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REVIEW ARTICLE

Categorization of psychoactive substances into "hard drugs" and "soft drugs": a critical review of terminology used in current scientific literature

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ABSTRACT

Background: Precise terminology and definitions are important components of scientific language. Although the terms "hard drugs" and "soft drugs" are used widely by professionals, neither the International Classification of Diseases nor the Diagnostic and Statistical Manual classify psychoactive substances into the categories "hard" and "soft."

Objectives: To analyze the occurrence of the terms "hard drugs" and "soft drugs" in recent scientific literature and to establish the degree of consensus in labeling psychoactive substances as "hard" or "soft."

Methods: A critical review of scientific papers listed in PubMed and Scopus between 2011 and 2015. Three hundred thirty-four articles were initially identified as potentially relevant for review, 132 of which were included in the final analysis.

Results: One hundred twenty-four articles used the term "hard drugs" and 84.7% provided examples of substances considered "hard." Forty-four articles used the term "soft drugs" and 90.9% provided examples of substances considered "soft." Citations of relevant articles supporting categorization as "hard" or "soft" were not given in 90% of the articles. The authors often provided no or only very sparse information on their reasons for considering specific drugs as "hard" or "soft."

Conclusions: Although it initially appeared that there is substantial agreement as to which psychoactive substances should be regarded as "hard" and "soft," closer inspection shows that the dividing line is blurred without clear criteria for categorization. At this time, it remains uncertain whether these terms should persist in the scientific literature. We therefore recommend these terms should be avoided or, if used, be clearly and precisely defined.

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Introduction

Precise terminology and definitions are important components of scientific language. If their meaning is clear, they help in understanding research findings, avoiding confusion and risks, and communicating results to healthcare professionals in clinical practice.

However, the terminology in the field of drug addiction is often unclear since the terms used are often confusing or contradictory. Several attempts have been made to standardize usage and to reduce misunderstandings and confusion, but many challenges still remain, such as the blurred dividing lines between popular and scientific definitions of key terms (1). Popular terms are used in scientific presentations, and scientific terms gradually undergo a process of popularization. A few examples that illustrate such overlaps may be pointed out with marijuana (e.g., "grass" vs. cannabis in public vs. research communication, respectively) (2), amphetamine-type stimulants ("ecstasy" vs. MDMA) (3), or newer synthetic drugs ("bath salts" vs. synthetic cathinones) (4).

The terms "hard drugs" and "soft drugs" are popular in both lay language and the media. They also appear in respectful international multimedia news agencies (5), which, conversely, may have an impact on disseminating the terms in the public. In addition, these terms have been used in the medical literature since at least 1968 (6), and they are even found in current systematic reviews (7). We believe Denise Kandel's work in the 1970s had a significant influence on this terminology although she did not explicitly use the terms (8), namely by initiation of the "gateway hypothesis" in which certain drugs (e.g., alcohol or tobacco cigarettes) tend to serve as a gateway for the use of other substances (e.g., cannabinoids) which itself tends to precede the use of other illicit drugs (9). Finally, the origins of the terms can be traced back to specific national legislative documents (10–12). In the Netherlands, for example, the

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regulations on drugs are laid down in the Opium Act (10), which, according to some authors, implicitly draws a distinction between "hard drugs" and "soft drugs" by separating the market and allowing controlled use of specified substances while possession of others is a crime (13).

Although they are used widely by professionals, the terms "hard" and "soft" have not been standardized. Neither the International Classification of Diseases (ICD-10) nor the Diagnostic and Statistical Manual (DSM-5) classify psychoactive substances into the categories "hard" and "soft" (14,15). It is generally assumed that the terms are ambiguous and that a scientific basis for such a classification is lacking (16).

Addictive behaviors can be viewed as a social phenomenon, and their definitions and classifications as social constructs (17). Social constructs can be indifferent or interactive (18). Indifferent constructs do not affect the object of conceptualization, but this might be applied to the "neutral" classification of psychoactive substances using the ICD-10 and DSM-5 criteria. The terms "hard drugs" and "soft drugs" are, however, interactive because they are used by people and influence the experience of those taking them, i.e., "hard drug" and "soft drug" users, as well as those who interact with them in different ways. Furthermore, the usage of these terms may have an impact on public perception, interpretation of research findings, and management of substance-use disorders.

The crucial question is how and why authors use the terms "hard drugs" and "soft drugs" in the current scientific literature, in what contexts, and what they actually mean by them. To our knowledge, no systematic review has yet been conducted in this area.

Aims

The aim of this review was to analyze the occurrence patterns of the terms "hard drugs" and "soft drugs" in the current scientific literature to establish the degree of consensus in labeling specific psychoactive substances with these terms.

