The *DSM-5* Changes and Challenges in Diagnosing Substance-related Disorders

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The *DSM-5* that was released in May 2013, has incorporated scientific advances, and enhanced clinical utility with more concise, as well as been amenable in primary care. In this overview, the authors review the new classification structure and changes in diagnosing substance related disorders from the *DSM-IV* to the *DSM-5*, and point out the new challenge with the new criteria. The major changes of the *DSM-5* include (A) renaming the title of chapter; (B) substance reclassification; (C) eliminating the terms of dependence and abuse, and merge the criteria of substance dependence and abuse together; (D) removing legal problem and adding craving in substance use disorder criteria; (E) course specifier modification; (F) modifying substance-specific disorders, such as separate substance-induced mood disorder into bipolar and depressive disorder, and separating substance-induced obsessive-compulsive disorders from anxiety disorders; (G) newly adding or removing each class diagnosis of substance related disorders; (H) adding non-substance-related disorders; and (I) adding other substance-related and addictive disorder for further study. Although the *DSM-5* solves the problems of the *DSM-IV*, there are several challenges in diagnosing substance-related and addictive disorder: First, what behaviors could be considered as an addiction is still an ongoing debate. Second, there are some controversies on the new criterion “craving.” Third, the polysubstance is still an important issue to be discussed. In addition, this overview also covers the changes from the *ICD-9-CM* to the *ICD-10-CM* codes related to the substance-related disorder of the *DSM-5*, but present some discrepancies between the *DSM-5* and the *ICD-10-CM* for more clinical conveniences and utility.

Key words: substance related and addictive disorders, neurobiological advances, *DSM-5*, *ICD-10-CM*  

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Introduction

Substance use disorders are chronic, relapsing diseases with long-term functional impairment, and it is associated with a high impact on the health, social, and economic costs [1]. The global prevalence of substance use disorders is about 3.8%, and that of men having higher rate (7.5%) than that of woman (2.0%) [2]. Although the prevalence is predicted to increase in coming decades, most patients do not receive adequate treatment [3]. The early concept of drug addiction was illegal drug-seeking behavior and participation in illegal activities, and needs the involvement of the criminal justice system [4]. But centuries of efforts of punishing addictive behaviors have failed to take effect [5], and punishment alone cannot be a safety intervention for offenders with drug-use related criminal behavior [4].

Neurobiological advances have provided insight into the fundamental biological processes in drug or behavioral addiction [5]. Three major stages of the addiction cycle exist, with different sources of reinforcement correspond to activating different neurobiological circuit [6]. The binge-intoxication stage is associated with positive reinforcement accompanied by activating the mesolimbic dopaminergic pathway with increased extracellular concentrations of dopamine (DA), and triggers craving for drugs [5], instead of natural reward satiation [7]. The withdrawal-negative affect stage is associated with negative reinforcement [6], with much less sensitive of reward system to everyday stimuli and decreased release of dopamine [8], thus re-orientated to drugs and the cues [5]. On the other hand, the “dark side” of addiction also involves persistent recruitment of anti-reward systems that drive aversive states [9]. The anti-reward systems within the extended amygdala composed of “stress neurotransmitter,” including corticotropin-releasing factor, norepinephrine, orexin, vasopressin, and dynorphin [10]. The overactive anti-reward systems give rise to negative emotional or stress-like states [5] and increases in reward thresholds to all the stimuli during withdrawal from drugs of abuse, leading to the urge of recurrent drug use [9]. This distinct framework of function of brain reward systems and anti-reward systems in contrast form a cycle that progressively worse, resulting in compulsive use of drugs [11]. The preoccupation-anticipation or craving stage associated with the positive and negative reinforcement, and accompanied by functional changes in the prefrontal cortex regions due to down-regulating dopamine release [5]. The disrupted prefrontal regulatory circuits impair executive process [5], thus promoting the compulsivity of drug-taking in addiction [12].

The transform of viewpoint from traditional sanction-oriented public safety approaches for criminal behavior to the therapeutic strategies against addiction [4] was correlated with the change in the American Psychiatric Association’s Diagnostic and Statistical Manual of the Mental Disorders (DSM). The first edition of the DSM was published in 1952, and was the first formal attempt to provide a nosology to guide the diagnosis of mental disorders, including substance use disorders [13]. The DSM-I initially classified addiction as part of the sociopathic personality disturbance, and subsequent the DSM-II placed the addiction within “personality disorders and certain other non-psychotic mental disorders.” From the DSM-III to the DSM-IV-TR, the substance use disorders were on their distinctive chapter, with criteria and discrimination between dependence and abuse. The law has gradually relied on these DSM distinctions between defendants abusing substance and those dependent on substance phys-
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io logically and/or psychologically, and court orders for addicted persons to receive treatment became relatively common since 1970s [14]. But some debates and controversies still exist, in substance abuse/dependence [15], and the substance use disorder is still questioned and challenged by public views for addiction as being a social problem rather than an actual disease [16].

