Research report

Are “social drugs” (tobacco, coffee and chocolate) related to the bipolar spectrum?

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Background: Across all ages and cultures, mankind has always used substances in order to induce pleasurable sensations or desirable psychophysical states. These substances, notably caffeine, tobacco, alcohol and chocolate, can be labeled ‘social drugs’. The acute administration of caffeine, for instance, improves mood and cognitive performance, increases mental energy, and reduces fatigue (Maridakis et al., 2009; Olson et al., 2010). Likewise, nicotine increases attention and working memory (Ernst et al., 2001; Kumari et al., 2003; Rezvani and Levin, 2001). Chocolate has similarly been reported to improve mood, while increasing the ability to concentrate; it even reveals an anxiolytic effect during stressful tasks (Dallard et al., 2001; Radin et al., 2007).

Methods: We analyzed the social drug habits of 562 patients suffering from mood disorders, according to DSM-IV-R criteria (major depressive episode, recurrent depression, bipolar type I and II disorders and depression not otherwise specified). The sample was also divided into bipolar and non-bipolar according to Hypomania Check-list 32 (HCL-32), which proposes a broader concept of hypomania and soft bipolarity, comprising the spectrum of bipolar disorders proper, along with other, “softer” expressions of bipolarity intermediate between bipolar disorder and normality.

Results: Using HCL-32 criteria, but DSM-IV-R criteria, a link was confirmed between bipolar spectrum and substance use including social drugs such as tobacco and coffee.

Limitation: Observational correlational study.

Conclusion: This study is in support of earlier theoretical formulations within the framework of the Pisa-San Diego collaboration.

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Keywords:
Tobacco
Coffee and chocolate use
Bipolar spectrum
Hypomania check-list

1. Introduction: brief literature review

Across all ages and cultures, mankind has always used substances in order to induce pleasurable sensations or desirable psychophysiological states. These substances, notably caffeine, tobacco, alcohol and chocolate, given their widely accepted recreational use, can be labeled ‘social drugs’. The acute administration of caffeine, for instance, improves mood and cognitive performance, increases mental energy, and reduces fatigue (Maridakis et al., 2009; Olson et al., 2010). Likewise, nicotine increases attention and working memory (Ernst et al., 2001; Kumari et al., 2003; Rezvani and Levin, 2001). Chocolate has similarly been reported to improve mood, while increasing the ability to concentrate; it even reveals an anxiolytic effect during stressful tasks (Dallard et al., 2001; Radin et al., 2007).

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A consumer of social drugs can develop the same tolerance and dependence phenomena that occur with substance abuse (Dingle et al., 2008; Hill, 2010; Miyata, 2010; Ogawa and Ueki, 2010), although the likelihood of transition to uncontrolled use is quite low, and the process develops more slowly than it does with heavier, illegal drugs, at least in the case of commonly available preparations (oral caffeine and inhaled nicotine). On the other hand, harmful use, even when occurring within a self-controlled pattern, is quite common.

Thanks to the wide availability of these substances, individuals can quickly adjust their own dose, times of administration and dose intervals, according to their perceived benefits and side-effects. It has been well documented that the use of social drugs in psychiatric patients is more widespread than in the general population.

With regard to caffeine, in hospitalized psychiatric patients the prevalence of tolerance and intoxication is significantly higher than in the healthy population (Ciapparelli et al., 2010). The highest caffeine intake has been found in patients suffering from eating disorders (Ciapparelli et al., 2010) and schizophrenia (Rihs et al., 1996), the lowest in patients with anxiety disorders and major depression (Ciapparelli et al., 2010; Rihs et al., 1996). Patients with mood disorders and disorders linked with alcohol dependence are more likely than normal volunteers to use caffeine in response to depressive symptoms (Leibenluft et al., 1993). Moreover, lifetime caffeine intake and caffeine-associated toxicity and dependence show a moderate association with a wide range of psychiatric and substance use disorders. Family factors, which are partly genetic, probably predispose to regular caffeine intake as well as exposure to risks of a broad array of internalizing and externalizing disorders (Kendler et al., 2006).

