Basic personality dimensions and alcohol consumption in young adults

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Abstract

Basic personality dimensions are relevant factors in the development of alcohol consumption. The main aim of this research was to evaluate the associations among some of the most important biodispositional models of personality, and to explore its role in the non-pathological alcohol consumption in young adults. In this study, the personality of 539 college students (283 women) was assessed using four questionnaires: EPQ-RS, SPSRQ-S, NEO-FFI, and TCI. Alcohol consumption was assessed with the AIS scale. Factor analyses of the different scales showed four broad factors labelled Negative Emotionality, Disagreeable Disinhibition, Unconscious Disinhibition, and Positive Emotionality. The openness to experience scale was not well represented in the factor solution and was excluded from the factor analysis. This dimension was studied independently in relation to alcohol use. Disagreeable Disinhibition predicted alcohol consumption both during the week and at the weekend, whereas Unconscious Disinhibition was associated with non-pathological alcohol drinking at weekends. These results were interpreted according to processes associated with impulsivity that facilitate alcohol use in young adults.

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1. Introduction

Alcohol is the most widely consumed drug in the world, and its misuse is a great public health concern (Goldman, Oroszi, & Ducci, 2005). Although the onset of consumption occurs in adolescence, this behaviour becomes a regular habit during young adulthood (Casswell, Pledger, & Pratap, 2002; Spanish Drug Observatory [SDO], 2007). Thus, the understanding of the risk factors associated with alcohol use at this stage of life has important implications for the development of more effective prevention and intervention programmes (Holder et al., 1999).

Personality is one of the psychological factors most consistently related to alcohol use. Although a so-called “alcoholic personality” does not exist, personality may be a vulnerability factor which would interact with other biological, psychological and social variables in the development of drug-taking behaviours, including alcohol (Cloninger, 1987; Eysenck, 1997; Ibáñez, Ruipérez, Villa, Moya, & Ortet, 2008; Rose, 1998; Sher, Grekin, & Williams, 2005).

There are several biodispositional models of personality that have shown their relevance in alcohol use, abuse, and dependence. These models assume that a number of relatively stable and consistent traits are the core of personality, which have a moderate biological and genetic influence and interact with environmental factors (Boyle, Matthews, & Saklofske, 2008). Among the most influential personality models, those of Eysenck, Gray, Cloninger, and McCrae and Costa’s Five-Factor Model (FFM) (Boyle et al., 2008; Cloninger, 1987; Corr, 2004; John, Naumann, & Soto, 2008) are especially relevant.

In an attempt to link psychological disorders to normal personality, Eysenck proposed three basic dimensions: extraversion, neuroticism, and psychoticism (Eysenck & Eysenck, 1985). Nowadays, however, the dominant biodispositional model is the FFM (John et al., 2008). It proposes five broad domains (McCrae & Costa, 2008): extraversion, neuroticism, agreeableness, conscientiousness, and openness to experience. From a more explanatory point of view, Gray (1991), Gray & McNaughton (2000) formulated a neuropsychological model of personality of three basic emotional systems: the behavioural inhibition systems (BIS), the behavioural activation system (BAS), and the flight-fight-freeze system (FFFS). It has been proposed that individual differences in punishment sensitivity are related to the combined FFFS/BIS functioning, and that reward sensitivity relates to BAS functioning (Corr, 2004). In line with Gray, Cloninger (1986, 1998) described a psychobiological model of individual differences in learning systems formed by four temperament dimensions: novelty seeking, associated with Gray’s BAS; harm avoidance, similar to Gray’s earlier proposal of BIS; and reward dependence and persistence, which refer to sensitivity to social cues and a tendency to persist with tasks despite frustration, respectively.

