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ORIGINAL CONTRIBUTION

Justice and rejection sensitivity in children and adolescents with ADHD symptoms

Rebecca Bondü · Günter Esser

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Abstract Justice sensitivity captures individual differences in the frequency with which injustice is perceived and the intensity of emotional, cognitive, and behavioral reactions to it. Persons with ADHD have been reported to show high justice sensitivity, and a recent study provided evidence for this notion in an adult sample. In 1,235 German 10-to 19-year olds, we measured ADHD symptoms, justice sensitivity from the victim, observer, and perpetrator perspective, the frequency of perceptions of injustice, anxious and angry rejection sensitivity, depressive symptoms, conduct problems, and self-esteem. Participants with ADHD symptoms reported significantly higher victim justice sensitivity, more perceptions of injustice, and higher anxious and angry rejection sensitivity, but significantly lower perpetrator justice sensitivity than controls. In latent path analyses, justice sensitivity as well as rejection sensitivity partially mediated the link between ADHD symptoms and comorbid problems when considered simultaneously. Thus, both justice sensitivity and rejection sensitivity may contribute to explaining the emergence and maintenance of problems typically associated with ADHD symptoms, and should therefore be considered in ADHD therapy.

Keywords ADHD · Justice sensitivity · Rejection sensitivity · Conduct problems · Depressive symptoms

R. Bondü (✉) · G. Esser
Department of Psychology, University of Potsdam,
Karl-Liebknecht-Str. 24-25, 14476 Potsdam, Germany
e-mail: rebecca.bondue@uni-potsdam.de

Introduction

Research has linked ADHD to erratic, defiant, disruptive, or socially withdrawn behavior as well as a lack of social competencies throughout the life span (e.g., [23, 26]). The constructs of justice sensitivity and rejection sensitivity may add to our understanding of the emergence and maintenance of these behavior patterns in persons with ADHD, as they may make ADHD patients particularly vulnerable to negative cues in social interactions and—with regard to victim justice sensitivity and rejection sensitivity—promote negative responses to these cues. Indeed, reports both from practitioners and persons affected point to a high sensitivity to injustice in persons with ADHD [31].

Justice sensitivity captures individual differences in the perception of and response to injustice from the perspectives of a victim, an uninvolved observer, a passive beneficiary, or an active perpetrator [40]. Individuals high in justice sensitivity generally perceive injustice more frequently and intensely, and show stronger cognitive, emotional, and behavioral responses to injustice [25, 43]. Victim sensitivity has been linked to antisocial behavior tendencies, but observer, beneficiary, and perpetrator sensitivity are related to prosocial behavior (e.g., [14, 19]). Rejection sensitivity, as a similar sensitivity construct, refers to individual differences in the tendency to expect, perceive, and react to alleged or actual cues of rejection in the social environment [11].

Findings from a recent study by Schäfer and Kraneburg [39] supported the notion of higher justice sensitivity in adults: participants with ADHD showed higher observer and beneficiary justice sensitivity than controls, visible in behavioral reactions in an experimental game. In addition, participants with the inattentive ADHD subtype showed

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higher justice sensitivity across all four subscales of the justice sensitivity inventory [40] than participants with the hyperactive/combined ADHD subtype and controls. In contrast, one previous study investigating male adults failed to show the expected higher rejection sensitivity in persons with ADHD than in controls [8].

We examined (1) the associations between justice sensitivity as well as anxious and angry rejection sensitivity and ADHD symptoms in children and adolescents, and (2) whether findings from previous research in adults can be transferred to this age range. Furthermore, (3) we examined the potential mediating role of justice and rejection sensitivity on the link between ADHD symptoms and associated problems such as conduct problems, depressive symptoms, or low self-esteem. Thus, our research combines personality psychology and clinical psychology with the aim of not only describing, but also explaining ADHD and its relationships with other problem behaviors. In this respect, the study strives to contribute to the understanding of the link between ADHD symptoms and interpersonal sensitivities as well as the link between ADHD symptoms and related problems in children and adolescents. The insights from our study can be useful for the development of therapeutic intervention strategies to prevent or alleviate comorbid problems in children and adolescents with ADHD symptoms. Furthermore, the study helps to extend the knowledge regarding (victim) justice and rejection sensitivity as potential risk factors for emotional and behavioral problems in children and adolescents.

