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# Comorbid drug use disorders and eating disorders – a review of prevalence studies

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ABSTRACT

AIMS – This study reviews literature on comorbidity of drug use disorders (DUD) and eating disorders (ED). The article updates knowledge on the occurrence of comorbidity of these diagnoses. METHODS – The databases Embase, Medline and PsycInfo were searched for studies published between 1990 and May 2011, with combinations of the terms 'eating disorder', 'substance-related disorder', 'drug dependence', 'drug abuse', 'drug addiction' and 'substance abuse'. This generated altogether 596 studies. Studies in which diagnostic DUD and ED were not assessed in the same sample or the result was not given in percentages were excluded. Thirteen studies remained. RESULTS – In 11 of the 13 studies, the participants were initially diagnosed with an eating disorder. The prevalence of lifetime drug use disorders varies from 8–43 %. In two studies, DUD is the initial diagnosis, and the participants report 14 % concurrent and 27.3 % lifetime ED. The most prevalent co-occurring diagnoses tend to be bulimia nervosa/bingeing-purging anorexia nervosa, and stimulants/cannabis disorders. CONCLUSIONS – The lifetime prevalence percentages of eating disorders in people with drug use disorders (and vice versa) are higher than in the general population. The results indicate that the field of drug disorder treatment and research could benefit from paying closer attention to the risk of eating disorders.

KEY WORDS – Drug use disorder, eating disorder, anorexia nervosa, bulimia nervosa, comorbidity, review article.

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## Introduction

Many researchers have investigated the relationship between substance use and eating disorders over the last three decades. These reviews have highlighted co-occurrence of eating and substance problems (Krahn 1993); comorbidity of eating disorders and substance use/abuse (Holderness et al. 1994); and comorbidity of substance use disorders and eating disorders (Harrop & Marlatt 2010). They have all focused on females in clinical or community settings. Briefly summarised, the reviewers conclude that there is an association among women between bulimic behaviour/bu-

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limia/non-restricting type of anorexia and an increased level of substance use/abuse, especially alcohol. Comorbid substance use disorders and eating disorders among adolescents have also been reviewed (Courbasson et al. 2010). In such studies, the categories of alcohol and drugs have to a large extent been collapsed (substance use/substance use disorders – SUD) or the reviews discuss only alcohol, obscuring the potential relationship between the use of particular substances/drugs and eating disorders. One recent meta-analysis on eating disorders and the *use* of drugs (Calero-Elvira et al. 2009) finds a small but significant increase of illicit substances (cannabis and opiates in particular) among the eating disorder population.

Until now, no reviews have looked specifically at the double diagnosis of eating disorder and drug use disorders. From a drug field perspective, this focus is valuable in raising awareness of eating disorders among drug disorder patients. This phenomenon has been given less attention in both research and clinical work (see, for example, Bonfa et al. 2008).

Several reviewers have commented on the problem of comparing studies that use different criteria for both substance abuse and eating disorders (for instance, Holderness et al. 1994; O'Brien & Vincent 2003; Calero-Elvira et al. 2009). Different assessment techniques can generate different categories, although this is not always made clear. My article attempts to address this problem by focusing on studies that apply the standard diagnostic systems (only the American Diagnostic and Statistical Manual of Mental Disorders DSM is used).

*Diagnoses*

Diagnostic eating disorders include Anorexia Nervosa, Bulimia Nervosa, Eating Disorders Not Otherwise Specified (DSM-IV-TR 2000) and Binge Eating Disorder.[1] *Anorexia Nervosa* (AN) is characterised by a low body mass index, intense fear of gaining weight, a distorted body image and amenorrhea. AN is diagnostically divided into restricting and binge-eating/purging subtypes. *Bulimia Nervosa* (BN) is marked by recurrent episodes of binge eating, recurrent inappropriate behaviour in order to prevent weight gain (such as vomiting, use of laxatives, excessive exercise, fasting), and a self-evaluation that is unduly influenced by body shape and weight. *Eating Disorders Not Otherwise Specified* (EDNOS) are applied to people who meet some, but not all, of the diagnostic criteria for AN or BN. For example, one may fulfill most of the criteria for Anorexia Nervosa but still retain a normal menstrual cycle. *Binge Eating Disorder* (BED) is a category within EDNOS, distinguished by repeated episodes of binge eating, including unusually large amounts of food and a sense of loss of control, and no compensatory behaviours (DSM-IV).