Although these four proposals have different origins and approaches, an elevated degree of convergence exists among them.
Several studies have explored the inter-relationships of these personality models and their underlying factor structure, and have proposed solutions ranging from two to five factors (e.g., Aluja, García, & García; 2004; Ávila et al., 1995; Caserás, Ávila, & Torrubia, 2003; Larstone, Jang, Livesley, Vernon, & Wolf, 2002; Mitchell et al., 2007; Ortet, Ibáñez, Llerena, & Torrubia, 2002; Watson, Clark, & Harkness, 1994; Zuckerman, Kuhlman, Teta, Joireman, & Kraft, 1993). Instead of discussing how many factors represent a better approximation to the structure of personality, Markon, Krueger, and Watson (2005) delineated an integrative hierarchy of personality ranging from two broad factors to five more specific ones. There are two superordinate factors at the top of the hierarchy: Alpha, comprising Negative Emotionality and Disinhibition; and Beta, comprising Positive Emotionality. At the next lower level in the hierarchy there are three factors: Negative Emotionality, Positive Emotionality and Disinhibition, and the last include the facets Disagreeable Disinhibition and Unconscious Disinhibition. At the third lower level they find four factors: Negative Emotionality, Disagreeable Disinhibition, Unconscious Disinhibition, and finally, Positive Emotionality, that comprises extraversion and openness domains. At the bottom of the hierarchy, there are five factors corresponding to the five personality dimensions proposed by the FFM. Regarding alcohol, the Disinhibition factor has been consistently related to both non-pathological and pathological alcohol consumption (Acton, 2003; Dawe, Gullo, & Loxton, 2004; Eysenck, 1997; Ibáñez et al., 2008; Sher et al., 2005; Sher & Trull, 1994). Interestingly, it has been shown that these disinhibition traits and the use and abuse of alcohol have common genetic factor (Krueger et al., 2002; Mustanski, Víken, Kaprio, & Rose, 2003; Slutske, Heath, & Madden, 2002; Young, Stallings, Corley, Krauter, & Hewitt, 2000). Therefore, the relationship between disinhibition and alcohol could be attributed, in part, to underlying biological systems that are common to disinhibited personality traits, reinforcement/incentive alcohol properties, and cognitive inhibitory control (Dawe et al., 2004; Goldman et al., 2005; Ibáñez et al., 2008). In relation to the more specific facets of disinhibition, two recent meta-analyses have shown that low conscientiousness and low agreeableness are associated with both regular and pathological alcohol consumption (Malouff, Thorsteinsson, Rohoe, & Schutte, 2007; Ruiz, Pinkus, & Schinka, 2008).

Regarding other personality traits, despite some studies have found that Extraversion/positive emotionality is associated with non-pathological alcohol use (e.g., Grau & Ortet, 1999; Hampson, Goldberg, Vogt, & Dubanovski, 2006), the meta-analyses of Malouff et al. (2007) and Ruiz, Pincus, and Schinka (2008) did not confirm the consistency of this relationship. With regard to Neuroticism/ negative emotionality, it has been proposed that alcohol use disorders may develop because alcohol relieves negative affect, so this dimension may play a significant role in alcohol consumption through the negative affect regulation. However, there is no clear empirical evidence to support this assumption in studies on non-pathological alcohol use, despite neuroticism apparently playing a more relevant role in certain types of pathological alcohol use (Cloninger, 1987; Ibáñez et al., 2008; Malouff et al., 2007; Ruiz et al., 2008; Sher et al., 2005; Sher & Trull, 1994). Finally, Openness has been less intensely explored in relation to alcohol consumption, although it seems to play a negligible role in this behaviour (Malouff et al., 2007; Ruiz et al., 2008).

The main aim of this study was to examine the relationship between the basic personality dimensions of different biodispositional models and regular alcohol use in young adults. Specifically, we investigated which factor structure may emerge the personality models of Eysenck, Cloninger, Gray and FFM best. We hypothesized that a four-factor solution related to Extraversion/positive emotionality, Neuroticism/negative emotionality, Disagreeable Disinhibition and Unconscious Disinhibition may adequately represent the underlying factors described by these biodispositional models. Regarding alcohol, we hypothesized that low agreeableness and low conscientiousness may be significantly and independently related to drinking behaviours, while we did not expect Extraversion/positive emotionality, Neuroticism/negative emotionality and Openness to be associated with alcohol consumption in young adults.

