

# Improvement in psychological wellbeing among adolescents with a substance use disorder attending an outpatient treatment programme

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**Objectives:** Adolescents with substance use disorders (SUDs) exhibit high rates of comorbid psychological problems. This study aimed to examine the impact of an outpatient substance use treatment programme upon the psychological wellbeing of adolescents.

**Methods:** A prospective study was carried out examining psychological symptoms in a group of adolescents attending the Youth Drug and Alcohol (YoDA) Addiction Service in Dublin. Participants were treated with evidenced based psychological models such as cognitive behavioural therapy, motivational interviewing and systemic family therapy. The Becks Youth Inventory was utilised to assess psychological symptoms at treatment entry and repeated three months later at follow up.

**Results:** Among 36 adolescents who were included in this study, poly-substance misuse was the norm. Almost three-quarter had a cannabis use disorder (CUD). There were significant reductions in mean subscale scores of depression (56.0 to 50.8,  $p = 0.003$ ), anger (55.2 to 49.5,  $p < 0.001$ ) and disruptive behaviour (61.6 to 56.5,  $p = 0.002$ ) at follow up. Although there wasn't a statistically significant reduction in mean scores for anxiety, we observed a significant proportion of participants ( $p = 0.008$ ) improving and moving out of a moderate to severe symptom range when examined by category. This was also the case for self-concept ( $p = 0.04$ ). Furthermore this study revealed a positive correlation between the reduction in days of cannabis use and reduction in depressive scores (Pearson correlation 0.49,  $p = 0.01$ ) among those with a CUD.

**Conclusion:** The findings indicate that substance use treatment for adolescents is associated with important psychological and behavioural improvements.

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**Key words:** Adolescent, substance use disorder, anxiety, depression, cannabis.

## Introduction

Substance use disorders (SUDs) among adolescents remain a major concern. In line with many European countries, cannabis is the most widely used illegal substance in Ireland (Bates, 2017). Polysubstance use is however common across all age ranges in people attending addiction treatment services (Bellerose *et al.* 2011).

Community based outpatient programmes have developed globally as a first line response for adolescents using cannabis and other illicit substances. The Cannabis Youth Treatment study (Dennis *et al.* 2004) in particular has revealed the effectiveness of outpatient interventions with structured approaches such as Motivational Enhancement therapy, Cognitive Behavioural therapy (CBT), Multidimensional Family

therapy (MDFT) and Adolescent Community Reinforced Approach (ACRA).

The phenomenon of dual diagnoses takes into account comorbid psychiatric and psychological problems coupled with SUDs (Saddichha *et al.* 2015; Vitali *et al.* 2018). Mental health disorders and SUDs co-occur with great frequency amongst adolescents (Kaminer & Bukstein, 2008). Research findings suggest a major role for substance use in the aetiology and prognosis of psychiatric disorders. These include internalising problems such as anxiety disorders and affective disorders as well as externalising problems that are associated with conduct disorders and delinquency. Psychiatric disorders also appear to have an important role in the aetiology of and vulnerability to substance use problems in adolescents (Bukstein *et al.* 1989).

A study by Chan *et al.* provides evidence that co-occurring mental health problems are the norm for both adolescents and adults in treatment for SUDs, with 78–90% having either an internalising or externalising

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problem and 42–61% experiencing both (Chan *et al.* 2008). The patterns of substance use and mental health problems with which clients present to addiction treatment are heterogeneous and vary by age and gender (Stevens *et al.* 2004; Edokpolo *et al.* 2010). Within a range of age groups, there is an association between the severity of substance use and co-occurring mental health problems (Stevens *et al.* 2004; Chan *et al.* 2008; Keane *et al.* 2014).

International research suggests that treatment of SUDs coincides with an improvement in many important behavioural and psychological symptoms (Stevens *et al.* 2004; Hser *et al.* 2017). Community based psychological interventions such as MDFT and Individual Therapy have been shown to reduce the rate of externalising and internalising symptoms and improve family functioning among adolescents with a cannabis use disorder (CUD) (Schaub *et al.* 2014). A recent Irish study reported positive changes in psychological symptoms among heroin dependent adolescents who engaged in psychosocially assisted opiate substitution treatment programmes (Smyth *et al.* 2018).