A similar pattern has been found with nicotine. Psychiatric morbidity has shown a strong direct association with nicotine dependence, so that heavy nicotine dependence can be recognized as expressing individual psychopathological vulnerability (Landolt et al., 2010; Le Strat et al., 2010; Martinez-Ortega et al., 2006; Xian et al., 2007). A higher risk of heavy nicotine dependence has been associated with substance-related disorders, conduct disorder and oppositional defiant disorders (Hakko et al., 2006). In addition, depression and anxiety disorders have been specifically correlated with nicotine dependence (Breslau, 1995). When the pattern of psychiatric comorbidity has been examined among alcohol-dependent subjects, those with nicotine dependence have reported higher lifetime rates of panic disorder, specific and social phobia, generalized anxiety disorder, mood disorders, suicide attempts and antisocial personality disorder than those without nicotine dependence (Le Strat et al., 2010). Recently, nicotine dependence has also been associated with psychotic disorders (Solty et al., 2009), and prospective studies among adolescents have shown that lifetime disruptive disorder significantly predicts the onset of nicotine dependence (Griesler et al., 2008).

Lastly, the consumption of chocolate has shown interesting forms of linkage with psychiatric conditions. The correlation most often studied is that with depression: it has been observed that the craving for the rewards given by chocolate intensifies when depressive mood is induced, whether in either animal or human models (Willner et al., 1998). More severe depressive symptoms have been associated with higher chocolate consumption (Rose et al., 2010). Self-labeled ‘chocolate addicts’ do not generally seem to suffer from eating disorders, but may constitute a population of psychologically vulnerable people with a high predisposition to depression and anxiety disorders (Dallard et al., 2001). More specifically, a craving for chocolate seems to be unusually high not only in cases of depressed mood, but also in conditions of emotional dysregulation, like anxious and irritable states. The capacity to find comfort in eating chocolate seems to be related to the biological mechanisms of emotional instability, so that the depression associated with a craving for chocolate turns out to be an efficient discriminator of hysteroïd dysphoria and DSM-IV atypical depression (Parker and Crawford, 2007; Schuman et al., 1987).

Although cocoa is responsible for chocolate’s psychoactive effects, its interaction with the reward system seems to be mediated to some extent by the milky part of it, so that taste and psychotropic properties follow separate pathways. On the whole, the mixture of a predominant milky base with a small quantity of cocoa seems to provide chocolate-likers with the greatest reward (Michener and Rozin, 1993).

Given the rewarding properties observed for sugar, we suppose that the addition of sugar in the marketed chocolate might play a certain role in mediating the appetite for chocolate. Sugar has been reported to trigger the reward system, with a particular action on opiates release. This effect would be specifically depressed by insulin (Erlanson-Albertsson, 2005; Romer, 1982; Smith and Kinney, 1956; Spangler et al., 2004; Vartiainen, 1967; Vendruscolo et al., 2010). However to date no study has specifically compared the consumption and the rewarding effect of sweetened and not sweetened chocolate. Comparisons have been made only with reference to somatic parameters such as the vascular endothelial response (Njike et al., 2009).

It has been demonstrated that the abuse of illegal drugs such as heroin and cocaine has shown a positive correlation with several psychiatric conditions, particularly those belonging to the bipolar disorders (Cocores et al., 1987; Maremmani et al., 2007, 2008).

The link between substance abuse and bipolar disorders is again confirmed with alcohol, whose consumption throughout the population is legal, though occurring in the distinct forms of use, abuse and addiction. A lifetime persistence of disorders associated with alcohol abuse or dependence appears to be 3 to 4 times higher in patients with bipolar disorders than in the general population. A lifetime prevalence of mood disorders in alcohol-dependent subjects is approximately 10 times higher than in the general population (Brousse et al., 2008). A strong relationship between bipolar II disorder and alcohol abuse is particularly common in patients with social phobia. The socializing and disinhibiting effect that many social phobics report might be mediated by mood elevation induced by alcohol on a bipolar substrate (Perugi et al., 2002).

The correlation between substance abuse and bipolar disorders has been proved too on the affective temperamental level, which, according to the framework of Akiskal and Mallya, is closely related to bipolarity (Akiskal, 1988; Akiskal et al., 1983, 1989; Akiskal and Mallya, 1987). Cyclothymic and, to a lesser extent, irritable traits seem to make up the
temperamental profile of heroin addicts (Maremmani et al., 2009), while cyclothymic traits associated with a depressive component turn out to constitute the temperamental profile of alcoholics (Pacini et al., 2009).

