ELSEVIER

Inattention, emotion dysregulation and impairment among urban, diverse adults seeking psychological treatment

Sarah O'Neill*, Sasha Rudenstine

Department of Psychology, The City College of New York, 160 Convent Avenue, New York, NY 10031, USA

ABSTRACT

Emotion dysregulation is commonly reported among adults with Attention-Deficit/Hyperactivity Disorder. This study examined whether inattention and/or hyperactivity/impulsivity directly affect functional impairment, or whether they do so indirectly by decreasing emotion regulation capabilities. An ethnically, racially and socio-economically diverse sample of clients seeking treatment at a low-fee outpatient mental health clinic were recruited [$N = 177$, male $n = 59$, 33.3%, mean (SD) age = 28.54 (8.41) years]. Participants completed measures of inattention, hyperactivity/impulsivity, emotion regulation and impairment at intake. Inattention was more strongly related to emotion regulation and impairment than hyperactivity/impulsivity. Hayes' PROCESS was used to test for significant indirect effects. More severe inattention was associated with less emotional clarity, which in turn was associated with worse Interpersonal Relationship difficulties; more severe inattention was associated with less access to emotion regulation strategies and poorer emotional clarity, which in turn were associated with greater Symptom Distress; and inattention was directly associated with impairment at school and work. In addition to treating inattention, clinicians should focus on emotion regulation deficits. Specifically, working with individuals to improve identification and labeling of emotions, develop strategies to reduce the intensity of their negative emotions, and feel more confident that they have these tools at their disposable may help to reduce impairment.

1. Introduction

Attention-deficit/hyperactivity disorder is a common neurodevelopmental disorder that often emerges in early childhood (American Psychiatric Association, 2013), and can be reliably diagnosed as early as 4-years-old (Lahey et al., 1998). For many individuals, symptoms persist throughout childhood and adolescence into adulthood (American Psychiatric Association, 2013), with current estimates suggesting the prevalence of ADHD in adulthood to be 4.4% of the U.S. population (Kessler et al., 2006).

ADHD is characterized by inattention, hyperactivity and impulsivity. In adulthood, inattention may be manifested as: putting off effortful tasks (e.g., sorting papers, paying bills); not listening when others are speaking or forgetting information one has been told; struggling to complete boring tasks, but able to pay attention during stimulating activities; and failure to give close attention to detail (Asherson et al., 2018). Hyperactivity/impulsivity typically declines across childhood (Lahey et al., 2016; Leopold et al., 2016), and is less overt in adulthood (Biederman et al., 2000). These symptoms may be manifested as fidgeting, a subjective feeling of restlessness, finding it difficult to wait for others to finish speaking, saying things without thinking, and feeling irritated when having to wait (Asherson et al., 2018).

Excessive inattention and hyperactivity/impulsivity are associated with impairment in multiple domains of functioning. Compared to those without ADHD, adults with the disorder report greater difficulties in higher education or employment settings (Hechtman. et al., 2016; Murphy and Barkley, 1996), and in their interpersonal relationships (Kooij et al., 2005; Murphy and Barkley, 1996). They are also are more likely to have committed traffic violations (Murphy and Barkley, 1996) and experience higher rates of psychiatric comorbidity, particularly related to problematic substance use and antisocial behavior (Biederman et al., 1993; Murphy and Barkley, 1996).

Impairments in daily functioning are not just observed among those with the full ADHD syndrome; even for those with sub-threshold symptom presentations, substantial impairment is observed (Biederman et al., 2000; Kooij et al., 2005; O'Connor et al., 2015). This was demonstrated by Biederman and colleagues who assessed boys with ADHD on multiple occasions over a 4-year period and modeled symptom remission and impairment as a function of age. By 18- to 20-

years-old, 10% had achieved "functional remission", meaning they reported fewer than 5 symptoms and no impairment as measured by the Global Assessment of Functioning Scale; approximately 60% had achieved "syndromatic remission," meaning they no longer met the full symptom count for a DSM-III-R ADHD diagnosis, but had residual impairment; and the remaining participants had "symptomatic remission," whereby they had fewer than 5 ADHD symptoms, but were still substantially impaired. Thus, impairment is at least in part independent from symptoms among individuals with developmentally inappropriate inattention and/or hyperactivity/impulsivity. This leaves us with a critical question: by what mechanism are ADHD symptoms associated with adaptive functioning difficulties? Emotion regulation is one possible candidate.

In the ADHD literature, emotion regulation has been defined in several ways. For the purposes of this study, emotion regulation refers to the ability to effectively monitor, evaluate, and modulate affective responses in terms of intensity, duration, and valence across contexts (Gross, 1998; Rudenstine et al., 2018; Shaw et al., 2014). In this sense, the capacity for emotion regulation is developmental. For example, 3–4 months infants show the capacity to self-soothe (e.g., thumb sucking) and by 7–9 months they can modify arousal states (e.g. shift their attention/gaze) (Ekas et al., 2013). These initial forms of regulation evolve throughout childhood and adolescence and result in an enhanced capacity for emotional awareness, naming emotions, tolerating a wide range of affective experiences, and employing strategies to regulate emotional experiences (Lewis, Todd, & Xu, 2010; Theurel and Gentaz, 2018). Emotion dysregulation occurs when there is a breakdown in these emotion regulatory processes, resulting in maladaptive behavioral and emotional responses (Shaw et al., 2014).

Emotion dysregulation is commonly reported by adults with elevated inattention and/or hyperactivity/impulsivity, affecting approximately 30–70% of individuals (Shaw et al., 2014). Typically, however, studies carried out among individuals with inattention and/or hyperactivity/impulsivity have defined emotional dysregulation according to an individual's affective or behavioral response, such as irritability, argumentativeness, emotional over-reactivity, low frustration tolerance, and emotional lability (Barkley and Fischer, 2010; Reimherr et al., 2005; Surman et al., 2013). When defined in this way, emotion dysregulation has been shown to predict functional impairment among adults with ADHD. For example, Barkley and Fischer (2010) examined emotional impulsiveness among adults with persistent ADHD from childhood, remitting (non-persisting) ADHD from childhood, and controls with no childhood history of ADHD. Emotional Impulsiveness was a unique predictor of overall impairment, and specifically in the domains of home life, social interactions, engagement in community activities, dating and marriage, finances, and driving. Inattention was the strongest predictor of overall impairment, followed by emotional impulsiveness, and then hyperactivity/impulsivity. In a longitudinal study of 9–12-year-old children, emotion regulation (measured using the Lability/Negativity scale of the Emotion Regulation Checklist) mediated the association between Inattention and Hyperactivity/Impulsivity symptom severity and Depression severity (Seymour et al., 2014). In this study, many of the participants did not meet diagnostic criteria for either ADHD or depression, and all constructs were measured continuously, but significant associations were observed among the constructs. This study highlights the need to examine associations among inattention and hyperactivity/impulsivity, emotion regulation and impairment using dimensional rather than strict categorical approaches (Seymour et al., 2014). Furthermore, utilizing a dimensional approach aligns several studies showing that ADHD has a continuous structure (e.g., Marcus and Barry, 2011). Dimensional rather than categorical analysis may be particularly pertinent for adults where diagnostic criteria may not be developmentally appropriate (Frick and Nigg, 2012) and where symptom remission is often seen without concomitant reduction in functional impairment (Biederman et al., 2000).

