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Research report

# Relationships of impulsiveness and depressive symptoms in alcohol dependence

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ABSTRACT

*Background:* Depressive symptoms as well as high levels of impulsivity are subjects of special interest in alcohol dependence, as these factors are considered to influence the course of this disorder. However, until now mutual relationships between impulsivity and depression have not been investigated thoroughly in alcohol-dependent patients.
*Methods:* By means of the Barratt Impulsiveness Scale (BIS-11) and *stop-signal task*, levels of impulsivity among 304 alcohol-dependent patients were measured. The *stop-signal task* was used as a manipulation-free method of estimating the level of behavioral impulsiveness, and the BIS-11 is a self report measure of global as well as cognitive impulsivity. Patients were also asked to complete the Beck Depression Inventory (BDI) and Hopelessness Scale (BHS). The results were analyzed in order to examine relationships between impulsiveness and depressive symptoms.
*Results:* Statistical analyses revealed significant associations between impulsiveness and severity of depressive symptoms. Individuals with higher scores on the BDI were more impulsive on the BIS-11, whereas patients with higher scores on the BHS were more impulsive on both the *stop-signal task* and BIS-11. The strongest correlations were found with the attention impulsivity subscale of BIS-11. Adjusting for other variables, a linear regression analysis revealed that cognitive impulsivity was the strongest predictor of depression severity.
*Limitations:* The main limitation of the study is a not fully representative sample, with exclusion of patients with active mood disorders
*Conclusions:* The results indicate a strong association between depressive symptoms and impulsivity in alcohol-dependent patients, and suggest an important distinction between hopelessness and other depressive symptoms.



## 1. Introduction

According to Moeller et al. (2001), impulsivity may be defined as "a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions". Thinking about a typical depressed patient one can hardly imagine depression has anything in common with this definition of impulsive behavior. However, current research concentrates on impulsivity as a multidimensional construct, distinguishing not only impulsive action (*behavioral impulsiveness* — inability to stop initiated reaction), but also impulsive decisions (*cognitive impulsiveness* — inability to weigh the consequences of one's behavior) (Arce and Santisteban, 2006), which may have special relevance in the context of depressive symptoms.

To date the relationship between impulsivity and depressive symptoms has been studied mainly in patients with bipolar disorder (BPD), which itself is associated with alcohol dependence (Swann, 2010). Impulsivity measures have been found to be higher in bipolar patients with than without an alcohol use disorder (Rogers et al., 2010). Recent research also shows that impulse

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control deficits are not limited to manic states (Rogers et al., 2010), but also occur during euthymic periods (Lewis et al., 2009; Swann et al., 2001) and depressive episodes (Strakowski et al., 2010; Swann et al., 2008). This observation may be the key to understand the fact that bipolar disorder is the most common psychiatric condition in patients with substance use disorders (Grant et al., 2004), with impulsivity being a key symptom of both. Research demonstrates that even euthymic patients with bipolar disorder are more sensitive to the euphorigenic influence of psychoactive substances, which may result from increased noradrenergic transmission (especially manifested in manic episodes) (Swann, 2010). These changes in neurotransmission may confer greater susceptibility to positive reinforcement, but also enhance impulse control deficits by inhibiting the frontal lobe function.

Surprisingly, some studies suggest that impulsiveness is not only a characteristic of BPD, but may accompany depressive episodes in both bipolar disorder and recurrent major depressive disorder (Corruble et al., 2003). This observation suggests the existance of a specific mechanism linking depressive episodes and impulsivity. Peluso et al. (2007) have shown that levels of impulsiveness in individuals with bipolar depression differ neither from levels of impulsivity among patients in remission, nor from levels in patients with recurrent depression. In all these cases impulsivity has been shown to have higher levels than in healthy controls (Peluso et al., 2007). In addition, Matthews et al. (2009) as well as Yang et al. (2009) described altered functioning in the anterior cingulate cortex (which is involved in inhibitory control) in patients performing a stop-signal task during an episode of major depression. Gonzalez et al. (2011) observed a significant association between depressive symptoms and negative urgency (a state-specific impulsivity related construct, referring to difficulty in controlling behavioral impulses when emotionally upset) in a group of college drinkers with depressive symptoms.