Changes from the DSM-IV to the DSM-5

The Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) was released at the American Psychiatric Association’s annual meeting in May 2013 and marked more than a decade’s efforts in revising the criteria for the diagnosis and classification of mental disorders [17]. The DSM-5 is expected to solve the problems in the DSM-IV, incorporate scientific advances, simplify the criteria without declined accuracy, and to enhance clinical use with more concise and amenable in primary care [18]. Here, we provide the major changes and general concept in substance-related disorders from the DSM-IV to the DSM-5.

Renaming the title of chapter

As with the changes from the DSM-IV to the DSM-5, the title was renamed from “substance-related disorder” in the DSM-IV, to “substance-related and addictive disorder” in the DSM-5. The term addiction represents for the addition of behavioral addiction to this chapter. Nonetheless, there are still debates and lack of consistent agreement about the title change [19], and the word addiction is not applied as disorder diagnostic terminology because of its uncertain definition and its potentially negative connotation.

Substance reclassification

In the DSM-IV, the substance-related disorder are grouped into 11 classes -- alcohol; amphetamine or similarly acting sympathomimetics; caffeine; cannabis; cocaine; hallucinogens; inhalants; nicotine; opioids; phencyclidine (PCP) or similarly acting arylcyclohexylamines; and sedatives, hypnotics, or anxiolytics. While in the DSM-5, amphetamines and cocaine are grouped together into “stimulants,” and phencyclidine (PCP) is incorporated into “hallucinogens” [20]. Nicotine-related disorders are renamed as tobacco-related disorders; nicotine dependence is recognized as a medical condition in the DSM of the APA. Tobacco dependence is recognized in the International Classification of Diseases (ICD) [21]. Those changes may reflect a desire to ensure a better alignment with the ICD, to facilitate DSM-ICD harmonization [22].

Elimination of distinction between dependence and abuse, in favor of a combined substance use disorder

To divide impulsive use and harmful use from the DSM-III through the DSM-IV-TR, the term of dependence and abuse are made in substance use disorder [13]. The DSM-IV required 3 of 7 criteria to meet for dependence, and 1 of 4 for abuse. Dependence forms one dimension of substance problem with physiologically or psychologically dependent on substance, while abuse is formed for another only with social and interpersonal consequence [19]. In addition, through the DSM-III-R to the DSM-IV-TR, the dependence diagnosis is hierarchically over abuse, such that any lifetime dependence diagnosis precludes the diagnosis for an abuse [23]. For many years, the law has been relied on these distinctions in determining defendants with substance use disorders for diversion, for dependence has been thought to be
less responsible and need for treatment, and abuse is considered as more responsible to their behavior and less deserving of treatment [14].

Three reasons exist to merge substance abuse and dependence together:

- The validity and reliability of the abuse criteria are much lower and variable than the dependence criteria [24].
- The hierarchy between dependence and abuse is not always obvious in every case [25]. Besides, the criterion sets for abuse and dependence symptom categories do not differ in their prevalence [23]. The overlap between these two distinctions may represent the same underlying substance use disorders, with different manifestations in different ways [14].
- The hierarchy between dependence and abuse leads to “diagnostic orphans,” that a person with substance use problems can meet two criteria for dependence but none for abuse, thus left the patient undiagnosed [26]. These findings suggest that the abuse and dependence criterion sets should be combined to form a unidimensional structure that across the severity spectrum.

The DSM-5 Substance-related Disorders Work Group wants to select a threshold for DSM-5 substance use disorders under the revised criterion sets that would maintain the overall prevalence of DSM-IV substance abuse and dependence diagnoses combined [14]. They finally chose the threshold of two or more criteria, for the more similar and agreement with the prevalence compared with the other thresholds [19].

**Removing legal problem, but adding craving**

The criterion of legal problem has been removed from the final criteria set in DSM-5 substance use disorders. Legal problems do not reflect either compulsive patterns of use or physiologic features [23]. Instead, they index antisociality which is more common in men and lack of gender invariance [27]. Those changes imply that substance-related illegal behavior is a better fit as a criterion for adolescent conduct disorder and adult antisocial personality disorder, but not as substance use disorder criteria [23]. Other reasons for removing criterion of legal problem include low prevalence, low discrimination, poor fit with other criteria, and little added information in item response theory analysis [19].