ADHD symptoms and subtypes

ADHD is characterized by patterns of inattentiveness as manifested by obliviousness, a lack of continuous attention, or distractibility, as well as patterns of hyperactivity and impulsiveness as manifested by agitation, excessive talking, or uncontrolled, impatient, emotionally unstable, or erratic behavior [1]. It is two to three times more frequent in boys than in girls. Inattentive symptoms (inattentive subtype) have been linked in particular to timidity and anxiousness in social interactions, whereas hyperactive symptoms (hyperactive/combined subtype; [23]) have been linked in particular to verbal and physical aggression, rule-breaking, or defiance. A lack of social competencies is considered as the underlying cause of both of these maladjusted behavior patterns, preventing persons with ADHD from adequately encoding, processing, and reacting to relevant social cues [33].

Given these social skill deficits, persons with ADHD frequently encounter negative reactions themselves: difficulties in school, in the workplace, as well as in parent, peer, partner, and child relationships are prevalent [26, 32, 37]. As these reactions can often be interpreted as rejecting and unjust, they are in turn likely to promote aggressive or defiant behavior. This interaction pattern presumably results in a spiral of negative interactions, with research pointing to ADHD as the source of this vicious circle [24]. Consequently, it can be assumed that persons with ADHD experience injustice and rejection more often than others, not only subjectively but also objectively.

Therefore, ADHD not only shows high comorbidities with oppositional defiant or conduct disorder in childhood and adolescence [9, 13, 32], but also shows high comorbidities with depression, anxiety, substance abuse, and eating disorders in children as well as in adults [16, 44]. As in the general population, females with ADHD show more internalizing problems and males with ADHD show more externalizing problems [15]. Safren et al. [38] introduced the Cognitive-Behavioral Model of (Adult) ADHD to explain the link between ADHD and these related problems: ADHD symptoms lead to failure, underachievement, and problems in relationships. These negative experiences promote negative thoughts and beliefs such as low self-esteem or negative self-statements, which ultimately result in negative feelings such as depression, guilt, anxiety, or anger.

Apparently, persons with ADHD suffer from their lack of social competencies and the resulting negative social experiences, and struggle to understand social cues and behave appropriately. Under these circumstances, Schäfer and Kraneburg [39] argue that justice sensitivity may be a useful disposition, because it may work to compensate for inadequate social skills: High victim sensitivity, which focuses on self-related interests, may protect the individual from disadvantages and exploitation in social interactions. People who are high in victim sensitivity are sensitive to only slight or ambiguous cues of untrustworthiness, meanness, and injustice and interpret these cues negatively due to a suspicious mindset. This results in the early withdrawal of cooperation if there appears to be any danger of the individual being exploited [3, 18]. In contrast, high observer, beneficiary, and perpetrator sensitivity, which focus on moral concerns, may demonstrate an understanding of social norms when shown in social interactions.

ADHD and justice sensitivity

Individuals consistently and persistently differ in terms of the frequency and intensity of their perceptions of and reactions to injustice [25, 43]. Justice sensitivity disposes the individual to a cognitive preoccupation with injustice (rumination). The pattern of emotional and behavioral reactions depends on the perspective from which injustice is perceived: victim-sensitive persons readily perceive injustice to their own disadvantage, react with anger, and

strive for retaliation. Observer-sensitive persons readily perceive disadvantages of others, react with indignation, and strive to retaliate against the perpetrator or to compensate the victim. Beneficiary-sensitive persons disapprove of injustice to their own advantage and to the disadvantage of others, react with feelings of guilt, and strive to compensate the victim. Finally, perpetrator-sensitive persons readily perceive themselves as causing disadvantages, react with guilt, and strive to punish themselves or to compensate the victim [40, 42].