Diagnostic substance-related disorders according to DSM-IV-TR (2000) include the abuse or dependence on amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids, phencyclidines (PCP), sedatives/hypnotics/anxiolytics (such as benzodiazepines, barbiturates), and polysubstance. Abuse of or dependence on any of these drugs will be included in drug use disorders (DUD). DSM-IV also includes alcohol abuse or dependence under the heading of substance-related disorders.

*Etiology*

The explanations for the comorbidity of eating disorders and substance use disorders have most recently been discussed in terms of common or causal etiology. Most researchers have proposed not just one but several explanations for the comorbidity, often in both categories of shared and causal etiology (for example, Carbaugh & Sias 2010; Wolfe & Maisto 2000; Holderness et al. 1994). Personality traits such as novelty-seeking and reward sensitisation (Calero-Elvira et al. 2009) and impulsivity (Thompson-Brenner et al. 2008; Lacey 1993) have been suggested as shared factors for eating disorders (BN in particular) and substance use. High interpersonal sensitivity (Carbaugh & Sias 2010) and neuroticism (high levels of negative affect such as depression and anxiety, low self-esteem) (Baker et al. 2007) have also been put forward as common factors, as has insufficient affect regulation (Root et al. 2010b). Insecure attachment has been seen as a common trait (although differently resolved) in both eating disorder and drug disorder individuals (Miljkovitch et al. 2005). A common biological vulnerability, too, has been suggested (Carbaugh & Sias 2010).

Harrop & Marlatt (2010, 396) have discussed and dismissed the idea of shared factors, concluding that "though sharing many facets, these disorders appear to be distinct". Hypotheses have been proposed of causality both ways: individuals with eating disorders may be self-medicating their concerns about the disorder with alcohol and drugs, or their food-deprived brains may trigger substance use (Carbaugh & Sias 2010; Krahn 1993).

## Methods

The databases Embase, Medline and PsycInfo were searched for studies published between January 1990 and May 2011, with combinations of the terms 'eating disorder', 'substance-related disorder', 'drug dependence', 'drug abuse', 'drug addiction' and 'substance abuse'. Only primary research articles in English or Scandinavian languages were considered (not including reviews and dissertations). Both clinical and community studies were accepted, with adolescent or adult samples. This search yielded 596 articles (comprising possible duplicates). The remaining screening of titles, abstracts and articles was done manually (see appendix). Included were studies in which diagnostic ED and diagnostic DUD were measured in the same sample and seen in relation to one another. The findings of possible concurrent or lifetime comorbidity had to be presented in percentages. Articles based on the same study sample were excluded. Thirteen articles could finally be included in the review.

## Results

In 11 of the 13 studies included, ED was the primary diagnosis and DUD was secondarily measured. In two studies, DUD was the primary diagnosis, and ED was measured secondarily. The studies are presented in Table 1 and 2, respectively. They are sorted by year of publication and further described by author, sample, the DUD and ED diagnoses included, and the results in percentages (and odds ratios where included). Minor divergences from the DSM criteria for AN and BN diagnoses are allowed and commented upon in the tables.

