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Emotion regulation and angry mood among adolescents with externalizing problems and intellectual disabilities

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ABSTRACT

Background and aims: Cognitive behavior therapy targeting emotion regulation is found to be effective in decreasing externalizing problems, but little is known about the emotion regulation capacities of adolescents with externalizing problems and Mild Intellectual Disabilities or Borderline Intellectual Functioning (MID-BIF). Therefore, the aim of this study was to compare emotion (i.e., anger) regulation capacities, angry mood level and angry mood variability between two groups: adolescents with externalizing problems and MID-BIF and adolescents with externalizing problems and average intelligence (AIQ).

Methods and procedures: Participants in the MID-BIF ($n = 42$, $M_{\text{age}} = 15.52$, $SD = 1.43$) and AIQ ($n = 39$, $M_{\text{age}} = 13.67$, $SD = 1.06$) group completed questionnaires about emotion regulation difficulties, emotion regulation strategies, and angry mood.

Outcomes and results: Adolescents in the MID-BIF group reported fewer emotion regulation difficulties, fewer maladaptive regulation strategies, and lower levels of angry mood than adolescents in the AIQ group. No between-group differences in angry mood variability were found. Lastly, adolescents in the MID-BIF group reported to use more behavioral than cognitive regulation strategies.

Conclusions and implications: These findings provide a starting point in understanding emotion regulation and angry mood of adolescents with externalizing problems and MID-BIF and show that it is important to consider differences between cognitive and behavioral regulation processes.

What this paper adds?

Little is known about the emotion regulation capacities of adolescents with externalizing problems and Mild to Borderline Intellectual Disabilities (MID-BIF). Nevertheless, interventions frequently aim to enhance the emotion regulation skills of these adolescents. The current study found, however, that adolescents with externalizing problems report fewer emotion regulation difficulties, fewer maladaptive regulation strategies, and lower levels of angry mood than adolescents with externalizing problems without intellectual disabilities. This may imply that the focus on the emotion regulation element of interventions for adolescents with MID-BIF could be reduced.

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1. Introduction

Adolescents with Mild Intellectual Disabilities or Borderline Intellectual Functioning (MID-BIF¹; IQ between 50 and 85 and limitations in social adaptive skills; American Psychiatric Association, 2013) have a three to four times higher risk to develop behavior problems, compared to adolescents without intellectual disabilities (Dekker, Koot, van der Ende, & Verhulst, 2002). This increased risk includes externalizing problems such as aggression and delinquency (Douma, Dekker, de Ruiter, Tick, & Koot, 2007). For adolescents without intellectual disabilities, a clear link has been found between emotion regulation difficulties and externalizing problems (Compas et al., 2017), and improving emotion regulation is a core target of cognitive behavior therapy (Garland, Hawley, Brookman-Frazee, & Hurlburt, 2008). However, little is known about the emotion regulation capacities of adolescents with externalizing problems and MID-BIF (McClure, Halpern, Wolper, & Donahue, 2009). This is unfortunate, as this knowledge can inform to which degree evidence-based interventions that aim to increase emotion regulation abilities, might also be suitable for adolescents with MID-BIF. Therefore, the current study explores differences in emotion regulation and angry mood between adolescents with externalizing problems and MID-BIF and adolescents with externalizing problems and average intelligence.

1.1. Emotion regulation and externalizing problems

Emotion regulation refers to the attempts of an individual to manage the internal experience and external expression of emotions (Thompson, 1994). It is a multi-modal construct, that includes both general *emotion regulation abilities* (typical ways to understand, regard, and respond to emotional experiences) and specific *emotion regulation strategies* (strategies to influence the processes through which emotions are generated or manifested in behavior) (Gratz & Roemer, 2004; Gross, 1998; Tull & Aldao, 2015). Emotion regulation strategies can involve either *cognition* (e.g., cognitive strategies such as reappraisal) or *behavior* (e.g., behavioral strategies such as withdrawal) and can be considered *adaptive* or *maladaptive* depending on their direct effects on negative affect and associations with psychopathology (Naragon-Gainey, McMahon, & Chacko, 2017). Thus, emotion regulation strategies can be disentangled into four categories; cognitive maladaptive, behavioral maladaptive, cognitive adaptive, and behavioral adaptive strategies (te Brinke et al., 2018). For adolescents without intellectual disabilities, all of these emotion regulation aspects are found to be related to externalizing problems. Longitudinal research shows, for example, that emotion regulation difficulties predict increases in externalizing problems (McLaughlin, Hatzenbuehler, Mennin, & Nolen-Hoeksema, 2011). In addition, adolescents who report to use a maladaptive profile of emotion regulation strategies (high maladaptive, low adaptive) are specifically at risk for externalizing problems (Otterpohl, Schwinger, & Wild, 2016). Moreover, cross-sectional research shows that adolescents with externalizing problems report high degrees of behavioral (rather than cognitive) maladaptive emotion regulation strategies (te Brinke et al., 2020). (te Brinke)