Methods

Quantitative content analysis of selected scientific papers published from 2011 to 2015 was performed to analyze the occurrence of the terms and the patterns of their use for the categorization of psychoactive substances.

Literature search

To generate data for the analysis, we conducted literature searches in PubMed and Scopus in September 2016. The search included the keywords "hard drug*" OR "soft drug*" in the title or abstract of the articles published in extenso or online between January 1, 2011 and December 31, 2015. The search period of the past five years was chosen for depiction of the most recent approach to the categorization. After the initial search, titles and abstracts were screened, followed by review of the full text of the remaining articles. All the articles were independently reviewed by two authors and discrepancies were resolved by consensus.

Papers were excluded if they did not use the keywords in the context of psychoactive substances. Full texts using the keywords but not providing examples of specific drugs and articles with unclear conclusions on the labeling of specific substances were also excluded. Since we intended to obtain a broad spectrum of different authors' views on categorization, only the first published articles from series of articles were included. No language limitations were applied.

Three hundred thirty-four articles were initially identified as potentially relevant for the review. Based on the search criteria and after additional review of the abstracts, 132 of the articles were included in the final analysis (Figure 1 and Table 1) (19–150).

Analysis of terms

To analyze the terminology, we recorded all substances identified by authors as "hard drugs" or "soft drugs" either explicitly by labeling specific substances or implicitly by direct assignment as opposed to labeled substances. To obtain a more precise delineation between the many substances identified, we allocated them into 10 groups following the ICD-10 and DSM-5 classifications: alcohol, caffeine, tobacco/nicotine, anxiolytics/hypnotics, opioids, cannabinoids, cocaine, amphetamine stimulants, hallucinogens, and volatiles (14,15). Unexplained groups of substances identified in articles such as "illicit drugs," "injection drugs," "stimulants," and "depressants" were analyzed separately.

Results

Based on our selection criteria, all 132 articles listed at least one example of "hard" or "soft" drugs. Only 44 (33.3%) articles provided examples of both "hard" and "soft" drugs. The term "hard drugs" was used in 124 (93.9%) articles, 84.7% of which provided any example of substances considered as "hard." Only 44 (33.3%) articles used the term "soft drugs," 90.9% of which provided any example of substances considered "soft."

Table 2 shows the occurrence of major substance groups categorized by examples of specific substances as either as "hard" or "soft" drugs in the final sample of articles. Only 17

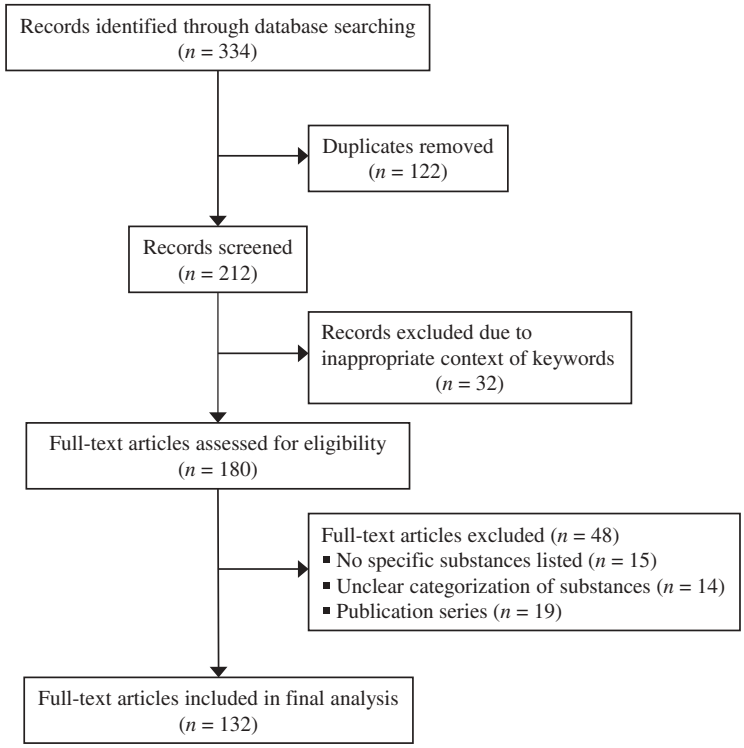

Figure 1. Article selection.

Table 1. Final sample of publications.

	Number of articles	%
Year of publication		
2011	26	19.7
2012	30	22.7
2013	23	17.4
2014	26	19.7
2015	27	20.5
Journal type		
Substance/addiction-related	32	24.2
Other biomedical	81	61.4
Non-biomedical	19	14.4
Publication type		
Original article	116	87.9
Other	16	12.1
Total	*132*	*100.0*

Table 2. Occurrence of categorized substance groups in the final sample of articles.