2. Method

2.1. Participants

Five hundred and thirty-nine volunteer Caucasian undergraduate college students answered the questionnaires in the classroom. The age range of the participants was 18–29 years. Two hundred and eighty-three of the students were women and 256 were men. The mean ages were 20.75 (SD = 2.46) and 21.27 (SD = 3.36), respectively.

2.2. Instruments

Alcohol consumption was assessed by the AIS scale (Grau & Ortet, 1999). Participants had to indicate the quantity of drinks of each of the following: “beer”, “wine”, “liquors” and “mix drinks” during the week and at weekends. We estimated the total grams of alcohol that the participants drank during the week, at the weekend and throughout the whole week by means of the formula described by Grau and Ortet (1999).

Personality was assessed with four different questionnaires: the short version of the EPQ-R (EPQ-RS) (Ortet, Ibáñez, Moro, & Silva, 2001) that assesses the three basic dimensions proposed by Eysenck & Eysenck (1985) psychotictism, extraversion and neuroticism; the short version of the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ-S) (Torrubia, Ávila, Molto, & Caserás, 2001, in preparation) that assesses individual differences in reward and punishment sensitivity constructs based on Gray’s theory (Corr, 2004); the NEO-FFI (Costa & McCrae, 1999), which assesses the five basic dimensions neuroticism (N), extraversion (E), openness to experience (O), agreeableness (A) and conscientiousness (C) of the FFM proposed by McCrae and Costa (2008); and the four temperament scales of the TCI (Gutiérrez-Zotes et al., 2004) that assess novelty seeking, harm avoidance, reward dependence and the persistence traits proposed by Cloninger (1986, 1998).

2.3. Data analyses

We carried out a parallel analysis with the Monte Carlo PCA program (Watkins, 2000) to obtain an objective index in order to select the number of retained factors. Then, we performed a principal component analysis (PCA) with oblimin rotation and calculated the regression scores for each factor.

In order to examine which personality factors were significant predictors of alcohol use, we performed three hierarchical regression analyses, one per dependent variable. Regressions were carried out through three steps. The first step included gender (as a dummy variable) and age. In the second step, we introduced the personality factor scores plus the O scale. Finally, the third step was formed by the interactions between each personality factor plus O and gender.

