Use of doping agents and symptoms of eating disorders among male and female patients in drug addiction treatment

HEID NØKLEBY

ABSTRACT
AIMS – This study investigates the prevalence of use of doping agents and symptoms of eating disorders among patients in drug addiction treatment. The aim is also to look for characteristics of the groups reporting the use of doping agents or symptoms of eating disorders. DESIGN – A survey including questions on exercise, the use of doping agents and Eating Disorder Inventory-2 was administered in a Norwegian drug addiction facility. The study included 109 patients in residential drug treatment, 30 females and 79 males (ranging from 17 to 50 years old). RESULTS – Symptoms of eating disorders were reported by 33 percent of the females and 7.6 percent of the males. Previous use of doping agents (anabolic-androgenic steroids in particular) was reported by 40.5 percent of the men and 20 percent of the women. The results are discussed in light of the theory on emotion regulation, gender and cultural expectations, drug treatment as a liminal phase and similarities to drug addiction. CONCLUSIONS – The symptoms of eating disorders and the use of doping agents are prevalent in this sample of male and female drug addicts in treatment. Drug treatment facilities should be aware of this and take the appropriate actions regarding attention, screening and treatment.
KEYWORDS – Doping agents, anabolic-androgenic steroids, eating disorder symptoms, EDI-2, drug addicts, drug addiction treatment, gender

Submitted 13.12.2012 Final version accepted 09.04.2013

Introduction
Research from the last three decades has revealed a co-prevalence between substance disorders and eating disorders (Calero-Elvira et al., 2009; Courbasson, McLaughlin, Letchumanan & Wong, 2010; Harrop & Marlatt, 2010; Holderness, Brooks-Gunn & Warren, 1994; Krahn, 1993; Nøkleby, 2012). In short, these reviews have found that among women a correlation exists between bulimic behaviour/bulimia/non-restricted type of anorexia (a type of anorexia that includes binge eating or purging) and an increased level of substance use/abuse/dependence. It is suggested that

Acknowledgments
For their valuable comments on drafts of this article, I would like to thank professor Jo Kleiven, my supervisor Finn Skårderud and the anonymous referees of Nordic Studies on Alcohol and Drugs. The librarians at the Norwegian Institute for Alcohol and Drug Research (SIRUS) have also been most helpful, as always.
there is a common aetiology between eating disorders and substance disorders: personality traits such as reward sensitisation (Calero-Elvira et al., 2009), impulsivity (Thompson-Brenner et al., 2008), high interpersonal sensitivity (Carbaugh & Sias, 2010), neuroticism (high levels of negative affect such as depression and anxiety, low self-esteem) (Baker, Mazzero & Kendler, 2007), insufficient regulations of emotions (Root et al., 2010) and insecure attachment (Miljkovitch, Pierrehumbert, Karmaniola, Bader & Halfon, 2005).

There are significant differences between men and women in terms of eating disorders. Males constitute only approximately ten percent of the total group with anorexia nervosa and bulimia nervosa (American Psychiatric Association, 2000); the percentages are higher among individuals with pathological overeating and “eating disorders not otherwise specified” (EDNOS) (Ousley, Cordero & White, 2008; Striegel-Moore et al., 2009). This affects the gender composition in the sample with both eating and drug disorders, although men make up about two thirds of the drug addiction population (Amundsen, 2010; SAMHSA, 2011). However, the affected males seem increasingly more visible, partly because the development of diagnosis and assessment instruments has occurred in a less feminine way (for instance, the proposed changes in DSM-5 criteria, www.dsm5.org).

Research has also shown correlations between substance use/abuse and the use of performance-enhancing drugs or doping agents, such as anabolic-androgenic steroids. Outside elite sports, doping agents are frequently more often associated with weight lifting (Graham, Davies, Grace, Kicman & Baker, 2008; Santos, da Rocha & da Silva, 2011), illicit drug use (Hakanson, Mickelsson, Wallin & Berglund, 2012; Denham, 2009; Dodge & Hoagland, 2011; Ip, Barnett, Tenerowicz & Perry, 2011), conduct disorder and criminal behaviour (Pope, Kanayama & Hudson, 2012; Skårberg, Nyberg & Engström, 2010) and body image problems and eating disorders (Morgan, 2008; Pope et al., 2012). Outside the sports arenas doping agents are used significantly more often by men than by women (Lenehan, 2003).

Previous studies have shown that drug treatment may lead to overweight (Cowan & Devine, 2008; Hodgkins, Jacobs & Gold, 2003) and that diagnostic eating disorders are often insufficiently dealt with in drug treatment (Bonfa et al., 2008). However, little research has been conducted on what kinds of eating disorder symptoms and other body-related problems – including the use of doping agents – drug addicts in treatment suffer from. This study aims to describe drug addicts in treatment in accordance with their problems and needs of help. The research questions are: How prevalent are the use of doping agents and symptoms of eating disorders? What characterises these groups with doping use or eating disorder symptoms? What is the significance of gender? The results will be discussed in relation to possible interpretations.

Methods
Sample
The participants were male and female drug addicts in treatment. Of the 129 patients available for the study, 109 participated, 30 females and 79 males, ranging from 17 to 50 years. Nine percent were
under 20 years, 45 percent were between 20 and 30, and 46 percent were 31 or older (Table 1). The women were slightly younger than the men. The main substances reported to be used prior to referral were amphetamines, heroine/opiates, cannabis, alcohol and benzodiazepines/sedatives.

