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## Exploring the role of emotional and behavioral problems in a personality-targeted prevention program for substance use in adolescents and young adults with intellectual disability

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### ABSTRACT

**Background:** Adolescents and young adults with a mild intellectual disability or borderline intellectual functioning (MID-BIF) are at risk for problematic substance use and are more likely to have emotional and behavioral problems than peers without MID-BIF. A personality-targeted prevention program called Take it Personal! effectively reduces substance use in adolescents and young adults with MID-BIF.

**Aims:** The program's effectiveness was examined on its secondary goal: reducing emotional and behavioral problems. The potentially moderating role of these problems on the program's effectiveness with substance use was also explored.

**Methods and procedures:** Substance use and emotional and behavioral problems were compared between participants in Take it Personal! ( $n = 34$ ) and those in the control condition ( $n = 32$ ) in a quasi-experimental pre-posttest study with a three-month follow-up. Effectiveness and moderation were assessed with multilevel models.

**Outcomes and results:** Take it Personal! seems to reduce rule breaking. There were no significant effects on anxiety, withdrawal, and aggression. None of the problem domains moderated the program's effectiveness on substance use frequency.

**Conclusions and implications:** Take it Personal! may effectively reduce rule breaking. Moreover, adolescent and young adults with different levels of emotional and behavioral problems benefit equally in terms of reduced substance use.

### What this paper adds?

Substance use in adolescents and young adults with MID-BIF is often not an isolated problem but comes with related emotional and behavioral problems. "Take it Personal!" is an effective prevention program for reducing the use of alcohol, cannabis, or other illicit drugs in adolescents and young adults with MID-BIF. As emotional and behavioral problems are highly common among adolescents and young adults with MID-BIF and have well-documented associations with substance use, the secondary aim of Take it Personal! is to

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reduce externalizing and internalizing problems. This paper highlights the role of problems related to anxiety, withdrawal, rule breaking, and aggression during Take it Personal! We demonstrate that Take it Personal! seems to reduce rule-breaking problems, albeit with a small effect size. Furthermore, we find that emotional and behavioral problems do not moderate the program's effect on substance use, thereby informing clinical practice on the broad applicability of this prevention program in the target group.

## 1. Introduction

Problematic alcohol, cannabis, and other illicit drug use among adolescents and young adults with mild intellectual disability (MID) or borderline intellectual functioning (BIF) is receiving increased attention in clinical practice and research (Carroll Chapman & Wu, 2012; Didden, VanDerNagel, Delforterie, & van Duijvenbode, 2020). MID is a disability that manifests during childhood. It is characterized by an intelligence quotient (IQ) score between 50–70 and limitations in adaptive behavior that impede a range of everyday social and practical skills (American Psychiatric Association, 2013). The DSM-5 describes BIF as a condition in which a person's limited intellectual functioning is the focus of, or has an impact on, their treatment (American Psychiatric Association, 2013). This diagnosis is typically given when IQ is roughly between 70 and 85 (Wieland & Zitman, 2016). Similar to those with MID, people with BIF often lead problematic lives, facing, for example, social and coping difficulties, and are vulnerable to the development of psychopathologies such as substance use disorder (Emerson, 2011). Slayter (2010) found that 2.7 % of youth with MID-BIF had a disorder for psychoactive substances, such as alcohol, cannabis, or other drugs. Although this prevalence rate is lower than that of youth without MID-BIF (5.2 %), the relative risk of developing a substance use disorder after initiating substance use is considered to be higher in youth with MID-BIF (Didden et al., 2020; Van Duijvenbode & VanDerNagel, 2019). This is because abstinence rates are proportionally higher in youth within the MID-BIF group compared to those without MID-BIF. Moreover, prevalence rates of individuals with MID-BIF in substance use disorder samples of 30 % (Baatveit, Torsheim, & Hove, 2018) and 39 % (Luteijn, Didden, & VanDerNagel, 2017) indicated a clear overrepresentation of this target group in addiction care (Van Duijvenbode & VanDerNagel, 2019).