With the focus of most studies centering on the maladaptive behavioral or emotional response consequent to a breakdown in regulation, there is a paucity of research on the ways in which emotion regulation processes are important or how they may be related to later impairment. One study of 10-year-olds with and without ADHD showed that children with higher ADHD symptomatology were less accurate in identifying their own emotions as well as expressed emotion in an audiotaped conversation (Norvilitis et al., 2000). Severity of children's symptoms was not related, however, to their ability to state the emotion seen on the face of a child in a videotape, or to pick out a drawing of a face whose emotion matched that of the child seen in the video (Norvilitis et al., 2000; but see Singh et al., 1998). In a medication-naïve sample of adults with ADHD, higher inattention and impulsivity, but not hyperactivity, were related to weaker adaptive emotion regulation skills (e.g., tolerance of negative feelings, awareness of feeling states, ability to modify negative feelings) (Hirsch et al., 2018). Thus, emerging evidence suggests that individuals with elevated inattention and impulsivity, and perhaps to a lesser extent hyperactivity, are less able to identify, monitor, and modulate their emotions. This adds to the body of research showing that these individuals are at much greater risk for expression of negative emotion states and greater overall psychological distress over the life course.

The aim of the current study was to build on this emerging body of research and examine whether inattention and/or hyperactivity/impulsivity directly affect functional impairment, or whether they do so indirectly by decreasing emotion regulation capabilities among an urban, diverse sample of adults seeking psychological services at a community outpatient facility. Given that emotion regulation skills develop across childhood and into adolescence and adulthood, we hypothesize that more severe ADHD symptomatology compromises emotion regulation capacity, which in turn is related to greater impairment. In light of the limited body of work that has examined emotion regulatory processes among adults with significant attentional problems, we did not make specific predictions about which domains of emotion regulation might be related to particular areas of impairment. Thus, this aspect of the study is exploratory.

2. Method

2.1. Subjects

Participants are clients at a community-based, low-fee outpatient mental health clinic in Northern Manhattan, New York City (NYC), who were evaluated between February 2016 and June 2018 ($N = 177$, male $n = 59$, 33.3%). All participants who sought treatment were informed about the study and asked if they wanted to participate; participants were not selected on the basis of a particular mental health condition or developmental disorder.

Participants' age spanned 18 to 65 years, with a mean (SD) of 28.54 (8.41) years. Participants were ethnically (Latinx $n = 49$, 27.7%) and racially diverse: White $n = 73$, 41.5%; Black $n = 32$, 18.2%; Asian $n = 16$, 9.1%; and biracial, multiracial or identifying as belonging to a different race $n = 55$, 31.3%. Consistent with the geographic area from which participants were recruited and the low-fee clinic participants were attending, the majority of participants ($n = 104$, 60%) reported an annual household income of below 40,000 USD, which is below the NYC median income of \$55,191 (US Census Bureau, 2012–2016, retrieved 2018[1]). Variability across the socioeconomic continuum was observed, however. Fourteen (8.4%) participants received some form of government assistance, including from the Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women, Infants and Children (WIC), or social security disability

---

[1] https://www.census.gov/quickfacts/fact/table/newyorkcitynewyork/PST045217

Table 1
Descriptive characteristics of the demographic and key measures (*N* = 177).

Variable	N	%
Sex (male)	59	33.3
Ethnicity (Hispanic/Latino)	49	27.7
Race		
White	73	41.5
Black	32	18.2
Asian	16	9.1
Biracial, multiracial, or race not listed	55	31.3
Household Income (annual, USD)		
<20,000	65	37.5
20,000–39,999	39	22.5
40,000–59,999	25	14.5
60,000–79,999	16	9.2
80,000–99,999	11	6.4
≥100,000	17	9.8
Receive government assistance (yes)	14	8.4
History of mental health services (yes)	125	71.0

	Mean	(SD)	Min – Max
Age (yrs)*	28.54	8.41	18.17–65.42
Inattention Severity (CAARS)**	58.16	11.19	36–83
Hyperactivity Severity (CAARS)***	51.23	9.14	32–78
Non-Accept (DERS)	2.54	1.13	1–5
Goals (DERS)	3.29	1.04	1–5
Impulse (DERS)	2.18	0.97	1–5
Aware (DERS)	2.73	0.89	1–4.5
Strategies (DERS)	2.66	1.03	1–5
Clarity (DERS)	2.62	0.80	1–5
Interpersonal Relationships (OQ-45)	2.64	0.63	1.18–4.09
Social Role (OQ-45)	2.59	0.54	1.11–4.11
Symptom Distress (OQ-45)	2.76	0.64	1.08–4.17

* *N* = 176.
** *N* = 175.
*** *N* = 167.

Government assistance includes Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women, Infants and Children (WIC), and social security disability benefits. CAARS = Conners Adult ADHD Rating Scale. Inattention Severity, measured using the CAARS Inattention/Memory Problems T score of the CAARS; Hyperactivity Severity, measured using the CAARS Hyperactivity/Restlessness T score; DERS = Deficits in Emotion Regulation Scale. DERS subscales: Non-Accept = Non-acceptance of emotional responses; Goals = difficulties engaging in goal-directed behavior; Impulse= impulse control difficulties; Aware = lack of emotional awareness; Strategies = limited access to emotion regulation strategies; Clarity = lack of emotional clarity. OQ = Outcome Measure-45. OQ-45 subscales: Interpersonal Relationship problems; Social Role difficulties and Symptom Distress.

benefits, and 28 (16%) participants had no health insurance benefits. In contrast, 17 (9.8%) participants reported an annual household income of at least $100,000. Finally, a large proportion of the sample had prior experiences with mental health service providers, with 125 (71%) reporting they had received mental health services for an unknown duration at some other point in their life (see Table 1).

Informed consent was obtained from all clients at the clinic to use their de-identified data in research-related publications. Individuals who did not provide consent (*n* = 8) are not included in this study. Individuals could decline to provide consent at no risk to themselves and/or risk of losing services. This study is approved by Institutional Review Board of the institution where the study was conducted.

2.2. Procedure

All clients attending the outpatient clinic completed a questionnaire on a computer as part of the standard intake process prior to receiving psychological services. Clients had the option of declining for their data to be used for research purposes, with no negative impact on their ability to receive psychological services. For clients who consented for their data to be used, if they did not want to answer a particular

question, they were able to leave it blank.

2.3. Measures

2.3.1. Inattention and hyperactivity/impulsivity

Participants completed the Short self-report version of the Conners Adult ADHD Rating Scale (CAARS-S:S; Conners et al., 1999). This 26-item measure asks participants to rate how frequently in recent times they have experienced behaviors covering the domains of Inattention/Memory problems, Hyperactivity/Restlessness, Impulsivity/Emotional Lability, and Problems with Self-Concept. Each item is rated on a 4-point scale from 0 (Not At All/Never) to 3 (Very Much, Very Frequently). Raw scores are converted to age and sex-normed T scores, with a mean (SD) of 50 (10), with higher scores indicating greater difficulties. The Inattention/Memory problems and Hyperactivity/Restlessness T scores were used in the current analyses (see Table 1). In the present sample, Cronbach's alpha was 0.82 for the Inattention/Memory Problems scale and 0.75 for the Hyperactivity/Restlessness Scale, indicating Acceptable to Good internal consistency.