**Setting**

All participants were patients in a Norwegian non-governmental institution offering long-term residential treatment. The average time spent in treatment at the time of the study period was eight months. Possessing or using doping agents was liable to lead to expulsion from treatment. The acquiring – not the use – of doping agents is illegal in Norway, if not medically prescribed. The legal status of using is now under debate.

**Instrument**

The survey included questions on exercise and the use of doping agents, as well as the standardised instrument Eating Disorder Inventory-2 (EDI-2, Garner, 1991). The questions on the use of doping agents comprised lifetime use, last year use, type of doping preparations used and motivation for use of doping agents. The questions on exercise included participation in sports during childhood or adolescence and motivation for physical exercise in general. These questions on exercise and the use of doping agents were drawn from a Norwegian prevalence study on the use of doping agents among military recruits (Barland & Tangen, 2009). The survey also included such background questions as sex, age group and most used substance prior to treatment.

EDI-2 measures symptoms of eating disorders. In previous studies, the EDI-2 has been shown to discriminate between samples of eating disorder patients and non-clinical individuals (Garner, 1991; Nevonen, Clinton & Norring, 2006; van Strien & Ouwens, 2003). It also appears to be well suited for screening for eating disorder symptoms in the general population (Clausen, Rokkedal & Rosenvinge, 2009). The test-retest reliability was found to be high (Thiel & Paul, 2006). In Norway, Jan Rosenvinge (1998) has translated the EDI-2, which has primarily been used clinically; a Norwegian validation study has not yet been carried out. In Sweden (Nevonen et al., 2006) and Denmark (Clausen et al., 2009), validation studies have been conducted and normative data obtained. In view of possible cultural variations between different countries, a thorough cross-cultural adaption of the instrument is recommended (Gjersing, Caplehorn & Clausen, 2010). However, for this introductory study on the area in Norway, other Nordic studies were considered offering acceptable comparison data. The fact that EDI-2 provides particularly useful data on the sample’s psychological profile has

| Age group                  | Females | Males |
|---------------------------|---------|-------|
| 17–20 years old           | 20.0    | 5.1   |
| 21–30 years old           | 46.7    | 44.3  |
| 31 years and older        | 33.3    | 50.6  |
| Amphetamines              | 39.3    | 36.6  |
| Heroine/opiates (opioids) | 32.1    | 38.0  |
| Cannabis                  | 10.7    | 12.7  |
| Alcohol                   | 7.1     | 5.6   |
| Benzodiazepines, sedatives| 10.7    | 2.8   |
| Other drugs               | 0.0     | 4.2   |
been an important motivation for using EDI-2 in this exploratory study.

The EDI-2 comprises two types of subscales: three symptom subscales and eight psychological subscales, totalling 91 items (Table 2). The three symptom subscales measure attitudes and behaviours of eating, shape and weight. The subscale Drive for Thinness taps a strong pursuit of being thin – namely, a great fear of being fat – and is considered to be a central feature of eating disorders (Bruch, 1973, 1982, in Garner, 1991). Bulimia assesses binge eating and is the defining characteristic of bulimia nervosa. Body Dissatisfaction measures overall unhappiness with shape and size of specific parts of the body.

The eight psychological subscales measure attributes relevant to eating disorders (Garner, 1991). The sense of Ineffectiveness has been regarded as an underlying disturbance in eating disorders, entailing a feeling of inadequacy, worthlessness and a lack of control over one’s life. Perfectionism has to do with believing that one’s personal achievements should be top quality. Interpersonal Distrust measures difficulties with forming close relationships as well as expressing thoughts and feelings to others. Interoceptive Awareness assesses problems with how to recognise and appropriately respond to inner emotional states, including sensations related to hunger and satiety. Maturity Fears measures a wish to retreat to the security of childhood, whereas Asceticism measures a person’s ideal of self-discipline, self-denial and control of bodily urges. Impulse Regulation taps a tendency toward thoughtlessness, substance abuse and destructiveness towards oneself or others. Finally, Social Insecurity assesses a belief that social relationships are generally disappointing, unrewarding and insecure (Garner, 1991).

The scoring system in EDI-2 reflects the idea that responses in the non-symptomatic direction (scoring less than 4 on a 6-point scale, ranging from 1 to 6) should not be counted. Subscale scores were computed, allowing only one subscale item to be omitted, in accordance with the EDI manual (Garner, 1991).

The EDI-2 does not operate with fixed cut-off values to identify individuals with eating disorders or eating disorder symptoms (Garner, 1991). Still, Garner has suggested using a score on Drive for Thinness as a cut-off in the screening process, as this subscale touches the core psychopathology of both anorexia and bulimia (Bruch, 1973, 1982, in Garner 1991). The proposed cut-off is 14, although Garner advises that the level be adjusted according to purpose. Other cut-off values may be derived from the symptom index that comprises all three symptom subscales, or just Drive for Thinness and Bulimia (see Nøkleby, 2013).

For boys/men with the typical diagnostic eating disorders (anorexia and bulimia), EDI-2 has demonstrated its usefulness and validity (Spillane, Boerner, Anderson & Smith, 2004). In a study that compares matched male and female eating disorder

| Table 2. The 11 subscales in EDI-2 |
|-----------------------------------|
| **Symptom subscales** | **Psychological subscales** |
| Drive for Thinness | Ineffectiveness |
| Bulimia | Perfectionism |
| Body Dissatisfaction | Interpersonal Distrust |
| | Interoceptive Awareness |
| | Maturity Fears |
| | Asceticism |
| | Impulse Regulation |
| | Social Insecurity |

Unauthenticated Download Date | 12/16/16 11:42 AM
patients, the men showed significantly lower scores on *Drive for Thinness, Body Dissatisfaction* and *Impulse Regulation* (Fernández-Aranda et al., 2004). No significant differences were evident on the other subscales. In another study, male eating disorder patients scored lower than females on all subscales, both upon admission to treatment and at follow-up (Weltzin, Weisensel, Cornella-Carlson & Bean, 2007).