Although many individual-specific factors contribute to developing a substance use disorder, the impairments in cognitive, social, and coping skills that are characteristic of this target group (American Psychiatric Association, 2013) unequivocally underlie the elevated risk of substance use disorder in people with MID-BIF (Carroll Chapman & Wu, 2012). The increased urgency to tackle substance use disorder in this target group is reflected by a growing evidence base of intervention programs for problematic substance use in the MID-BIF population (Van Duijvenbode & VanDerNagel, 2019). However, substance use is seldom an isolated problem—numerous adverse psychological, physiological, legal, and social consequences have been associated with substance use in people with MID-BIF (Taggart, McLaughlin, Quinn, & Milligan, 2006). Problematic substance use relates to a range of emotional and behavioral problems. Emotional problems (often termed internalizing problems) include anxiety, depression, and associated symptoms and behaviors. Behavioral problems (or externalizing problems) include a range of difficulties associated with, for example, attention, hyperactivity, conduct problems, aggression or antisocial behavior (Hannigan, Walaker, Waszczuk, McAdams, & Eley, 2017). Emotional problems are mostly harmful to oneself, whereas behavioral problems are generally also disruptive to others. Both constructs can reciprocally reinforce each other and lead to increases in the other (Lee & Bukowski, 2012). Frequent rule breaking and aggression are examples of behavioral problems that co-occur with problematic substance use, while persistent internalizing problems, such as feelings of depression, anxiety, and withdrawal and resulting behaviors, also have well-documented associations with substance use (e.g., Colder et al., 2013). Associations between substance use and emotional and behavioral problems have also been found in people with MID-BIF (Didden, Embregts, van der Toorn, & Laarhoven, 2009). The high risk of triple diagnosis (i.e., MID-BIF, substance use disorder, and a comorbid mental disorder) in adolescents and young adults with MID-BIF reveals the considerable interrelatedness between problematic substance use and other emotional and behavioral problems (Didden, 2017). Consequently, effective prevention programs for problematic substance use should have an additional impact on related emotional and behavioral problems.

Extensive research has documented that personality significantly correlates with problematic substance use and a wide range of emotional and behavioral problems (Krueger, McGue, & Iacono, 2001; Zilberman, Yadid, Efrati, Neumark, & Rassovsky, 2018). Woicik, Stewart, Phil, and Conrod (2009) distinguished four higher order personality profiles that are associated with an increased risk for problematic substance use: anxiety sensitivity (AS), negative thinking (NT), impulsivity (IMP), and sensation seeking (SS). Targeting these high-risk personality profiles in intervention efforts has shown effectiveness in reducing substance use in adolescents without MID-BIF (Lammers et al., 2015; Mahu, Doucet, O'Leary-Barret, & Conrod, 2015). Schijven, VanDerNagel, Otten, Lammers, and Poelen (2020) adapted this personality-targeted approach to the needs of alcohol- and/or drug-using adolescents and young adults with MID-BIF and comorbid emotional and behavioral problems in an indicated prevention program called Take it Personal! This program is aimed at reducing problematic substance use and, as a secondary aim, attempts to reduce related emotional and behavioral problems. A recent study demonstrated its effectiveness on substance use frequency at three months post intervention (Schijven, Hulsmans et al., 2020).

Emotional and behavioral problems are highly prevalent among adolescents and young adults with MID-BIF (Dekker, Koot, van der Ende, & Verhulst, 2002) and have known associations with substance use (Barrett & Paschos, 2006; Didden et al., 2009). It remains to be determined if Take it Personal! is effective in reducing emotional and behavioral problems and what impact these problems have on the program's effect on substance use by adolescents and young adults with MID-BIF. However, the role of emotional and behavioral problems in personality-targeted substance use prevention programs has received attention with respect to adolescents and young adults without MID-BIF. Indeed, evidence suggests that the personality-targeted substance use prevention approach for adolescents without MID-BIF (Conrod, Stewart, Comeau, & MacLean, 2006) also reduces specific problem behaviors such as panic attacks, truancy,