2.3.2. Emotion regulation

Participants' self-reported difficulties with emotion regulation were assessed using the Difficulties in Emotion Regulation Scale (DERS, Roemer and Gratz, 2004). This 36-item questionnaire asks participants to describe how often each statement applies to them using a 5-point scale from 1 (Almost Never) to 5 (Almost Always). Responses fall on to six subscales: Non-Acceptance of Emotional Responses (Non-Accept); Difficulty Engaging in Goal Directed Behavior (Goals); Impulse Control Difficulties (Impulse); Lack of Emotional Awareness (Awareness); Limited Access to Emotion Regulation Strategies (Strategies); and Lack of Emotional Clarity (Clarity). In the current analyses, the mean of items for each scale was calculated; higher scores indicate greater emotion regulation difficulties (see Table 1). In the current sample, Cronbach's alpha for the six scales ranged from 0.81 (Clarity) to 0.93 (Non-Accept), indicating Good to Excellent internal consistency.
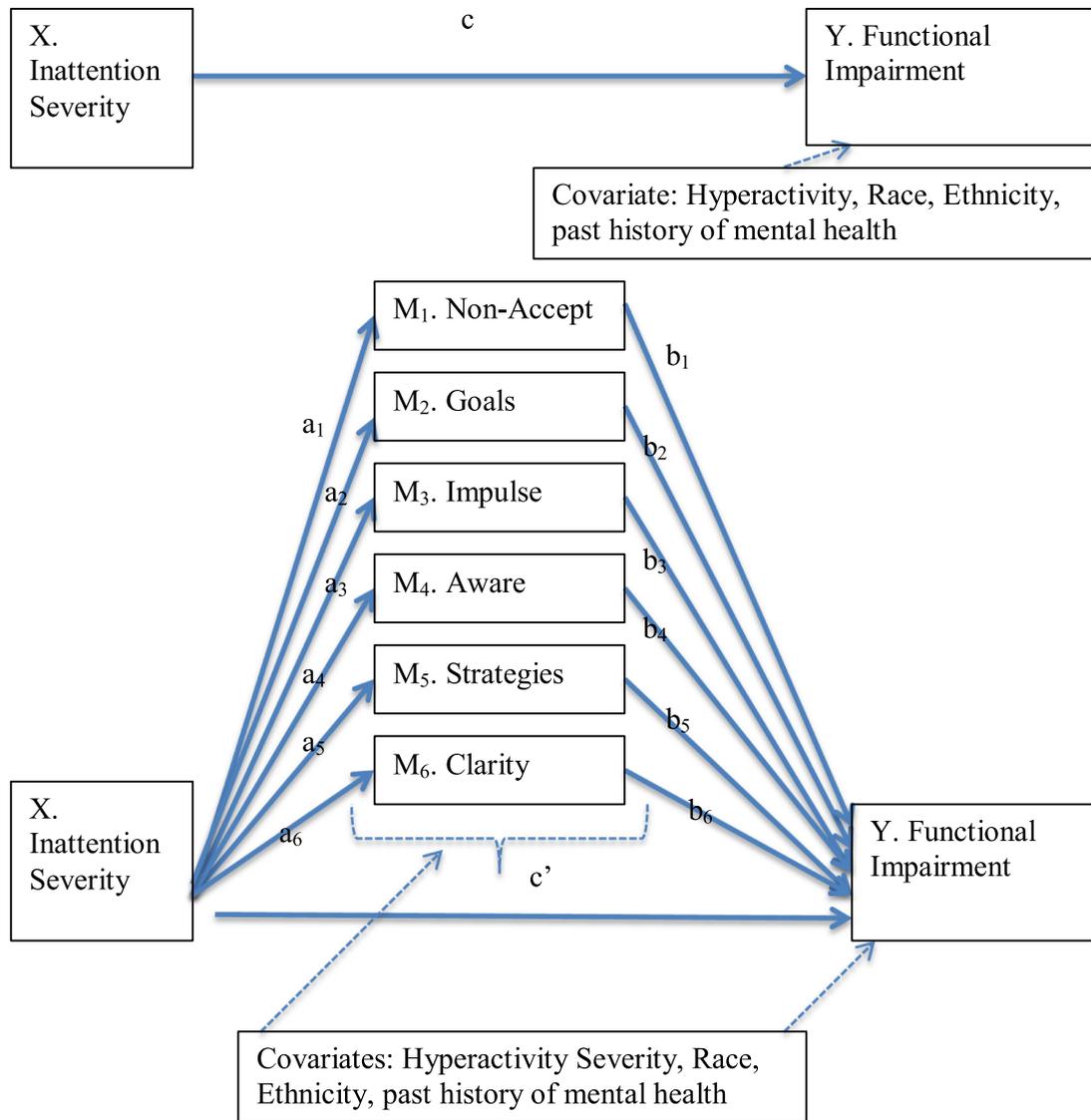
2.3.3. Impairment

Impairment associated with inattention and hyperactivity severity, as well as emotional regulation difficulties was assessed using the three subscales of the Outcome Questionnaire-45 (OQ-45; Lambert et al., 2002): Symptomatic Distress, Social Role, and Interpersonal Relationships. Symptomatic Distress measures severity of psychological symptoms, particularly anxiety and depression (Lambert et al., 2002). The Social Role domain assesses difficulties experienced in activities related to work, family and leisure environments (Lambert et al., 2002). Finally, Interpersonal Relationships measures the extent of an individual's difficulties in personal relationships with family, friends and intimate partners (Lambert et al., 2002). The mean of items for all subscales was obtained, with higher scores indicating greater impairment in the respective domain (see Table 1). Internal consistency of the domains for the present sample was assessed; Cronbach's alpha was 0.68 for Social Role, 0.80 for Interpersonal Relationships, and 0.92 for Symptomatic Distress.

2.4. Data analysis

Hayes' PROCESS was used to test for significant indirect effects (see Fig 1). This model proposed that more severe inattention would be indirectly related to greater impairment across multiple domains of functioning by compromising emotion regulation capacity. That is, more severe inattention would be associated with poorer emotion regulation, which in turn would be related to greater impairment. The model controlled for hyperactivity severity, ethnicity (Not Latinx vs. Latinx), race (Asian vs. all other racial groups), and history of past mental health treatment (no vs. yes).

Participants who identified as Asian reported more severe

Fig. 1. Model being tested: How does Inattention Severity relate to Functional Impairment? Directly, or Indirectly compromising emotion regulation? X: Inattention Severity, measured using the Inattention/Memory Problems Subscale of the Conners Adult ADHD Rating Scale (CAARS). Mediators are subscales of the Deficits in Emotion Regulation Scale (DERS): Non-Accept = Non-acceptance of emotional responses; Goals = difficulties engaging in goal-directed behavior; Impulse = impulse control difficulties; Aware = lack of emotional awareness; Strategies = limited access to emotion regulation strategies; Clarity = lack of emotional clarity. Y = Functional Impairment, measured using 3 subscales of Outcome Measure: Symptom Distress; Social Role difficulties; Interpersonal Relationship problems. Pathways of M and Y control for Hyperactivity Severity, measured using the Hyperactivity/Restlessness scale of the CAARS, race, ethnicity, and past history of mental health treatment.

Inattention/Memory problems than individuals from all other racial groups, who did not differ from each other; Asian mean (SD) = 66.50 (10.03) vs. White mean (SD) = 57.70 (10.58), Black mean (SD) = 57.69 (10.00), identifying as another racial group mean (SD) = 56.38 (12.10), $F(3, 170) = 3.64, p = .014$. No other differences in hyperactivity/restlessness, emotion regulation scales, or impairment domains were observed as a function of race. Race was recoded into a binary variable, Asian (1) and all other racial groups (0), and included in analyses as a covariate.