1.2. Emotion regulation and intellectual disabilities

Relatively little is known about the emotion regulation capacities of adolescents with externalizing problems and MID-BIF (McClure et al., 2009). On the one hand, it seems plausible that adolescents with externalizing problems and MID-BIF have more emotion regulation difficulties than adolescents with only externalizing problems. Evidence points towards a developmental delay in two constructs that are related to emotion regulation; self-regulation and coping. Research on self-regulation, which refers to the ability to regulate emotion, behavior, and cognition (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013) shows that both children and adolescents with mild to moderate intellectual disabilities have fewer self-regulation abilities than their typically developing peers (Nader-Grosbois, 2014; Vieillevoys & Nader-Grosbois, 2008). In addition, research on coping, which refers to conscious efforts to regulate emotion, cognition, behavior, and physiology in response to stressful events or circumstances (Compas et al., 2017) shows that adults with mild intellectual disabilities use fewer emotion-focused coping strategies than non-emotional coping strategies, which might point towards specific difficulties in dealing with emotions (Hartley & MacLean, 2008). However, this study did not include a comparison group of individuals without intellectual disabilities, thus it is not clear to which degree absolute differences in regulation strategies between individuals with and without intellectual disabilities exist.

On the other hand, it may be that adolescents with externalizing problems and MID-BIF and adolescents with externalizing problems and average intelligence do not differ in emotion regulation capacities. Mechanisms that underly externalizing problems might, for example, cause the two groups to be (more) similar. An important underlying mechanism of externalizing problems is executive functioning (Granvald & Marciszko, 2016). Research shows that executive functioning (e.g., behavioral inhibition) is impaired in adolescents with externalizing problems, both for adolescents with average intelligence (Hobson, Scott, & Rubia, 2011) and for adolescents with MID-BIF (Schuiringa, van Nieuwenhuijzen, de Castro, & Matthys, 2017). Besides, executive functioning is found to be associated with emotion regulation (Lantrip, Isquith, Koven, Welsh, & Roth, 2016). Because in the current study both groups have externalizing problems, it is possible that the groups display comparable emotion regulation difficulties.

Lastly, it is also possible that differences in emotion regulation only emerge for specific regulation strategies. Previous research shows that adolescents with externalizing problems who do not have intellectual disabilities are more likely to use a 'behavioral', rather than 'cognitive' regulation style (te Brinke et al., 2020). Because adolescents with MID-BIF have cognitive difficulties, it seems

¹ In the Netherlands, people with mild intellectual disabilities (MID; IQ 55 - 69) and borderline intellectual functioning (BIF; IQ between 70 and 84) are generally treated by the same healthcare centers. Consistent with other Dutch studies (e.g., de Lang et al., 2019), these two groups are therefore addressed together.

plausible that these adolescents are even more likely to regulate emotions in a behavioral, rather than cognitive way. Therefore, the current study aimed to examine differences in cognitive/behavioral strategies at both the between-group and within-group level.

1.3. Angry mood and variability in angry mood

A concomitant goal of the current study was to explore between-group differences in angry mood level and angry mood variability. Emotions and moods are distinguishable, but related constructs: emotions persist from seconds to minutes and mainly motivate immediate action, whereas moods persist from hours to days and weeks, and bias patterns of cognition and behavior over time (Beauchaine & Cicchetti, 2019). Angry mood is identified as both an antecedent and consequence of emotion regulation capacities (Colombo et al., 2020). Thus, the association between angry mood and emotion regulation is twofold; angry mood both effects emotion regulation capacities, and is effected by emotion regulation capacities. Angry mood is also expected to impact behavior. A focus on angry mood seems, therefore, specifically important among individuals with externalizing problems and/or MID-BIF, since high levels of angry mood are related to externalizing problems (Taylor, 2002) and related disorders such as Oppositional Defiant Disorder (ODD; American Psychiatric Association, 2013). Research shows that for adolescents without intellectual disabilities, both daily levels of anger (i.e., angry mood level) and day-to-day fluctuations in anger (i.e., angry mood variability) are positively associated with externalizing problems such as (reactive) aggression (Moore, Hubbard, Bookhout, & Mlawer, 2019; Silk, Steinberg, & Morris, 2003). In contrast, when simultaneously examining angry mood level and angry mood variability, only angry mood level is found to be associated with aggression (Neumann, van Lier, Frijns, Meeus, & Koot, 2011). Thus, evidence regarding angry mood level and angry mood variability among adolescents with externalizing problems and average intelligence is mixed.

Besides, little is known about angry mood level and angry mood variability for adolescents with MID-BIF. Although research suggests that adolescents with mild intellectual disabilities appear to be capable to report their mood states (Argus, Terry, Bramston, & Dinsdale, 2004), differences in self-reported angry mood level and angry mood variability between adolescents with externalizing problems and MID-BIF and adolescents with externalizing problems and average intelligence have – to our knowledge – not been taken into account. This is unfortunate, as this knowledge may advance our understanding of externalizing problems among individuals with intellectual disabilities. Moreover, since anger management plays a prominent role in the treatment of externalizing problems (Garland et al., 2008; Novaco, 2011), this knowledge may also be informative for clinical practice.