All justice sensitivity perspectives are positively correlated due to a conjoint concern for justice. Victim sensitivity, however, also comprises a concern for self-related interests [2, 40]. Consequently, victim sensitivity has been positively related to negative, egoistic traits such as jealousy, Machiavellism, negative reciprocity, or vengeance as well as to aggression or emotional and conduct problems. In contrast, in questionnaire and experimental studies conducted in different age groups, observer, beneficiary, and perpetrator sensitivity were positively linked to positive, altruistic traits such as role-taking, empathy, or tender-mindedness as well as to prosocial behavior [2, 6, 14, 17, 19, 42].

Reports on high sensitivity to injustice in people with ADHD point to correlations of individual difference variables with clinically relevant conditions. Thus, our research strives to highlight the links between personality dispositions reflecting sensitivity to negative social cues and ADHD symptoms. This should add to the understanding and explanation of ADHD and its association with other problem behaviors (e.g., by showing how these dispositions influence thoughts and feelings as well as the perception and interpretation of social cues). This appears to be important, because our study may highlight that effective intervention strategies for treating ADHD and related problems need to take into account not only external social influences and symptoms of ADHD, but also individual difference variables which may shape these problems further.

In line with reports on high justice sensitivity in persons with ADHD, Schäfer and Kraneburg [39] found significantly higher observer and beneficiary sensitivity in 29 adults with ADHD symptoms recruited via ADHD internet forums and screened for ADHD symptoms than in 14 controls in an experimental game: participants with ADHD showed a lower acceptance of unjust allocations of lottery tickets to their own benefit (beneficiary) and higher willingness to restore justice after unjust allocations of tickets (observer; victim sensitivity not assessed, no differences in just allocations of lottery tickets as an indicator of perpetrator sensitivity). In a second step, 37 participants rated their justice sensitivity regarding all four facets using the justice sensitivity inventory [40]. Nine persons classified as having the inattentive ADHD subtype averaged significantly higher justice sensitivity ratings on all four subscales of the justice sensitivity inventory than 13 persons with the hyperactive ADHD subtype and 15 controls. The hyperactive group only differed from controls in terms of higher ratings of observer sensitivity. Thus, although correlations between measures were small, both the experimental and questionnaire data pointed to a vulnerability to injustice in persons with ADHD, especially in those with the inattentive subtype.

However, previous research on ADHD on the one hand and justice sensitivity on the other hand, as well as theoretical considerations, would suggest somewhat different correlation patterns between ADHD symptoms and the different perspectives of justice sensitivity than previously reported: given the positive relations of ADHD symptoms as well as of victim sensitivity with aggressive behavior and conduct problems, positive correlations between ADHD symptoms and victim sensitivity can be expected. Furthermore, persons with high impulsiveness, as ascribed to individuals with ADHD, may find it more difficult to control the need to retaliate against a perpetrator of injustice and the accompanying feelings of anger that have been linked to high victim sensitivity [6]. Thus, high victim sensitivity might enhance the risk of impulsive disruptive behavior in persons with ADHD symptoms. Negative reactions associated with victim sensitivity may also work to impair social relations in the long term, promoting a vicious circle of disruptive behavior and negative reactions in the social environment, as has been related to ADHD. Furthermore, victim sensitivity in particular has been linked to other emotional and behavioral problems such as high levels of neuroticism, insomnia, depressive symptoms, anxiety, or psychosomatic discomfort in different age groups [6, 21, 22, 40, 42]. Therefore, it has been considered as a potential risk factor for different kinds of problem behavior [6, 36]. In line with this rationale, victim sensitivity may promote dysfunctional thoughts and beliefs, which may enhance comorbid problems in persons with ADHD, as described in the Cognitive-Behavioral Model of ADHD by Safren et al. [38].

The link between ADHD symptoms and victim sensitivity also requires further examination for two other reasons: first, so far, this link has only been investigated via questionnaire data in a comparatively small sample of adult participants with ADHD and controls. The findings from this study therefore require replication in a larger sample. Second, previous research has found that victim sensitivity increases throughout childhood and adolescence [6]. Accordingly, in the age range investigated in the present study, victim sensitivity is still developing, and correlations between ADHD and victim sensitivity in child and adolescent samples may differ from those in adult samples. Hence, we expected to find higher victim sensitivity in children and adolescents with ADHD symptoms than in

controls. Moreover, we assumed that victim sensitivity would positively mediate the link between ADHD symptoms and comorbid problems in line with the theoretical assumptions outlined above.

