.74**	−0.29	0.10	0.10
Spent a lot of time using/getting opiates	6 (45)	**0.50**	0.26	−0.04	0.24
Ever used opiates larger amounts, longer time	7 (46)	**0.57**	0.29	−0.01	0.12
Reduced important activities to get or use	3 (18)	**0.78**	0.14	−0.27	−0.04
Withdrawal symptoms	41 (286)	**0.59**	0.26	−0.04	0.11