1.4. Current study

In summary, the current study aimed to gain more insight into the emotion regulation capacities and angry mood of adolescents with externalizing problems and MID-BIF, by comparing emotion regulation difficulties, emotion regulation strategies, angry mood level, and angry mood variability between two groups: adolescents with externalizing problems and MID-BIF and adolescents with externalizing problems and average intelligence (AIQ). As this is the first study that targets emotion regulation and angry mood among adolescents with both externalizing problems and intellectual disabilities, and indirect evidence is mixed, we were not able to formulate hypotheses regarding between-group differences in emotion regulation difficulties, angry mood level, and angry mood variability. Regarding regulation strategies, it is however hypothesized, first, that adolescents in the MID-BIF group report fewer cognitive adaptive/maladaptive strategies and more behavioral adaptive/maladaptive strategies than adolescents in the AIQ group. Second, it is hypothesized that within the MID-BIF group, the average emotion-regulation profile is characterized by the reported use of fewer cognitive adaptive/maladaptive than behavioral adaptive/maladaptive strategies.

This study adds to the literature in several ways. In previous research, mainly non-clinical samples of individuals with and without intellectual disabilities were compared, whereas the current study focused on adolescents with externalizing problems, and therefore can potentially be of relevance to clinical science and practice. Besides, a multi-modal perspective of emotion regulation is used, as both overall emotion regulation difficulties and emotion regulation strategies are taken into account, using self-reports. In general, self-reports appear to be best suited to examine (cognitive aspects of) emotion regulation (Zeman, Cassano, Perry-Parrish, & Stegall, 2006) and are also used for adolescents with MID-BIF (Douma, Dekker, Verhulst, & Koot, 2006). Lastly, the current study examined angry mood with a daily diary questionnaire. Using daily reports might be of additional value for individuals with MID-BIF, as this method uses concrete formulations (e.g., “how angry did you feel today”) and does not include recall over longer periods of time.

2. Material and methods

2.1. Participants

In total, 81 adolescents between 12 and 18 years old ($M = 14.63$, $SD = 1.57$, 60.5 % boys) participated in this study. Of these adolescents, 13.6 % was born in another country than the Netherlands (of which 27.4 % East-European, 18.2 % West-European, 9 % South-European, 18.2 % South-American, 18.2 % Caribbean, 9 % African).

Participants in the MID-BIF group ($n = 42$) were recruited from a residential treatment center for adolescents with intellectual disabilities and behavior problems, and participants in the average intelligence (AIQ) group ($n = 39$) were recruited at (special education) schools. Inclusion criteria were: (1) a score above the 84th percentile on one or both of the externalizing problems subscales (rule-breaking/aggressive behavior) of the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) as reported by residential care-staff (MID-BIF group) or parents (AIQ group), (2) for the MID-BIF group: mild intellectual disabilities (IQ 55–69) or borderline intellectual functioning (IQ 69–84), and for the AIQ group: (above) average intelligence (IQ ≥ 85). Exclusion criteria were: (1) severe

autism spectrum symptoms, as evidenced by a score above the 98th percentile (clinical range) on the Autism Spectrum Questionnaire (ASV; van der Ploeg & Scholte, 2014) reported by residential care-staff (MID-BIF; combined with an autism spectrum diagnosis) or parents (AIQ). See Table 1 for a description of the groups. The groups differed significantly regarding IQ, gender, age, and externalizing problems.

2.2. Procedure

This study was part of a larger experimental emotion regulation study (te Brinke et al., 2018) and approved by The Ethics Committee of the University Medical Center Utrecht. In the current study, data from the eligibility screening and baseline measurement were used. First, information letters were sent to all possibly eligible adolescents. After informed consent was obtained from the adolescent and parent(s) or legal guardian(s) of adolescents aged 12–15 (for adolescents aged 16 consent of a parent/guardian was not required), the residential care-staff, teachers, and parents filled out the screening measures. In addition, information about the adolescent's IQ score was obtained. If this information was not available, a short IQ-test was administered by a trained research assistant.

If participants met the inclusion criteria, self-report questionnaires were administered individually by a trained research assistant in a quiet room. For adolescents in the MID-BIF group, the questions were posed orally to ensure comprehension. Adolescents in the AIQ group filled out the questionnaires on a computer. Subsequently, the daily diary questionnaires were administered at five consecutive days (Monday-Friday). Adolescents received a notification and could answer the questions on their smartphones. If this was not possible (e.g., no smartphone access), the daily diary questionnaires were administered via e-mail.

2.3. Measures

2.3.1. Screening measures

2.3.1.1. Externalizing problems. Externalizing problems were assessed with the rule-breaking and aggression subscales of the CBCL (Achenbach & Rescorla, 2001). The rule-breaking scale consists of 17 items (e.g., “vandalism”) and the aggression scale consists of 18 items (e.g., “argues a lot”). The subscales were aggregated to form the broadband externalizing problems scale. Items are rated on a 3-point scale from 0 (*not true*) to 2 (*very true or often true*). T-scores were obtained based on norm scores, with higher scores being indicative of more externalizing problems. In the current study, Cronbach's alpha was .89.