Participants who identified as Latinx reported less severe Inattention/Memory problems (mean (SD) = 54.88 (11.04)) than non-Latinx individuals (mean (SD) = 59.44 (11.04), $F(1, 173) = 6.02$, $p = .02$. Compared to the non-Latinx group, individuals identifying as Latinx also reported less severe impairment in the domains of Symptomatic Distress, mean (SD) = 2.83 (0.61) vs. 2.61 (0.68), $F(1, 175) = 4.32, p = .04$, and Interpersonal Relationships, mean (SD) = 2.71 (0.60) vs. 2.46 (0.67), $F(1, 175) = 6.25, p = .01$. Ethnicity,

coded as Non-Latinx (0) and Latinx (1) was included as a covariate.

Compared to those who were first time recipients of mental health services, individuals who had previously received services reported significantly worse Inattention/Memory Problems, Hyperactivity/Restlessness, emotion regulation in all domains except for Lack of Emotional Awareness, and significantly greater Symptomatic Distress. Therefore, History of Mental Health Services, coded No (0) and Yes (1) was included as a covariate in analyses.

Finally, in light of well-documented sex differences in prevalence rates for ADHD (Willcutt, 2012) and internalizing disorders (Marcus et al., 2008), we also looked to see whether key study variables differed as a function of sex. A Bonferroni correction was applied given the number of comparisons being tested ($p = .05 / 11 = 0.005$), and after adjustment, no significant differences in Inattention/Memory Problems, Hyperactivity/Restlessness, emotional regulation or impairment were observed between males and females, *all p* $\geq .014$.

Hayes' (2013) PROCESS uses a non-parametric bootstrapping

Table 2
Correlations among key variables (N = 177)[a].

	Hyperactivity Severity	Non-Accept	Goals	Impulse	Aware	Strategies	Clarity	Interpersonal Relationships	Social Role	Symptom Distress
Inattention Severity	.51**	.34**	.54**	.36**	.17*	.47**	.35**	.32**	.54**	.54**
Hyperactivity Severity	1	.21**	.37**	.37**	.05	.29**	.31**	.25**	.31**	.32**
Non-Accept		1	.46**	.50**	.17*	.64**	.31**	.21**	.33**	.45**
Goals			1	.61**	.09	.72**	.43**	.32**	.45**	.54**
Impulse				1	.10	.74**	.45**	.29**	.38**	.46**
Aware					1	.14#	.50**	.15*	.20**	.23**
Strategies						1	.46**	.36**	.44**	.63**
Clarity							1	.35**	.30**	.50**
Interpersonal Relationships								1	.50**	.63**
Social Role									1	.72**

**p < .01, *p < .05, #p < .10.
[a] Hyperactivity Severity N = 167; Inattention Severity N = 175.

Inattention Severity, measured using the Conners Adult ADHD Rating Scale (CAARS) Inattention/Memory Problems T score; Hyperactivity Severity, measured using the CAARS Hyperactivity/Restlessness T score; DERS = Deficits in Emotion Regulation Scale. DERS subscales: Non-Accept = Non-acceptance of emotional responses; Goals = difficulties engaging in goal-directed behavior; Impulse = impulse control difficulties; Aware = lack of emotional awareness; Strategies = limited access to emotion regulation strategies; Clarity = lack of emotional clarity. OQ = Outcome Measure-45. OQ-45 subscales: Interpersonal Relationship problems; Social Role difficulties and Symptom Distress.

procedure to estimate the 95% CI around the indirect effect. This procedure has the advantage in that it does not assume a normal sampling distribution for the indirect effect or a significant association between the predictor and outcome variable. Furthermore, it is a more robust method when sample size is small. Bootstrapping draws multiple random samples from the data set and measures the unstandardized path coefficients for each sample, yielding an empirical distribution for all of the indirect effects. The bootstrapped estimate of the indirect effect is the mean across all of the samples, with the true indirect effect considered to fall within the 95% confidence interval (CI). A CI that excludes zero can be taken as evidence that the indirect effect is different from zero at $p < 0.05$. 10,000 bootstrap samples were taken to estimate the indirect effect.

3. Results

Correlations among inattention/memory problems, hyperactivity/restlessness, emotional regulation and impairment variables can be seen in Table 2. In general, correlation analyses showed that Inattention/Memory problems had stronger associations with the emotion regulation subscales and domains of impairment than was seen among Hyperactivity/Restlessness and the emotion regulation subscales or Hyperactivity/Restlessness and impairment.

Partial correlations among Inattention/Memory Problems and all emotion regulation subscales, while controlling for Hyperactivity/Restlessness, were significant, rs = 0.19–0.44, all $p < 0.05$ with the exception of Inattention/Memory Problems and Lack of Emotional Awareness, $r = 0.13$, $p = .10$. In contrast, partial correlations among Hyperactivity/Restlessness and the emotion regulation subscales after controlling for Inattention/Memory Problems, were largely non-significant, $r = -0.02$ to 0.13, all $p \geq .09$. Only the correlations between Hyperactivity/Restlessness and Impulse Control Difficulties, $r = 0.24$, $p = 0.002$, and Hyperactivity/Restlessness and Clarity, $r = 0.17$, $p = .03$, remained significant after controlling for Inattention/Memory Problems. Thus, analyses only examined whether Inattention/Memory Problems was associated with functional impairment, either directly or indirectly via emotion regulation problems.

Bootstrapping analyses showed that after controlling for Hyperactivity/Restlessness, race, ethnicity, and past mental health treatment, greater Inattention/Memory Problems was indirectly associated with Interpersonal Relationship difficulties; worse Inattention/Memory Problems were associated with less emotional clarity, which in turn was associated with greater Interpersonal Relationship problems (coefficient = 0.002, 95% CI = 0.0002–0.007). After including emotion regulation in the model, Inattention was no longer significantly related to Interpersonal Relationship difficulties, c' = 0.005, $t = 0.86$, $p = .39$, 95% CI = −0.006–0.02 (Table 3).

More severe Inattention was directly associated with greater impairment at school and work. That is, after accounting for emotion regulation domains, Hyperactivity/Restlessness, race, ethnicity, and past mental health treatment, more severe Inattention/Memory Problems remained significantly associated with greater Social Role difficulties, c' coefficient = 0.018, $t = 4.46$, $p < .01$, 95% CI = 0.01–0.03 (Table 4).

After controlling for Hyperactivity/Restlessness, race, ethnicity, and past mental health treatment, more severe inattention was associated with less access to emotion regulation strategies (coefficient = 0.008, 95% CI = 0.003–0.02) and poorer emotional clarity (coefficient = 0.002, 95% CI = 0.0003–0.006), which in turn were associated with greater Symptom Distress. Inattention Severity also remained directly associated with Symptom Distress (c' coefficient = 0.014, $t = 3.26$, $p < .01$, 95% CI = 0.006–0.02), even after its indirect effect through emotion regulation was taken into account. A pairwise comparison of Emotional Clarity and Lack of Access to Emotion Regulation Strategies to test for a difference between the indirect effects was not significant (coefficient = 0.005, 95% CI = −0.001–0.013) (Table 5).