**Implementation**

The survey was distributed in the institution’s different units by the author. Participation was voluntary and anonymous, but the participants could use the questionnaire’s identification number if they wanted to get back to the researcher or a psychologist to discuss their individual results. Six female and 14 male patients did not participate or delivered an incomplete sheet; thus, 30 women and 79 men were included in the final analysis. Informed consent was given by all participants, and the study was approved by the Norwegian Regional Committee for Medical and Health Research Ethics, South-East (S-09219d).

**Analysis**

SPSS, version 19, was used for statistical analysis (IBM SPSS Statistics).

As we had no Norwegian norm data, a Swedish study was used for comparison (Nevonen et al., 2006). In the Swedish study, three samples were assessed: eating disorder patients, psychiatric outpatients and a non-clinical control sample. In the present study, we used data from the sample of eating disorder patients. The eating disorder patients were women between 18 and 24 years of age (N=978). They were diagnosed according to DSM-IV with anorexia nervosa (18 percent), bulimia nervosa (44 percent) and eating disorder not otherwise specified (38 percent) (Nevonen et al., 2006). The patients had been recruited from 15 eating disorder specialist centres in Sweden (Nevonen et al., 2006). These Swedish data were compared to our data through unpaired t-tests, using mean scores and standard deviations (SD).

**Internal consistency of EDI-2**

Cronbach’s Alpha was used to test the internal consistency of the EDI-2 subscales applied on this sample (Table 3).

Two of the symptom subscales (*Drive for Thinness, Body Dissatisfaction*) as well as

| Symptom subscales           | C. Alpha | Psychological subscales      | C. Alpha |
|-----------------------------|----------|-------------------------------|----------|
| Drive for Thinness          | .90      | Ineffectiveness               | .85      |
| Bulimia                     | .72      | Perfectionism                 | .72      |
| Body Dissatisfaction        | .87      | Interpersonal Distrust        | .74      |
|                             |          | Interoceptive Awareness       | .80      |
|                             |          | Maturity Fears                | .71      |
|                             |          | Asceticism                    | .46      |
|                             |          | Impulse Regulation            | .71      |
|                             |          | Social Insecurity             | .65      |
two of the psychological subscales (Ineffectiveness, Interoceptive Awareness) yielded Cronbach’s Alpha coefficients above .80. The third symptom scale (Bulimia) and the rest of the psychological scales were around .70, except Asceticism, which had a critically low Alpha of .46. The average Cronbach’s Alpha was .74, indicating an acceptable internal consistency.

Results
Symptoms of eating disorders
The 11 EDI-2 subscale scores for the total sample, and for women and men separately, are presented in Table 4.

Comparing men and women, we found that women had on average higher scores on all subscales, except for Maturity Fears, where men had the highest scores. Significant gender differences were found in Drive for Thinness, Body Dissatisfaction, Ineffectiveness and Interoceptive Awareness (p=0.01), as well as for Bulimia, Perfectionism, Interpersonal Distrust and Impulse Regulation (p=0.05). Only non-significant differences were found in Maturity Fears, Asceticism and Social Insecurity.

A cut-off of 12 on Drive for Thinness identified 33.0 percent of the women (10) and 7.6 percent of the men (6). Lowering the cut-off by two points from Garner’s suggestion of 14 included three more men, in accordance with Fernández-Aranda et al. (2004). Only one woman was added. Apart from the men’s slightly lower score on Drive for Thinness (14 vs. 16.7), no differences emerged between these men and women based on their scores on other subscales.

The subgroup with symptoms of eating disorders scored significantly higher than the rest of the drug addiction sample on Drive for Thinness, Bulimia and Body Dissatisfaction, all of which comprise the symptom index, as well as on Ineffectiveness, Interpersonal Distrust, Interoceptive Awareness, Asceticism and Impulse Regulation (p<0.01). Perfectionism, Maturity Fears and Social Insecurity showed no differences between the two groups – namely, those scoring above and below the cut-

| Subscales       | Total sample (N=109) SD | Males (N=79) SD | Females (N=30) SD | T-test |
|-----------------|------------------------|----------------|------------------|--------|
| Drive for Thinness | 4.3 (5.6)              | 2.6 (4.1)      | 8.7 (6.7)        | <0.01* |
| Bulimia         | 1.6 (2.6)              | 1.3 (2.0)      | 2.5 (3.7)        | 0.03*  |
| Body Dissatisfaction | 7.7 (6.4)              | 5.8 (5.1)      | 12.6 (7.0)       | <0.01* |
| Ineffectiveness | 5.0 (5.0)              | 4.0 (3.7)      | 7.8 (6.9)        | <0.01* |
| Perfectionism   | 3.9 (3.7)              | 3.4 (3.3)      | 5.2 (4.4)        | 0.03*  |
| Interpersonal Distrust | 5.2 (3.9)            | 4.7 (3.6)      | 6.6 (4.2)        | 0.03*  |
| Interocep. Awareness | 5.3 (5.1)           | 4.2 (4.5)      | 8.0 (5.6)        | <0.01* |
| Maturity Fears  | 4.6 (3.8)              | 5.0 (4.1)      | 3.7 (3.0)        | 0.12   |
| Asceticism      | 4.0 (2.8)              | 3.9 (2.8)      | 4.5 (2.8)        | 0.31   |
| Impulse Regulation | 8.1 (5.2)            | 7.4 (4.6)      | 9.9 (6.1)        | 0.03*  |
| Social Insecurity | 4.8 (3.3)            | 4.7 (3.1)      | 5.0 (3.7)        | 0.67   |

* Statistically significant at 5-percent level
These significant differences and similarities were equal for the cut-off of 14.