Given the above, we sought to further our knowledge about the impact of outpatient treatment of adolescent SUDs upon measures of psychological wellbeing. Given that international evidence suggests that psychological symptoms would improve during treatment, we wished to determine if such an effect was evident in an Irish treatment group. We further hypothesised that reductions in substance use would correlate with improvements in mental health.

## Method

### Study design

The primary aim of the broader study was to measure changes in drug use following treatment of adolescents attending an outpatient programme. These results have been previously reported (Smyth *et al.* 2015). A secondary outcome explored related to changes in psychological symptoms. To examine this in the current study we conducted a prospective analysis of psychological wellbeing among adolescents attending the Youth Drug and Alcohol (YoDA) Addiction Service in Dublin. We utilised the Beck's Youth Inventories – Second Edition (BYI-II) (Beck *et al.* 2005) to assess psychological symptoms. Initial interviews for those included in the study were carried out during a period between April 2008 and October 2010 where baseline BYI-II scores were obtained pre-treatment (T0). This was then compared to follow up BYI-II scores (T1) after structured interventions three months later during a period between July 2008 and January 2011. This study

was approved by the Research and Ethics committee of the National Drug Treatment Centre (NDTC).

### Participants

We included participants from the YoDA outcome study who had completed the BYI-II at baseline and during their follow up interview (Smyth *et al.* 2015). Of the 108 participants in the initial outcome study, 87 were followed up. Of these, 37 completed the BYI-II during that follow up assessment. One person had failed to complete the BYI-II during baseline assessment, so that left 36 participants for inclusion in this study, for whom we had both baseline and follow up BYI-II scores.

### Measures

The BYI-II was used as the outcome measure. This is a self-reported instrument with a set of norm-referenced diagnostic scales designed to assess children and youth between the ages of 7 and 18. The BYI-II has five inventory scales: Depression, Anxiety, Anger, Disruptive Behaviour, and Self-Concept. Each inventory contains 20 statements about thoughts, feelings, or behaviours associated with emotional and social impairment in youth. Children and adolescents describe how frequent the statement has been true for them and marks a four – point Likert scale (0 = never, 1 = sometimes, 2 = often, 3 = always). The total score is calculated for each inventory by summing its 20 items and standardising it to *T*-scores with a mean of 50 and standard deviation of 10. This allows the clinician to interpret the degree of distress the individual is experiencing. *T*-scores permit comparison with a normative sample by age and gender. Higher *T*-scores indicate greater problems in the domains of depression, anxiety, anger, and disruptive behaviour. For self-concept subscale, scoring is in the opposite direction.

*T*-scores may be viewed as a point on the severity continuum, or in a categorical manner. The categories are not diagnostic of psychiatric disorders. For the purpose of this study, we viewed scores which are deemed to be in the moderate to severe range as 'abnormal'. Consequently, a *T*-score on the self-concept subscale of 39 or less was categorized as 'abnormal' and a *T*-score of 60 or higher on each of the other subscales was deemed 'abnormal'.

Details of the extent of drug use were captured via the Maudsley Addiction Profile (MAP) (Marsden *et al.* 1998). We also utilised the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) which provides lifetime as well as current estimates of substance-related risk (WHO ASSIST Working Group, 2002). Substance use risk scores above established thresholds for youth were deemed to indicate

presence of a substance use disorder (Smyth *et al.* 2015). We also used the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) to assess an individual's motivation to change their substance use related behaviour (Miller & Tonigan, 1996). Structured clinical interviews were used to elicit important information about substance use as well as other social, demographic, and clinical characteristics.

### Setting

YoDA is an adolescent drug and alcohol treatment service based in South West Dublin. The clinic was opened in October 2005 with the aim of providing treatment for those under 18 with a range of alcohol or other substance-use disorders. The service is provided within Ireland's Health Service Executive (HSE). Patients attending are not charged any fee for the treatment. There is an open referral system, with referrals being accepted from medical and other professionals, from parents and from young people themselves. The service operates with a multidisciplinary team comprising of professionals in child and adolescent psychiatry, nursing, counselling, and family therapy. The initial biopsychosocial assessments are carried out to collect vital information from the adolescent and their caregivers as well as other relevant parties in order to formulate a collaborative care plan. The psychological model of treatment is not manualised but encompasses evidence based psychological approaches including cognitive behavioural therapy, motivational interviewing, and systemic family therapy. The one-to-one sessions adopt a structure based on the Adolescent Community Reinforcement Approach (A-CRA) (Godley *et al.* 2001) which is a behavioural intervention that aims to enhance the family, social, and educational/vocational reinforcers of an adolescent to support recovery from SUDs. In keeping with international evidence highlighting the importance of family-based treatment approaches, family participation in assessment and treatment is strongly encouraged (Schaub *et al.* 2014).