4. Discussion

This study examined emotion dysregulation as a possible mechanism by which inattention is related to domains of functional impairment among a diverse sample of mental health treatment-seeking adults. The literature has long shown that many individuals with high levels of inattention also experience emotion regulation difficulties (Barkley and Fischer, 2010; Murphy and Barkley, 1996; Shaw et al., 2014). For individuals with high inattention and/or hyperactivity/impulsivity, emotion dysregulation has often been conceptualized as aggression and/or oppositionality (e.g., Barkley and Fischer, 2010; Shaw et al., 2014), which may reflect the outcome of failed emotion regulation, rather than the processes by which individuals regulate their affective responses. This study utilized a measure that aims to provide a more nuanced assessment of emotion regulation by evaluating different strategies that individuals use to modulate their emotional responses, including monitoring, evaluating, and modifying their emotions.

4.1. Inattention, hyperactivity/impulsivity and emotion dysregulation

To the best of our knowledge this is one of the few studies to assess dimensions of emotion dysregulation as mechanisms to explain the

Table 3
Bootstrapping results showing the indirect effect of inattention severity (X) on impairment in interpersonal relationships (Y) through emotion regulation processes (M_1 to M_6).

Antecedent	X → M coefficient (SE)	M → Y coefficient (SE)	Total Effect (c) coefficient (SE)	Total effect bias-corrected 95% CI	Direct Effect (c') coefficient (SE)	Direct Effect bias-corrected 95% CI	Completely standardized indirect effect coefficient (SE)	Completely standardized indirect effect bias corrected 95%CI
X: Inattention	-	-	.01 (0.005)*	.002–0.02	.005 (0.005)	−0.006 - 0.02	-	-
M_1: Non-Accept	a_1: 0.03 (0.009)**	b_1: −0.01 (0.05)					a_1b_1: −0.007 (0.02)	−0.06 - 0.04
M_2: Goals	a_2: 0.04 (0.007)**	b_2: 0.02 (0.07)					a_2b_2: 0.01 (0.05)	−0.08 - 0.11
M_3: Impulse	a_3: 0.02 (0.007)*	b_3: 0.03 (0.07)					a_3b_3: 0.007 (0.02)	−0.03 - 0.07
M_4: Aware	a_4: 0.01 (0.007)	b_4: −0.01 (0.06)					a_4b_4: −0.002 (0.01)	−0.04 - 0.02
M_5: Strategies	a_5: 0.04 (0.008)**	b_5: 0.12 (0.08)					a_5b_5: 0.07 (0.05)	−0.03 - 0.18
M_6: Clarity	a_6: 0.01 (0.006)*	b_6: 0.16 (0.08)*					a_6b_6: 0.04 (0.02)	.002 –10

**$p ≤ .01$; *$p < .05$.

Inattention is indirectly related to Interpersonal Relationships through the Lack of Emotional Clarity subscale of the DERS ($N = 166$). After controlling for Hyperactivity severity, Race, Ethnicity, and past mental health treatment, Inattention severity was related to all subscales of the DERS except for Awareness. However, only Lack of Emotional Clarity was significantly related to Interpersonal Relationships. The partial effect of Ethnicity on Interpersonal Relationships was significant, coefficient $= −0.23$, $t = −2.07$, $p = .04$, 95% CI $= −0.44 - −0.01$.

Table 4
Bootstrapping results showing the indirect effect of inattention severity (X) on impairment in social roles (Y) through emotion regulation processes (M_1 to M_6).

Antecedent	X → M coefficient (SE)	M → Y coefficient (SE)	Total Effect (c) coefficient (SE)	Total effect bias-corrected 95% CI	Direct Effect (c') coefficient (SE)	Direct Effect bias-corrected 95% CI	Completely standardized indirect effect coefficient (SE)	Completely standardized indirect effect bias corrected 95%CI
X: Inattention	-	-	.02 (0.004)**	.02–0.03	.02 (0.004)**	.01–0.03	-	-
M_1: Non-Accept	a_1: 0.03 (0.009)**	b_1: 0.01 (0.04)					a_1b_1: 0.006 (0.02)	−0.03 - 0.06
M_2: Goals	a_2: 0.04 (0.007)**	b_2: 0.06 (0.05)					a_2b_2: 0.05 (0.04)	−0.03 - 0.14
M_3: Impulse	a_3: 0.02 (0.007)*	b_3: 0.10 (0.06)#					a_3b_3: 0.03 (0.03)	−0.001 - 0.10
M_4: Aware	a_4: 0.01 (0.007)	b_4: 0.07 (0.05)					a_4b_4: 0.01 (0.01)	−0.006 - 0.06
M_5: Strategies	a_5: 0.04 (0.008)**	b_5: 0.03 (0.06)					a_5b_5: 0.02 (0.05)	−0.07 - 0.12
M_6: Clarity	a_6: 0.01 (0.006)*	b_6: −0.04 (0.06)					a_6b_6: −0.01 (0.02)	−0.06 –02

**$p ≤ .01$; *$p < .05$, #$p < .10$.

Inattention is directly related to Social Role difficulties ($N = 166$). After controlling for Hyperactivity, race, Ethnicity and previous mental health treatment, Inattention severity was related to Social Role problems. However, none of the emotion regulation domains were related to Social Role difficulties. No covariates were related to Social Role difficulties.

Table 5
Bootstrapping results showing the indirect effect of inattention severity (X) on symptom distress (Y) through emotion regulation processes (M_1 to M_6).

Antecedent	X → M coefficient (SE)	M → Y coefficient (SE)	Total Effect (c) coefficient (SE)	Direct Effect (c') coefficient (SE)	Total effect bias-corrected 95% CI	Direct Effect bias-corrected 95% CI	Completely standardized indirect effect coefficient (SE)	Completely standardized indirect effect bias corrected 95%CI
X: Inattention	–	–	.03 (0.005)**	.01 (0.004)**	.02–0.04	.01 - 0.02	–	–
M_1: Non-Accept	a_1: 0.03 (0.009)**	b_1: 0.03 (0.04)					a_1b_1: 0.01 (0.02)	−0.02 - 0.06
M_2: Goals	a_2: 0.04 (0.007)**	b_2: 0.03 (0.05)					a_2b_2: 0.02 (0.04)	−0.05 - 0.10
M_3: Impulse	a_3: 0.02 (0.007)*	b_3: −0.02 (0.06)					a_3b_3: −0.004 (0.02)	−0.05 - 0.03
M_4: Aware	a_4: 0.01 (0.007)	b_4: 0.03 (0.05)					a_4b_4: 0.004 (0.01)	−0.01 - 0.04
M_5: Strategies	a_5: 0.04 (0.008)**	b_5: 0.21 (0.07)**					a_5b_5: 0.12 (0.05)	.05 - .24
M_6: Clarity	a_6: 0.01 (0.006)*	b_6: 0.16 (0.06)*					a_6b_6: 0.04 (0.02)	.004 –.10

** $p \leq .01$; * $p < .05$.

Inattention is indirectly related to Symptom Distress through the Lack of Emotional Clarity and Lack of Access to Emotion Regulation Strategies subscale of the DERS ($N = 166$). Inattention Severity also remained directly associated with Symptom Distress even after its indirect effect through emotion regulation was taken into account. A pairwise comparison of Emotional Clarity and Lack of Access to Emotion Regulation Strategies to test for a difference between the indirect effects was not significant (coefficient = 0.005, 95% CI = −0.001–0.013).

relation between inattention and functional impairment. First, we found that inattention severity generally had stronger relations with emotion regulation and impairment than with hyperactivity/restlessness. Similar findings were obtained by Barkley and Fischer (2010), who looked at the relative contributions of inattention, hyperactivity/impulsivity, and emotional impulsiveness to domains of functioning in a sample of young adults, some of whom had been diagnosed with ADHD in childhood. Hyperactivity/impulsivity contributed the least variance (2.5%) to global impairment after inattention (38%) and emotional impulsiveness (9.4%). This may reflect that as individuals get older, overt hyperactivity tends to decline (Biederman et al., 2000; Lahey et al., 2016; Leopold et al., 2016), while inattention tends to remains stable or may even rise over time (Leopold et al., 2016; but see Lahey et al., 2016).