We compared this group to a sample of eating disorder patients from a Swedish study (Nevonen et al., 2006). (The scores from the Swedish and Danish studies were corresponding.) This comparison indicated that our group reported comparable scores on most EDI-2 subscales (Table 5). Our group scored significantly lower on Bulimia and significantly higher on Interpersonal Distrust and Impulse Regulation. The identified group showed typical symptoms of eating disorders.

Testing for preferred drug prior to treatment, this subgroup used amphetamine significantly more often than the rest of the sample, OR 3.5 (p<0.04).

In terms of motivation for exercise, the eating disorder symptoms group answered “get in shape”, “get a beautiful body”, “feel well” and “lose a few kilos” significantly more often than those scoring below 12 on Drive for Thinness (Table 6). The eating disorder symptoms group reported “get bigger muscles” significantly less as their motivation. Other motives for exercise were equally distributed between those scoring above and below 12.

### Table 5. Subscale scores of the group of male and female drug patients scoring above 12 on Drive for Thinness, compared to a group of eating disorder patients (Nevonen et al., 2006). Unpaired t-test of means.

| Subscales                | Drug patients (SD) N=16 | ED sample (SD) N=978 | T-test |
|--------------------------|-------------------------|----------------------|--------|
| Drive for Thinness       | 15.7 (2.5)              | 13.4 (5.6)           | 0.10   |
| Bulimia                  | 4.4 (3.9)               | 8.0 (5.9)            | 0.02*  |
| Body Dissatisfaction     | 15.1 (4.5)              | 17.3 (7.5)           | 0.24   |
| Ineffectiveness          | 10.1 (5.8)              | 11.6 (6.7)           | 0.37   |
| Perfectionism            | 5.4 (4.8)               | 6.1 (4.1)            | 0.50   |
| Interpersonal Distrust   | 8.3 (4.0)               | 4.6 (4.0)            | <0.01* |
| Interoceptive Awareness  | 10.9 (5.3)              | 12.2 (6.5)           | 0.43   |
| Maturity Fears           | 4.8 (3.8)               | 5.5 (4.8)            | 0.56   |
| Asceticism               | 6.5 (3.0)               | 6.9 (3.9)            | 0.68   |
| Impulse Regulation       | 11.6 (6.0)              | 6.0 (4.9)            | <0.01* |
| Social Insecurity        | 6.1 (3.4)               | 7.6 (4.3)            | 0.17   |

* Statistically significant at 5-percent level

Use of doping agents

According to the results, 40.5 percent (32) of the men and 20.0 percent (6) of the women reported having used doping agents. The predominant preparations used were anabolic-androgenic steroids (used by 78.9 percent) and testosterone (used by 59.5 percent). Furthermore, 23.7 percent of this group (8.3 percent of the total sample) had been using during the last year, while the rest prior to the last year.

The motivation for using various doping agents was related primarily to the concrete, physical appearance (e.g. “get the body I want” and “get big muscles”) (Figure 1). It was less related directly to this body’s effect on others (e.g. “be able to defend myself”).

However, looking at their motivation for
physical exercise in general (Table 6), the group who had been using doping agents was significantly more prone to answer “defend myself or my dearest ones” than the rest of the sample who had not used doping agents. The non-users reported “have something to do” significantly more often than users as a motive for exercise. In addition, users had significantly more often been engaged in regular sporting activities in their childhood and youth than the non-users, OR 4.1 (p=0.03).

No differences occurred between the users and the non-users regarding which (other) substances of intoxication participants had used prior to treatment. Regarding the EDI-2 subscales, 10.5 percent of the users of doping agents reported a score above 12 on Drive for Thinness – that is, they exhibited symptoms of eating disorders. No differences emerged between users and non-users on any of the subscales. However, the subgroup that reported use last year scored higher than the rest of the sample on all subscales, with significant differences on Inefficacy (p=0.02), Asceticism (p<0.01), Impulse Regulation (p<0.01), Social Insecurity (p=0.02) and almost on Interoceptive Awareness (p=0.06).