3. Results

The descriptive results of the variables are presented in Table 1. Regarding alcohol consumption, we found that roughly 13% of men...
Table 1
Means, standard deviations, t-test and Cronbach’s alpha of the variables included in the study for the total sample and for both genders.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (N = 539)</th>
<th>Men (n = 256)</th>
<th>Women (n = 283)</th>
<th>t-test</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Total qua.</td>
<td>122.61</td>
<td>128.12</td>
<td>163.58</td>
<td>158.44</td>
<td>85.55</td>
</tr>
<tr>
<td>Midweek</td>
<td>100.93</td>
<td>94.53</td>
<td>126.25</td>
<td>111.77</td>
<td>78.20</td>
</tr>
<tr>
<td>Weekend</td>
<td>22.14</td>
<td>52.22</td>
<td>38.31</td>
<td>70.31</td>
<td>7.40</td>
</tr>
<tr>
<td>N-NEO</td>
<td>20.49</td>
<td>8.63</td>
<td>17.22</td>
<td>8.36</td>
<td>23.46</td>
</tr>
<tr>
<td>E-NEO</td>
<td>30.45</td>
<td>5.42</td>
<td>30.76</td>
<td>5.50</td>
<td>30.15</td>
</tr>
<tr>
<td>O-NEO</td>
<td>28.91</td>
<td>5.99</td>
<td>28.74</td>
<td>6.05</td>
<td>29.06</td>
</tr>
<tr>
<td>A-NEO</td>
<td>32.05</td>
<td>5.95</td>
<td>31.11</td>
<td>6.40</td>
<td>32.92</td>
</tr>
<tr>
<td>C-NEO</td>
<td>29.58</td>
<td>7.13</td>
<td>28.67</td>
<td>7.18</td>
<td>30.41</td>
</tr>
<tr>
<td>HA-TCI</td>
<td>16.15</td>
<td>6.67</td>
<td>13.65</td>
<td>6.40</td>
<td>18.41</td>
</tr>
<tr>
<td>NS-TCI</td>
<td>20.23</td>
<td>6.02</td>
<td>21.07</td>
<td>6.14</td>
<td>19.48</td>
</tr>
<tr>
<td>RD-TCI</td>
<td>16.76</td>
<td>3.80</td>
<td>15.32</td>
<td>3.86</td>
<td>18.04</td>
</tr>
<tr>
<td>PE-TCI</td>
<td>4.26</td>
<td>1.98</td>
<td>4.21</td>
<td>1.91</td>
<td>4.31</td>
</tr>
<tr>
<td>N-EPQ</td>
<td>4.46</td>
<td>3.26</td>
<td>3.62</td>
<td>3.12</td>
<td>5.23</td>
</tr>
<tr>
<td>E-EPQ</td>
<td>8.65</td>
<td>2.66</td>
<td>8.69</td>
<td>2.76</td>
<td>8.62</td>
</tr>
<tr>
<td>P-EPQ</td>
<td>3.53</td>
<td>2.53</td>
<td>3.96</td>
<td>2.74</td>
<td>3.13</td>
</tr>
<tr>
<td>SP-S</td>
<td>5.62</td>
<td>3.58</td>
<td>4.71</td>
<td>3.41</td>
<td>6.44</td>
</tr>
<tr>
<td>SR-S</td>
<td>6.41</td>
<td>3.70</td>
<td>8.04</td>
<td>3.67</td>
<td>4.96</td>
</tr>
</tbody>
</table>

Note: Qua = Quantity of alcohol use; Midweek = During the week quantity of alcohol use; Weekend = Weekend quantity of alcohol use; N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness; HA = Harm Avoidance; NS = Novelty seeking; RD = Reward dependence; PE = Persistence; P = Psychoticism; SP-S = Sensitivity to Punishment; SR-S = Sensitivity to Reward.

*** p < 0.001.
**  p < 0.01.
*

and 12% of women from our sample could be considered high-risk drinkers, while 66% of men and 70% of women were low-risk consumers according to the WHO criteria applied (SDO, 2007). Furthermore, men drank significantly more alcohol than women. While men consumed the equivalent of 16 beers, women’s equivalence was 9 beers in a normal week. This pattern is similar to the results found in epidemiological studies conducted in Spain (SDO, 2007) and in studies done in other countries (Magid, Maclean, & Colder, 2007). In relation to personality, we also found that mean values, scales normality, alpha reliabilities and gender differences were in line with other studies (Costa & McCrae, 1999; Gutiérrez-Zotes et al., 2004; Ortet et al., 2001; Torrubia et al., 2001).

The parallel analysis suggested retaining four factors. However, O was weakly represented in the four-factor solution as its low communality indicated, so we excluded O from the PCA. In a second parallel analysis, a four-factor solution was also found to be optimal (see Fig. 1). The factor loadings of the personality scales in the factor solution are shown in Table 2, which accounted for 72.61% of the total variance.

Table 3 shows the zero-order correlations of the personality scales with the outcome measures. Those scales more linked to the disinhibition factors were the most related to alcohol use.

The results of the hierarchical regression analyses are presented in Table 4. The five gender × personality factor interactions did not explain much significant variance, so these data are not reported. Hence in our sample, gender, Disagreeable Disinhibition and Unconscious Disinhibition were considered independent predictors of alcohol use.