	Number of articles	%
Alcohol	45	34.1
Caffeine	1	0.8
Tobacco/nicotine	22	16.7
Anxiolytics/hypnotics	20	15.2
Opioids	88	66.7
Cannabinoids	67	50.8
Cocaine	91	68.9
Amphetamine stimulants	67	50.8
Hallucinogens	44	33.3
Volatiles	23	17.4

(12.9%) of the 132 articles covered more than half of the major substance groups in their categorization of specific substances, and 53.0% of the articles categorized specific substances from three major groups of substances or fewer.

Figure 2 shows, by major substance group, the categorization of specific substances into "hard" or "soft" drugs as assigned by authors in the 132 articles. Newly discovered drugs (e.g., benzylpiperazine or mephedrone) were not mentioned in any of the articles, although gammahydroxy-butyrate (GHB) appeared in 13 articles and was categorized exclusively as a "hard drug." Only 13 (9.8%) of the articles referred to an external bibliographic source that supported their categorization of substances and only 24 (18.2%) of the articles provided any specific rationale for categorization as such.

Discussion

The occurrence of the terms "hard drug" and "soft drug" in a sample of 132 scientific articles concerned with the use of psychoactive substances published between 2011 and 2015 shows that these terms are in common use.

Most authors used the term "hard drug" for opioids, anxiolytics/hypnotics, amphetamines, cocaine, hallucinogens, volatiles, and GHB. The term "soft drug" was primarily used for cannabinoids, alcohol, and tobacco.

An incomplete list of substances for a particular category ("hard" or "soft") and insufficient categorization of all major substance classes according to ICD-10 or DSM-5 was found in most of the studied articles. This is underlined by the finding that 36 (27.3%) articles categorized vaguely defined groups of substances, such as illicit or injection

Figure 2. Assignment of specific substances as "soft" or "hard" drugs in the final sample of articles. Numbers in the bars are the number of articles in which the substance was identified as a "soft" or "hard" drug, respectively. For example, 63/4 in the cannabinoids bar means that marijuana or hashish was categorized as "soft" in 63 articles and as "hard" in 4 articles. *No further explanation or examples of specific substances given by authors.

drugs, stimulants, and depressants, as "hard drugs" without offering any specific examples. Notably, authors of 17 (12.8%) of the articles merely distinguished other illicit drugs from marijuana when speaking about "hard drugs."

The reason for categorizing substances was not clear in most of the articles, and authors often gave no or only little information on how they reached their decision that a drug is "hard" or "soft." Citations of relevant articles supporting categorization were not given in 90% of the articles. Moreover, 103 (78.0%) of the articles provided neither citations nor rationale for what they meant by "hard" or "soft" drugs. Finally, 23 (17.4%) of the articles included the terms in quotations which possibly showed the authors had no intention to mislead readers and implied their agreement that the terms were somewhat ambiguous. We think that these findings may indicate the uncertainty of the authors themselves within the categorization of substances into "hard" and "soft."

Caffeine was considered in only one article and was labeled as a "soft drug" (62). Although caffeine addiction (caffeine substance-use disorder) is not classified in DSM-5, it is still classified in ICD-10) (14,15). Its use is very prevalent (151) and may have complications such as intoxication and a withdrawal state (15). From this point of view, it is not clear why it was hardly ever categorized in any of the 132 articles we reviewed.

In the articles where alcohol was mentioned, it was labeled as "soft drug" by most authors (93.3%). This is surprising especially when comparing alcohol with benzodiazepines, which were categorized as "hard drugs" in 85.7% of the articles where they were mentioned. It is of note that in another study using a card sorting test in a sample of university students, both alcohol and benzodiazepines were substances with no consensus on categorization as "hard" or "soft" (62). Many experts see alcohol as a most harmful drug, and benzodiazepines are perceived as far less harmful (152). Alcohol, like the benzodiazepines, acts on the GABA-A (γ-aminobutyric acid) receptors in the brain (153,154) and both demonstrate significant clinical parallels in addiction and addictive potential (153,155). We feel that the difference between alcohol and benzodiazepines with regard to categorization as "hard" or "soft" in our review may possibly be due to inadequate differentiation from other substances and also partly due to the social acceptance of alcohol. Alcohol was not categorized in seven of the 12 articles where benzodiazepines were categorized, and benzodiazepines were not categorized in 40 of the 45 articles where alcohol was

categorized. In the remaining five articles where both were categorized, alcohol was labeled as a "hard drug."