**Table 1.** Studies with eating disorders as primary diagnosis.

| Study | Sample | Eating Disorder | Drug Use Disorder | Results |
|---|---|---|---|---|
| **Newman & Gold (1992) USA** | N=34 females in inpatient ED treatment<br>Age: 18-41,<br>Mean: 25 years | DSM-III-R:<br>AN (8),<br>BN (24),<br>EDNOS (2) | DSM-III-R drug abuse (cocaine, marijuana) | 23.5% reported current cocaine abuse,<br>11.8% reported lifetime cocaine abuse<br>14.7% reported current marijuana abuse,<br>11.8% reported lifetime marijuana abuse<br>12/24 from the BN group, 3/8 from the AN group; only 1 AN restrictor |
| **Bushnell et al. (1994) New Zealand** | *Sample 1*: N=20 females with BN, recruited through a larger community study,<br>Age: 18-44 years<br>*Sample 2*: N=25 females with BN, inpatients | DSM-III:<br>BN | DSM-III drug abuse/dependence | Sample 1: 24% reported lifetime drug abuse/ dependence<br><br>Sample 2: 32 % reported lifetime drug abuse/ dependence |
| **Dohm et al. (2002) USA** | N=215 females, through a community study of risk factors for BED,<br>Age: 18-40,<br>Mean: 30 yeras | DSM-IV:<br>BN (53),<br>BED (162) | DSM-IV drug dependence,<br>(+ abuse of cannabis, cocaine/ crack, hallucinogens, opiates, sedatives/ hypnotics, stimulants, other) | 43.3% of the BN group and 34% of the BED group reported lifetime drug dependence.<br>Most reported drugs of abuse: cannabis, cocaine/ crack and stimulants |
| **Nagata et al. (2002) Japan** | N=185, female outpatients with ED, Mean: 24 years | DSM-IV:<br>AN-R (62),<br>AN-BP (48),<br>BN (75) | DSM-IV: drug use disorder (DUD) | 8.6% of the ED group reported lifetime DUD<br>(4.3% benzodiazepine dependence, 4.3% inhalant dependence, 0.5% amphetamine dependence)<br>No sign differences between the EDs, but tendencies to higher among AN-R than AN-BP |
| **Jordan et al. (2003) USA** | N=40, female outpatients with AN, age 17-40 years | DSM-IV (slightly modified):<br>AN<br>(AN-R, AN-BP) | DSM-III-R cannabis abuse/dependence | 20% of the AN group reported lifetime cannabis abuse/dependence<br>No sign. diff. between AN-R and AN-BP |
| **Blinder et al. (2006) USA** | N=2436 female inpatients (AN, BN, EDNOS), age 11-68, mean 23 y | DSM-IV:<br>AN,<br>BN,<br>EDNOS | DSM-IV drug disorders: cannabis, polysubstance, other, amphetamine, cocaine, hallucinogen, opioid, inhalant | 4% of the total ED group reported concurrent cannabis disorder, 6% polysubstance, 0.9 amphetamine, 0.5% cocaine disorder<br>Ratio of DUD for BN:AN-BP:AN-R was 6:3:1 |
| **Herzog et al. (2006) USA** | N=246, female patients with AN, BN or mix, Age: ≥12 years,<br>*Longitudinal study* | DSM-IV:<br>AN,<br>BN<br>(AN-R, AN-BP) | Research Diagnostic Criteria for Drug Use Disorder<br>(abuse or dependence of amphetamines, cocaine, cannabis, hallucinogens) | 17.0% met criteria for lifetime DUD<br>No difference between AN and BN<br>(AN-BP significantly more often than AN-R)<br>Most prevalent drug: cocaine and amphetamines |
| **Grilo et al. (2009) USA** | N=404, 77% females, through advertisement (all diagnosed with BED),<br>Mean: 45 years | DSM-IV research criteria:<br>BED | DSM-IV Drug Abuse/Dependence | 14.6% of the BED group reported lifetime drug use disorders |
| **Baker et al. (2010) USA** | N=2083, females from a twin registry (AN=58, BN=118),<br>Mean: 30 years,<br>*Longitudinal study* | DSM III-R:<br>AN,<br>BN | DSM III-R Illicit drug use disorder DUD<br>(abuse or dependence of cannabis, sedative, stimulant, cocaine, opiate or hallucinogen) | 8.1% of the total sample reported DUD,<br>while 17.2% of the AN sample and 18.6% of the BN sample reported DUD.<br>Odds ratio: 2.0 (AN) and 2.4 (BN) |
| **Castro-Fornieles et al. (2010) Spain** | N=95 adolescent patients (95% females) with AN, BN or EDNOS,<br>Age: 12-17,<br>Mean: 15 years | DSM-IV-TR:<br>AN,<br>BN,<br>EDNOS | DSM-IV<br>Diagnosis of abuse or dependence (cannabis or other illicit drug) | 3.2% of the total ED group reported concurrent cannabis disorder, 1.1% other drugs<br>(Purging ED significantly more often than restrictive ED) |
| **Root et al. (2010a) Trans-national** | N=731, females with AN, recruited from an AN proband registry,<br>Mean: 26 years | DSM-IV (modified) AN (restricting type=RAN,<br>purging only=PAN, binge eating only=BAN, lifetime AN and bulimia nervosa=ANBN) | DSM-IV Drug Abuse/Dependence<br>(cannabis, stimulants, opiates, hallucinogens) | 13.8% of the AN group reported lifetime drug abuse/dependence (RAN=6.4%, PAN=14.1%, BAN=17.4%, ANBN=31.8%)<br>Most prevalent drug: cannabis, second: stimulants |

The 13 studies originate from the United States (9), Japan (1), New Zealand (1) and Spain (1). One study is transnational (Canada, Germany, Italy and the USA). Eight of the studies have clinical samples; four have community samples; and one has one of each. Two studies are longitudinal. Only one study involves a non-clinical control group. Ten out of 13 samples include females only, and there is only one study in which the sample is predominantly male. The participants' ages range between 11 and 68, with a majority in their late twenties.