The criterion of craving has been added to DSM-5 substance use disorders. Craving is correlated positively to activity in brain regions including the nucleus accumbens, inferior frontal/orbitofrontal gyrus, and anterior cingulate [28]. While the equivocal benefit in adding craving criterion for diagnostic information and clinical significance, craving still plays a rôle in becoming a future biological treatment target [14]. Craving is also a dependence criterion in the ICD-10, so added craving criteria in the DSM-5 can increase the consistency between the DSM-5 and the ICD-10 [19]. Table 1 summarizes the changes of substance use disorder criteria from the DSM-IV to the DSM-5.

**Specifier modification**

In the DSM-IV, four remission specifiers have been applied after the criteria for substance dependence or abuse have not been present for at least one month. There are early full remission (at least 1 month but less than 12 months, without any criteria have been met), early partial remission (at least 1 month but less than 12 months, with one or more criteria have been met), sustained full remission (without any criteria have been met for 12 months or longer), and sustained partial remission (with one or more criteria have been met for 12 months or longer). But such a division for remis-
sion is complex and little used [19]. In the DSM-5, the remission specifiers are simplified into two categories according only to the time frame, and the term of partial remission has been removed. There are early remission (at least 3 months but less than 12 months, with none of the criterion in substance use disorder have been met except the criterion of craving) and sustained remission (for 12 months or longer, with none of the criterion in substance use disorder have been met, except the criterion of craving). The time division of three months has been chosen for the better outcome if retained abstinence for three months or longer, and the criterion of craving is an exception for remission specifiers as it is the core symptom of dependence and could persist for longer than other symptoms [19].

Another course specifier “on agonist therapy” in the DSM-IV has been replaced by the course specifier “on maintenance therapy” in the DSM-5, for the more appropriate description about the treatment in the case of opioid and tobacco use disorders, including agonist, partial agonist and antagonist therapy. The other course specifier “in a controlled environment” is retained and not been changed through the DSM-IV to the DSM-5, indicating that the person is in a restricted environment and the substance is unavailable.

The DSM-IV also includes physiological specifiers for tolerance and withdrawal which are associated with a higher risk for general medical problems and relapse, and these specifiers divide patients into “with physiological dependence” (with tolerance or withdrawal) or “without physiological dependence” (no evidence of tolerance or withdrawal). But due to inconsistent predictive value and poor clinical utility, these specifiers were eliminated finally in the DSM-5 [19].

As shown in Table 1, another issue is the severity indicators. Where available, severity speci-

| Table 1. The criteria of Substance use disorder from the DSM-IV to the DSM-5³ |
|---|---|---|
| DSM-IV criteria | DSM-5 criteria |
| Abuse: ≥ 1 criterion | Dependence: ≥ 3 criteria | Substance use disorders: ≥ 2 criteria |
| Neglect major roles to use | ✓ | ✓ | The Severity according to criterion counts: |
| Legal problems | ✓ | ✗ | Mild: The presence of 2 to 3 symptoms |
| Hazardous use | ✓ | ✓ | Moderate: The presence of 4 to 5 symptoms |
| Social/interpersonal problems related to use | ✓ | ✓ | Severe: The presence of 6 or more symptoms |
| Tolerance | ✓ | ✓ | |
| Withdrawal | ✓ | ✓ | |
| Used larger amounts/longer | ✓ | ✓ | |
| Repeated attempts to quit/control use | ✓ | ✓ | |
| Much time spent using | ✓ | ✓ | |
| Activities given up to use | ✓ | ✓ | |
| Physical/psychological/problems related to use | ✓ | ✓ | |
| Craving | New criterion in DSM-5 | ✓ | |

³ Adapted from references [20], [23] and [26]
Modifiers are given in the *DSM-5* for the purposes of guiding clinicians to rate the intensity, frequency, duration, symptom count, or other severity indicator of a disorder. Based on the number of symptom criteria met, the work group uses a criteria count as the severity indicators of substance use disorders, from mild (2 to 3 symptoms), moderate (4 to 5 symptoms), to severe (6 or more symptoms) [19].