### Statistical analysis

When contrasting those who completed the follow up BYI-II with those who did not, we utilised the Pearson Chi-square test or Fishers Exact test for categorical variables. We used the *T*-test or Mann-Whitney *U* test for quantitative variables, dependent upon normality of data distribution.

To test our hypothesis that treatment impacted positively on BYI-II measures of psychological wellbeing, we examined this from the complimentary perspectives of changes in subscale *T*-scores and secondly changes in numbers of patients whose *T*-scores characterized them

in a binary fashion as being in the 'normal' or 'abnormal' range.

Our previous use of the BYI-II and examination of other research papers using this instrument suggested that subscale scores were likely to be normally distributed (Edokpolo *et al.* 2010). We therefore planned to conduct a paired sample *t*-test to examine changes in subscale scores. McNemar's paired proportions test with continuity correction was employed to determine whether treatment was associated with changes in the binary category of subscale measures. We determined that for an effect size of 0.5, where alpha is 0.05 and power is 0.8, a sample size of 34 participants was required in this study.

To explore the relationship between changes in cannabis use and BYI subscale scores, we used Pearson's correlation test. Although we conducted multiple statistical tests in this study, we maintained a *p* value of 0.05 for all tests rather than conduct a correction such as a Bonferoni correction.

### Results

Table 1 provides the characteristics of the 36 study participants as well as the 50 individuals who were followed but did not complete follow up BYI-II. Comparing these two groups they did not differ significantly in terms of age, gender, ethnicity, living circumstances, education status, criminal activity, motivation to change or past drug treatment. Those who completed follow up BYI-II were more likely to be referred by probation or courts ( $p = 0.02$ ), less likely to be referred by social services ( $p = 0.02$ ) and more likely to have had past treatment for an alcohol use disorder ( $p = 0.02$ ). They were more likely to have a current amphetamine use disorder but no more likely to have any other specific SUD. Their baseline BYI-II subscale scores were not different to those who did not complete follow up BYI-II. Participants were more likely to have a planned progression from treatment ( $p = 0.05$ ) but no more likely to have parental involvement in treatment. Participants did attend more treatment sessions prior to follow up (median 9, interquartile range [IQR] 6–14) than those who did not complete follow up BYI-II (median 6, IQR 3–10,  $p = 0.006$ ). A major contributor to low completion of BYI-II at follow up related to fact that 51 of the follow up interviews occurred via telephone where repeat of drug use related instruments (MAP and ASSIST) was given priority in those cases.

### Changes in psychological wellbeing

When contrasting the baseline BYI-II scores with those at follow up, there were significant improvements in the depression, anger, and disruptive behaviour domains (see Table 2). While the subscale scores of self-concept

**Table 1.** Baseline characteristics of adolescents followed up after treatment in a specialist community based addiction service.

	Completed BYI at Follow up		Failed to complete BYI at Follow up	
	Number (%)		Number (%)	
Aged over 16 years	21	(58)	28	(55)
Male Gender	32	(89)	37	(72)
Living with Parents or family	33	(92)	48	(94)
Stable accommodation	35	(97)	45	(88)
White Irish Ethnicity	33	(92)	47	(92)
Employment status				
Student	25	(69)	37	(72)
NEET*	9	(25)	10	(20)
Working	2	(6)	4	(8)
Referral source				
Family	14	(39)	17	(34)
Social services	2	(6)	12	(24)
Court or probation services	8	(22)	2	(4)
Other	12	(33)	19	(38)
Self-reported crime in last 30 days	17	(55)	16	(46)
Had previous treatment for alcohol problem	6	(17)	1	(2)
Had previous treatment for drugs?	5	(14)	6	(12)
Substance Use Disorders				
Cannabis	26	(72)	29	(57)
Alcohol	16	(44)	19	(38)
Benzodiazepine	9	(25)	7	(14)
Cocaine	5	(14)	6	(12)
Amphetamine/MDMA	8	(22)	3	(6)
Heroin	3	(8)	2	(4)
Poly-substance use disorder	15	(42)	22	(44)
Motivation to change				
Low/very low Behaviour Change motivation	20	(65)	29	(66)
Low/very low Problem Recognition	28	(90)	40	(89)
Planned progression from treatment	25	(69)	24	(48)
Parental involvement in treatment	25	(69)	31	(62)

\*Not in employment, education or training.