Although results of some studies suggest that impulsivity in depressed subjects results from the presence of subtle manic symptoms in mixed states (Akiskal et al., 2005; Goldberg et al., 2009; Swann, 2009), other studies point to differences in the types of impulsiveness observed in manic and depressive episodes. In manic episodes an increase in behavioral impulsivity has been observed (Swann et al., 2008) whereas cognitive impulsiveness has been reported to accompany depression (Corruble et al., 2003; Lau et al., 2007; Swann et al., 2008). Neither self-report (Corruble et al., 2003; Swann et al., 2008) nor objective measures (Lau et al., 2007) revealed increases in behavioral impulsivity during depressive episodes.

An explanation for this phenomenon has yet to be established. Some authors (Swann et al., 2002, 2008) emphasize that lack of planning (the inability to think about the consequences of one's behavior, the core element of cognitive impulsivity) may be symptomatic of depression, coming from feelings of helplessness and hopelessness regarding future events. According to one theoretical model, depression may be perceived as a result of loss of control over negative thoughts (Lau et al., 2007). In a study by Swann et al. (Swann et al., 2008), high levels of impulsiveness correlated significantly with hopelessness, anhedonia, and suicidality. Moreover, some authors suggest (Rzewuska, 2005) that behavioral manifestations of impulsivity (aggression, lost of control over one's behavior) may appear during early periods of a depressive disorder as equivalents of low mood. In addition, impulsivity is considered to be an important risk factor of suicidal behavior (Baca-Garcia et al., 2005; Dougherty et al., 2004; Mann et al., 1999; Najt et al., 2007). Indeed, suicidal behavior can be viewed as a manifestation of both severe depression and, in some cases, as severely deficient impulse control.

Suicide attempts may possibly result from the coexistence of two factors: hopelessness (a common symptom of depression) and impulsiveness (Rzewuska, 2005). A question of whether suicide attempts of impulsive individuals are more harmful than non-impulsive individuals is still a matter of dispute as different studies gave different results (Baca-Garcia et al., 2005; Swann et al., 2005).

It has to be emphasized that depressive symptoms as well as high levels of impulsivity, are important risk factors for relapse in alcohol dependence (de Wit, 2009; Nigg et al., 2006; Nunes and Levin, 2004; Rubio et al., 2008; Simons et al., 2004; Swann, 2010; Witkiewitz and Villarroel, 2009). The definition of impulsiveness overlaps at least two symptoms of alcohol dependence according to ICD-10 (World Health Organization, 1992) and DSM-IV (American Psychiatric Association, 2000) criteria: drinking more than previously planned and drinking despite knowledge of negative consequences. This explains and emphasizes the significance of impulsivity in the course of alcoholism. On the other hand, depression may exert its effect on drinking by leading to alcohol use that is an attempt to avoid negative affect (drinking to cope, self-medication) or manage sleep problems (Davis et al., 2008; Gonzalez et al., 2011). The comorbidity of depression and alcohol use disorders may result in more severe social impairment as well as a higher risk of suicide, which — as mentioned earlier can be also perceived as a manifestation of higher impulsivity (Davis et al., 2008). However, until now mutual relationships between depression and impulsivity have not been investigated thoroughly in alcohol-dependent patients. Considering the importance of impulsivity and depressive symptoms for the course of alcohol dependence and considering results of their correlation in studies of individuals with mood disorders, we decided to investigate this issue in a group of alcohol-dependent patients. Taking into account the definition of impulsivity as a multidimensional construct, we analyzed the relationships between depressive symptoms and two dimensions of impulsiveness: behavioral and cognitive. We hypothesized that the severity of depressive symptoms would be associated with cognitive but not behavioral impulsivity in a group of alcoholics. Given that impulsivity may lead to negative consequences that might, by themselves, increase depression, we also analyzed the effects of selected variables (decreased social support, severity of alcohol dependence, use of other substances, and adverse consequences of drinking) in order to test our second hypothesis that impulsiveness would remain significantly correlated with depression severity after controlling for these other factors.

## 2. Method

### 2.1. Subjects

A group of 304 patients entering abstinence-based, drug-free alcohol treatment programs in Warsaw, Poland, was recruited into the study. Most of them (n = 270) came from residential treatment centers whereas 34 patients were recruited from