This reported bipolar connection, in our opinion, is not just valid at a clinical level. We have stressed the possible role of the bipolar spectrum in the pathogenesis of substance use disorders. In particular, our integrated model provides an explanation for why the bipolar spectrum is the psychic substrate for the development of a substance-resorting attitude (Maremmani et al., 2002; Pani et al., 2010). Bipolar spectrum disorders and addiction often co-occur and stand as reciprocal risk factors that should be viewed from a unified perspective (Maremmani et al., 2006). Camacho and Akiskal (2005) have expressed similar views.

To recapitulate: a) the use of social drugs such as tobacco, coffee and chocolate is greater in the psychiatric population than among healthy people; b) there is a certain link between substance abuse and bipolarity, including its temperamental expressions. Starting from the hypothesis of a continuum between use, abuse and dependence/addiction, our next step is to examine if the bipolarity-substance abuse link can be extended from illegal substances of abuse to habitually used substances, with particular regard to social drugs (caffeine, nicotine and chocolate).

In this study we have analyzed the ‘social drug’ habits of patients suffering from mood disorders, using DSM-IV-TR criteria to discriminate between cases of major depressive episode, recurrent depression, bipolar type 1 and 2 disorders, and ‘depression’, not otherwise specified. These patients were also divided into “bipolar spectrum” and non-bipolar depressives according to Hypomania Check List 32 (HCL-32), a widely validated screening instrument which allows the hypomanic components in patients with MDD to be identified in a way that helps the clinician to diagnose bipolar I, bipolar II and other, softer expressions of bipolarity intermediate between bipolar disorder and normality (Angst et al., 2003, 2005). This perspective is consistent with Akiskal’s bipolar spectrum model (Perugi and Akiskal, 2002).

A double classification has been chosen to allow consideration of two different conceptualizations of bipolar disorder: DSM-IV-TR criteria make use of the restrictive criteria for mania and hypomania found in DSM-IV, whereas HCL-32 refers to a broader concept of hypomania and to the idea of a continuum where full-blown disorders are differentiated from attenuated phenotypes. We expected differences between bipolar and non-bipolar patients on the basis of DSM-IV-TR criteria; these were expected to be higher when bipolarity is assessed according to the Angst classification.

2. Methods

The study included 562 Italian patients who had participated in the “Come to Me” study (Perugi et al., in press). This is a cross-sectional, multicentre, observational study that enrolled 571 consecutive patients with a diagnosis of MDE, according to DSM-IV, over a 7-month period. Its main aim was to explore the joint prevalence of somatic symptoms in a large national sample of outpatients with major depression evaluated in psychiatric facilities located in various parts of Italy. The study involved 30 psychiatric facilities for outpatients, with a nationwide distribution; 8 centers are located in northern Italy, 9 in the central regions, 7 in the south and 6 in the islands of Sicily and Sardinia.

In accordance with the observational nature of the protocol, routine medical procedures were left unchanged. The Ethics Committee of each center approved the study protocol in compliance with the Italian Ministerial Bulletin issued on September 2, 2002 regarding observational studies. All patients gave their informed consent on the handling and use of the data collected during the course of the study.

2.1. Study population

Subjects who were referred to the selected centers between December 2006 and July 2007 were considered for recruitment in the study. They were recruited consecutively, according to the following inclusion criteria: i) men and women aged 18–75 years; ii) diagnosis of MDE according to DSM-IV; and iii) ability to complete the self- and non self-administered questionnaires. The exclusion criteria were: i) comorbidity with schizophrenia and other psychotic disturbances; and ii) current major physical illnesses.

The study included 571 depressed outpatients; for 9 (1.9%) the information provided on somatic symptoms, demographic and clinical variables was incomplete. The study population therefore consisted of 562 evaluable subjects with a mean of 18.7 patients per center (range 5–80). The average age was 51 ± 14 years old (range 19–80). Most of the patients were female (N = 375, 66.7%), single (N = 332, 59.1%), with 10 ± 4 years of education (range 0–24). As to the ‘social drug’ habit, a majority of patients never used tobacco (N = 266, 47.3%), used coffee habitually (N = 407, 72.4%) and used chocolate sporadically (N = 524, 93.2%).

Males and females differed in years of education and tobacco use. For males, education had lasted 11 ± 5 years, for females, 10 ± 4 years (T = 4.07, p < 0.001); 32.6% of males had never used tobacco, 23.0% were past users and 44.4 were present users whereas 54.7% of females had never used tobacco, 13.6% were past users, and 31.7% were present users (chi-square 2435; df = 2, p = <0.001). There were no statistically significant differences between males and females in the figures for age, or coffee and chocolate use.