2.3.1.2. Autism spectrum symptoms. Severity of autism spectrum symptoms was measured with the ASV (van der Ploeg & Scholte, 2014). This questionnaire consists of 24 items (e.g., “does not seek eye contact”) that are rated on a 5-point scale from 1 (*totally disagree*) to 5 (*totally agree*). Percentile scores were obtained based on norm scores, with higher scores being indicative of more autism spectrum symptoms. Cronbach's alpha was .87.

2.3.1.3. Intelligence. Intelligence was assessed with the Dutch version of the Wechsler Intelligence Scale for Children (WISC; Kort et al., 2005) or the Wechsler Adult Intelligence Scale (WAIS; Wechsler, 2012). A full-scale IQ-score from the adolescents' clinical file was used if the WISC or WAIS was administered within 24 months before the start of the study. If this score was not available, the subtests “Block Design” and “Vocabulary” were administered. Subsequently, total-IQ was estimated with the formula for approximation of Full-Scale IQ (FIQ; Silverstein, 1970). FIQ estimates are found to be reliable and strongly correlated with the total-IQ (Hrabok, Brooks, Fay-McClymont, & Sherman, 2014) and have also been used in MID-BIF populations (Schuiringa, van Nieuwenhuijzen, de Castro, Matthys et al., 2017).

2.3.2. Adolescent self-report measures

2.3.2.1. Emotion regulation difficulties. Emotion regulation difficulties were measured with a short version of the Dutch Difficulties in Emotion Regulation Scale (DERS; de Castro et al., 2018; Gratz & Roemer, 2004; Neumann, van Lier, Gratz, & Koot, 2010). Adolescents rated 15 items (e.g., “when I am upset, I become out of control”) on a 5-point scale from 1 (*almost never*) to 5 (*almost always*). A mean score was constructed, with a higher score indicating that the adolescents reported more difficulties in regulating their emotions. Cronbach's alpha was .83 for the MID-BIF group and .93 for the AIQ group.

Table 1

Means, Standard Deviations and Group Differences for Demographic and Screening Variables.

	MID-BIF (n = 42)		AIQ (n = 39)		F / χ	p	η^2 / ϕ
	M	SD	M	SD			
IQ	75.67	6.55	96.82	9.52	137.40	<.001	0.64
Externalizing (T-scores ^a)	71.64	5.68	64.31	5.02	31.38	<.001	0.28
Age	15.52	1.43	13.67	1.06	43.34	<.001	0.35
Gender (% male)	50.00		71.79		4.02	.045	0.22
Ethnicity (% non-Dutch)	19.05		7.69		2.22	.136	0.17

Note. ^a F and p values are based on the sum scores. MID-BIF = Mild Intellectual Disabilities or Borderline Intellectual Functioning, AIQ = Average IQ.

2.3.2.2. Emotion regulation strategies. Emotion regulation strategies were assessed with the Dutch version of the Fragebogen zur Erhebung der Emotionsregulation bei Kinder und Jugendlichen (FEEL-KJ; Cracco, van Durme, & Braet, 2015; Grob & Smolenski, 2009). The FEEL-KJ measures a large variety of both cognitive and behavioral strategies that children and adolescents use to regulate anger, sadness, and anxiety. In correspondence to previous research, the current study measured only emotion regulation strategies in response to feelings of anger (e.g., Otterpohl et al., 2016). Based on this measure, four types of regulation strategies can be specified (te Brinke et al., 2020); cognitive maladaptive (3 items, e.g., “if I feel angry... I think it is my own problem”), behavioral maladaptive (6 items, e.g., “.. there is nothing I can do against it”), cognitive adaptive (9 items, e.g., “... I think about possible solutions”), and behavioral adaptive (5 items, e.g., “... I do something to distract myself”). Items are rated on a 5-point scale from 1 (*never*) to 5 (*almost always*). Mean scores of the four categories were constructed, with higher scores indicating that the adolescents were more likely to report the probable use of these strategies when experiencing feelings of anger. Cronbach’s alpha ranged from .50 (cognitive maladaptive) to .80 (cognitive adaptive) for the MID-BIF group and from .55 (cognitive maladaptive) to .84 (behavioral adaptive) for the AIQ group.

2.3.2.3. Angry mood level and angry mood variability. The Daily Mood questionnaire was used to assess angry mood and variability in angry mood (Hoeksma et al., 2000; Maciejewski, van Lier, Branje, Meeus, & Koot, 2015). Adolescents were asked to rate the intensity of their daily mood (e.g., “how angry did you feel today”) on 5 consecutive days, using a 9-point scale from 1 (*not angry*) to 9 (*angry*). In the current study, the scores of the three items measuring anger (i.e., angry, cross, and short-tempered) were used. Items were summed, resulting in a total anger score per day. Subsequently, these total scores were summed and divided by the valid number of daily scores, resulting in the average angry mood level. Thus, a higher score on angry mood level indicated that adolescents reported higher levels of angry mood across the five days. To calculate variability in angry mood, absolute differences in total angry mood scores between consecutive days were calculated, summed, and divided by the valid number of absolute difference scores. Thus, a higher score on angry mood variability indicated that adolescents reported more variability in angry mood across the five days. Cronbach’s alpha ranged from .78 to .96 for the MID-BIF group, and from .67 to .92 for the AIQ group.