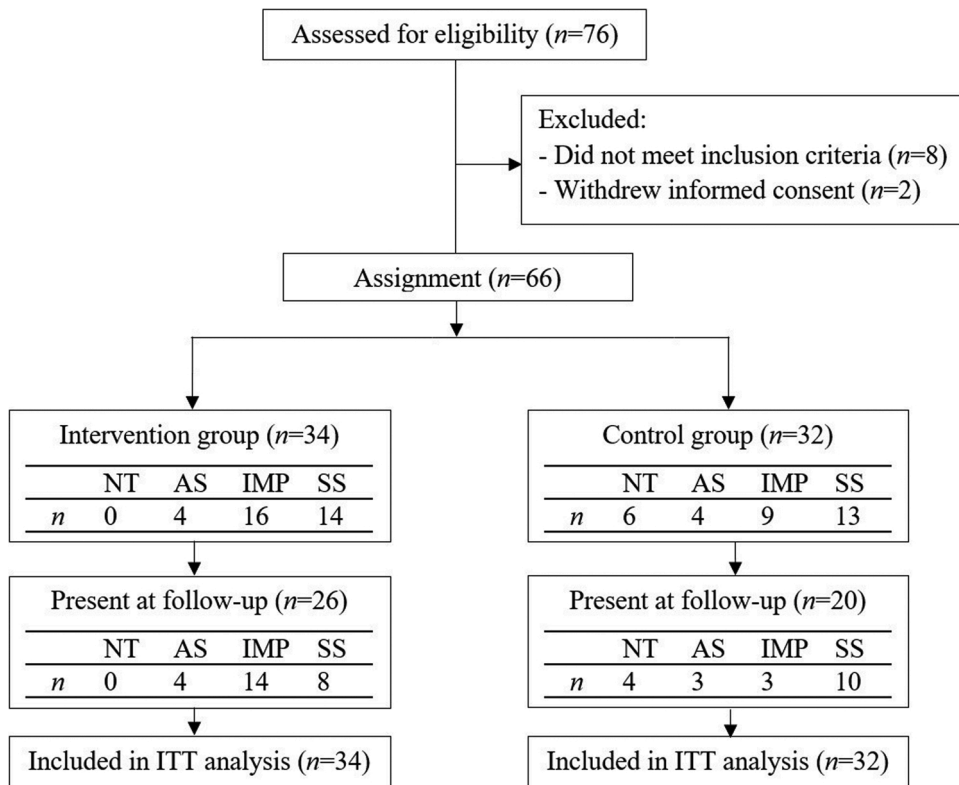


Fig. 1. Flow diagram of enrollment and retention by treatment arm.

and shop lifting (Castellanos & Conrod, 2006) and the problem domains of depression, anxiety, and conduct (O'Leary-Barrett et al., 2016). The evidence on how emotional and behavioral problems impact substance use outcomes in personality-targeted substance use interventions for adolescents and young adults without MID-BIF is more limited. One study demonstrated that youth with higher levels of hyperactivity, inattention, and conduct problems were significantly more likely to decrease their substance use over a 24-month period (Perrier-Ménard, Castellanos-Ryan, O'Leary-Barrett, Girard, & Conrod, 2017). Edalati and Conrod (2019), therefore, suggested that youth with higher levels of pre-existing behavioral problems benefit either equally or more in terms of reduced substance use.

The current study aims to examine the role of internalizing and externalizing problems in Take it Personal!—a prevention program that is effective in reducing substance use frequency (Schijven, Hulsmans et al., 2020). The program is primarily aimed at reducing substance use, with the reduction of emotional and behavioral problems of targeted adolescents and young adults as a secondary aim. The current study builds on previous work by examining the program's effectiveness on emotional and behavioral problems. Specifically, we hypothesize that the program is also effective in reducing the problem domains of anxiety, withdrawal, rule breaking, and aggression. Furthermore, the moderating role of these problem domains on the frequency of substance use is explored, assessing whether pre-existing levels of anxiety, withdrawal, rule breaking, and aggression impact the program's effectiveness in reducing substance use. We make no specific predictions regarding this research question due to its exploratory nature and purpose. This study's results will inform clinical MID-BIF practice on the potential applicability of Take it Personal! to adolescents and young adults with different levels of emotional and behavioral problems.

## 2. Methods

### 2.1. Participants and procedure

In total, 76 adolescents and young adults with MID-BIF from 14 treatment centers in the Netherlands were recruited and screened for participation in this quasi-experimental study. All treatment centers were specialized in offering intra- and extramural care for people with MID-BIF and complex emotional and/or behavioral problems. Adolescents and young adults could only be included if they were between 14 and 30 years old, had a total IQ between 50 and 85, and had one of the four personality risk profiles for problematic substance use. Furthermore, their use of alcohol, cannabis, and/or other illicit substances had to be assessed by their clinician as anywhere between experimental and mild substance use disorder. To assess this, clinicians used the standardized criteria for a substance use disorder of the DSM-5 (American Psychiatric Association, 2013). A total of 66 adolescents and young adults (47 male,  $M_{\text{age}}$

= 17.5,  $M_{IQ} = 73.7$ ) from 11 treatment centers met these inclusion criteria and were assigned to one of the two conditions.

Those in the intervention condition ( $n = 34$ ) followed Take it Personal! and those in the control condition ( $n = 32$ ) received care as usual. The latter was neither standardized nor protocolled. Take it Personal! required group constellations of three or four adolescents and young adults from the same treatment center and from the same personality profile (AS, NT, IMP, or SS). Therefore, an independent researcher assigned participants to either Take it Personal! or the control group based on a file that only listed participant identification numbers, their treatment center, and their personality profile. Information about IQ was obtained via client files that contained recent, up-to-date IQ scores measured with either the Wechsler Intelligence Scale for Children (fourth or fifth edition, Wechsler, 2003, 2014) or the Wechsler Adult Intelligence Scale – Fourth edition (Wechsler, 2008). The trial was originally registered at the Dutch Trial Register (NTR5037; April 15, 2015) as a randomized controlled trial with 140 participants. However, individual or cluster randomization proved impossible because we were not able to include enough participants and Take it Personal! required group constellations of three or four participants with the same personality profile within the same treatment center. Participants were screened at baseline and three months after Take it Personal!, for which they were complemented with a €5 gift card per measurement. All participants were still in treatment at the follow-up screening. Further information on enrolment, allocation, and follow-up is visualized in Fig. 1. Data was collected between January 2015 and April 2017. This research was approved by the Ethical Committee Social Sciences of Radboud University (ECSW2015-0903-303).