Discussion

Regulating emotions

The current study identified a subgroup of the drug addiction sample reporting symptoms of eating disorders. The group showed high scores in the pursuit of thinness. Compared with the rest of the drug addiction sample, this subgroup was characterised by poor self-esteem, difficulties with identifying and expressing their feelings, denial of bodily needs and inadequate impulse control (as measured by EDI-2). These find-

Table 6. Motivation for physical exercise. Total sample, eating disorder symptoms group and doping agent group.

| Motive                          | Total sample (N=109) | Eating disorder symptoms group (n=16) | Doping agents group (n=38) |
|---------------------------------|----------------------|--------------------------------------|--------------------------|
| Get in shape                    | 85.4                 | 100.0*                               | 88.9                     |
| Feel well                       | 76.7                 | 92.9*                                | 69.4                     |
| Get a beautiful body            | 74.8                 | 100.0*                               | 80.6                     |
| Get rid of unrest               | 70.9                 | 71.4                                 | 77.8                     |
| Be with friends                 | 51.5                 | 42.9                                 | 47.2                     |
| Have something to do            | 50.5                 | 50.0                                 | 33.3**                   |
| Have a healthy lifestyle        | 44.7                 | 57.1                                 | 41.7                     |
| Get bigger muscles              | 43.7                 | 14.3*                                | 55.6                     |
| Lose a few kilos                | 40.8                 | 92.9*                                | 38.9                     |
| Become part of a community      | 38.8                 | 28.6                                 | 33.3                     |
| Perform better in competitions  | 24.3                 | 14.3                                 | 27.8                     |
| In order to feel safe           | 20.4                 | 14.3                                 | 22.2                     |
| Defend myself or my dearest ones| 20.4                 | 7.1                                  | 33.3**                   |
| In order to be respected        | 13.6                 | 21.4                                 | 19.4                     |
| Something else                  | 10.7                 | 14.3                                 | 8.3                      |

* Significant different percentage compared to those scoring below 12 on Drive for Thinness (<0.05)
** Significant different percentage compared to those who report not having used doping agents (<0.05)
ings are supported by an understanding of eating disorders as related to the regulation of emotions (for example, Bruch, 1978; Fox & Power, 2009; Skårderud & Fonagy, 2012). Recent theory and research have focused attention on the regulation of emotions as underlying both eating disorders and drug addiction (Bateman & Fonagy, 2012; Root et al., 2010; Taylor et al., 1997). Typical examples include using heroin or amphetamine to suppress unbearable experiences and emotions or using a strict nutritional scheme or engaging in excessive physical exercise to control difficult thoughts and ‘unruly’ emotions.

The subgroup reporting use of doping agents during the past year was also characterised by poor self-esteem, denial of bodily needs, inadequate impulse control and lack of trust towards other people. The rest of the doping agent users reported no such characteristics, but their reasons for using doping agents imply that self-esteem is important for many. The data are not conclusive, but there are indications that doping agents are used not only to build muscles, but also to build confidence and moderate other emotions, as is supported by previous research (Barland, Tangen & Johannesen, 2010; Petersson Bengtsson, Voltaire-Carlsson & Thiblin, 2010).

Gender and cultural expectations
Eating disorder symptoms, particularly the pursuit of thinness, are far more widespread among women than among men in this study. This result is in accordance with previous research (Hudson, Hiripi, Pope & Kessler, 2007; Keel, 2010), which may be at least partly related to cultural expectations (Dworkin & Wachs, 2009). With changing cultures, the proportion of boys and men with eating disorders may be rising. However, an inventory such as EDI-2 has a rather feminine bias with a focus on the female body, as do many eating disorder inventories. Thus, boys’ and men’s eating disorders may be overlooked.

Also identified is a substantial subgroup using doping agents, a group in which...
men comprise the large majority. This also accords with previous research results, although we may also see a changing gender pattern in this area. The reported use of doping agents can refer to use in treatment, use in periods with (other) drugs or use in abstinent periods outside treatment. Qualitative findings suggest that gateways to the use of doping agents in this group of drug addicts are primarily drug use and drug treatment (Nøkleby & Skårderud, 2013). The most important motivation in general for using doping agents as reported in this study has to do with developing a desirable body. One craves for the right visual qualities but not necessarily a specific strength or capacity. This result may also be linked to cultural expectations towards the muscular man (Dworkin & Wachs, 2009), although the reported use by women in this study adds some nuances to this. Looking at the two subgroups (with eating disorder symptoms or doping use) together, there is a general preoccupation with appearance. Their physical exercise is largely motivated by looks.

This motivation and emphasis on bodily appearance can be seen in relation to substance treatment as a liminal phase (Turner, 1967; 1969). The liminal phase is the in-between phase in a transition process (a rite de passage) in which the individual no longer inhabits its previous role and has not yet reached its new role (van Gennep, 1960). Residential drug treatment resembles the liminal phase in several ways. The patient is in an in-between period; not a drug addict, but still not an “ordinary non-addict”. The patients sleep and work/study in a particular setting, both symbolically and practically separated from their previous (drug) milieu and the rest of society (Nøkleby & Skårderud, 2013). In this in-between setting, the transformation from user to non-user can take on many forms. For many patients, this transformative period is also a period for the transformation of the body. The use of doping agents and excessive workout can be a way of transforming one’s body, motivated by an overall need to change in order to become a “new and abstinent person”.

Relations to the substance addiction
As expected, our subgroup with eating disorder symptoms reports more frequent use of amphetamines. Previous research has highlighted various stimulants in studies of co-occurring drug and eating problems, recognising the appetite-decreasing effect of the use of these drugs (Cochrane, Malcolm & Brewerton, 1998; Neale, Abraham & Russell, 2009; Piran & Robinson, 2006). Some studies have found that cannabis (Rodondi, Pletcher, Liu, Hulley & Sidney, 2006) and opiates (Calero-Elvira et al., 2009) are the preferred drugs among individuals with eating problems and are perhaps used as a “downer” in combination with stimulants.