**Modification of substance-specific disorders**

The *DSM* manual provides a table for diagnosis associated with substance class. Table 2 shows the changes of substance related disorders and substance classification form the *DSM-IV* to the *DSM-5*. In the *DSM-IV*, the assortment of substance induced disorders includes intoxication, withdrawal, psychotic disorders, mood disorders, anxiety disorders, sleep disorders, sexual dysfunction, intoxication delirium, withdrawal delirium, dementia and amnestic disorders. As with the classification changes of mental disorders in the *DSM-5*, the substance-induced mood disorder has been separated into bipolar disorders and depressive disorder, and the substance-induced dementia and amnestic disorders are merged into neurocognitive disorders. The intoxication delirium and withdrawal delirium were merged into one, as delirium. Obsessive-compulsive and related disorders are separated from anxiety disorders in the *DSM-5* (Table 2).

**Which classes of diagnoses of substance related disorders have been added or removed in the DSM-5?**

The *DSM-IV* does not include cannabis withdrawal, but cannabis has long been questioned whether can really cause physiological dependence or withdrawal. In addition, recent studies have been established the neurobiological basis with the clinical reliability, validity, time course, and the effect of various medications on cannabis withdrawal [29]. Cannabis withdrawal is also reported as common among treatment-seeking patients and is associated with relapse to dependence [30]. The *DSM-5* finally adds cannabis withdrawal in cannabis-induced disorders. The *DSM-IV* includes the caffeine withdrawal as a research diagnosis in the Appendix B, “Criteria Sets and Axes Provided for Further Study,” and there is only caffeine intoxication in the caffeine-related disorders. Based on accumulated evidences supporting the reliability, validity, and the clinical significance, the *DSM-5* work group has modified the *DSM-IV* research criteria, elevating caffeine withdrawal to an independent disorder of caffeine-related disorders in the *DSM-5* [19]. Other additions of the substance related disorders include cannabis intoxication/withdrawal-induced sleep disorders, stimulant intoxication/withdrawal-induced obsessive-compulsive and related-disorders, and tobacco withdrawal-induced sleep disorders (Table 2). In the *DSM-IV*, the withdrawal syndromes are not included in the hallucinogen/inhalant-related disorders, and those remain unchanged in the *DSM-5*, for insufficient evidence and further studies being needed [19].

The polysubstance dependence has been removed from the *DSM-5*. The *DSM-IV* characterizes the “polysubstance dependence” as who has been repeatedly using at least three groups of substance (not including caffeine and nicotine) during the same 12-month period, but no single substance predominated. Further, during the 12-month period, the dependence criteria are met for substances as a group but not for any specific substance when all the drugs of abuse are considered collectively. But few clinicians and researchers have used this label in a manner consistent with
<table>
<thead>
<tr>
<th>Substance class</th>
<th>DSM-IV</th>
<th>DSM-5</th>
<th>DSM-5</th>
<th>DSM-5</th>
<th>DSM-5</th>
<th>DSM-5</th>
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<tbody>
<tr>
<td>Alcohol</td>
<td>I/W</td>
<td>I/W</td>
<td>I/W</td>
<td>I/W</td>
<td>I→I/W</td>
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<tr>
<td>Caffeine</td>
<td>I</td>
<td>I</td>
<td>I</td>
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<td>I</td>
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<tr>
<td>Cannabis</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Hallucinogens</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
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<tr>
<td>PCP</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
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<tr>
<td>Inhalants</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Opioids</td>
<td>I→ deleted</td>
<td>I→I/W</td>
<td>I→I/W</td>
<td>I/W</td>
<td>I→I/W</td>
<td>I→I/W</td>
</tr>
<tr>
<td>Sedatives, hypnotics or anxiolytics</td>
<td>I/W</td>
<td>I/W</td>
<td>I/W</td>
<td>W</td>
<td>I/W</td>
<td>I→I/W</td>
</tr>
<tr>
<td>Amphetamine Cocaine Cocaine</td>
<td>Merged into Stimulants</td>
<td>I</td>
<td>I/W</td>
<td>I→I/W</td>
<td>I/W (New)</td>
<td>I/W</td>
</tr>
<tr>
<td>Nicotine Tobacco</td>
<td>Polysubstance deleted</td>
<td>I</td>
<td>I/W</td>
<td>I/W</td>
<td>I/W</td>
<td>I/W</td>
</tr>
<tr>
<td>Others (or unknown)</td>
<td>Others (or unknown)</td>
<td>I/W</td>
<td>I/W</td>
<td>I/W</td>
<td>I/W</td>
<td>I/W/P</td>
</tr>
</tbody>
</table>

The table was adapted from the *DSM-IV-TR* and the *DSM-5*.