## 2.2. Measures

### 2.2.1. Personality risk

A Dutch version of the Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009), adapted for individuals with MID-BIF (Poelen, Schijven, Otten, & Didden, 2017), was administered at baseline to distinguish the four high-risk personality profiles for substance use. This 23-item questionnaire contained seven items that measure NT, six items for SS, five items for IMP and five items for AS. Each item could be scored on a 4-point Likert scale that ranged between (1) “strongly agree” and (4) “strongly disagree”. Simple wording and pictorial stimuli were used to adapt the SURPS to adolescents and young adults with MID-BIF. This adapted version of the SURPS had previously demonstrated reliability and validity in people with MID-BIF (Pieterse, VanDerNagel, ten Klooster, Turhan, & Didden, 2020; Poelen et al., 2017). The SURPS had an acceptable internal consistency with Cronbach’s  $\alpha = 0.71$  for AS, 0.87 for NT, 0.62 for IMP, and 0.67 for SS in this sample.

### 2.2.2. Emotional and behavioral problem domains

Adolescents and young adults’ emotional and behavioral problems were measured with a Dutch version of the Youth Self Report (YSR; Achenbach, 1991; Verhulst, van der Ende, & Koot, 1997). This questionnaire can reliably be administered to adolescents and young adults with MID-BIF (Douma, Dekker, Verhulst, & Koot, 2006). The YSR includes 118 items that can be rated on a 3-point Likert scale with (0) “not true at all,” (1) “somewhat or sometimes true,” and (2) “very true or often true,” with three overall subscales: internalizing problems, externalizing problems, and other problems. Anxious (13 items, e.g., “I feel fearful”) and withdrawn (8 items, e.g., “I would rather be alone than around others”) fall within the internalizing subscale, while rule breaking (15 items, e.g., “I am truant”) and aggressive (17 items, e.g., “I get in fights”) make up the externalizing category. All four problem domains show acceptable to good internal consistency with Cronbach’s  $\alpha = 0.64$  for anxious, 0.82 for withdrawn, 0.69 for rule-breaking, and 0.77 for aggressive.

### 2.2.3. Substance use frequency

One item from the Substance Use and Misuse in Intellectual Disability Questionnaire (SumID-Q; VanDerNagel, Kiewik, van Dijk, de Jong, & Didden, 2011) was used to measure the frequency of substance use. In accordance with the structure of the SumID-Q, substance use frequency was asked separately for three categories: alcohol, cannabis, and other drugs. The latter category “other drugs” included the following substances: cocaine, crack cocaine, ecstasy, LSD, GHB, heroin, and magic mushrooms. Participants thus answered the questions “How often do you drink alcohol/smoke weed/do any of the other illicit drugs?” with answer categories (1) “never,” (2) “less than once a month,” (3) “every month,” (4) “every week,” (5) “almost every day”.

## 2.3. Prevention program

Take it Personal! is a substance use prevention program that was developed for adolescents and young adults (14–30 years old) with MID-BIF and emotional and/or behavioral problems. The program was based on the theory that personality is a key construct for understanding a person’s substance use (Conrod et al., 2006). For each of the four personality profiles (NT, AS, IMP, SS), different programs were developed that had the same structure, but with their own personality-specific materials, games, and (psychomotor) exercises. The primary aim was to reduce substance use. The use of the substances (alcohol, cannabis, or other illicit drugs) that was addressed was based on what was/were most relevant for the individual. A secondary aim was to reduce relevant related emotional and/or behavioral problems. Each program comprised five 45-minute group sessions and five 30-minute individual sessions within a 6-week time span, each conducted by a clinical psychologist and a psychomotor therapist. There were three general components to Take it Personal! that were delivered through psychomotor, motivational interviewing, or cognitive behavioral therapeutic techniques: 1) psychoeducation about participants’ personality profile, 2) training of behavioral coping skills, and 3) training of cognitive coping skills. The intention was to teach adolescents and young adults the skills needed to cope with personality-related cognitions and behaviors that result in substance use or other emotional or behavioral problems. Each participant set personalized goals and edited a personal “changing plan” for their own (substance use) problems. In this personal “changing plan”, each participant wrote down—in

**Table 1**  
Participant's baseline demographics and outcome characteristics.

	Total sample (n = 66)	Intervention (n = 34)	Control (n = 32)	t / $\chi^2$	p
Age (M, SD)	17.45 (2.76)	17.21 (2.67)	17.72 (2.88)	-0.75	0.455
Total IQ (M, SD)	73.68 (7.92)	72.39 (9.13)	74.85 (6.91)	0.94	0.329
Sex (male, %)	47 (71 %)	20 (59 %)	27 (84 %)	4.08	0.043*
Anxiety (M, SD)	4.47 (3.95)	4.09 (1.52)	4.86 (1.49)	0.80	0.426
Withdrawn (M, SD)	4.88 (2.71)	5.21 (2.72)	4.53 (2.72)	-1.00	0.317
Rule-breaking (M, SD)	10.56 (3.80)	10.92 (4.29)	10.19 (3.23)	-0.78	0.440
Aggression (M, SD)	7.65 (4.44)	8.53 (5.06)	6.72 (3.50)	-1.70	0.095
Substance use frequency <sup>+</sup> (M, SD)	3.58 (1.10)	3.82 (1.06)	3.31 (1.09)	-2.16	0.058

Note. \* Significant at  $p < .05$ . <sup>+</sup> Frequency of each adolescent's or young adult's most problematic substance (alcohol, cannabis, or illicit drugs).