2.4. Missing data

There was no missing data on the screening measures and adolescent-reported emotion regulation questionnaires. In accordance with other diary studies with youth (e.g., Suveg, Payne, Thomassin, & Jacob, 2010), there was, however, missing data on the daily mood questionnaire. In total, for 16 adolescents (20 %), angry mood scores were missing on all five days and 14 adolescents (17 %) reported their mood only on one day. Angry mood level and angry mood variability were only calculated when at least two valid (consecutive) days were available. Angry mood level data of 50 adolescents (62 % of the total sample), and angry mood variability data of 44 adolescents (54 % of the sample) were used. Adolescent with at least two valid daily diary reports did not differ from adolescents with missing data regarding gender ($\chi^2(1) = 0.34, p = .560, \phi = 0.07$) and ethnicity ($\chi^2(1) = 0.02, p = .889, \phi = 0.16$). However, adolescents with valid daily diary reports were significantly younger ($F(1, 79) = 7.88, p = .006, \eta^2 = 0.09$), displayed fewer externalizing problems ($F(1, 79) = 7.17, p = .009, \eta^2 = 0.08$), and were more likely to belong to the AIQ group ($\chi^2(1) = 10.04, p = .002, \phi = -0.35$).

2.5. Analyses

In all analyses concerning between-group differences, gender (0 = boy, 1 = girl) and externalizing problems (mean score) were included as covariates, because these aspects, theoretically, influence emotion regulation (McLaughlin et al., 2011; Zimmermann & Iwanski, 2014), and differed between the groups (Table 1). Chronological age also differed between the two groups (i.e., chronological age was higher in the MID-BIF group than in the AIQ group). Adolescents with MID-BIF are, however, expected to have socio-emotional delays, and as a consequence, their mental age is usually lower than their chronological age. Procedures to take these differences into account (i.e., including chronological age as a covariate, or matching for chronological- and/or mental-age) may inflate differences between the two groups, since these procedures neglect either cognitive levels or experiences (Nader-Grosbois, 2014). As such, age was not included as a covariate. First, an univariate analysis of covariance (ANCOVA) was performed with group as independent variable and the mean score of emotion regulation as dependent variable. Subsequently, a multivariate analysis of covariance (MANCOVA) was performed with group as independent variable, and the mean of the four categories of regulation strategies as dependent variables. Next, within-group differences between cognitive/behavioral strategies were examined with pairwise t-tests. Lastly, two ANCOVA’s were performed with group as independent variable and angry mood level/variability as dependent variables. Significant MANCOVA results were followed-up with post-hoc Tukey HSD tests and significant ANCOVA results were followed-up with pairwise comparisons, using the Bonferroni correction.

3. Results

3.1. Between-group differences in emotion regulation difficulties

Correlations between all study variables are displayed in Table 2. Results of an ANCOVA showed that, after controlling for gender ($F(1, 77) = 7.86, p = .006, \eta^2 = 0.09$) and externalizing problems ($F(1, 77) = 3.04, p = .085, \eta^2 = 0.04$), the MID-BIF and AIQ group

differed significantly in their reported emotion regulation difficulties (Table 3). A comparison of the estimated marginal means (Table 3) showed that adolescents in the MID-BIF group reported fewer emotion regulation difficulties than adolescents in the AIQ group.

3.2. Between-group differences in emotion regulation strategies

Results of a MANCOVA showed that, after controlling for gender (Wilks $\lambda = 0.90$; $F(4, 74) = 2.18, p = .080, \eta^2 = 0.11$) and externalizing problems (Wilks $\lambda = 0.91$; $F(4, 74) = 1.84, p = .129, \eta^2 = 0.09$), there was a significant overall difference in emotion regulation strategies between the two groups, Wilks $\lambda = 0.83$; $F(4, 74) = 3.77, p = .008, \eta^2 = 0.17$. A comparison of the estimated marginal means (Table 3) showed that adolescents in the MID-BIF group reported to use significantly fewer cognitive maladaptive and behavioral maladaptive emotion regulation strategies than adolescents in AIQ group. Differences between the MID-BIF and AIQ group were non-significant for cognitive adaptive and behavioral adaptive emotion regulation strategies.

3.3. Within-group differences in emotion regulation strategies

Absolute means of emotion regulation strategies are displayed in Fig. 1. Results of pairwise t-tests showed that adolescents in the MID-BIF group reported to use significantly fewer cognitive maladaptive than behavioral maladaptive strategies, $t(41) = -2.82, p = .007$. In addition, these adolescents reported to use significantly fewer cognitive adaptive than behavioral adaptive strategies, $t(41) = -2.73, p = .009$. For adolescents in the AIQ group, the difference between cognitive maladaptive and behavioral maladaptive strategies was not significant, $t(38) = -0.25, p = .807$. These adolescents reported, however, also to use significantly fewer cognitive adaptive than behavioral adaptive strategies, $t(38) = -2.73, p = .009$.