X, The category is recognized in *DSM-5*; I, With onset during intoxication; W, With onset during withdrawal, I/W, either with onset during intoxication or with onset during withdrawal; P, the disorder is persisting; the arrow, the change from the *DSM-IV* to the *DSM-5*; the "new", the disorder is new and added in the *DSM-5*, the "deleted", the disorder is presented in the *DSM-IV* but deleted in the *DSM-5*.
the diagnostic manual [31]. The work group finally eliminates the polysubstance dependence in the DSM-5, not only for the poor utility, and also for the often misunderstanding as co-dependence on different substances [19]. Besides, the opioid intoxication-induced psychotic disorders and the opioid withdrawal-induced anxiety disorders have been removed in the DSM-5 (Table 2).

Adding non-substance-related disorders

An important distinction from the DSM-IV is that the DSM-5 substance-related and addictive disorders now include non-substance-related disorders. The DSM-IV characterizes pathological gambling as persistent and recurrent maladaptive gambling behavior and listed in the “impact-control disorders not elsewhere classified” [32]. There are growing evidences showing the similarities between pathological gambling and drugs of abuse in many aspects, including the biochemistry [33], neurocircuitry [34], genetics [35], and the treatment modalities [36]. In the DSM-5, the pathological gambling has been renamed as gambling disorder, and is reclassified to the “substance-related and addictive disorders.” This change reflects that the gambling disorder shares many features with substance-related disorders, supporting their grouping together as addictions [37], and for the purpose of improving further research efforts directed to the addictive behavior [32]. DSM-5 gambling disorder has also changed the diagnosis criteria by removing the criterion “illegal acts” in the DSM-IV, and its criteria count for the diagnosis has also been reduced from 5 to 4.

Other substance-related and addictive disorder for further study in the section III of the DSM-5

In the DSM-5, the official mental disorders with accepted clinical applicability are located in Section II of the manual. But “conditions for further study” exists in the section III including disorders that require future research and more scientific evidence but are not sufficiently well-established to be a part of the official classification of mental disorders for clinical use; these diagnostic criteria are included for the purpose of encouraging further studies. Substance/non-substance-related disorders in the section III (conditions for further study) include caffeine use disorder, internet gaming disorder, and neurobehavioral disorder associated with prenatal alcohol exposure [19].

Challenges in Substance-related and Addictive Disorders in the Future

Non-substance-related addictive behavior

Non-substance-related behavioral addiction has never been listed in the DSM until recently, as the DSM-5 firstly includes gambling disorder as the only condition in non-substance-related disorders in the chapter [38]. In the meanwhile, the DSM-5 also proposes internet gaming disorder as a condition needed for further study.

Contrary to the common belief for addiction to be dependent on psychoactive drugs, behavioral science experts believe that all entities can be considered as an addiction whenever a habit changes into an obligatory behavior despite adverse consequences [39]. These disorders have historically been considered as impulsive-compulsive problems or non-substance-related behavioral addictions, but growing evidence indicates that behavioral addictions resemble substance use disorders in many domains [40]. But impairment in social or occupational function should also be present to diagnose a behavioral addiction [39].
The gambling disorder is included for its being most thoroughly studied of the behavioral addiction, providing further insight into the relationship of behavioral addictions and substance use disorders [40]. In addition to the gambling disorder, the internet gaming disorder has also been included in section III of the DSM-5 for the large literature available on internet gaming addiction as a problematic condition, with mostly Asian cases/series of young males [19]. But further research is needed for reliability and validity of the diagnostic criteria, and for more evidence of biological factors in this disorder [19].

There are still other internet-related behaviors as addictive conditions, such as social networking and pornograph-viewing that are under scrutiny [38]. Non-internet-related technology (such as non-internet video/computer gaming or television viewing), may also be addictive that warrant consideration [41]. Besides, other form of behavioral addictions (including compulsive buying [42], sexual addiction [43], and love addiction [44]), have ever been presented. In a word, what behavior could be considered, or whether they should be labelled as an addiction is still an ongoing debate in the future [38].

**Debates on the new criterion “craving”**

As mentioned above, craving has been added to DSM-5 substance use disorder criteria for many reasons. The most important issues are to emphasize craving as a core symptom and a treatment target, and to encourage further research on the role of craving for substance use disorder criteria [19]. But four issues about craving are still under debates:

- The new criterion does not contribute much to the psychometric benefit and thus not likely to add much clinical significance [14]. Some studies have considered craving as redundancy of the other criteria [45].
- No consensus exists regarding the definition of craving [46], despite the term being used regularly by laboratory researchers and clinicians [47]. Craving has generally been regarded as a subjective experience of urgent and overpowering desire which motivates drug use, but other definitions have been modified by many authors and no unique definition exists at the present time [48].
- No single perfect measure of craving exists across all settings with measurement selection as a formidable challenge [49], and one key question is whether the measurement should comprise multiple response domains, including emotional experiences, cognitive experiences, overt behavior, and psychophysiological experiences [47].
- We are still awaiting the development of biological craving indicators for craving [45], although the DSM-5 work group suggests a craving query.