In contrast to victim sensitivity, observer, beneficiary, and perpetrator sensitivity have been shown to be negatively related to antisocial behavior and positively related to prosocial behavior [14, 17, 19]. This is most probably due to the moral motivation underlying these justice sensitivity facets, which reflects a genuine concern for others and works to inhibit antisocial impulses. Thus, high observer and perpetrator sensitivity may enhance positive social interactions and relationships, and buffer the suggested adverse effects of ADHD symptoms in terms of protective factors. However, high impulsiveness, low inhibitory control, and conduct problems often associated with ADHD may undermine these prosocial tendencies or impede the individual from acting on them appropriately. Moreover, given the antithetic links of ADHD symptoms and observer, beneficiary, and perpetrator justice sensitivity with antisocial behavior and aggression, we expected to find lower observer and perpetrator sensitivity in children and adolescents with ADHD symptoms than in controls.

Persons who are high in justice sensitivity are considered to perceive injustice frequently. If our assumption of higher victim sensitivity and more unjust experiences in participants with ADHD symptoms as compared to controls is valid, they should also report more frequent perceptions of injustice from the victim perspective. Accordingly, if participants with ADHD symptoms indeed show lower observer and perpetrator sensitivity, they should also report perceptions of injustice from the observer and the perpetrator perspective less frequently.

ADHD and rejection sensitivity

Rejection sensitivity resembles justice sensitivity and is defined as the tendency to "expect, readily perceive, and overact to rejection" [11]. It serves self-protective goals, and persons who are high in rejection sensitivity tend to react unfavorably to perceived threats of rejection either through aggression (particularly in persons who angrily expect rejection) or through social withdrawal (particularly in persons who anxiously expect rejection) [28]. Both of these behavior patterns are often observed in relation to ADHD as well and are likely to result in a self-fulfilling prophecy of expected and real rejection in parent, peer, and partner relationships [12]. Again, this is a pattern which has been frequently observed in persons with ADHD.

Rejection sensitivity is assumed to be acquired through previous rejection by parents and peers [12], implying that repeated rejection makes the individual vulnerable and not resilient to its effects. Because persons with ADHD are prone to experiencing rejection [26, 32, 37], they may also be prone to rejection sensitivity. However, contrary to expectation, a previous study using questionnaire data did not find higher rejection sensitivity in 53 adult men with ADHD than in 25 controls [8]. In line with the expectations, rejection sensitivity was linked to more positive outcomes in persons with the inattentive ADHD subtype and controls, but in persons with the hyperactive ADHD subtype higher rejection sensitivity predicted better social outcomes cross-sectional. The failure to find higher rejection sensitivity in men with ADHD as compared to controls was interpreted as an adult expression of the positive illusory bias. This has been observed in children with ADHD and leads to an overestimation of social skills and seemingly also prevents the perception of the impairment of peer relations (p. 270).

Nevertheless, this explanation cannot account for the frequent erratic and disruptive behavior or withdrawal in persons with ADHD. Furthermore, child and adolescent samples may differ from adult samples in terms of the link between rejection sensitivity and ADHD (e.g., the adult version of the rejection sensitivity measure only captures anxious rejection sensitivity, whereas the child version covers anxious and angry rejection sensitivity). In line with our theoretical assumptions, we therefore expected to find higher anxious and angry rejection sensitivity in children and adolescents with ADHD symptoms than in controls. Like justice sensitivity, rejection sensitivity might also explain the link between ADHD symptoms and comorbid problems, because it has already been connected to a variety of problem behaviors such as aggression, depression, and eating disorders in different age groups and is considered a risk factor for psychological problems in adolescence [12, 29, 30]. Thus, we expected rejection sensitivity to positively mediate the link between ADHD symptoms and related problems.