3.4. Between-group differences in angry mood level and angry mood variability

Results of an ANCOVA showed that, after controlling for gender ($F(1, 46) = 1.60, p = .213, \eta^2 = 0.03$) and externalizing problems ($F(1, 46) = 6.44, p = .015, \eta^2 = 0.12$), the MID-BIF and AIQ group differed significantly in angry mood level (Table 3). A comparison of the estimated marginal means (Table 3) showed that adolescents in the MID-BIF group reported a lower average level of angry mood than adolescents in the AIQ group. Results of an ANCOVA showed that, after controlling for gender ($F(1, 40) = 15.16, p < .001, \eta^2 = 0.28$) and externalizing problems ($F(1, 40) = 0.03, p = .862, \eta^2 = 0.00$), there was no significant overall difference in angry mood variability between the two groups (Table 3).

4. Discussion

The aim of the current study was to gain more insight into the emotion regulation capacities and angry mood of adolescents with externalizing problems and MID-BIF. Results showed that adolescents with externalizing problems and MID-BIF report fewer overall difficulties in emotion regulation and fewer maladaptive emotion regulation strategies than adolescents with only externalizing problems, whereas no differences were found for adaptive emotion regulation strategies. Within the MID-BIF group, however, adolescents reported to use fewer cognitive than behavioral strategies. Finally, adolescents in the MID-BIF group reported lower levels of angry mood, whereas no between-group differences were found for variability in angry mood.

The findings of the current study, first of all, show that adolescents with externalizing problems and MID-BIF report fewer overall difficulties and fewer (cognitive and behavioral) maladaptive emotion regulation strategies than adolescents with externalizing problems and average intelligence. On the one hand, this might imply that adolescents with externalizing problems and MID-BIF have fewer difficulties in regulating their emotions than their peers without intellectual disabilities. On the other hand, it may also be that adolescents with MID-BIF have more difficulties in reporting their emotion regulation skills than adolescents with average intelligence. Although self-reports of psychological difficulties are considered reliable for adolescents with MID-BIF (e.g., Boström, Åsberg Johnels, & Broberg, 2018; Douma et al., 2006; Hurley, 2006), these adolescents possibly experience more difficulties in reporting internal processes, such as dealing with emotions, rather than concrete behaviors (Finlay & Lyons, 2001). Future research could test these

Table 2
Correlations Between Study Variables.

	1.	2.	3.	4.	5.	6.	7.	8.
1. Externalizing	–							
2. Gender ^a	.22	–						
3. ER Difficulties	–.01	.21	–					
4. Cognitive Maladaptive ER	.01	.07	.24	–				
5. Behavioral Maladaptive ER	.17	.27**	.78**	.14	–			
6. Cognitive Adaptive ER	.12	–.02	–.07	.49**	–.21	–		
7. Behavioral Adaptive ER	–.05	–.04	–.15	.36*	–.38*	.75**	–	
8. Angry mood level	.09	.06	.38*	.47**	.30	.53**	.37*	–
9. Angry mood variability	.04	.47**	.66**	.54*	.39	.44	.31	.62*

Note. ^a 0 = boy, 1 = girl, *** $p < .001$. ** $p < .01$. * $p < .05$.

Table 3

Adjusted Means, Standard Errors, and Group Differences Between the MID-BIF and AIQ group, while Controlling for the Covariates Gender and Externalizing Problems.

	MID-BIF group			AIQ group			<i>F</i>	<i>p</i>	η^2
	<i>M</i>	<i>SE</i>	<i>n</i>	<i>M</i>	<i>SE</i>	<i>n</i>			
ER Difficulties	2.08	0.13	42	2.90	0.14	39	15.23	<.001	0.17
Cognitive Maladaptive ER	2.12	0.15	42	2.89	0.16	39	10.59	.002	0.12
Behavioral Maladaptive ER	2.56	0.12	42	2.94	0.13	39	4.23	.043	0.05
Cognitive Adaptive ER	2.63	0.13	42	2.52	0.13	39	0.32	.574	0.01
Behavioral Adaptive ER	2.97	0.16	42	2.74	0.17	39	0.86	.356	0.01
Angry mood level	4.51	1.13	19	8.66	0.82	31	6.92	.012	0.13
Angry mood variability	2.32	0.81	15	3.65	0.52	29	1.51	.227	0.04

Note. ER = Emotion Regulation, MID-BIF = Mild Intellectual Disabilities or Borderline Intellectual Functioning group, AIQ = Average IQ group.

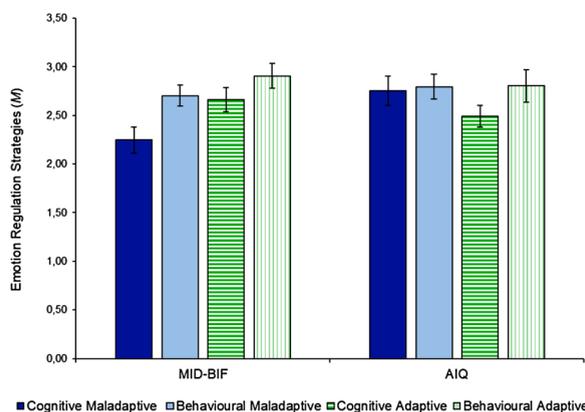


Fig. 1. Absolute means (*M*) of emotion regulation strategies within the Mild Intellectual Disabilities or Borderline Intellectual Functioning group (MID-BIF) and average IQ group (AIQ). Error bars denote one standard error around the mean.

differential explanations of the current study's findings, through incorporation of parent- or teacher-reports of emotion regulation (e.g., van Beveren et al., 2020) and observational methods.