4. Discussion

The present research showed that a four-factor solution appeared to be the most robust structure to group the personality scales under study. This structure is similar to the ones found in other studies (Aluja, García, & García, 2004; Avia et al., 1995; Caseras et al., 2003; Larstone et al., 2002; Markon, Krueger, & Watson, 2005; Ortet et al., 2002; Zuckerman et al., 1993) and seems to embrace the personality broad domains from some of the main biodirectional models (Eysenck, Gray, Cloninger and FFM), with the exception of O. This scale was poorly represented in the four-factor solution, indicating that this domain was not well captured in either Eysenck and Gray models or Cloninger’s temperament traits (Markon et al., 2005). However, since O represented an important
source of individual differences in personality (McCrae & Costa, 2008), we decided to exclude it from the PCA, but we studied its relationship with alcohol as an independent factor. The four factors obtained were labelled Positive Emotionality, Negative Emotionality, Disagreeable Disinhibition and Unconscious Conscientiousness, according to Markon et al.’s (2005) nomenclature.

Regarding the SPSRQ-S scales, our data indicated that SP was associated mainly with N and anxiety-related scales and secondarily with low Positive Emotionality, which is in line with other studies (Cerasas et al., 2003; Mitchell et al., 2007; Turrubia et al., 2001). Thus, our results indicate that the SC-short scale may be a valid measure of BIS/FFS (Corr, 2004). The sensitivity to reward (SR) construct and its BAS underlying system have been hypothesized to be at the basis of extraversion (Corr, 2004; Smiley, Pickering, & Jackson, 2006), but also of impulsivity and novelty/sensation seeking (Cloninger, 1998; Pickering & Gray, 1999). In the present study, the SR scale loaded on the Disagreeable Disinhibition factor and secondarily on the Positive Emotionality factor, which is in accordance with the findings of Mitchell et al. (2007). These results support the notion that BAS, at least when assessed with the SR-short scale, may underlie Extraversion/Positive Emotionality and, especially, Impulsivity/Disagreeable Disinhibition.

In relation to the role of personality in alcohol use, those factors associated with impulsivity/disinhibition were significant predictors of alcohol consumption. Disagreeable Disinhibition was the most relevant factor in predicting alcohol use both during the week and at weekends. Independently, Unconscious Conscientiousness also showed a significant relationship to alcohol use, especially at the weekend. Nonetheless, Positive Emotionality, Negative Emotionality and O were not related to alcohol consumption, which is in accordance with recent meta-analyses (Malouff et al., 2007; Ruiz et al., 2008).

These results may indicate the usefulness of differentiating between two independent factors (Disagreeable Disinhibition and Unconscious Conscientiousness) linked to impulsivity in the study of alcohol consumption. Along these lines, Dawe et al. (2004) suggested that different facets of impulsivity may be associated with substance misuse through different processes, possibly linked to distinct biological pathways. They proposed two main facets of impulsivity/disinhibition: reward sensitivity, that reflects BAS functioning and is linked to mesolimbic dopamine circuits; and rash impulsiveness, that reflects the difficulty to inhibit prepotent approach tendencies that are manifested in loss of control, and is related to certain areas of the prefrontal cortex. According to our factor solution, we may speculate that the reward sensitivity facet of impulsivity may be embraced in the Disagreeable Disinhibition factor (in which the SR scale acted as a marker), whereas the rash impulsiveness facet may be reflected, in part, in the Unconscious Conscientiousness factor. Different studies seem to support these assumptions. On one hand, Barrós-Loscertales et al. (2006) and Hahn et al. (2009) found an association between the SR scale and key areas of the human reward circuitry which were hypothesized to be at the basis of reward sensitivity (Dawe et al., 2004). On the other hand, Krueger, Caspi, Moffitt, White, and Stouthamer-Loeber (1996), and Petrican and Schimack (2008) found that conscientiousness was related to working memory and delay of immediate gratification. These cognitive functions, and their biological bases, are proposed to underlie rash impulsiveness (Dawe et al., 2004). Accordingly, we may interpret that alcohol use during the week in young adults was associated with reward sensitivity, whereas alcohol consumption at the weekends was influenced by both reward drive and loss of control processes related to Disagreeable Disinhibition and Unconscious Conscientiousness factors, respectively.