Current users of tobacco were significantly younger than past users and total non-users (p < 0.001). Regular users of chocolate were younger than sporadic or total non-users (p = 0.006). No correlations were found between age and coffee use.

According to DSM-IV-TR criteria the sample was consisted of 192 patients with a Major Depressive Episode, 212 with Major Depression, Recurrent, 119 with Bipolar Depression, and 39 with Depression NOS (“not otherwise specified”).

According to the Hypomania Check list (using a cut-off score of 14) the sample was comprised of 306 non-bipolar and 256 bipolar depressive patients. No patient diagnosed as suffering from a bipolar disorder according to DSM-IV TR/SCID-I was rated “non-bipolar” according to the HCL.

2.2. Diagnostic procedures and symptom assessment

Individuals were assessed by psychiatrists with extensive clinical experience in diagnosing and treating mood disorders. The diagnosis of MDE was formulated according to DSM-IV criteria.
An anonymous data sheet was used to collect the following information: demographic status, life style, surgical, pathological and pharmacological case history, presence and characterization of somatic symptoms, any supposed delay in a major depression diagnosis (considered present when the patient reported a delay of at least 1 year from the onset of the (retrospectively supposed to be plausible) depressive symptomatology and the diagnosis of major depression), health resource use in the 6 months preceding enrolment. All the information was gathered directly by the patient with the help of significant others and medical records.

2.2.1. Bipolar spectrum
To divide our sample into patients with and without bipolar spectrum, we used the Hypomania Check-List (HCL) compiled by Angst (Angst et al., 2003, 2005). This is a checklist of 32 possible symptoms of hypomania that are rated “yes” (present or typical of me) or “no” (not present or not typical) by the subject. The cut-off for the discrimination between unipolar and bipolar patients is fixed at a score of 14/32.

2.2.3. Social drug habit
The social drug habit was recorded in terms of the use of tobacco, coffee and dark chocolate-based food (chocolate bars, hot chocolate, chocolate-containing ice cream, biscuits or cakes). We classified smoking habits by division into 3 ascending ranks: total non-smokers, past regular users and current regular users and considered one cigarette as a “unit”. As to coffee, we distinguished between regular consumption (at least one coffee a day) and sporadic or no use. We also compared the average daily number of cigarette and coffee units (one cup was considered a unit).

2.3. Statistical analyses
We compared the categorical use of tobacco, coffee and chocolate in depressed patients grouped on the basis of DSM-IV criteria by means of chi-square analysis, with posteriori contrast. In social drug users, cigarette use (daily units) and coffee and chocolate use (weekly units) were compared within the same groups using the one-way ANOVA followed by the Schaffee F-test or the Mann–Whitney U test when appropriate.

The categorical use of tobacco, coffee and chocolate was also compared between non-bipolar and bipolar depressed patients (according to the Angst classification) by means of chi-square analysis. In social drug users, cigarette use (daily) and coffee and chocolate use (weekly units) were compared between the same groups using Student’s T-test or the Mann–Whitney U test when appropriate.

Statistical analyses were carried out using the SPSS package (version 4.0 by SPSS Inc.). As this is an exploratory study, statistical tests were considered significant at the p<0.05 level.

3. Results
As regards the social drugs habit of our sample according to DSM-IV-TR diagnoses, the percentage of subjects using tobacco (“never”, “past users”, “present users”), coffee (“no” or “sporadically”, “usually”), and chocolate (“no” or “sporadically”, “usually”) was similar in different diagnostic groups (Table 1). Likewise, the number of cigarettes (daily), coffees (weekly units) and chocolate (weekly units) did not differ between the groups.

Significant differences in tobacco and coffee, but not in the use of chocolate, were observed between bipolar spectrum and non-bipolar spectrum depressive patients according to Angst’s Hypomania Check-List (HCL). Bipolar spectrum depressed patients used more cigarettes and coffees, but not more chocolate than the non-bipolar spectrum depressed (Table 2).

In other words, not only did a higher percentage of bipolar spectrum depressed patients use tobacco and coffee, but also a greater number of cigarettes and coffees differentiated those affected by bipolar spectrum depression from those with non-bipolar depression.