**Table 2**

Number of participants (N = 66) in normal, borderline, and clinical range at baseline per subscale of the Youth Self Report.

	Normal range	Borderline range	Clinical range
Anxiety	59 (89 %)	4 (6 %)	3 (5 %)
Withdrawn	51 (77 %)	9 (14 %)	6 (9 %)
Rule-breaking	23 (35 %)	24 (36 %)	19 (29 %)
Aggression	60 (91 %)	2 (3 %)	4 (6 %)

addition to goals related to reducing substance use—their goals for reducing the emotional and/or behavioral problems that were relevant for them. Hence, each participant had unique goals with respect to existing emotional and/or behavioral problems that reflected the actuality of their lives. The content of Take it Personal! is described in more detail in the intervention mapping paper (Schijven, VanDerNagel et al., 2020).

#### 2.4. Data analysis

All analyses were performed with R version 3.6.1 (R Core Team, 2018). Descriptive statistics were separately obtained for the total sample and for the two conditions (Take it Personal! and control group) in terms of demographics (age, sex, total IQ) and all outcome measures. Any demographics that differed between conditions at baseline were added to the statistical models as covariates (see paragraph 3.1). Little's MCAR test indicated that missing values at follow-up occurred at random, warranting the use of a multiple imputation strategy for analyses according to intention-to-treat principles.

To assess the effect of Take it Personal! on emotional and behavioral problems, four multilevel analyses were conducted—one per problem domain. Anxious, withdrawn, rule breaking, or aggressive behavior at follow-up were entered as the dependent variable, each with three predictors: dummy coded covariate sex (0 = male, 1 = female), dummy coded between subjects factor condition (control = 0, Take it Personal! = 1) and the problem domain at baseline (anxious, withdrawn, rule breaking, aggression). Each multilevel model included a random intercept for treatment centers and thus controls for data clustering within treatment centers.

In addition, to examine if emotional and behavioral problems moderated the program's effect on substance use frequency, four separate multilevel analyses were conducted, each with substance use frequency at follow-up as the dependent variable. The variable substance use frequency was constructed as each participant's most frequently used substance(s) at baseline compared to (the average of) that/those substance(s) at follow-up (cf. Schijven, Hulsmans et al., 2020). This was done because Take it Personal! addressed the use of the substance(s) that was/were most problematic for the individual. Substance use frequency at baseline, sex, condition, and one of the four behavioral problems at baseline (anxious, withdrawn, rule breaking, aggression) were added as predictors. To evaluate moderation effects, each model also included a two-way interaction term for condition with behavioral problem score at baseline. Similar to models that evaluate effects on behavioral problems, the models that evaluate moderation by behavioral problems included random intercepts that account for clustering within treatment centers. All continuous predictor variables were mean-centered. To obtain model parameters from the multilevel models, we used functionality from R package lme4 (Bates, Mächler, Bolker, & Walker, 2015). Satterthwaite's method was used to evaluate  $p$ -values, for which significance level was set at  $p < 0.05$ .

### 3. Results

#### 3.1. Preliminary analyses

Table 1 presents descriptive statistics for participants on demographics and outcome variables. There were significantly more males in the control group than in the intervention group, which is the reason sex was added as a covariate to all regression models. Bivariate correlations between the four behavior problem domains and substance use reveal that none of the problem domains correlate with substance use at baseline or follow-up (Appendix Table A1). Table 2 shows that for anxiety, withdrawn, and aggressive behaviors, most adolescents and young adults did not score in the borderline or clinical range as assessed by the YSR (Achenbach, 1991). Rule-breaking scores were more severe, with 29 % of adolescents and young adults in the clinical range and 36 % in the borderline range at baseline.

**Table 3**  
Fixed-effects parameters reflecting effects of Take it Personal! on problem domains at follow-up measurements.

	Anxiety			Withdrawn			Rule-breaking			Aggression		
	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>
Sex	-0.09	0.77	0.907	0.45	0.48	0.347	0.46	0.61	0.453	-0.44	0.98	0.656
Behavioral problem <sup>+</sup>	0.81	0.09	<0.001***	0.70	0.08	<0.001***	0.58	0.07	<0.001***	0.87	0.10	<0.001***
Condition	0.21	0.65	0.744	-0.11	0.40	0.790	-1.15	0.55	0.041*	-1.85	0.93	0.051

Note.  $N = 66$ . \*  $p < 0.05$ . \*\*\*  $p < 0.001$ . <sup>+</sup> Baseline score of the problem domain (anxiety, withdrawn, rule-breaking, or aggression). Condition is dummy coded (0 = control, 1 = intervention).