Second, our study showed that as inattention increased, greater levels of impairment were observed in all three domains: Interpersonal Relationship and Social Role difficulties, and Symptom Distress, even after the inclusion of several covariates. This is consistent with clinical reports of individuals with a history of ADHD, who describe difficulties in their relationships, in their jobs or academic settings, and who often experience comorbidity with other psychological disorders (Klein et al., 2012).

Third, inattention was significantly associated with all subscales of emotion dysregulation, except for the Awareness subscale. The absence of a significant relation between inattention and Awareness, which refers to an individual's lack of awareness of, or inattention to emotional responses, initially seemed perplexing given that this is how the Awareness subscale is defined. However, this finding aligns with those from a recent study by Wiersema and Godefroid (2018) that found adults with and without ADHD show equal capacity for interoceptive awareness. That is, individuals with ADHD were as aware of their bodily sensations as their non-ADHD counterparts, whether this was assessed by objective measurement (i.e., heart beat perception) or self-report. Thus, it may be that adults with high levels of ADHD-like symptomatology do attend to their emotional responses, but their ability to accurately label them, know why they are experiencing them, and the psychological tools at their disposal for modulating their affective experience, differs from those with low inattention.

It is also possible that the failure to see a significant relation between ADHD-like behaviors and Awareness is a measurement issue. Several studies now show that the DERS is psychometrically stronger if the Awareness scale is removed (e.g., Bardeen and Fergus, 2014; Hallion et al., 2018); perhaps because the remaining subscales measure an individual's reaction to their emotions, whereas Awareness assesses whether an individual has attended to the emotion (Hallion et al., 2018). Given the documented relations discussed above, we examined whether inattention directly affected three forms of functional impairment, or whether inattention did so indirectly by decreasing emotion regulation capabilities.

4.2. Inattention indirectly related to interpersonal relationship by worsening emotion dysregulation

Inattention was indirectly related to interpersonal relationships via weaker emotional clarity. That is, more severe inattention was associated with poorer ability to know how one is feeling or to make sense out of emotion, which in turn, appears to compromise interpersonal relationships.

Jurist and colleagues' (Fonagy, Gergely, Jurist, & Target, 2002; Greenberg et al., 2017; Jurist, 2005) have proposed that the Clarity subscale of the DERS is related to Identifying, the first element of their Mentalized Affectivity model of emotion regulation. At its most basic level, Identifying involves naming the emotions one is experiencing, but its more complex aspect involves making connections between affective experiences and understanding why a person is feeling the way they do. In this hierarchical model, Identifying precedes Processing, which

involves modulating (basic) and refining (complex) emotional experiences; this in turn precedes Expressing, which involves the outward (basic) or inward expression and communication of the affect (complex).

Interpreted within this model, the current findings suggest that difficulties experienced by adults with high ADHD-like symptoms at the first stage of this model – Identifying – can explain the association between Inattention and Interpersonal Relationship difficulties. Consistent with this, Shaw et al. (2014) meta-analysis showed that individuals with ADHD were less able to recognize emotions (effect size = 0.65). Although the DERS primarily concerns the ability to identify one's own emotions, it is likely that the difficulties arising in interpersonal difficulties are also linked to deficits in recognizing others' emotions, as this may lead to intrusive behavior, impulsive verbal outbursts, or inappropriate responding to how others are feeling.

4.3. Inattention is directly related to social role impairment

Inattention remained significantly associated with impairment related to one's social role after emotion dysregulation was included in the model. This finding highlights the direct relation between inattention severity and difficulties at work and/or academic settings, including but not limited to high levels of stress in these settings, lack of satisfaction with work or study, and perceiving or receiving objective reports of not doing well at work or in school. This result is consistent with patients' reports of how their high levels of inattention manifest in work or academic settings. For example, patients talk of needing to read information several times to take it in, making many errors in their work or on tests, being disorganized (e.g., course notes in disarray, work is completed in an inefficient sequence or high priority tasks are not completed first), arriving late to class or to work, forgetting important information or deadlines, or submitting assignments/deliverables late (Solanto, 2011). None of the emotion dysregulation subscales were found to be associated with social role impairment, which underscores the particular importance of attention, alone, to how one successfully manages the demands of work and academic contexts.

4.4. Inattention indirectly related to symptom distress, by worsening emotion dysregulation

As we would expect given the negative life consequences of inattention, the strength of the association between inattention and symptom distress remained significant, albeit weakened, after emotion regulation was included in the model. This finding is consistent with Seymour and colleagues (Seymour et al., 2014) who showed that emotion regulation mediated the association between ADHD and depression in adolescents. The current study expands on this finding by investigating the association in a sample of treatment-seeking adults, and by investigating which aspect of emotional regulation is important. The findings showed that two dimensions of emotion dysregulation, Clarity and Strategies, were found to explain part of the relation between inattention and symptom distress. As noted above, the Clarity subscale reflects the degree to which an individual can identify their emotions, whereas the Strategies subscale refers to the belief that an individual can regulate oneself once upset. There are several explanations for why these two subscales, in particular, were found to be significant in this model. First, the inability to identify one's emotional experience in the context of being aware of having an emotional experience reduces the individual's capacity to elect an appropriate emotion-specific coping mechanism to modulate and self-soothe (Linehan, 2014). Second, it is plausible that an individual will feel more vulnerable to greater and more persistent distress if they do not feel able to self-soothe or modulate their emotional experiences. In this vein, the ability to employ different strategies has been related to better coping and mental health (Bonanno and Burton, 2013; Galatzer-Levy et al., 2012).

4.5. Clinical implications and limitations

Each dimension of emotion dysregulation identified in the present study can inform clinicians about areas on which to focus in therapy. Thus, the focus of therapeutic work with individuals who present with inattention may be on helping patients to be able to identify and label what it is they are feeling, and to learn skills in reducing the intensity of their negative emotions, with the goal of the patient feeling more competent and developing a sense of agency over their emotional experiences. Furthermore, given inattention remained significantly associated with academic/occupational impairment and symptom distress, it is important for clinicians to continue to treat inattention, specifically, in therapeutic work. This may include medication or non-pharmacological interventions that show promise for attenuating inattention and emotional distress, such as mindfulness.

There are several limitations of this study that warrant discussion. First, all data are generated from questionnaires completed by the same person at the same time point. This method bias may increase the likelihood of positive relations among variables. Second, the sample comprises treatment-seeking adults from an outpatient mental health services clinic, thus, findings may not generalize to other groups, including non-clinical samples or children.

In addition, the cross-sectional nature of the study limits our ability to draw conclusions about the temporal order of variables. Nevertheless, the significant findings suggest future explorations are warranted and would benefit from utilizing path analysis as a more robust test of the model (Kline, 2005). It is also possible that our findings are confounded by executive functioning difficulties; that is, deficits in higher order cognitive abilities - such as inhibitory control, working memory and cognitive flexibility - that are important for carrying out behaviors that are consistent with meeting our goals, especially when automatic responses would be costly (Diamond, 2013). Deficits in executive functioning are commonly seem among individuals with significant attentional difficulties (Willcutt et al., 2005), as well as individuals with internalizing problems. Executive functioning deficits have also been shown to be associated with impairment in daily functioning (Holst and Thorell, 2019). It may be helpful for future work to control for this, or to include it mechanistic models to better understand how neurocognitive deficits, particularly in executive functioning domains, may differentially impact attention, emotion regulation and functional impairment.

