

## High impulsivity as a risk factor for the development of internalizing disorders in detained juvenile offenders

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### Abstract

**Background:** Whilst impulsivity is most commonly linked to the development of internalizing disorders, high levels of impulsivity, anxiety, and depression have been found in detained juvenile offenders. We therefore sought to determine whether impulsivity is associated with the development of self-reported anxiety or depression in a sample of detained juvenile offenders.

**Methods:** 323 male juvenile offenders and 86 typically developing controls, aged 15–17 were assessed. The Schedule for Affective Disorder and Schizophrenia for School-Age Children Present and Lifetime (SADS-PL) was used to assess psychiatric diagnoses, the Barratt Impulsivity Scale (BIS-11) was used to measure impulsivity, and the Screen for Child Anxiety Related Emotional Disorders (SCARED) and the Birlson Depression Self-Rating Scale (DSRS) were used to assess self-reported anxiety and depression respectively.

**Results:** Compared to controls, juvenile offenders had significantly higher scores on the BIS-11 total, as well as on the motor and nonplanning subscales (all  $p$  values  $<0.001$ ), as well as higher DSRS ( $p < 0.001$ ) and SCARED ( $p < 0.05$ ) scores. Within the juvenile offender group, scores on the SCARED correlated positively with BIS-11 total, attention subscale, motor subscale, and total DSRS (all  $p$  values  $<0.01$ ). DSRS scores correlated positively with BIS-11 total, attention subscale, nonplanning subscale, and total SCARED scores (all  $p$  values  $<0.01$ ). Participants were then categorized low, middle or high impulsivity according to scores on the BIS-11. One-way ANOVAs demonstrated a significant difference between these tertiles on DSRS [ $F(2,320) = 4.862, p < 0.05$ ] and SCARED total scores [ $F(2,320) = 3.581, p < 0.05$ ]. Specifically, *post-hoc* analyses found that the high impulsivity tertile scored significantly higher than the remaining tertiles on both DSRS ( $16.1 \pm 0.3$  vs.  $14.0 \pm 0.6, p < 0.05$ ) and SCARED ( $23.3 \pm 0.9$  vs.  $18.4 \pm 1.4, p < 0.05$ ) scores. Using multiple linear regression, BIS-11 attention scores, number of months served in custody, age, and BIS-11 nonplanning scores predicted higher levels of anxiety, whilst only BIS-11 attention and nonplanning scores predicted higher levels of depression.

**Conclusions:** In detained juvenile offenders, high impulsivity may be an important risk factor not only for the externalizing disorders, but also for anxiety and depression. Results of this study, therefore, suggest that specific facets of impulsivity may represent one mechanism underlying the emergence of anxiety and depression in this population.

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### 1. Introduction

Detained juvenile offenders are at increased risk of a range of psychiatric disorders [1,2], and have higher rates of both externalizing and internalizing disorders compared

to adolescents living in the community [3], and adolescents attending community-based psychiatric services [4]. Although externalizing disorders, such as conduct disorder and oppositional defiance disorder, are most frequently associated with offending behavior in juveniles, emerging work suggests that internalizing disorders, such as anxiety [5] and depression [6], may also be implicated in the development of offending [7,8], and perhaps in the development of violence specifically [9,10].

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Research into the co-association between externalizing and internalizing disorders has focused on a number of putative shared risk factors, including: genetic and non-shared environmental influences [11], emotional reactivity, lower executive control [12], negative self-concept [13], poor parental attachment, a family history of offending [14], poor social interactions with peers [15,16], poor social functioning [17], peer rejection, the experience of psychological stress [18], and a lack of social support [19]. To our knowledge, however, no previous study has considered how these shared risk factors may also underlie the association between these disorders and offending.

Impulsivity may constitute one risk factor which underlies the co-association between externalizing and internalizing disorders, and which can also help to explain the association between these disorders and offending. Impulsivity has traditionally been related to the development of externalizing disorders, particularly aggression [20,21] and offending [22]. Recently, however, it has been suggested that higher levels of impulsivity may also underlie the development of several internalizing disorders in adolescence including anxiety [21–24] and depression [21,25,26]. Highly impulsive adults have also been shown to have significantly higher levels of internalizing psychopathology during childhood [21].

The purpose of this study, therefore, is to investigate whether measures of impulsivity could be used to predict self-reported anxiety or depression in a sample of detained juvenile offenders. Specifically, we sought to determine whether juvenile offenders have higher levels of impulsivity than healthy controls, whether impulsivity subtypes differ between detained juvenile offenders and controls, whether there is an association between impulsivity and the symptoms of internalizing disorders, such as anxiety and depression, whether different levels of impulsivity are associated with the severity of anxiety or depression symptoms in juvenile offenders, and whether different facets of impulsivity are uniquely associated with anxiety or depression. Additionally, as previous work suggests that the association between impulsivity, anxiety, and depression may vary as a function of the severity of impulsivity [27], we also sought to investigate whether the association between these three factors would differ for low, middle, and high impulsivity.

## 2. Methods

### 2.1. Subjects

The analyses reported here form part of a multicentre study of juvenile offenders detained in one of three Youth Detention Centres (YDCs) located in the Hunan, Sichuan, and Guangdong provinces of the People's Republic of China. Further details of this sample are therefore reported elsewhere [28]. Briefly, the juvenile offender group was recruited from consecutive receptions to the Hunan, Sichuan, or Guangdong YDCs. All were males, between 15 and

17 years of age, and had been convicted of various offences ranging from theft and fraud to rape, assault, and homicide. A total of 347 offenders were invited to participate in this study. Nine boys or their legal guardians refused to participate, and 15 did not complete the clinical assessment.

The healthy control group was recruited from local high schools in the same provinces as the YDCs, and was matched for gender and age (ranging from 15 to 17 years). Ninety typically developing controls were recruited, of whom 86 completed the clinical assessment. There were no significant differences between those boys who completed the clinical assessment and those who did not in terms of demographic or index offence characteristics.

All participants, and their legal guardians, were given written information about the aims and procedure of the study, and all were informed that information collected as part of the study was confidential. Additionally, for the juvenile offender group, all participants were assured that refusal to participate would not affect their judicial status or length of stay in the YDC. All procedures of this study were approved by the Biomedical Ethics Board of the Second Xiangya Hospital, Central South University, People's Republic of China.

### 2.2. Crime-related variables

Information on criminal history, index offence, number of previous convictions, and total length served in YDC custody were collected from official police records.

### 2.3. Psychiatric diagnoses

The Schedule for Affective Disorder and Schizophrenia for School-Age Children Present and Lifetime (SADS-PL) [29] was used to assess both current and lifetime psychiatric diagnoses according to DSM-IV criteria. The SADS-PL was administered by a trained psychiatrist using an established interview procedure [2].

### 2.4. Impulsivity

The Barratt Impulsivity Scale (BIS-11) was used to measure trait impulsivity [27,30]. In addition to yielding a total score, the BIS-11 consists of 3 subscales measuring attentional, motor, and nonplanning impulsivity with higher scores indicating higher levels of impulsivity. Previous work has shown that the Chinese version of the BIS-11 has good test–retest reliability for both the total score and for the three subscale scores [31].

### 2.5. Depression

The Birlerson Depression Self-Rating Scale (DSRS) [32], has previously been used to assess for depressive symptoms in both children and young adolescents [33,34]. The DSRS is an 18-item self-report scale which measures the occurrence of depressive symptoms during the preceding week. Higher values indicate greater depression severity. The Chinese

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