The present study has several limitations. Firstly, our participants were college students. However research studies conducted in more heterogeneous samples found similar results (Malouff et al., 2007; Ruiz et al., 2008). Secondly, estimations of personality

Table 3
Pearson correlations between the personality scales and the alcohol use variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>NEO-FFI</th>
<th>TCI</th>
<th>EPQ-RS</th>
<th>SPSQ-S</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>E</td>
<td>O</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>Frequency</td>
<td>-0.00</td>
<td>0.03</td>
<td>0.12</td>
<td>-0.16***</td>
</tr>
<tr>
<td>Quantity</td>
<td>-0.06</td>
<td>0.04</td>
<td>0.07</td>
<td>-0.19***</td>
</tr>
</tbody>
</table>

Note: N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness; HA = Harm Avoidance; NS = Novelty Seeking; SP = Sensitivity to Reward; SR = Sensitivity to Reward. 

** p < 0.01. 
*** p < 0.001.

Table 4
Hierarchical multiple regressions for the quantity of alcohol consumption in the total week, during the week and at weekends.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>IV</th>
<th>Total quantity</th>
<th>During the week quantity</th>
<th>Weekend quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>R²</td>
<td>R²</td>
<td>t</td>
</tr>
<tr>
<td>1</td>
<td>Gender</td>
<td>0.09***</td>
<td>0.09***</td>
<td>0.09***</td>
</tr>
<tr>
<td>Age</td>
<td>0.01</td>
<td>0.23</td>
<td>0.04</td>
<td>0.74</td>
</tr>
<tr>
<td>2</td>
<td>NE</td>
<td>0.18***</td>
<td>0.09***</td>
<td>0.14***</td>
</tr>
<tr>
<td>PE</td>
<td>0.03</td>
<td>0.57</td>
<td>0.02</td>
<td>0.33</td>
</tr>
<tr>
<td>DD</td>
<td>-0.26</td>
<td>-4.79***</td>
<td>-0.21</td>
<td>3.86***</td>
</tr>
<tr>
<td>UD</td>
<td>-0.16</td>
<td>-3.12***</td>
<td>-0.08</td>
<td>1.51</td>
</tr>
<tr>
<td>O</td>
<td>0.03</td>
<td>0.68</td>
<td>0.01</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Note: IV = Independent variables; NE = Negative Emotionality; DD = Disagreeable Disinhibition; PE = Positive Emotionality; UD = Unconscious Conscientiousness; O = Openness to experience. 

** p < 0.01. 
*** p < 0.001.
and alcohol use were based on self-report measures, and not through more objective measures (especially in relation to alcohol consumption). Thirdly, the variables included in this study only explain a small part of alcohol consumption (between 12% and 19% of the variance). Hence, other biological, psychological and social variables also influence the development of these behaviours (Ruípériz, Ibáñez, Villa, & Ortet, 2006; Zucker, Boyd, & Howard, 1994). Finally, the present study is correlational, so no causal explanations could be inferred from our results. In order to disentangle the causal role of personality, longitudinal prospective studies have to be carried out (Rose, 1998).

In short, a four-factor solution of Positive Emotionality, Negative Emotionality, Disagreeable Disinhibition and Unconscientious Disinhibition seems to represent an adequate level of integration for some of the most important biosocialational models of personality, leaving the broad trait of openness mainly to FFM. Regarding alcohol, the more closely related dimensions to regular alcohol use were Disagreeable Disinhibition and Unconscientious Disinhibition. Disagreeable Disinhibition was related to alcohol during the week and at weekends, while Unconscientious Disinhibition was associated only with alcohol consumption at weekends. Finally, Positive Emotionality, Negative Emotionality and Openness did not seem to be relevant traits in alcohol use in young adults.

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