4. Discussion
The percentage of patients using tobacco (“never”, “past users”, “present users”), coffee (“no” or “sporadically”, “usually”) and chocolate (“no” or “sporadically”, “usually”) does not differ significantly between the groups as diagnosed according to DSM-IV-TR criteria for Mood Disorders. On the other hand, bipolar depressed patients assessed according to HCL-32 criteria are those most frequently classified as “present users” of tobacco, and those most often classified as “coffee usually users”.

In the same way, no differences in the use of cigarettes, coffee and chocolate as measured by the use of units was found in the groups diagnosed according to DSM-IV-TR criteria for Mood Disorders. By contrast, bipolar spectrum depressed patients use more cigarettes daily and more weekly coffee units than non-bipolar spectrum depressed ones.

On the use of chocolate, no differences were observed regarding the percentage of users and the number of units used, whether our patients were divided up according to DSM-IV-TR criteria or to HCL-32 criteria.

In psychiatric patients the use of social drugs has been widely studied, but, to the best of our knowledge, no comparisons on this topic have been carried out so far between bipolar and non-bipolar subjects.

In the literature, among hospitalized patients affected by a wide range of psychiatric disorders the lowest caffeine intake has been found in those suffering from major depression (Capparelli et al., 2010; Rihs et al., 1996). On the other hand, patients with mood disorders are more likely to use caffeine than healthy subjects in response to depressive symptoms (Kendler et al., 2006; Leibenluft et al., 1993). Referring now to nicotine, an adolescent onset of smoking was strongly associated with later major depression, dysthymia or bipolar disorders, while only depression and dysthymia were associated with an adult onset of smoking (Ajdacic-Gross et al., 2009). All these observations suggest the role of mood disorders in an intense use of social drugs. Our data support the importance of bipolar disorders, especially when Angst’s criteria are applied. When our subjects were divided up in accordance with DSM-IV-TR criteria, these differences failed to emerge clearly.
In line with the hypothesis of a continuum between the use of legal and illegal substances, the use of caffeine and nicotine has been associated both with alcohol use disorders and substance use disorders (Hakko et al., 2006; Kendler et al., 2006; Leibenluft et al., 1993). By contrast, the abuse of alcohol and substances such as heroin and cocaine has been associated with bipolarity both in its full-blown expressions (Brousse et al., 2008; Cocores et al., 1987; Maremmani et al., 2007, 2008) and in temperamental ones (Maremmani et al., 2009; Pacini et al., 2009). These linkages again suggest that coffee and cigarette use may be higher in conditions belonging to the bipolar spectrum, as confirmed by our data when patients are compared on the basis of the Hypomania Check-List. It should be noted at this point that the result for chocolate should not necessarily be regarded as contradictory with the findings for coffee and cigarette use; the fact is that regular chocolate eaters appear to crave for chocolate to enjoy its taste, without paying any special attention to its potential psychotropic properties, as shown by Michener and Rozin (1993). As a result, (black) chocolate appears to have the profile of a mood-modulating kind of food without exerting any preferential appeal on bipolar spectrum subjects, in terms of the induction of regular consumption.

It cannot be excluded that the lack of differences between bipolar and non-bipolar patients, when DSM-IV-TR criteria are applied, is due to the low sensitivity of the classificatory system. Some patients labeled as non-bipolar on the basis of their longitudinal history, by applying DSM-IV criteria, could actually prove to be bipolar, and go on to develop manic or hypomanic episodes later in life. The importance of subthreshold hypomania in the diagnostic classification of Major Depressive Disorder has been emphasized in previous papers that support the need for a broader concept of bipolarity (Angst et al., 2010; Zimmermann et al., 2009). The Angst criteria successfully overcome this bias by analyzing periods between episodes during which attenuated symptoms predicting bipolarity are not masked by an actual affective episode (Angst et al., 2003, 2005).