The present study

The present study examined the link between ADHD symptoms and justice and rejection sensitivity in a large sample of 10- to 19-year-old children and adolescents in Germany and tested whether previous findings in adult samples could be replicated in this age range. In addition, using structural equation models, we examined the role of justice and rejection sensitivity as potential mediators of the link between ADHD symptoms and related problems. Thus, our research adds to the understanding and explanation of ADHD symptoms and their associations with other problem behaviors by taking an individual difference perspective and linking it to clinical psychology. Based on the theoretical considerations outlined above and on

findings from previous research, we expected to find: (1) higher victim sensitivity and lower observer and perpetrator sensitivity in participants with ADHD symptoms than in controls; (2) more frequent perceptions of injustice as a victim and less frequent perceptions of injustice as an observer and a perpetrator in participants with ADHD symptoms than in controls; and (3) higher anxious and angry rejection sensitivity in participants with ADHD symptoms than in controls. Moreover, we assumed that (4) justice and rejection sensitivity would independently mediate the link between ADHD symptoms and comorbid problems such as conduct problems as an example of externalizing problem behavior, depressive symptoms as an example of internalizing problem behavior, and low self-esteem from a cross-sectional perspective.

Method

Sample

The sample consisted of $N = 1{,}235$ German children and adolescents aged between 10 and 19 years ($M = 13.91$ years, ± 1.78). Gender was almost equally distributed (50.2 % girls). Of the participants, 21.1 % attended a public primary school, 52 % grammar school, 23.9 % comprehensive school, and 3 % other school types.

Material

ADHD symptoms

We assessed AHDH symptoms using the five-item hyperactivity subscale of the German version of the Strengths and Difficulties Questionnaire (SDQ; [20]). Three items cover hyperactivity (SDQ-HA; "I am restless. I cannot stay still for long"), and two items cover inattentiveness symptoms (SDQ-IN; "I am easily distracted"). Response options ranged from 0 = not true to 2 = certainly true. The SDQ is an established, economical measure to assess various problems in children and adolescents. It has been normalized to distinguish a normal, a borderline, and an abnormal group (www.sdqinfo.com) and is frequently used in research both in Germany and internationally. Previous research established the construct validity and acceptable internal consistencies of the German version of the SDQ [4, 27].

Justice sensitivity

We measured justice sensitivity from the victim (e.g., "It makes me angry when others get recognition that I deserve"), observer (e.g., "I am indignant when someone does not get recognition he/she deserves"), and perpetrator (e.g., "I feel guilty when I deny someone the recognition he/she deserves") perspective with five congruently worded items per scale of the Justice Sensitivity Inventory for Children and Adolescents [6]. Response options ranged from 0 = completely disagree to 5 = completely agree. The number of items was reduced to five and the beneficiary subscale was not assessed to avoid overstraining the younger participants and due to time restrictions. In addition, 2 out of the 15 items were reworded somewhat to make them more comprehensible for children. Research has established the reliability and validity of the original 10-item version of the Justice Sensitivity Inventory [40, 42, 43] and of the adapted 5-item version for children and adolescents [6]. Participants rated the frequency of perceived injustice as a victim, an observer, and a perpetrator during the past year on a four-point scale (0 = never to 3 = often; e.g., "How often have you been treated unfairly during the last year?") with three additional items. We also used these three items to compute a mean score of the total perceived injustice.

Rejection sensitivity

We measured rejection sensitivity with a translated (initial translation by the first author and translation checked by a bilingual speaker) and shortened version of the Child Rejection Sensitivity Questionnaire (the original measure comprises 12 items; [12]). Participants were presented with six ambiguous situations which might or might not be interpreted as resulting in rejection and were asked to rate how anxious and how angry they would feel prior to the outcome (1 = not anxious/angry to 6 = very, very anxious/angry) and how likely rejection would be (1 = very unlikely to 6 = very likely, e.g., "Imagine that a famous person is coming to visit your school. Your teacher is going to pick five kids to meet this person. You wonder whether she will choose you…"). We computed anxious and angry rejection sensitivity in line with Downey and Feldman [12] by multiplying the degree of anxiety and anger by the perceived likelihood of rejection for each situation and dividing the resulting sum by the number of situations. The authors provided evidence for acceptable to good internal consistencies (0.79 and 0.82) for the two subscales and for the factorial validity of the original 12-item scale (http://socialrelations.psych.columbia.edu/measures/children-rs-questionnaire).