Heroin was mentioned in 61.4% of the articles and was labeled exclusively as "hard drug." However, only eight of the articles gave any specific rationale for categorization such as:

(1) Monshouwer et al. (2011): "…hard drugs […] are considered to pose an unacceptable risk to public health, such as heroin…" (39).
(2) Tennsted and Saint-Remy (2011): "cannabis, which is traditionally recognized as a soft drug (as it entails no physical addiction nor death from overdose), as opposed to hard drugs such as heroin […]…" (43).
(3) Blomqvist et al. (2012): "…addiction to what has in this study been classified as "hard" drugs (heroin […]), is seen as a 'disease' that the individual user is struck by, and which she/he cannot resolve, at least not without professional help […] 'hard' drugs […] are perceived as a very large threat to society…" (46).
(4) Palamar et al. (2012): "harder, more dangerous drugs […] appear to remain associated with higher levels of stigma […] drugs that are more harmful and addicting, such as heroin…" (60).
(5) Wouters et al. (2012): "…hard drugs (heroin […]), which are viewed as more hazardous to health…" (73).
(6) Samuelsson et al. (2013): "…hard narcotic drugs, that is, heroin […] which are judged to be very dangerous to society, highly addictive and very difficult to quit…" (92).
(7) Vos et al. (2013): "Soft drugs […] are regarded to pose fewer risks to public health than hard drugs such as heroin…" (97).
(8) Kelly and Rasul (2014): "…hard drugs, known as 'Class-A' drugs in England (intended to indicate increasing potential harm to users) include […] heroin…" (111).

Even in this very small sample of eight publications, the authors use at least five different aspects to arrive at the categorization as a "hard drug": (1) addictive potential; (2) physical addiction with physical withdrawal state; (3) assumed harm to user; (4) poor prognosis of addiction remission; and (5) assumed harm to public health and society.

Our critical review of 132 articles raises important questions with regard to the categorization of psychoactive substances as "hard" or "soft" drugs. The terms are often used in the literature but explanations for categorization as "hard" or "soft" are rarely given. "Hardness" or "softness" may refer to different aspects of psychoactive substances and can be perceived differently when comparing only two or a small number of specific drugs rather than the entire spectrum of substances. The authors' decisions seem to be often––but not exclusively––based on subjective clinical impressions that result in statistical uncertainty into scientific publications, which in turn brings confusion into evidence-based medicine (98).

Inconsistencies in the published terminology may lead to confusion in clinical practice when specific substances are perceived differently with regard to their relationship with etiology, clinical picture and course, and the influence these considerations have on diagnostics, therapy and prognosis of different disorders. Furthermore, vague or inadequate usage of the terms by the media might have a negative impact on the views of public on the problems related to psychoactive substances. Critical analysis of terminology would be therefore needed to enhance the internal consistency of scientific publishing and to improve the application of research results in clinical practice. For example, much discussion and debate was required before more standardized terminology for the area of "quality of life" research was achieved (156). We would need a similar approach if we wanted to arrive at more standardized criteria for the categorization of substances as "hard" and "soft" drugs and to consolidate scientific language in addiction research and avoid confusion and associated risks. From our point of view, the acceptable and correct use of the categorization in research, publishing, and clinical practice currently remains an unresolved issue.

Limitations

Our review focused on a quantitative analysis of the terms "hard drugs" and "soft drugs" in the literature. Because only a small number of articles we selected provided reasons for assignment to these categories, we were unable to perform systematic qualitative review. Moreover, with a few exceptions, individual articles did not directly compare specific substances within the selected categories ("hard" or "soft") as this was not part of their aims. Our findings should therefore be viewed more as a collection of opinions than a measure of consensus.

Conclusion

The terms "hard" and "soft" drugs have been widely used in the scientific literature over the past five years. Although it initially appears that there is substantial agreement as to which psychoactive substances should be regarded as "hard" and "soft" drugs in the 132 articles we reviewed, closer inspection shows that the dividing line is often blurred. Authors often used only partial lists of known

substances in different categories and did not categorize all of the main substance classes according to ICD or DSM. Authors also gave insufficient information regarding their criteria for deciding whether a drug was "hard" or "soft," and citations supporting categorization were missing in 90% of the articles.

Based on our results, the distinction between "hard" and "soft" drugs in the published literature remains unclear for at least three reasons. First, consensus has not yet been reached on the complete range of substances requiring categorization. Second, grouping of substances into specific "hard" or "soft" category within their relation to other drugs is hardly ever considered. Third, thoroughly discussed and precisely defined criteria of "hardness" and "softness" are currently missing.

To avoid confusion in the future, we recommend not using the terms "hard drugs" and "soft drugs" in scientific publications unless adequately clarified and precisely specified by authors. In addition, the question whether there is a place for these terms in scientific literature at all is also relevant and should be a subject of a broader scientific discourse. Therefore, we suggest that editors and reviewers are cautious when they encounter these terms within the publishing process.

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