**Table 4**  
Fixed-effects parameters predicting substance use frequency at follow-up with baseline problems related to anxiety, withdrawn, rule-breaking or aggression moderating the intervention effect on substance use frequency.

	Model SU frequency BP IV <sup>+</sup> = Anxiety			Model SU frequency BP IV <sup>+</sup> = Withdrawn			Model SU frequency BP IV <sup>+</sup> = Rule-breaking			Model SU frequency BP IV <sup>+</sup> = Aggression		
	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>
Sex	0.01	0.29	0.950	-0.20	0.28	0.478	-0.09	0.27	0.732	-0.01	0.26	0.965
Baseline substance use <sup>±</sup>	0.30	0.11	0.007**	0.32	0.11	0.003**	0.27	0.11	0.014*	0.32	0.10	0.003**
Behavioral problem <sup>+</sup>	0.03	0.04	0.445	0.01	0.05	0.807	-0.01	0.05	0.756	0.04	0.04	0.325
Condition	-0.51	0.24	0.037*	-0.53	0.22	0.023*	-0.50	0.23	0.033*	-0.61	0.23	0.010*
Behavioral problem <sup>+</sup> × Condition	-0.03	0.06	0.571	0.11	0.08	0.168	0.08	0.06	0.198	0.00	0.05	0.931

Note. \*  $p < 0.05$ . \*\*  $p < 0.01$ . <sup>+</sup> Baseline score of the problem domain (anxiety, withdrawn, rule-breaking, or aggression). <sup>±</sup> Baseline substance use frequency. SU = substance use. BP IV = behavioral problem independent variable. Condition is dummy coded (control = 0, intervention = 1).

### 3.2. Intervention effect on behavioral problems

Table 3 presents the effects of Take it Personal! on problems related to anxiety, withdrawal, rule breaking, and aggression. Adolescents and young adults who followed Take it Personal! showed less rule-breaking problems at follow-up compared to the adolescents and young adults in the control condition ( $B = -1.15$ ,  $SE B = 0.55$ ,  $p = 0.041$ ). This finding reflects a small effect size with Cohen's  $d = 0.21$ . There were no significant effects of Take it Personal! on anxiety, withdrawal, and aggression.

### 3.3. Moderating effects of behavioral problems on substance use

Table 4 shows that problems related to anxiety, withdrawal, rule breaking, and aggression did not moderate the program's effect on substance use frequency, as there were no significant interactions between condition and the different emotional and behavioral problem domain scores at baseline.

### 3.4. Power

Participant recruitment in this complex target group proved difficult, resulting in a sample size ( $N = 66$ ) that was smaller than intended. An a-priori power analysis based on a medium effect size for the main target of substance use frequency initially suggested that a sample size of 140 adolescents and young adults was necessary for an 80 % chance of finding an effect on substance use frequency at  $\alpha = 0.05$  (Schijven, Engels, Kleinjan, & Poelen, 2015). Although the effectiveness on substance use frequency had a medium effect size (Schijven, Hulsmans et al., 2020), the effectiveness on rule breaking had a small effect size. A post-hoc power analysis estimates that with the current sample size, we only had a 51 % chance of finding this effect for rule-breaking problems.

## 4. Discussion

This study examined the role of emotional and behavioral problems in Take it Personal!—a personality-targeting prevention program for adolescents and young adults with MID-BIF that has demonstrated effectiveness in reducing substance use frequency (Schijven, Hulsmans et al., 2020). Whereas decreasing substance use frequency was the primary aim of the program, the secondary aim was reducing related emotional and behavioral problems (Schijven et al., 2015). The current study first assessed effectiveness on problems related to anxiety, withdrawal, rule-breaking, and aggression. Our hypothesis that Take it Personal! would show concurrent effectiveness on emotional and behavioral problems could partially be confirmed. The problems of anxiety, withdrawal, and aggression did not show a stronger decrease for the adolescents and young adults who followed the program compared to the adolescents and young adults in the control condition. Rule-breaking problems decreased significantly more in those who followed Take it Personal!, but the effect size was small. Second, the moderating role of anxiety, withdrawal, rule-breaking, and aggression on the program's primary effect on the frequency of substance use was explored. None of the four emotional and behavioral problem domains moderated this effect, indicating that the program was effective in reducing substance use frequency regardless of how anxious,

withdrawn, rule-breaking, or aggressive the adolescents and young adults were at baseline.