Nonetheless, as more attention and emphasis on the new criterion for craving as a possible core symptom for addiction, further research may deal with these unsolved problems, and better insight into craving may contribute to the target treatment strategies and the development of more efficient relapse prevention [46].

**Polysubstance**

The DSM-5 has abandoned the polysubstance dependence because of little utility and being often misunderstood as dependence on different substances simultaneously [19]. The polysubstance use is defined as using many substances within a period of time, and it is prevalent in substance users, particularly among adolescents [50]. In the U.S., between 15% and 39% of adolescents in school have been estimated to be classified as polysubstance users [50]. Polysubstance
use is also associated with high comorbid psychiatric/physical health problems [51], and early onset polysubstance use is an important risk factor for injection drug use in adulthood [52].

In our clinical practice, most of the patients with substance use is not only using one substance. They are often meeting the criteria of substance use disorder for more than one substance class simultaneously, but this condition cannot point out in the DSM-5 diagnostic system. In addition, research to prevent and to treat of polysubstance use is still under-explored, but benefit may be obtained from the efforts of doing clinical research targeting specific polysubstance use and risk profiles [51]. Whether to include polysubstance use disorder as a unique disease diagnosis is an important issue to be discussed, not only for the high prevalence and important clinical profile, and also for promoting clinical understanding and further research.

**Using ICD-10-CM Codes for Substance-related Disorders of the DSM-5**

In this overview on substance use disorders in the DSM-5, a brief section covering on the ICD is appropriate and necessary because most, if not all, hospitals in Taiwan are adopting the ICD system for the purpose of statistics and insurance reimbursement. Therefore, the authors here would like to discuss the ICD-10-CM codes briefly.

**A brief ICD history**

The ICD system has a long history of development and can be traced back to 1893, when the French physician J. Bertillon first introduced the Bertillon Classification of Causes of Death to the world [53]. After several decades of evolution, the World Health Organization took responsibility for preparing and publishing the revisions since 1946, and subsequently published the ICD-6 in 1949, which was the first to contain a section on mental disorders [54]. Beginning from 1900 with the ICD-1 to 1990 with the ICD-10, the ICD is nowadays the most widely used classification of diseases in the world. The system of ICD is not only for classifying morbidity and mortality in statistical purposes, and it is also useful for applications in many fields such as reimbursement, administration, epidemiology, and health services research [55].

**Clinical utility of the ICD-9-CM and the ICD-10-CM**

As with the adopted trends over the world that WHO members agree to use as the basis for reporting of health statistics and for consistency [56], the U.S. and Taiwan transited from the ICD-9-CM to the ICD-10-CM since October 2015 and January 2016, respectively. Therefore, we should understand the ICD-9 and the ICD-10 in clinical practice.

The ICD-9 was designed in 1970s and was adopted thereafter by many countries around the world [53]. To make the application of the ICD-9 appropriate to the American healthcare settings, the U.S. National Center for Health Statistics and the Council on Clinical Classifications modified the ICD-9 as the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) [57]. This modified version introduced a fifth-digit numeric code for classification with increased specificity, and contains more than 12,000 diagnostic and 3,500 procedure codes [55]. The ICD-9-CM has an alphabetic or numeric first digit and the remaining digits are numeric, with minimum of three digits to a maximum of five digits [57]. The ICD-9-CM codes diseases with the first 3 digits describing category, and
each character beyond the first 3 providing more specificity [54]. For substance-related disorder, the substance use disorders and substance-induced disorder have been considered to be different categories and received distinct first-3-digit codes (Table 3).

Principally, the substance dependence has been coded as 304.x0 (expect for alcohol dependence (303.90) and nicotine dependence (305.1)), and the substance abuse is coded as 305.x0. For substance induced disorders, intoxication (292.89), withdrawal (292.0), delirium (292.81), persisting dementia (292.82), persisting amnestic disorders (292.83), psychotic disorders (292.1X), mood disorders (292.84), other disorders (292.89, including anxiety disorders, sleep disorders, sexual dysfunction and persisting perceptive disorders), and disorders not otherwise specified (292.9) all have been coded as 292.XX, except for alcohol intoxication (303.00) and other alcohol-induced disorders (291.xx). But the coding system for substance use disorders is too complex and complicated to find the consistency between the codes and the representing disorders easily.