The differences between our subgroup with symptoms of eating disorders and the Swedish sample of eating disorder patients exposed some characteristics of the drug addiction subgroup. Their scores on Drive for Thinness are comparable to those in our eating disorder sample, but their scores on Bulimia were significantly lower. This bulimic factor (binge eating, purging) is emphasised in other studies of co-occurring substance abuse and eating disorders (Calero-Elvira et al., 2009; Holderness et al., 1994; Nøkleby, 2012). Moreover, our subgroup scored significantly
higher on the subscales Impulse Regulation and Social Insecurity, compared to the eating disorder sample. Not trusting other people and low degree of impulse control are traits that are rather characteristic of drug addicts in general (Cuomo, Sarchiapone, Di Giannantonio, Mancini & Roy, 2008; de Wit, 2008; MacKillop et al., 2011; Thorberg & Lyvers, 2010). (Two out of 11 items in Impulse Regulation concern use of substances directly.)

The important motivation for using doping agents (particularly anabolic-androgenic steroids) in this study resembles a well-known motivation for using drugs—that is, to improve confidence, calm down and create a sense of belonging and status. This related motivation suggests that using doping agents and (other) drugs may for some have similar functions or meanings. Recent findings in both qualitative (Barland et al., 2010; Nøkleby & Skårdeterud, 2013) and quantitative studies (Kanayama, Brower, Wood, Hudson & Pope, 2009; Rohman, 2009) suggest that the use of doping agents may induce a feeling of intoxication, similarly to such drugs as amphetamine or heroine, albeit not as fast or as strong. Some researchers have suggested that major use of anabolic-androgenic steroids be regarded as a possible dependence, along the lines of other substance dependences (Kanayama et al., 2009; Rohman, 2009; Trenton & Currier, 2005).

Future Research

Large-scale studies on eating disorder symptoms and use of doping agents using validated instruments should be carried out among substance abusers in a Nordic treatment context in order to describe the population in accordance with their problems and needs for help. In addition, more qualitative studies should be conducted to improve our understanding of such behaviours among substance abusers inside or outside treatment. In particular, the area of substance use and doping agent use requires more research on meanings and functions. Finally, the tailored treatment for these combined conditions should be given greater research emphasis.

Limitations

This study has used a non-validated version of EDI-2. The results from this part of the study need to be interpreted with caution as the findings are only preliminary. The sample size of the group is another shortcoming of the current study; a larger sample would have given more statistical power, particularly on behalf of the women. The lack of participant BMIs may be a limitation regarding body dissatisfaction, and more background information in general would have been valuable with regards to the generalisation of the findings. A standardised instrument identifying the more male-typical behaviour would have been suitable for comparing results with other samples.

Declaration of interest

None.

Heid Nøkleby, researcher
Tyrili Research and Development, Oslo
The Research Centre for Child and Youth Competence Development, Lillehammer University College, Norway
E-mail: heid.nokleby@tyrili.no
REFERENCES

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders*. Fourth edition. Text revision. (DSM-IV-TR) Washington DC: American Psychiatric Association.

Amundsen, E. J. (2010). Hvor mange misbrukere har vi? In E. J. Amundsen (Ed.), *Hva er misbruk og avhengighet? Betegnelser, begreper og omfang*. [What is abuse and addiction? Concepts, terms and prevalence]. (pp. 56–70) Statens institutt for rusmiddelforskning: SIRUS-Rapport nr. 4/2010.

Barland, B., & Tangen, J.O. (2009). *Kroppspresentasjon og andre prestasjoner: en omfangsundersøkelse om bruk av doping* [Bodily representation and other performances: a prevalence study on the use of doping agents]. Oslo: Politihøgskolen.

Barland, B., Tangen, J. O. & Johannesen, C. A. (2010). *Doping, Muskler, mestring og mening. En kvalitativ studie av unge menns bruk av muskelbyggende medikamenter* [Use of doping agents. Muscles, managing, and meaning]. PHS Forskning 2010:6. Oslo: Politihøgskolen.

Baker, J. H., Mazzero, S. E. & Kendler, K. S. (2007). Association between broadly defined bulimia nervosa and drug use disorders: Common genetic and environmental influences. *International Journal of Eating Disorders, 40*(8), 673–678.

Bateman, A. W. & Fonagy, P. (Eds.) (2012). *Handbook of mentalizing in mental health practice*. Washington/London: American Psychiatric Publishing.

Bonfa, F., Cabrini, S., Avanzi, M., Bettinardi, O., Spotti, R., & Uber, E. (2008). Treatment dropout in drug-addicted women: Are eating disorders implicated? *Eating & Weight Disorders, 13*(2), 81–86.

Bruch, H. (1978). *The golden cage: The enigma of anorexia nervosa*. Cambridge, MA: Harvard University Press.

Calero-Elvira, A., Krug, I., Davis, K., Lopez, C., Fernandez-Aranda, F., & Treasure, J. (2009). Meta-analysis on drugs in people with eating disorders. *European Eating Disorders Review, 17*(4): 243–259.

Carbaugh, R. J., & Sias, S. M. (2010). Comorbidity of bulimia nervosa and substance abuse: Etiologies, treatment issues, and treatment approaches. *Journal of Mental Health Counseling, 32*(2), 125–138.

Clausen, L., Rokkedal, K & Rosenvinge, J. H. (2009). Validating the Eating Disorder Inventory (EDI-2) in two Danish samples: A comparison between female eating disorder patients and females from the general population. *European Eating Disorders Review, 17*(6), 462–467.

Cochrane, C., Malcolm, R. & Brewerton, T. (1998). The role of weight control as a motivation for cocaine abuse. *Addictive Behaviors, 23*(2), 201–207.