### Table 1
Social drug habits of 562 depressed patients according to DSM-IV diagnoses.

<table>
<thead>
<tr>
<th></th>
<th>Major depression, single episode N = 192</th>
<th>Major depression, recurrent N = 212</th>
<th>Bipolar disorder N = 119</th>
<th>Major depression NOS N = 39</th>
<th>Chi (df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never used</td>
<td>90 (46.9)</td>
<td>108 (50.9)</td>
<td>50 (42.0)</td>
<td>18 (46.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past users</td>
<td>36 (18.2)</td>
<td>35 (16.5)</td>
<td>16 (13.4)</td>
<td>7 (17.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present users</td>
<td>66 (34.4)</td>
<td>69 (32.5)</td>
<td>53 (44.5)</td>
<td>14 (35.9)</td>
<td>5.84 (6)</td>
<td>0.44</td>
</tr>
<tr>
<td>Coffee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None or sporadic</td>
<td>60 (31.3)</td>
<td>59 (27.8)</td>
<td>27 (22.7)</td>
<td>9 (23.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usually (≥ 1 day/week)</td>
<td>132 (68.8)</td>
<td>153 (72.2)</td>
<td>92 (77.3)</td>
<td>30 (76.9)</td>
<td>3.12 (3)</td>
<td>0.37</td>
</tr>
<tr>
<td>Chocolate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None or sporadic</td>
<td>179 (93.2)</td>
<td>199 (93.6)</td>
<td>108 (90.8)</td>
<td>38 (97.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usually (≥ 1 day/week)</td>
<td>13 (6.8)</td>
<td>13 (6.1)</td>
<td>11 (9.2)</td>
<td>1 (2.6)</td>
<td>2.38</td>
<td>0.49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>M ± sd</th>
<th>M ± sd</th>
<th>M ± sd</th>
<th>M ± sd</th>
<th>K-W * z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarettes (daily)</td>
<td>8.75 ± 11.5</td>
<td>8.17 ± 10.6</td>
<td>10.66 ± 12.4</td>
<td>7.48 ± 9.0</td>
<td>3.42</td>
<td>0.33</td>
</tr>
<tr>
<td>Coffee (weekly units)</td>
<td>10.25 ± 9.9</td>
<td>12.07 ± 13.2</td>
<td>12.89 ± 10.8</td>
<td>13.15 ± 12.2</td>
<td>5.42</td>
<td>0.14</td>
</tr>
<tr>
<td>Chocolate (weekly units)</td>
<td>0.17 ± 0.8</td>
<td>0.25 ± 1.3</td>
<td>0.13 ± 0.4</td>
<td>0.02 ± 0.1</td>
<td>2.23</td>
<td>0.52</td>
</tr>
</tbody>
</table>

* Mann–Whitney U test.

### Table 2
General characteristics and habits of depressed patients according to bipolarity.

<table>
<thead>
<tr>
<th></th>
<th>Depression N = 306</th>
<th>Bipolar depression N = 256</th>
<th>Chi</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>168 (54.9)</td>
<td>98 (38.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past users</td>
<td>47 (15.4)</td>
<td>47 (18.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present users</td>
<td>91 (29.7)</td>
<td>111 (43.4)</td>
<td>16.08</td>
<td>0.0003</td>
</tr>
<tr>
<td>Coffee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None or sporadic</td>
<td>101 (33.0)</td>
<td>54 (21.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usually</td>
<td>205 (67.0)</td>
<td>202 (78.9)</td>
<td>9.90</td>
<td>0.0016</td>
</tr>
<tr>
<td>Chocolate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None or sporadic</td>
<td>280 (94.8)</td>
<td>234 (91.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usually</td>
<td>16 (5.2)</td>
<td>22 (8.4)</td>
<td>2.50</td>
<td>0.1135</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>M ± sd</th>
<th>M ± sd</th>
<th>M–W * z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarettes (daily)</td>
<td>7.51 ± 10.6</td>
<td>10.45 ± 11.8</td>
<td>−3.61</td>
<td>0.0003</td>
</tr>
<tr>
<td>Coffee (units/week)</td>
<td>10.33 ± 11.3</td>
<td>13.33 ± 11.8</td>
<td>−3.50</td>
<td>0.0005</td>
</tr>
<tr>
<td>Chocolate (units/week)</td>
<td>0.16 ± 0.9</td>
<td>0.21 ± 1.1</td>
<td>−1.52</td>
<td>0.1281</td>
</tr>
</tbody>
</table>

* Mann–Whitney U test.

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In conclusion, by using HCL32 criteria, we propose that the link between bipolar spectrum and substance use can be broadened to include social drugs like tobacco and coffee.

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Conflict of interest
None of the authors have a conflict of interest.

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References


Erlanson-Albertsson, C., 2005. [Sugar triggers our reward-system. Sweets can make us high]. Lakartidningen. 102, 1620–1622, 1625, 1627.


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