The ICD-10 was released in 1990, and then with modification as the ICD-10-CM in 2003 [53]. Compared to the 3 to 5 numeric digit system of the ICD-9-CM, the ICD-10-CM introduces alphanumeric codes, with the first digit being an alphabet (any letter except “U”), second digit always numeric, and 3rd to 7th digits being alpha or numeric, with totally 3 to 7 digits consisting of more different codes and permitting greater coding specificity [57]. The ICD-10 classification system also incorporates V codes (factors influencing healthcare) and E codes (external causes of injury) into the main classification and totally contains 21 chapters and other supplementary classifications [54]. The ICD-10-CM has the similar structure with the ICD-9-CM, for the first 3 digits categorizing the disease and the 4th to 6th digits describing cause, anatomical site, and severity; and the 7th being an extension [57].

**ICD-10-CM diagnostic code for substance-related disorders**

In the ICD-10-CM, each disorder is divided into three sections, with the first section consisting of the main clinical features, the second section the generally diagnostic guidelines, and the third section the differential diagnosis [56].

The substance-related disorders in the ICD-10-CM have been coded with the format F1X.XXX. As showed in Figure 1, the first digit “F” represents the “mental, behavioral and neurodevelopmental disorders” in the chapter 5, and the second digit “1” represents the mental or behavioral disorder due to psychoactive substance use. The third digit represents the substance class, labeled from 0 to 9. After the decimal point, the subsequent digits manifests more information about nature and severity, including abuse or dependence, uncomplicated or with intoxication, with induced mood disorders, psychotic disorders of other disorders. For example, for a patient diagnosed as alcohol abuse with alcohol-induced psychotic disorder with hallucinations, the ICD-10-CM code is F10.151. Table 3 reveals the substance class and codes of related disorders, from the DSM-IV/ICD-9-CM to the DSM-5/ICD-10-CM.

**Challenges in the ICD-10-CM code for substance-related disorders of the DSM-5**

As with the DSM evolution, the ICD-10-CM provides new code system to apply in the substance use disorders. But two major inconsistencies exist between the DSM-5 and the ICD-10-CM classification:

- The DSM-5 merges substance abuse and dependence together as substance use disorders, with
Table 3. Substance class and codes: from DSM-IV/ICD-9-CM to DSM-5/ICD-10-CM

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<thead>
<tr>
<th>Substance-related disorders</th>
<th>DSM-IV with ICD-9-CM code</th>
<th>DSM-5 with ICD-10-CM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol-related disorders</td>
<td>Alcohol use disorders: (D) 303.90, (A) 305.00</td>
<td>Alcohol-related disorders (F10.bcx)</td>
</tr>
<tr>
<td>Amphetamine-related disorders</td>
<td>Amphetamine induced disorders: (I) 292.89, (W) 292.0, (ID) 292.81, (P) 292.1x, (M) 292.84, (others) 292.89, NOS (292.9)</td>
<td>Stimulant-related disorders (F14.bcx)</td>
</tr>
<tr>
<td>Cocaine-related disorders</td>
<td>Cocaine induced disorders: (I) 292.89, (W) 292.0, (ID) 292.81, (P) 292.1x, (M) 292.84, (others) 292.89, NOS (292.9)</td>
<td>Cocaine-related disorders (F15.bcx)</td>
</tr>
<tr>
<td>Caffeine-related disorders</td>
<td>Caffeine use disorders: (X) 305.90, (A) 305.20</td>
<td>Caffeine-related disorders (F15.bcx)</td>
</tr>
<tr>
<td>Cannabis-related disorders</td>
<td>Cannabis use disorders: (D) 304.30, (A) 305.20</td>
<td>Cannabis-related disorders (F12.bcx)</td>
</tr>
<tr>
<td>Hallucinogen-related disorders</td>
<td>Hallucinogen induced disorders: (I) 292.89, (PPD) 292.89, (ID) 292.81, (P) 292.1x, (M) 292.84, (others) 292.89, NOS (292.9)</td>
<td>Hallucinogen-related disorders (F16.bcx)</td>
</tr>
<tr>
<td>Phencyclidine-related disorders</td>
<td>Phencyclidine induced disorders: (I) 292.89, (ID) 292.81, (P) 292.1x, (M) 292.84, (others) 292.89, NOS (292.9)</td>
<td>Phencyclidine-related disorders (F17.bcx)</td>
</tr>
<tr>
<td>Inhalant-related disorders</td>
<td>Inhalant induced disorders: (I) 292.89, (ID) 292.81, (PD) 292.82, (P) 292.1x, (M) 292.84, (others) 292.89, NOS (292.9)</td>
<td>Inhalant-related disorders (F18.bcx)</td>
</tr>
<tr>
<td>Nicotine-related disorders</td>
<td>Nicotine use disorders: (D) 305.1</td>
<td>Tobacco-related disorders (F17.bcx)</td>
</tr>
</tbody>
</table>