The effectiveness of Take it Personal! was not limited to its primary goal of reducing substance use (described in [Schijven, Hulsmans et al., 2020](#)); rule-breaking problems also decreased significantly more for adolescents and young adults who followed Take it Personal! compared to those in the control condition. This is in line with the study by [O'Leary-Barrett et al. \(2016\)](#) that found concurrent effectiveness on alcohol use and conduct problems in a personality-based prevention program for alcohol-using youth without MID-BIF. On the other hand, our null results on the problems of anxiety and withdrawal contrast with the effects that [O'Leary-Barrett et al. \(2016\)](#) found on internalizing symptoms. This discrepancy is most likely explained by our predominantly rule-breaking sample. The vast majority of participant scores on problems related to anxiety, withdrawal, and aggression were in the normal range (89 %, 77 %, 91 %, respectively). In contrast, 35 % of the participants were in the normal range for rule breaking. It is, therefore, possible that most of the personal “changing plans” that each participant edited during Take it Personal! contained personal goals related to reducing rule-breaking problems. This would explain why, with a small sample of adolescents and young adults that—compared to the other problem domains—scored relatively high on rule breaking according to YSR ranges ([Table 2](#)), we only found an effect on the rule-breaking problem domain.

It is striking that the majority of emotional and behavioral problem domains were in the normal YSR ranges, as the adolescents and young adults receive intramural care for their emotional and behavioral problems. Therefore, the occurrence of such problems within these treatment centers is more normative. Specifically, adolescents and young adults who live in a treatment center are surrounded by peers who also show emotional and/or behavioral problems, which may normalize these problems. Sometimes it may even promote deviant behavior as a consequence of deviancy training, a process in which peers talk about, or encourage engaging in, antisocial behaviors ([Dishion, McCord, & Poulin, 1999](#)). As a result of these norms, it is possible that participants “underreported” their own emotional and/or behavioral problems in the YSR. [Douma et al. \(2006\)](#) found similar or lower YSR scores with the MID-BIF adolescents compared to a reference group of YSR scores from peers without MID-BIF. This suggests that different YSR norm scores may be necessary for the young MID-BIF target group. Due to floor effects in this study, scores on these problem domains cannot decrease as much as they can increase. The underrepresentation of clinically anxious and withdrawn adolescents and young adults is also reflected by the relatively small number of participants with the personality profiles of anxiety sensitivity and negative thinking (9 % and 12 %, respectively). For anxiety sensitivity, this is in line with previous research, as anxiety appears to be a protective factor for substance use in adolescents and young adults with MID-BIF ([Poelen et al., 2017](#)). Participation in the program might have appealed less to negative thinking adolescents and young adults ([Schijven, Hulsmans et al., 2020](#)). Nevertheless, externalizing problems are typically characteristic for youth with MID-BIF in treatment centers ([Dekker et al., 2002](#)). Therefore, it is striking that we only find an equal distribution of adolescents and young adults in the normal, borderline, or clinical range in terms of rule-breaking behavior but not for aggression problems. Non-aggressive acts of rule-breaking typically increase considerably during adolescence, whereas aggression remains fairly stable between early childhood and adulthood ([Burt, 2013](#)). This might have made rule-breaking problems more noticeable by adolescents and young adults in the self-reports and vice versa caused their self-reported scores on items for aggression to be underreported as they felt normal relative to how they had conducted themselves their entire lives. Future research could, therefore, include additional parent- or staff-reported assessments of adolescents and young adults' emotional and behavioral problems in order to avert potential self-report bias.

This study is the first to demonstrate that the effect of a personality-targeted substance use prevention program is equally beneficial for MID-BIF adolescents and young adults with high and low emotional and behavioral problems. Whereas the personality-targeted substance use approach was more effective for youth of average intelligence with higher levels of externalizing symptoms ([Perrier-Ménard et al., 2017](#)), our findings support the notion that a personality-targeted program reduces substance use regardless of the severity of behavioral problems ([Edalati & Conrod, 2019](#)). This finding has important clinical implications, as it suggests that the program is applicable for adolescents and young adults with varying levels of emotional and behavioral problems.