Despite these limitations, this study contributes to our understanding of the interplay among inattention, emotion regulation and functional impairment in a diverse, community sample of mental health patients. To our knowledge, this is one of the first studies to attempt to understand how ADHD-like behaviors are related to emotion regulation processes (rather than behavioral outcomes of poor emotion regulation), and how this impacts impairment across multiple settings. This study highlights the need for clinicians to continue to focus on both attention deficits as well as emotion regulation processes. Particularly, work that helps patients to identify what they are feeling, and to have tools at their disposable for managing negative affect may have a positive impact on difficulties that patients experience in their relationships with others, at work or in school, and/or in severity of internalizing symptoms.

Declaration of Competing Interest

Acknowledgments

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.112631.

References

American Psychiatric Association, 2013. Diagnostic and Statistical Manual of Mental disorders : DSM-5. American Psychiatric Associationhttps://doi.org/10.1176/appi.books.9780890425596.744053. DSM.

Asherson, P., Ramos-Quiroga, J.A., Young, S., 2018. Adult ADHD: Clinical presentation and assessment. In: Banaschewski, T., Coghill, D., Zuddas, A. (Eds.), Oxford Textbook of Attention Deficit Hyperactivity Disorder. Oxford University Press, Oxford, UK, pp. 178–192.

Bardeen, J.R., Fergus, T.A., 2014. An examination of the incremental contribution of emotion regulation difficulties to health anxiety beyond specific emotion regulation strategies. J. Anxiety Disord. https://doi.org/10.1016/j.janxdis.2014.03.002.

Barkley, R.A., Fischer, M., 2010. The unique contribution of emotional impulsiveness to impairment in major life activities in hyperactive children as adults. J. Am. Acad. Child Adolesc. Psychiatry 49, 503–513. https://doi.org/10.1016/j.jaac.2010.01.019.

Biederman, J., Faraone, S.V., Spencer, T., Wilens, T., Norman, D., Lapey, K.A., Mick, E., Lehman, B.K., Doyle, A., 1993. Patterns of psychiatric comorbidity, cognition, and psychosocial functioning in adults with attention deficit hyperactivity disorder. Am. J. Psychiatry. https://doi.org/10.1176/ajp.150.12.1792.

Biederman, J., Mick, E., Faraone, S.V., 2000. Age-dependent decline of symptoms of attention deficit hyperactivity... Am. J. Psychiatry 157, 816. https://doi.org/10.1176/appi.ajp.157.5.816.

Bonanno, G.A., Burton, C.L., 2013. Regulatory flexibility: an individual differences perspective on coping and emotion regulation. Perspect. Psychol. Sci. https://doi.org/10.1177/1745691613504116.

Conners, C.K., Erhardt, D., Sparrow, E., 1999. Conners' Adult ADHD Rating Scales (CAARS): Technical Manual. Multi-Health Systems Inc, North Tonawanda NY.

Diamond, A., 2013. Executive functions. Annu. Rev. Psychol. 64, 135–168. https://doi.org/10.1146/annurev-psych-113011-143750.

Ekas, N.V., Lickenbrock, D.M., Braungart-Rieker, J.M., 2013. Developmental trajectories of emotion regulation across infancy: do age and the social partner influence temporal patterns. Infancy. https://doi.org/10.1111/infa.12003.

Fonagy, P., Gergely, G., Jurist, E.L., Target, M., 2002. Affect regulation, mentalization and the development of the self. Other Press, New York, NY.

Frick, P.J., Nigg, J.T., 2012. Current issues in the diagnosis of attention deficit hyperactivity disorder, oppositional defiant disorder, and conduct disorder. Annu. Rev. Clin. Psychol. 8, 77–107.

Galatzer-Levy, I.R., Burton, C.L., Bonanno, G.A., 2012. Coping flexibility, potentially traumatic life events, and resilience: a prospective study of college student adjustment. J. Soc. Clin. Psychol. https://doi.org/10.1521/jscp.2012.31.6.542.

Greenberg, D.M., Kolasi, J., Hegsted, C.P., Berkowitz, Y., Jurist, E.L., 2017. Mentalized affectivity: a new model and assessment of emotion regulation. PLoS One. https://doi.org/10.1371/journal.pone.0185264.

Gross, J.J., 1998. Antecedent- and Emotion regulation : divergent consequences experience, expression. Physiology. J. Pers. Soc. Psychol. 74, 224–237.

Hallion, L.S., Steinman, S.A., Tolin, D.F., Diefenbach, G.J., 2018. Psychometric properties of the difficulties in emotion regulation scale (DERS) and its short forms in adults with emotional disorders. Front. Psychol. https://doi.org/10.3389/fpsyg.2018.00539.

Hechtman, L., Swanson, J.M., Sibley, M.H., Stehli, A., Lakes, K.D., Owens, E.B., Mitchell, J.T., Arnold, L.E., Molina, B.S.G., Hinshaw, S.P., Jensen, P.S., Abikoff, H.B., Perez Algorta, G., Howard, A.L., Hoza, B., Nichols, J.Q., Etcovitch, J., Houssais, S., Vitiello, B., Severe, J.B., Jensen, P.S., Arnold, L.E., Hoagwood, K., Richters, J., Vereen, D., Hinshaw, S.P., Elliott, G.R., Wells, K.C., Epstein, J.N., Murray, D.W., Conners, C.K., March, J., Swanson, J., Wigal, T., Cantwell, D.P., Abikoff, H.B., Hechtman, L., Greenhill, L.L., Newcorn, J.H., Molina, B., Hoza, B., Pelham, W.E., Gibbons, R.D., Marcus, S., Hur, K., Kraemer, H.C., Hanley, T., Stern, K., 2016. Functional adult outcomes 16 years after childhood diagnosis of attention-deficit/hyperactivity disorder: mta results. J. Am. Acad. Child Adolesc. Psychiatry 55https://doi.org/10.1016/j.jaac.2016.07.774. 945-952.e2.

Hirsch, O., Chavanon, M.L., Riechmann, E., Christiansen, H., 2018. Emotional dysregulation is a primary symptom in adult attention-deficit/hyperactivity disorder (ADHD). J. Affect. Disord. 232, 41–47. https://doi.org/10.1016/j.jad.2018.02.007.

Holst, Y., Thorell, L.B., 2019. Functional impairments among adults with ADHD: a comparison with adults with other psychiatric disorders and links to executive deficits. Appl. Neuropsychology: Adult. https://doi.org/10.1080/23279095.2018.1532429.

Jurist, E.L., 2005. Mentalized affectivity. Psychoanal. Psychol. 22, 426–444. https://doi.org/10.1037/0736-9735.22.3.426.

Kessler, R.C., Adler, L., Berkley, R., Biederman, J., Conners, C.K., Demler, O., Faraone, S.V., Greenhill, L.L., Howes, M.J., Secnik, K., Spencer, T., Ustun, T.B., Walters, E.E., Zaslavsky, A.M., 2006. The prevalence and correlates of adult ADHD in the United States: results from the national comorbidity survey replication. Am. J. Psychiatry. https://doi.org/10.1176/ajp.2006.163.4.716.