Conduct problems

Conduct problems were measured using the five-item subscale of the Strengths and Difficulties Questionnaire (SDQ; [20]; "I fight a lot").

Depressive symptoms

Depressive symptoms were measured using 39 items (1 = yes, 0 = no) of the dysphoria ("Do you cry often?") and the psychosomatic complaints ("Do you often feel ill?") subscales of the Deutscher Depressionstest für Kinder (German depression test for children; [35]).

Self-esteem

We measured self-esteem with a subscale of the kid-KINDL (e.g., "During the last week I was proud of myself"; [34]). Response options ranged from 1 = never to 5 = always. We deleted one item due to low item-total correlations and low factor loadings in the structural equation models. The three remaining items were summed up to form a total score. The measure has shown acceptable internal consistencies and factorial, convergent, and discriminant validity [34].

Procedure

We collected data in standardized 1.5-to 2-h sessions as part of a large-scale study on risk factors for frequent psychological problems in children and adolescents. All participants were guaranteed privacy and completed the questionnaires either via paper and pencil or via computer. Instructions were read aloud to the participants. Items were only read aloud if low reading skills impaired understanding or took up too much time. Participants marked their answers alone. Interviews followed a standardized sequence (measures of the present study: self-esteem, SDQ, rejection sensitivity, justice sensitivity, depression). Participants were offered breaks and were told that they could request breaks if necessary. Written consent to participate in the study was obtained from the parents or the participants themselves if they were of age. The procedure and instruments applied in the study were approved by the Ethics Committee of the University of Potsdam and the Ministry of Education of the German Federal state of Brandenburg. For all variables, the percentage of missing data was $\leq$0.2 %. Given the low percentage of missing data, they were replaced by single imputation via SPSS 22.

Low internal consistencies of the conduct problems and the self-esteem scales (Table 1) could not be improved by deleting further items. With regard to the conduct problem scale, the SDQ captures different forms of these problems in terms of clinical symptoms, which can be, but are not necessarily, associated with one another. The items are therefore not required to form an internally consistent scale. Furthermore, we were able to replicate the intended factor structure of the measures as used in our study via confirmatory factor analyses, including conduct problems and self-esteem (see below for more details). We therefore proceeded using all of the scales in the structural equation models.

Results

Descriptive statistics and correlations

In line with the German SDQ norms (www.sdqinfo.com), we considered participants to have severe (abnormal) ADHD symptoms and assigned them to the ADHD symptoms group if they scored at least 7 out of 10 points on the SDQ hyperactivity subscale. Of the 1,235 participants in our sample, 87 (7 %) reported severe ADHD symptoms. We assigned the remaining 1148 participants to the control group. Groups did not differ in terms of age ($t(105.86) = 1.21$, $p = 0.230$), but age was related to most dependent variables (see Table 2). Boys were overrepresented in the ADHD symptoms group (Fisher's Exact Test: $p = 0.019$, OR = 1.71). Table 1 shows scale internal consistencies as well as scale characteristics and mean values of dependent and independent measures for all participants and separately for boys and girls. Due to significant correlations between dependent measures (Table 2), we employed MANOVA to test for gender differences and controlled for age to test whether gender should be used as a control variable in subsequent analyses. Results indicated a significant effect of gender, $F(12, 1221) = 20.24$, $p < 0.001$, $\eta_p^2 = 0.17$). On the subscale level, girls showed significantly higher observer and perpetrator sensitivity ($p < 0.001$ each), anxious rejection sensitivity ($p = 0.001$), and depressive symptoms ($p < 0.001$), whereas boys showed significantly higher ratings of perceived injustice as a perpetrator ($p = 0.047$), conduct problems ($p < 0.001$), and self-esteem ($p < 0.001$). There were no gender differences within the ADHD symptoms group in any of the justice or rejection sensitivity measures [MANOVA: $F(8, 77) = 1.25$, $p = 0.281$], but a separate MANOVA revealed gender differences in related problems [$F(3, 82) = 7.24$, $p < 0.001$, $\eta_p^2 = 0.21$]: boys from the ADHD symptoms group showed significantly higher conduct problems than girls ($p = 0.006$), whereas girls reported significantly higher depression scores ($p = 0.007$) and marginally lower self-esteem ($p = 0.069$).