All participants received care in specialized intra- and extramural care facilities for adolescents and young adults with MID-BIF. In order to be admitted to these treatment facilities, the adolescents and young adults were screened on all diagnostic criteria for intellectual disability (intelligence, adaptive functioning, and onset; [American Psychiatric Association, 2013](#)). As participants were all recruited from specialized MID-BIF centers, they naturally belonged to our target group. Thus, we only obtained IQ scores via client files and we did not screen participants on all criteria of MID-BIF. Whereas we do not expect that this impacted the results, the small sample size does form a limitation for the statistical power. As with other substance use intervention studies for adolescents and young adults with MID-BIF and complex emotional and/or behavioral problems ([Van Duijvenbode & VanDerNagel, 2019](#)), recruiting a sample with sufficient statistical power was difficult. Several factors impeded the recruitment process in this complex clinical population. Adolescents and young adults typically have multiple problems besides their substance use. Therefore many of them, despite using substances, may have been in need for intervention efforts with a different clinical focus (e.g., trauma or other emotional/behavioral problems). Some adolescents and young adults who—according to their clinician—could benefit from Take it Personal!, did not perceive their substance use a problem and thus did not comply. The motivation to change substance use can vary strongly from day-to-day ([Frielink, Schuengel, Kroon, & Embregts, 2015](#)). Therefore, timing the offer of an intervention/prevention program is essential. In particular for starting Take it Personal!, the right timing was necessary for multiple participants, as group constellations of three or four participants from the same treatment site and the same personality profile were required. Furthermore, the possibility of being included in the control arm, further hampered recruitment efforts. This study's findings on emotional and behavioral problems in Take it Personal! should thus be seen in the light of the small sample size and should be considered exploratory rather than conclusive in nature. Nevertheless, the program's effect on its main goal—reducing substance use—that was found in [Schijven, Hulsmans et al. \(2020\)](#) seems robust as this effect is significant in all models that were tested with different problem domain scores as covariates ([Table 4](#)).

**Table A1**  
Bivariate correlations between substance use and problem domains.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. B Substance use	1									
2. FU Substance sue	.30**	1								
3. B Anxiety	-.03	.09	1							
4. FU Anxiety	-.08	-.03	.80**	1						
5. B Withdrawn	-.15	.09	.54**	.37**	1					
6. FU Withdrawn	-.18	.07	.50**	.56**	.79**	1				
7. B Rule-breaking	.18	.18	.25**	.21	.32**	.32**	1			
8. FU Rule-breaking	-.09	.09	.22	.39**	.30*	.40**	.72**	1		
9. B Aggression	-.05	.14	.31*	.22	.43**	.47**	.68**	.54**	1	
10. FU Aggression	-.04	.13	.20	.37**	.26*	.47**	.55**	.72**	.73**	1

Note. \*  $p < .05$ . \*\*  $p < .01$ . B = baseline. FU = follow-up. SU = substance use.

Take it Personal! is a personality-based prevention program in which adolescents and young adults set personalized goals to work on the problems that are most relevant for them, in addition to reducing the use of those substances that are most problematic. The outcome variable substance use was constructed in line with the personalized nature of the program, that is, concerning the frequency of those substance(s) that were most problematic. A noteworthy limitation of this study is that a standardized assessment of emotional and behavioral problems might not always capture the most relevant problems for the adolescents and young adults. Weisz et al. (2011) compared youth self-reports on the YSR to the three problems that each individual identified as most relevant in his/her life. The majority of those self-nominated top problems did not correspond to items on the YSR scales. Therefore, it might be that Take it Personal! decreased certain individual-specific emotional and/or behavior problems within or outside the problem domains of the YSR, but with the current study design and measures, we were unable to capture such idiographic effects. Future research on moderating effects of—and prevention effects on—emotional and behavioral problems in this target group could employ an idiographic design in which every individual's most relevant problems are considered as outcome variables. In addition to these methodological advantages, such a design would also be more pragmatic than recruiting a large sample.

## 5. Conclusion

Altogether, the current study demonstrates that Take it Personal!, a personality-targeted prevention program for adolescents and young adults with MID-BIF, seems to effectively reduce rule-breaking behavior. The effect size, however, is small. Furthermore, this personality-targeted prevention approach for adolescents and young adults with MID-BIF is effective in its primary goal—reducing substance use—for adolescents and young adults with high and low anxiety, withdrawal, rule-breaking and aggression problems. Adolescents and young adults with varying levels of emotional and behavioral problems thus benefit equally—a finding that informs clinical practice on the broad applicability of this prevention program in the target group. This is the first study to explore the role of emotional and behavioral problems in a personality-targeted substance use intervention for adolescents and young adults with MID-BIF. To better understand the interrelations between emotional and behavioral problems and substance use, we recommend that future research assesses the problems that are relevant to the individual. Such a personalized study approach would match the personalized program approach.

## Data statement

Processed data and R codes are available upon request from the corresponding author via <https://doi.org/10.17026/dans-z88-5vsv>.

## CRedit authorship contribution statement

**Daan H.G. Hulsmans:** Conceptualization, Data curation, Formal analysis, Methodology, Writing - original draft. **Roy Otten:** Conceptualization, Supervision, Methodology, Writing - review & editing. **Esmée P. Schijven:** Conceptualization, Investigation, Methodology, Writing - review & editing. **Evelien A.P. Poelen:** Conceptualization, Funding acquisition, Investigation, Methodology, Supervision, Writing - review & editing, Project administration.

## Declaration of Competing Interest

D. H. G. Hulsmans and R. Otten declare that they have no competing interests. E. P. Schijven and E. A. P. Poelen were involved in the development of the Take it Personal! prevention program.

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## Appendix A

## Appendix B. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.ridd.2020.103832>.

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