In the two studies where the samples were initially diagnosed with drug use disorders, concurrent comorbidity of an eating disorder was 14 % in one study, and lifetime comorbidity 27.3 % in the other. The main eating disorder is Bulimia Nervosa. In the studies in which samples were initially diagnosed with ED, the comorbid lifetime DUD varies from 8–43 % for various drug disorders. The current abuse of/dependence on specific drugs varies from 0.5 % to 23.5 %. Nine studies separate between different kinds of ED, and in five of these, BN and bulimic/purging subtype of AN are significantly more comorbid with DUD than restricting AN is with DUD. In two studies, there were non-significant differences, and the last two studies showed no differences between the various kinds of eating disorders. In the eight studies that separate between different drugs, the most prevalent drugs were cannabis, cocaine and amphetamines.

## Discussion

The percentages of 8–43 of lifetime drug use disorders among individuals with an eating disorder are elevated compared to the general population. In the American *National Comorbidity Survey* (Kessler et al. 1994), the lifetime prevalence of drug abuse/dependence according to DSM-IV criteria was 11.9 %, and last year prevalence was 3.6 %. A later replication study (Kessler et al. 2005) showed a 10.9 % lifetime prevalence of drug abuse/dependence. The only reviewed study that included a non-clinical control group showed an odds ratio for DUD of 2.0 (AN) and 2.4 (BN). The variations in sample size, participants, study setting and actual diagnoses in the included studies call for carefulness regarding the possibility of generalising the findings. The study with the lowest percentage (8.6 %) was conducted in Japan, and the authors remark that drug use disorders in general, as well as in ED patients in particular, seem to be much less frequent than in Western populations (Nagata et al. 2002).

14 % concurrent ED and 27.3 % lifetime ED in the two DUD samples is also much higher than in the general population. According to DSM-IV-TR (2000), the lifetime prevalence for adult women is 0.5 % for AN and 1–3 % for BN. In men, the frequence of these eating disorders is estimated to be around 10 % of the female prevalence (DSM-IV-TR 2000).

In this review, the vast majority of the samples are initially diagnosed with an eating disorder, and drug use disorders are then measured in this context. Previous reviews of substance use and eating disorders show the same bias, with substantially fewer studies departing from substance use/abuse (Holderness et al. 1994; Krahn 1993), or exclusively including eating disorder samples (Calero-Elvira et al. 2010; Courbasson et al. 2010). One of the reasons

**Table 2.** Studies with drug use disorders as primary diagnosis.

| Study | Sample | Drug Use Disorder | Eating Disorder | Results |
|---|---|---|---|---|
| **Hudson et al. (1992) USA** | N=386, male (243)+ female (143) inpatients in substance treatment, Mean: 34 years | DSM-III drug disorders, stimulants, opioids, sedative-hypnotics, cannabis (+ alcohol) | DSM-III-R diagnosis (by questionnaire[15]): AN, BN, AN/BN | 27.3% of the stimulant-addicted women had a current ED diagnosis (25% AN, 50% BN, 25% AN/BN) |
| **Walfish et al. (1992) USA** | N=64 female inpatients with drug dependency (+36 with alcohol dep.), Mean: 34 years | DSM-III-R drug dependence (cannabis, cocaine, opioids, tranquilizers) | DSM-III-R: BN | 14% of the group of drug dependent report current BN<br>19% of the cocaine dependent group,<br>5% of the opioids dependent group |

for this tendency may be a greater focus on psychiatric comorbidity in the field of ED treatment and research than in the drug field. The drug field has traditionally been less focused on psychiatry, rather concentrating on educational, political and religious theories.

Stimulants and cannabis seem to be the most prevalent co-occurring drugs. Various writers have emphasised amphetamine and cocaine (Piran & Robinson 2006; Cochrane et al. 1998) and to some extent ecstasy (Curran & Robjant 2006) in this context, recognising the appetite-decreasing effect of the use of these drugs. Other writers have called attention to methamphetamine, in particular, (Neale et al. 2009) as a drug that closely connects substance abuse and disordered eating behaviour.

Cannabis, on the other hand, is known to have appetite-increasing qualities, which could be associated more with binge eating or over-eating (e.g. Rodondi et al. 2006). When we see cannabis disorders correlating to eating disorders in this review, it could be related to the position of cannabis as the most commonly used illicit drug in Europe (EMCDDA 2010) and USA (SAMHSA 2009). Reviewers Calero-Elvira et al. (2009) offer another explanation: they found raised levels of both opiates and cannabis use among individuals with eating disorders, which suggests that the use of stimulants also requires the use of "downers", such as opiates or tranquillisers.