Klein, R.G., Mannuzza, S., Olazagasti, M.A.R., Belsky, E.R., Hutchison, J.A., Lashua-shriftman, E., Castellanos, F.X., 2012. Clinical and functional outcome of childhood ADHD 33 years later. Arch. Gen. Psychiaty 69, 1295–1303. https://doi.org/10.1001/archgenpsychiatry.2012.271.Clinical.

Kline, R.B., 2005. Methodology in the Social Sciences: Principles and Practice of Structural Equation Modeling (2nd Ed.). Guilford Press, New York, NY.

Kooij, J.J.S., Buitelaar, J.K., van den Oord, E.J., Furer, J.W., Rijnders, C.A.T., Hodiamont, P.P.G., 2005. Internal and external validity of attention-deficit hyperactivity disorder in a population-based sample of adults. Psychol. Med. 35, 817–827. https://doi.org/10.1017/S003329170400337X.

Lahey, B.B., Lee, S.S., Sibley, M.H., Applegate, B., Molina, B.S.G., Pelham, W.E., 2016. Predictors of adolescent outcomes among 4-6-year-old children with attention-deficit/hyperactivity disorder. J. Abnorm. Psychol. 125, 168–181. https://doi.org/10.1037/abn0000086.

Lahey, B.B., Pelham, W.E., Stein, M.A., Loney, J., Trapani, C., Nugent, K., Kipp, H., Schmidt, L., Lee, S., Cale, M., Gold, E., Hartung, C.M., Willcutt, E., Baumann, B., 1998. Validity of DSM-IV attention-deficit/hyperactivity disorder for younger children. J. Am. Acad. Child Adolesc. Psychiatry. https://doi.org/10.1097/00004583-199807000-00008.

Lambert, M.J., Burlingame, G.M., Umphress, V., Hansen, N.B., Vermeersch, D.A., Clouse, G.C., Yanchar, S.C., 2002. The reliability and validity of the outcome questionnaire. Clin. Psychol. Psychother. 3, 249–258.

Lewis, M.D., Todd, R., Xu, X., 2010. The development of emotion regulation: a neuropsychological perspective. In: Lerner, R.M., Lamb, M.E., Freund, A.M. (Eds.), The Handbook of Lifespan Development, Volume 2, Social and Emotional Development. John Wiley & Sons, Inc, Hoboken, NJ.

Leopold, D.R., Christopher, M.E., Burns, G.L., Becker, S.P., Olson, R.K., Willcutt, E.G., 2016. Attention-deficit/hyperactivity disorder and sluggish cognitive tempo throughout childhood: temporal invariance and stability from preschool through ninth grade. J. Child Psychol. Psychiatry Allied Discip. 57, 1066–1074. https://doi.org/10.1111/jcpp.12505.

Linehan, M.M., 2014. DBT Skills Training Manual (2nd Ed.). Guilford Press, New York, NY.

Marcus, D.K., Barry, T.D., 2011. Does attention-deficit/hyperactivity disorder have a dimensional latent structure? A taxometric analysis. J Abnorm Psychol 120, 427–442.

Marcus, S.M., Kerber, K.B., Rush, A.J., Wisniewski, S.R., Nierenberg, A., Balasubramani, G.K., ... Trivedi, M.H., 2008. Sex differences in depression symptoms in treatment-seeking adults: confirmatory analyses from the sequenced treatment alternatives to relieve depression. Compr Psychiatry 49 (3), 238–246. https://doi.org/10.1016/j.comppsych.2007.06.012.

Murphy, K., Barkley, R.A., 1996. Attention deficit hyperactivity disorder adults: comorbidities and adaptive impairments. Compr. Psychiatry 37, 393–401. https://doi.org/10.1016/S0010-440X(96)90022-X.

Norvilitis, J.M., Casey, R.J., Brooklier, K.M., Bonello, P.J., 2000. Emotion appraisal in children with attention-deficit/hyperactivity disorder and their parents. J. Atten. Disord. https://doi.org/10.1177/108705470000400102.

O'Connor, B.C., Garner, A.A., Peugh, J.L., Simon, J., Epstein, J.N., 2015. Improved but still impaired: symptom-impairment correspondence among youth with attention-deficit hyperactivity disorder receiving community-based care. J. Dev. Behav. Pediatr. https://doi.org/10.1097/DBP.0000000000000124.

Reimherr, F.W., Marchant, B.K., Strong, R.E., Hedges, D.W., Adler, L., Spencer, T.J., West, S.A., Soni, P., 2005. Emotional dysregulation in adult ADHD and response to atomoxetine. Biol. Psychiatry. https://doi.org/10.1016/j.biopsych.2005.04.040.

Roemer, L., Gratz, K.L., 2004. Multidimensional assessment of emotion regulation and dysregulation: development, factor structure, and initial validation of the difficulties in emotion regulation scale. J. Psychopathol. Behav. Assess. 30, 41–54. https://doi.org/10.1023/B.

Rudenstine, S., Espinosa, A., McGee, A.B., Routhier, E., 2018. Adverse childhood events, adult distress, and the role of emotion regulation. Traumatology (Tallahass. Fla). 10.1037/trm0000176.

Seymour, K.E., Chronis-Tuscano, A., Iwamoto, D.K., Kurdziel, G., MacPherson, L., 2014. Emotion regulation mediates the association between ADHD and depressive symptoms in a community sample of youth. J. Abnorm. Child Psychol. https://doi.org/10.1007/s10802-013-9799-8.

Shaw, P., Stringaris, A., Nigg, J., Leibenluft, E., 2014. Emotion dysregulation in attention deficit hyperactivity disorder. Am. J. Psychiatry. https://doi.org/10.1176/appi.ajp.2013.13070966.

Singh, S.D., Ellis, C.R., Winton, A.S.W., Singh, N.N., Leung, J.P., Oswald, D.P., 1998. Recognition of facial expressions of emotion by children with Attention- Deficit Hyperactivity disorder. Behav. Modif. https://doi.org/10.1177/01454455980222002.

Solanto, M.V., 2011. Cognitive-Behavioral Therapy for Adult ADHD: Targeting Executive Dysfunction. The Guilford Press, New York, NY.

Surman, C.B.H., Biederman, J., Spencer, T., Miller, C.A., McDermott, K.M., Faraone, S.V., 2013. Understanding deficient emotional self-regulation in adults with attention deficit hyperactivity disorder: a controlled study. ADHD Atten. Deficit Hyperact. Disord. https://doi.org/10.1007/s12402-012-0100-8.

Theurel, A., Gentaz, E., 2018. The regulation of emotions in adolescents: age differences and emotion-specific patterns. PLoS One. https://doi.org/10.1371/journal.pone.0195501.

Wiersema, J.R., Godefroid, E., 2018. Interoceptive awareness in attention deficit hyperactivity disorder. PLoS One 13, 1–13. https://doi.org/10.1371/journal.pone.0205221.

Willcutt, E., 2012. The prevalence of DSM-IV attention-deficit/hyperactivity disorder: a meta-analytic review. Neurotherapeutics 9, 490–499. https://doi.org/10.1007/s13311-012-0135-8.

Willcutt, E.G., Doyle, A.E., Nigg, J.T., Faraone, S.V., Pennington, B.F., 2005. Validity of the executive function theory of attention-deficit/hyperactivity disorder: a meta-analytic review. Biol. Psychiatry 57 (11), 1336–1346.