Second, the results of the current study indicate that adolescents in the MID-BIF group report lower levels of angry mood than adolescents in the AIQ group. Thus, adolescents with externalizing problems and MID-BIF seem to experience lower levels of angry mood in their daily life, in comparison to their peers who do not have intellectual disabilities. However, adolescents with MID-BIF and externalizing problems, in comparison to adolescents with only externalizing problems, may also have more difficulties in *labeling and identifying* anger. Indeed, emotional awareness, which can be defined as the process by which individuals attend to, identify, differentiate, and evaluate emotions (Rieffe, Oosterveld, Miers, Meerum Terwogt, & Ly, 2008), is linked to externalizing problems (Hessler & Katz, 2010) and a core element of emotion regulation (Gross & Jazaieri, 2014). Alternatively, it may also be that adolescents with MID-BIF have more interoceptive awareness difficulties, or in other words, more difficulties in receiving and understanding sensations within their body that are related to anger (i.e., heavy breathing, fast heartbeat; Pinna & Edwards, 2020). Thus, results of the current study could indicate that adolescents with externalizing problems and MID-BIF have more difficulties in labeling their own emotions and/or understanding bodily sensations than adolescents with externalizing problems and average intelligence, and as a result, report lower levels of angry mood than adolescents with externalizing problems and average intelligence.

Third, no between-group differences in angry mood variability were found. These findings should, however, be interpreted with caution, due to a large amount of missing daily diary data. Variability scores could only be calculated for 54 % of the total sample, and the amount of missing data was larger in the MID-BIF group. This implies that, although diary methods are promising, adolescents with externalizing problems and/or MID-BIF might require more guidance when participating in a daily diary study.

Fourth, within-group differences in cognitive/behavioral emotion regulation strategies were found. Adolescents in the MID-BIF group reported, as expected, to use fewer cognitive adaptive/maladaptive than behavioral adaptive/maladaptive strategies. Within the AIQ group, the difference between cognitive and behavioral *maladaptive* strategies was not significant, but these adolescents also reported to use significantly fewer cognitive *adaptive* than behavioral adaptive strategies. Combined, these results seem to imply that adolescents with externalizing behavior, and specifically adolescents with both externalizing behavior and MID-BIF, rely less on cognitive than behavioral strategies, possibly due to overall cognitive difficulties. It should be noted that the magnitudes (i.e., effect sizes) of both the between- and within-group differences that were found in this study were small. This implies that even though, on average, the two groups of adolescents (i.e., adolescents with externalizing problems and MID-BIF versus adolescents with externalizing problems and average intelligence) differ in their self-reported emotion regulation skills and angry mood, there is at the same time a large degree of overlap. Moreover, due to uncertainties about the validity of measuring internal processes such as emotion

regulation and mood with self-reports in the MID-BIF population, it cannot be ruled out that, in the current study, adolescents in the MID-BIF group underreported their emotion regulation difficulties, use of maladaptive regulation strategies, and angry mood. Therefore, findings of the current study need to be confirmed, with studies that use observational methods (e.g., in virtual environments) and/or parent- or teacher-reports of emotion regulation as an addition to self-reports.

4.1. Clinical implications and future research directions

If it is confirmed in future research that adolescents with externalizing behavior and MID-BIF have indeed fewer difficulties in regulating their emotions than adolescents with externalizing behavior who do not have intellectual disabilities, and if these adolescents do not differ in emotion regulation skills from adolescents with MID-BIF without externalizing behavior, this might have important treatment implications. Cognitive behavior therapy (CBT) focusing on emotion regulation skills, anger management, and/or social problem solving skills is an effective treatment for children and adolescents with externalizing problems who do not have intellectual disabilities (Garland et al., 2008; McCart, Priester, Davies, & Azen, 2006; Sukhodolsky, Kassinove, & Gorman, 2004), and CBT interventions are adjusted to the cognitive capacities of children with MID-BIF (e.g., Schuiringa, van Nieuwenhuijzen, de Castro, Lochman, & Matthys, 2017). Research has shown that CBT interventions that focus on anger regulation have positive effects, both for adolescents (Schuiringa, van Nieuwenhuijzen, de Castro, Lochman et al., 2017; Schuiringa, van Nieuwenhuijzen, de Castro, Matthys et al., 2017), and adults (Taylor, Novaco, Gillmer, & Thorne, 2002) with MID-BIF. However, if it is confirmed that children and adolescents with MID-BIF and externalizing problems have fewer difficulties in regulating their emotions than children and adolescents with average intelligence, this might imply that the relative focus on the emotion regulation element of adjusted CBT interventions could be reduced.