Courbasson, C.,M., McLaughlin, P.M., Letchumanan, M., & Wong, B.I. (2010). Substance use disorders in adolescents with eating disorders. *Minerva Psichiatrica, 51*(3), 177–189.

Cowan, J. & Devine, C. (2008). Food, eating, and weight concerns of men in recovery from substance addiction. *Appetite, 50*(1), 33–42.

Cuomo, C., Sarchiapone, M., Di Giannantonio, M., Mancini, M., & Roy, A. (2008). Aggression, impulsivity, personality traits, and childhood trauma of prisoners with substance abuse and addiction. *The American Journal of Drug and Alcohol Abuse, 34*(3), 339–345.

Denham, B.E. (2009). Association between narcotic use and anabolic-androgenic steroid use among American adolescents. *Substance Use & Misuse, 44*(14), 2043–2061.

de Wit, H. (2008). Impulsivity as a determinant and consequence of drug use: A review of underlying processes. *Addiction Biology, 14*(1), 22–31.

Dodge, T. & Hoagland, M. F. (2011). The use of anabolic-androgenic steroids and polypharmacy: A review of the literature. *Drug & Alcohol Dependence, 114*(2–3), 100–109.

Dworkin, S. L. & Wachs, F. L. (2009). *Body
panic: Gender, health, and the selling of fitness. New York: New York University Press.

Fernández-Aranda, F., Aitken, A., Badía, A., Giménez, L., Solano, R., Collier, D., Treasure, J., & Vallejo J. (2004). Personality and psychopathology traits of males with an eating disorder. *European Eating Disorders Review, 12*(6), 367–374.

Fox, J. R. E. & Power, M. J. (2009). Eating disorders and multi-level models of emotion: An integrated model. *Clinical Psychology and Psychotherapy, 16*(4), 240–267.

Garner, D. M. (1991). *EDI-2 Eating Disorder Inventory-2*. Professional manual. PAR Psychological Assessment Resources, Inc.

Gjersing, L., Caplehorn, J. R. M., & Clausen, T. (2010) Cross-cultural adaptation of research instruments: Language, setting, time and statistical considerations. *BMC Medical Research Methodology, 10*:13 doi:10.1186/1471-2288-10-13.

Graham, M. R., Davies, B., Grace, F. G., Kicman, A., & Baker, J. S. (2008). Anabolic steroid use: Patterns of use and detection of doping. *Sports Medicine, 38*(6), 505–525.

Hakansson, A., Mickelsson, K., Wallin, C. & Berglund, M. (2012). Anabolic androgenic steroids in the general population: User characteristics and associations with substance use. *European Addiction Research, 18*(2), 83–90.

Harrop, E. N. & Marlatt, G. A. (2010). The comorbidity of substance use disorders and eating disorders in women: Prevalence, etiology, and treatment. *Addictive Behaviors, 35*(5), 392–398.

Hodgkins, C. C., Jacobs, W. S., & Gold, M. S. (2003). Weight gain after adolescent drug addiction treatment and supervised abstinence. *Psychiatric Annals, 33*, 112–116.

Holderness, C. C., Brooks-Gunn, J., & Warren, M. P. (1994). Co-morbidity of eating disorders and substance abuse – Review of the literature. *International Journal of Eating Disorders, 16*(1), 1–34.

Hudson, J. I., Hiripi, E., Pope, H. G. Jr, & Kessler, R. C. (2007) The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological Psychiatry, 61*(3), 348–58.

Ip, E. J., Barnett, M., Tenerowicz, M., & Perry, P. (2011). The anabolic 500 survey: Characteristics of male users versus nonusers of anabolic-androgenic steroids for strength training. *Pharmacoeth, 31*(8), 757–766.

Kanayama, G., Brower, K. J., Wood, R. I., Hudson, J. I. & Pope, H. J. (2009). Anabolic-androgenic steroid dependence: An emerging disorder. *Addiction, 104*(12), 1966–1978.

Keel, P.K. (2010). Epidemiology and course of eating disorders. In W. S. Agras (Ed.), *The Oxford handbook of eating disorders* (pp.25–32). Oxford: Oxford University Press.

Krahn, D. (1993). The relationship of eating disorders and substance abuse. In E. S. L. Gomberg, & T. D. Nirenberg (Eds.), *Women and substance abuse*. Stamford, CT: Ablex Publishing.

Lenehan, P. (2003). *Anabolic steroids and other performance-enhancing drugs*. London/New York: Taylor & Francis.

MacKillop, J., Amlung, M., Few, L., Ray, L., Sweet, L., & Munafó, M. (2011). Delayed reward discounting and addictive behavior: A meta-analysis. *Psychopharmacology, 216*(3), 305–321.

Miljkovitch, R., Pierrehumbert, B., Karmaniola, A., Bader, M., & Halfon, O. (2005). Assessing attachment cognitions and their associations with depression in youth with eating or drug misuse disorders. *Substance Use and Misuse, 40*(5), 605–623.

Morgan, J. F. (2008). *The invisible man: A self-help guide for men with eating disorders, compulsive exercise and bigorexia*. London: Routledge.

Neale, A., Abraham, S., & Russell, J. (2009). ‘Ice’ use and eating disorders: A report of three cases. *International Journal of Eating Disorders, 42*(2), 188–191.