**Table 2.** Changes in psychological wellbeing among 36 episodes of outpatient treatment of adolescent substance use disorder.

	Baseline		Follow up		P value
	Mean	(S.D.)	Mean	(S.D.)	
BYI Subscale scores					
Self-Concept	41.9	(10.8)	44.3	(8.9)	0.06
Anxiety	53.6	(14.1)	50.3	(6.7)	0.17
Depression	56.0	(12.3)	50.8	(6.9)	0.003
Anger	55.2	(10.2)	49.5	(7.2)	<0.001
Disruptive Behaviour	61.6	(11.6)	56.5	(10.4)	0.002

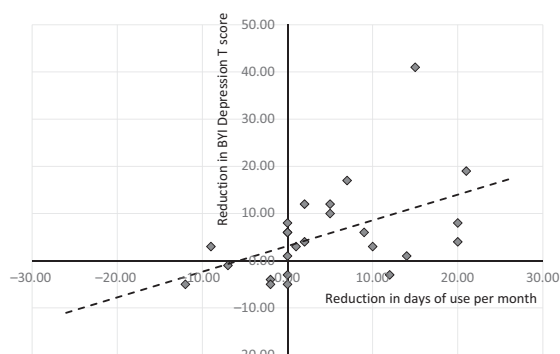
increased and anxiety reduced from baseline to follow up, these changes were not statistically significant. When examined by pathological category, there was evidence of significant improvement in the domains of depression, anxiety, anger, and self-concept (See Table 3).

Of the 36 people with baseline and follow up BYI-II scores, there were 26 with a CUD. The median days of cannabis use per month amongst those with a CUD in this study dropped from 21 days (IQR 15–30) to 15 days (IQR, 3–30), this change being significant (Wilcoxin Signed rank test,  $p = 0.02$ ). In regard to examining the relationship between the reduction in cannabis use and an improvement in the above BYI-II scores, our

**Table 3.** Changes in pathological categories of psychological wellbeing during 36 episodes of outpatient treatment of adolescent substance use disorder.

BYI Subscale	Follow up Normal (% changing)	Follow up Abnormal (% changing)	<i>p</i> value <sup>a</sup>
<b>Self-Concept</b>			
Baseline Normal	18	1 (5)	0.04
Baseline Abnormal	8 (53)	7	
<b>Anxiety</b>			
Baseline Normal	20	0 (0)	0.008
Baseline Abnormal	8 (73)	3	
<b>Depression</b>			
Baseline Normal	21	0 (0)	0.03
Baseline Abnormal	6 (55)	5	
<b>Anger</b>			
Baseline Normal	23	0 (0)	0.002
Baseline Abnormal	10 (77)	3	
<b>Disruptive Behaviour</b>			
Baseline Normal	16	1 (6)	0.13
Baseline Abnormal	6 (40)	9	

<sup>a</sup> McNemar's paired proportions test.



**Fig. 1.** Correlation between reduction in depressive symptoms and reduction in cannabis use among adolescents attending outpatient treatment of a cannabis use disorder.

analysis revealed a positive correlation between the reduction in days of cannabis use and the reduction in the depression subscale score on the BYI-II (Pearson correlation 0.49,  $p=0.01$ ). This is shown in Fig. 1. The correlation with regards to changes in other subscales was not statistically significant.

## Discussion

Participants were quite typical of treatment attending adolescents with substance use disorders from international studies (Dennis *et al.* 2004; Schaub *et al.* 2014). They were predominantly male and living mainly with family. Despite a mean age of 16.6 years, almost one quarter of these patients were not involved in education, work or training.

Referral sources were varied and included referrals from parents and probations services amongst others. Over half of the participants self-reported some criminal activity in the preceding month. These behaviours are commonly reported in other international studies (Tims *et al.* 2002).