Regarding the different subtypes of eating disorders, the current review finds a stronger link between drug disorders and the diagnosis BN and the diagnosis AN, binge-eating/purging subtype, while the

link is weaker to the restricting subtype of Anorexia. This is in agreement with earlier research (for example, Calero-Elvira et al. 2010; Holderness et al. 1994), although we still need more research on the connections between specific drugs and specific eating disorders.

Based on the findings of this review, some comments can be made on the etiology of co-occurrence. A causal explanation that obtains some support in the reviewed studies is that eating disorders (AN or BN) can initiate the use of stimulants in order to suppress appetite (Newman & Gold 1992; Hudson et al. 1992). More studies support theories of shared etiology, suggesting impulsivity (Castro-Fornieles et al. 2010; Dohm et al. 2002), depression (Blinder et al. 2006; Herzog et al. 2006) or previous traumatic experiences (Blinder et al. 2006; Dohm et al. 2002) as underlying features influencing both eating disorders (in particular the bulimic type) and substance abuse.

Several studies find associations between substance abuse and Anorexia Nervosa. Previous research shows that quite a few individuals with AN later develop BN (see Peat et al. 2009 for an overview). This calls for a broader look. Difficulties with regulating affects is suggested as a common trait in individuals with AN and substance abuse (Root et al. 2010b). The large variety of explanations could indicate that there *are* different explanations for different groups of eating disorders and groups of substance use disorders (for instance, Carbaugh & Sias 2010; Root et al. 2010b; Cohen & Gordon 2009).

*Limitations*

As previous reviewers have pointed out, it is difficult to compare studies when criteria vary considerably. When we keep the diagnostic criteria strict, the number of studies becomes rather low. Furthermore, the studies included employ different diagnostic categories of drug use disorders and eating disorders, and their samples vary in age. Also, the drug disorder diagnoses in the studies are both lifetime and concurrent. These features make conclusions uncertain.

Another more philosophical-methodological problem in both primary studies and reviews is that conclusions can only be drawn on the basis of what has been investigated. This leaves out large uninvestigated areas, such as men and eating disorders. When the instruments are not designed for men, or the samples do not include men, knowledge about men and comorbid ED and DUD will be limited. The current review therefore says less about men than about women in this respect. (It appears that this is slowly being rectified through increased interest in men's eating disorders.)

*Clinical implications*

Even though the connections between eating disorders and substance abuse have been known for some time, current research shows that many addiction treatment programmes fail to offer both assessment and treatment based on this knowledge (Gordon et al. 2008). Prior research on order of onset (by, for example, Wolfe & Maisto 2000; Krahn 1993) implies that patients presenting for drug treatment may bring with them some sort of eating disorder. Studies of drug addicts in and after treatment reveal that eating symptomatology (Bonfa et al. 2008) and/or (excessive) weight gain

(Cowan & Devine 2008; Hodgkins et al. 2003) may be partly to blame for dropout from treatment/taking up drugs again. Several authors have suggested approaches in targeting co-occurring substance abuse and eating disorders, especially in the cognitive-behavioural direction (Courbasson et al. 2011; Carbaugh & Sias 2010; Sysko & Hildebrandt 2009). Cohen and Gordon (2009) discuss the pros and cons of giving integrated, sequential or parallel treatment, while Harrop and Marlatt (2010) conclude that all research so far suggests integrated or simultaneous treatment. Recent research by Killeen et al. (2011) indicates a need for educating addiction treatment professionals in assessment, referral and treatment of eating disorders.

## Conclusion

This review set out to inspect studies of diagnostic eating disorders and drug use disorders, and found 13. The surveyed ED population report comorbidity between 8 and 43 % for various lifetime drug disorders, highlighting the factor of bulimia, binge eating and purging. The surveyed DUD population report 14 % of concurrent and 27.3 % of lifetime eating disorders. Stimulant use is highlighted in this comorbidity.

It is noteworthy that 11 out of the 13 studies – and all of the newer surveys – in this review have eating disorders as their departure point. This may suggest that the field of both research and treatment of drug disorders has not yet been sufficiently interested in co-occurring eating disorders. Future research calls for prevalence studies in the drug treatment field as well as for qualitative approaches exploring the interactions with drug disorders.

**Declaration of Interest** None.

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## NOTE

1 Binge Eating Disorder is only included in the research section of DSM-IV (DSM-IV-TR), but will probably be added in the new edition, DSM-V (www.dsm5.org).

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**Appendix.** The assortment process.