Nevonen, L., Clinton, D., & Norring, C. (2006). Validating the EDI-2 in three Swedish female samples: Eating disorder patients, psychiatric outpatients and normal controls. *Nordic Journal of Psychiatry, 60*(1), 44–50.
Nøkleby, H. (2012). Comorbid drug use disorders and eating disorders. A review of prevalence studies. *Nordic Studies on Alcohol and Drugs, 29*(3), 303–314.

Nøkleby, H. (2013). Eating disorder symptoms in a sample of female Norwegian drug addicts in treatment. Manuscript submitted for publication.

Nøkleby, H., & Skårderud, F. (2013). Body practices among male drug abusers: Meanings of workout and use of doping agents in a drug treatment setting. *International Journal of Mental Health and Addiction, 11*(1). doi: 10.1007/s11469-013-9434-5

Ousley, L., Cordero, E. D., & White, S. (2008). Eating disorders and body image of undergraduate men. *Journal of American College Health, 56*(6), 617–621.

Petersson, A., Bengtsson, J., Voltaire-Carlsson, A., & Thiblin, I. (2010). Substance abusers’ motives for using anabolic androgenic steroids. *Drug & Alcohol Dependence, 111*(1–2), 170–172.

Piran, N., & Robinson, S. R. (2006). Associations between disordered eating behaviors and licit and illicit substance use and abuse in a university sample. *Addictive Behaviors, 31*(10), 1761–1775.

Pope, H. G., Kanayama, G. & Hudson, J. I. (2012). Risk factors for illicit anabolic-androgenic steroid use in male weightlifters: A cross-sectional cohort study. *Biological Psychiatry, 71*(4), 254–261.

Rodondi, N., Fletcher, M. J., Liu, K., Hulsey, S. B. & Sidney, S. (2006). Marijuana use, diet, Body Mass Index, and cardiovascular risk factors. *American Journal of Cardiology, 98*(4), 478–484.

Rohman, L. (2009). The relationship between anabolic androgenic steroids and muscle dysmorphia: A review. *Eating Disorders, 17*(3), 187–199.

Root, T. L., Pisetsky, E. M., Thornton, L., Lichtenstein, P., Pedersen, N. L., & Bulik, C. M. (2010). Patterns of co-morbidity of eating disorders and substance abuse in Swedish females. *Psychological Medicine, 40*(1), 105–115.

Rosenvinge, J. (1998). *Eating Disorder Inventory-2*. Adapted and reproduced with permission from EDI-2 by Garner (1984, 1991). Translated into Norwegian by psychologist Jan Rosenvinge.

Santos, A. M., da Rocha, M. S. & da Silva, M. F. (2011). Illicit use and abuse and anabolic-androgenic steroids among Brazilian bodybuilders. *Substance Use & Misuse, 46*(6), 742–748.

SAMHSA (2011). *Results from the 2010 National Survey on Drug Use and Health: Summary of National Findings*. Report. U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality.

Skårberg, K., Nyberg, F & Engström, I. (2010). Is there an association between the use of anabolic-androgenic steroids and criminality? *European Addiction Research, 16*(4), 213–219.

Spillane, N. S, Boerner, L. M., Anderson, K. G. & Smith, G. T. (2004). Comparability of the Eating Disorder Inventory-2 between women and men. *Assessment, 11*(1), 85–93.

Skårderud, F & Fonagy, P. (2012). Eating disorders. In A. W. Bateman, & P. Fonagy (Eds.) *Handbook of mentalizing in mental health practice* (pp. 347–383). Washington/London: American Psychiatric Publishing.

Striegel-Moore, R. H., Rosselli, F., Perrin, N., DeBar, L., Wilson, G. T., May, A., & Kraemer, H. C (2009). Gender differences in the prevalence of eating disorder symptoms. *International Journal of Eating Disorders, 42*(5), 471–474.

Taylor, G. J., Bagby R. M. & Parker, J. D. A. (1997). *Disorders of affect regulation: Alexithymia in medical and psychiatric illness*. Cambridge: Cambridge University Press.

Thiel, A., & Paul, T. (2006). Test-retest reliability of the Eating Disorder Inventory-2. *Journal of Psychosomatic Research, 61*(4), 567–569.

Thompson-Brenner, H. K., Eddy, T., Franko, D. L., Dorer, D., Vashchenko, M., & Herzog, D. B. (2008). Personality pathology and substance abuse in eating disorders: A longitudinal study. *International Journal of Eating Disorders, 41*(3), 203–208.
Thorberg, F. A. & Lyvers, M. (2010). Attachment in relation to affect regulation and interpersonal functioning among substance use disorder in patients. *Addiction Research and Theory, 18*(4), 464–478.

Trenton, A. J., & Currier, G.W. (2005). Behavioural manifestations of anabolic steroid use. Review article. *CNS Drugs, 19*(7), 571–595.

Turner, V. (1967). *Betwixt and between: The liminal period in rites de passage, in the forest of symbols*. Ithaca, NY: Cornell University Press.

Turner, V. (1969). *The ritual process: Structure and anti-structure*. Chicago: Aldine Pub.

van Gennep, A. (1960). *The rites of passage*. Chicago: University of Chicago.

van Strien, T., & Ouwens, M. (2003). Validation of the Dutch EDI-2 in one clinical and two non-clinical populations. *European Journal of Psychological Assessment, 19*(1), 66–84.

Weltzin, T. E., Weisensel, N., Cornella-Carlson, N., & Bean, P. (2007). Improvements in the severity of eating disorder symptoms and weight changes in a large population of males undergoing treatment for eating disorders. *Best Practices in Mental Health, 3*(1), 52–65.