Poly-substance use was evident within the study group with cannabis being the most widely used substance. This is consistent with other Irish and international treatment settings (Dennis *et al.* 2004; Bates, 2017; Bellerose *et al.* 2011). The overall motivation to change was very poor within the participants. This was the case with both the 'Problem recognition' and the 'Taking steps' domains. International studies have shown that motivation levels among adolescents attending addiction treatment are poorer than their adult counterparts (Melnick *et al.* 1997). Perhaps related to lower motivation, poor treatment adherence is widespread in adolescent with SUDs (Winters & Kaminer, 2011). Nevertheless, the majority of participants in this study left treatment in a planned manner. Their adherence may have been influenced by positive changes and therefore were more likely to persist and complete treatment and follow up reviews. Consequently, participants can be viewed as self-selecting.

Our findings are consistent with our initial hypothesis that adolescents with substance use disorders who attended a community based outpatient service showed improvement in psychological symptoms. Both internalising and externalising symptoms in these young individuals improved following their attendance at treatment. This is consistent with other international



studies where treatments such as MDFT, CBT and individual therapy approaches to the treatment of adolescent SUDs have been shown to reduce self-reported internalising and externalising symptoms in adolescents with a CUD (Hides *et al.* 2010; Schaub *et al.* 2014).

While numbers were small, about half of those with substantial baseline depressive symptoms resolved. These outcomes are consistent with international studies that elaborate on improvements in depressive symptoms and disorders over the course of addiction treatment (Hides *et al.* 2010; Rohde *et al.* 2016).

While the reduction in mean anxiety symptom score was not significant, there was a significant improvement when examined by category, with almost three-quarters of those with moderate to severe anxiety symptoms at baseline, moving out of that category at follow up. International studies have tended to look at internalising symptoms globally or to focus on depressive symptoms alone. However, studies from Australia and USA have also shown improvements in comorbid anxiety symptoms (Hides *et al.* 2010; Horigian *et al.* 2013).

Furthermore, this study revealed a positive correlation between the reduction in days of cannabis use and the reduction in depressive scores on the BYI-II. A study among 18–50 year old patients by Hser *et al.* revealed a longitudinal relationship between reduction in cannabis use and improvement in anxiety, depression and sleep quality (Hser *et al.* 2017).

In addition to improvements in internalising symptoms, we also found some evidence of improvements in the disruptive behaviour and anger domains, especially the latter. A large US multi city study by Hser *et al.* showed levels of hostility and criminal behaviour reduced significantly over treatment for adolescents (Hser *et al.* 2001). That study also showed improvement in suicidal thoughts and improved school performance, outcomes not examined in our study. A large body of research has demonstrated that drug use and antisocial behaviours initiated in adolescence are often maintained into young adulthood (Brook *et al.* 1995). Targeting these symptom domains in adolescence may therefore yield longer term benefits.

Although the increase in the mean score of self-concept did not reach a statistical significance, we did find a significant improvement in this domain when examined categorically. It has been suggested that self-concept and self-esteem appear less malleable to short-term intervention than mood states such as depression and anxiety (Swann and Read, 1981). A previous study of Irish adolescents in treatment for heroin dependence failed to show significant changes in self-esteem (Smyth *et al.* 2018). We are aware of one other international study which has shown significant improvements in this psychological attribute (Hser *et al.* 2001).

This study has a number of limitations. The sample size is quite small and represents only a subset of adolescents who were recruited into the original study. Hence findings may not generalise to other settings. There was no control group so we cannot determine whether the treatment was more effective than no treatment. We did not measure potential confounders such as medical comorbidities or new life events. These challenges appear to be a common feature in several similar studies (Knudsen, 2009). The results that indicate an improvement in psychological symptoms could constitute a simple regression to the mean (Marsden *et al.* 2010). The fact that the findings are quite consistent with a wider international literature, including studies with more rigorous RCT designs, suggests that the findings may be valid. Furthermore, although treatment at YoDA followed evidence based guidelines, the treatment interventions were not manualized. It was therefore difficult to compare with other treatment models.

Our results support the limited international research conducted in adolescents with SUDs availing of treatment. Even though the adolescents who commenced treatment tended to be poorly motivated, they demonstrated improvements in mood and behavioural symptoms. Reductions in cannabis use correlated with reductions in depressive symptoms. Given the international evidence, and findings from Irish studies such as this, there is a need to expand provision of this effective treatment across all of Ireland.

### Conflicts of interest

Author has no conflicts of interest to disclose.

### Ethical standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committee on human experimentation with the Helsinki Declaration of 1975, as revised in 2008. The authors assert that ethical approval for publication of this study has been provided by their local Ethics Committee.

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