In contrast, if future research shows that adolescents with externalizing problems and MID-BIF do not have fewer emotion regulation problems, but report low levels of emotion regulation difficulties and low levels of angry mood due to difficulties in emotional awareness, this implies that CBT interventions for adolescents with MID-BIF need to pay specific attention to emotional awareness. Emotional awareness is considered the first step in the emotion regulation treatment sequence (Berking & Lukas, 2015). This treatment step often includes teaching adolescents emotional labeling, emotion differentiation and awareness of bodily sensations, for example with “anger thermometer” exercises (e.g., Boxmeyer, Lochman, Powell, Yaros, & Wojnarowski, 2007). It is possible that for adolescents with MID-BIF more time should be spent on this first treatment step, because if increases in negative emotions such as anger are not recognized, it is difficult to apply adaptive regulation strategies. It may also be that interventions for adolescents with externalizing problems and MID-BIF are more effective when they have a stronger focus on interoceptive awareness (i.e., psychomotor therapy; Bellemans et al., 2018).

Lastly, the finding of the current study that the within-group emotion regulation profile of adolescents with externalizing problems and MID-BIF can be characterized by relatively low levels of cognitive regulation strategies could have treatment implications. CBT targeting emotion regulation differs in the degree to which the focus is on cognitive (e.g., cognitive reappraisal or problem solving) and/or behavioral (e.g., behavioral distraction or skills training) approaches (te Brinke et al., 2020). The finding that adolescents with MID-BIF are less likely to use a cognitive, rather than behavioral regulation style, could imply that a behavioral approach is specifically useful, because the treatment approach is then aligned to their preferred regulation style. Alternatively, a cognitive approach could be more effective, because this strengthens underdeveloped skills. Future experimental research is needed to examine the differential effectiveness of these possible treatment adaptations.

4.2. Strengths and limitations

Strengths of the current study include the participation of a difficult to reach, understudied population; adolescents with MID-BIF and externalizing problems. Moreover, emotion regulation was examined from a multi-modal perspective, as both overall emotion regulation difficulties and emotion regulation strategies were taken into account. Besides, both self-report questionnaires and daily diaries were used. Lastly, the difference between cognitive/behavioral regulation strategies was taken into account.

This study does contain limitations. First of all, although the internal consistencies of the questionnaires used in the current study were comparable in the MID-BIF and AIQ group, these questionnaires were not specifically validated for adolescents with MID-BIF. Besides, some of the scales measuring emotion regulation strategies consisted of relatively few items (i.e., 3 items measuring cognitive maladaptive strategies), which could have caused low internal consistency. Moreover, there appeared to be some degree of conceptual overlap between emotion regulation and externalizing problems. For example, ‘aggressive actions’ was included as a behavioral maladaptive strategy in the generalized emotion regulation questionnaire, whereas this item may also tap into aspects of externalizing problems (e.g., aggressive behavior). It thus seems to be important for future research to develop and validate emotion regulation questionnaires that measure a larger repertoire of (cognitive and behavioral) strategies (Girgis, Paparo, & Kneebone, 2020). Second, to ensure comprehension, questionnaires were administered orally in the MID-BIF group. Even though this approach is often used with this group (e.g., Douma et al., 2006), this might have increased social desirability bias. At the same time, we do not have reasons to believe that responses on the emotion-regulation questionnaires by adolescents with MID-BIF were socially desirable, as these adolescents also reported lower levels of angry mood when they were alone (i.e., daily diary report). Third, the inclusion criteria were based solely on IQ, and impairment in everyday adaptive functioning was not formally assessed. We presumed, however, that adolescents in the MID-BIF group were impaired in their adaptive functioning since they were recruited through residential treatment centers. Fourth, in contrast to adolescents in the MID-BIF group, adolescents in the AIQ group were recruited through schools. Thus, adolescents in the MID-BIF group lived in a more structured environment, and their emotion regulation skills could have been

influenced through previous interventions. However, adolescents in the AIQ group also experienced externalizing problems, and therefore, possibly also received mental health care.

4.3. Conclusions

Notwithstanding these limitations, the current study, for the first time, examined emotion regulation and angry mood among adolescents with MID-BIF and externalizing problems. Adolescents with MID-BIF and externalizing problems reported fewer emotion regulation difficulties, fewer maladaptive emotion regulation skills, and lower levels of angry mood than adolescents with externalizing problems without intellectual disabilities. Moreover, the current study showed that the emotion regulation profile of adolescents with externalizing problems and MID-BIF is characterized by a greater reliance on behavioral rather than cognitive regulation strategies. These findings need replication using not only similar self-report methods but also parent and teacher reports of emotions and mood, as well as observational methods, because of uncertainties about the adequacy of self-reporting of emotions and related mood by adolescents with MID-BIF.

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Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki. Ethical approval was granted by the Ethics Committee of the University Medical Center Utrecht.

CRedit authorship contribution statement

Lysanne W. te Brinke: Conceptualization, Methodology, Project administration, Formal analysis, Writing - original draft, Writing - review & editing. **Hilde D. Schuiringa:** Conceptualization, Methodology, Writing - review & editing. **Walter Matthys:** Conceptualization, Methodology, Supervision, Writing - review & editing.

Declaration of Competing Interest

The authors report no declarations of interest.

Appendix A

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