(to be continued)
The concept of drug addiction has been transformed from illegal drug-seeking behavior to a chronic brain disease, and the transform of viewpoint has also correlated to the change in DSM diagnosing system. From the DSM-IV to the DSM-5, the most remarkable change is merge substance abuse and dependence together, and the replacement of abuse and dependence categories with independent class. However, in the ICD-10-CM, cocaine is in an independent class, whereas amphetamine and caffeine are in the other class (other stimulants, including caffeine). As more effort to the DSM-ICD harmonization there may be a solution to these inconsistencies in the future.

**Conclusion**

The concept of drug addiction has been transformed from illegal drug-seeking behavior to a chronic brain disease, and the transform of viewpoint has also correlated to the change in DSM diagnosing system. From the DSM-IV to the DSM-5, the most remarkable change is merge substance abuse and dependence together, and the replacement of abuse and dependence categories with

<table>
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<th>DSM-IV with ICD-9-CM code</th>
<th>DSM-5 with ICD-10-CM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opioid-related disorders</strong></td>
<td>Opioid use disorders: (D) 304.00, (A) 305.50</td>
</tr>
<tr>
<td></td>
<td>Opioid induced disorders: (I) 292.89, (W) 292.0, (ID) 292.81, (P) 292.1x, (M) 292.84, (others) 292.89, NOS (292.9)</td>
</tr>
<tr>
<td><strong>Sedative, hypnotic or anxiolytic-related disorders</strong></td>
<td>Sedative, hypnotic or anxiolytic use disorders: (D) 304.10, (A) 305.40</td>
</tr>
<tr>
<td></td>
<td>Sedative, hypnotic or anxiolytic induced disorders: (I) 292.89, (W) 292.0, (ID, WD) 292.81, (PD) 292.82, (PAD) 292.83, (P) 292.1x, (M) 292.84, (others) 292.89, NOS (292.9)</td>
</tr>
<tr>
<td><strong>Polysubstance-related disorders</strong></td>
<td>Polysubstance use disorders: (D) 304.80 Polysubstance induced disorders: X</td>
</tr>
<tr>
<td><strong>Other (or unknown)-related disorders</strong></td>
<td>Other (or unknown) use disorders: (D) 304.90, (A) 305.90</td>
</tr>
<tr>
<td></td>
<td>Other (or unknown) induced disorders: (I) 292.89, (W) 292.0, (ID) 292.81, (PD) 292.82, (PAD) 292.83, (P) 292.1x, (M) 292.84, (others) 292.89, NOS (292.9)</td>
</tr>
</tbody>
</table>

The left side is the DSM-IV-TR categories for substance related disorders with accompanied ICD-9-CM code; the right side is the DSM-5 categories for substance related disorders with accompanied ICD-10-CM code.

- Some differences of substance classification exist between those two nosologies. In the DSM-5, stimulants include amphetamine and cocaine as same class, and caffeine is another independent class. However, in the ICD-10-CM, cocaine is in an independent class, whereas amphetamine and caffeine are in the other class (other stimulants, including caffeine). As more effort to the DSM-ICD harmonization there may be a solution to these inconsistencies in the future.
Despite the DSM-5 diagnosing system solves the problems of the DSM-IV and enhances the clinical utility and research advance, several challenges and controversies still exist in the chapter of substance-related and addictive disorder, including the debate on non-substance related disorders, adding the new criterion “craving,” and eliminating polysubstance dependence.

The ICD is nowadays the most widely used classification and coding systems for diseases. The ICD-10-CM provides a more principal and easier way to code substance use disorder, but the ICD-10-CM remains some difference to the DSM-5. Perhaps the future research and expert discussion could improve these international diagnosing system, making them more suitable and perfect, and to improve the DSM-ICD harmonization.

Acknowledgement

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References


30. Cornelius JR, Chung T, Martin C, Wood DS, Clark DB: Cannabis withdrawal is common among treatment-seeking adolescents with cannabis dependence and major depression, and is associated with rapid relapse to dependence. Addict Behav 2008; 33: 1500-5.


55. Topaz M, Shafran-Topaz L, Bowles KH: ICD-9 to ICD-10: evolution, revolution, and current debates in