Victim sensitivity and both rejection sensitivity subscales were significantly positively correlated with ADHD symptoms, and perpetrator sensitivity was significantly negatively correlated with ADHD symptoms (Table 2). No correlation was found between ADHD symptoms and

Table 1 Descriptive statistics for the total sample and separately for boys and girls

Scale	α	Total *M* (SD)	Boys *M* (SD)	Girls *M* (SD)	ADHD *M* (SD)	Control *M* (SD)	*F*	p^{d}	η_p^2
SDQ-hyperactivity	0.72	3.46 (2.06)	3.54 (2.15)	3.37 (1.98)					
JS-victim	0.79	2.77 (1.10)	2.75 (1.18)	2.80 (1.07)	3.12 (1.18)[a]	2.75 (1.09)[d]	11.04	0.001	0.009
JS-observer	0.86	2.92 (1.15)	2.68 (1.20)[a]	3.15 (1.04)[c]	2.88 (1.27)	2.92 (1.14)	0.06	0.802	
JS-perpetrator	0.88	3.35 (1.26)	3.04 (1.30)[a]	3.66 (1.14)[c]	2.88 (1.40)[a]	3.38 (1.25)[c]	10.10	0.002	0.008
JS-frequency victim		1.33 (0.75)	1.34 (0.76)	1.33 (0.74)	1.60 (0.90)[a]	1.31 (0.73)	12.24	<0.001	0.010
JS-frequency observer		1.86 (0.77)	1.86 (0.78)	1.86 (0.76)	2.06 (0.78)	1.85 (0.77)	6.39	0.012	0.005
JS-frequency perpetrator		0.82 (0.63)	0.85 (0.66)[a]	0.78 (0.61)[c]	1.10 (0.72)	0.80 (0.62)	19.06	0.000	0.015
JS-mean frequency injustice	0.60	1.34 (0.53)	1.35 (0.55)	1.32 (0.55)	1.59 (0.60)	1.32 (0.52)	21.02	<0.001	0.017
RS-anxious	0.65	7.44 (3.24)	7.15 (3.20)[a]	7.74 (3.24)[b]	9.11 (3.58)	7.32 (3.17)	27.11	<0.001	0.022
RS-angry	0.65	4.53 (2.53)	4.67 (2.59)	4.39 (2.47)	6.01 (2.75)	4.42 (2.48)	30.73	<0.001	0.024
SDQ-conduct problems	0.44	1.51 (1.25)	1.67 (1.34)[a]	1.35 (1.13)[c]	2.90 (1.47)	1.41 (1.17)	120.78	<0.001	0.089
Depressive symptoms (total)	0.89	8.02 (6.49)	6.73 (5.63)[a]	9.30 (7.02)[c]	12.38 (7.30)	7.69 (6.31)	54.91	<0.001	0.043
Self-esteem	0.55	11.30 (1.76)	11.64 (1.68)[a]	10.98 (1.78)[c]	11.34 (1.75)	10.84 (1.76)	9.77	0.002	0.008

n boys = 615, *n* girls = 620, *n* ADHD = 87, *n* control = 1,148

[a,b] $p < 0.05$, [a,c] $p < 0.001$, [d] two-tailed

observer sensitivity. When controlling for rejection sensitivity, the partial correlation between victim sensitivity and ADHD symptoms was reduced to 0.05 ($p = 0.08$), whereas the correlation between perpetrator sensitivity and ADHD symptoms remained stable at −0.13 ($p < 0.001$). When controlling for the justice sensitivity scales in terms of the relationship between ADHD symptoms and anxious and angry rejection sensitivity, correlations remained stable at 0.24 and 0.22, respectively (both *p*'s <0.001).

Differences between participants with ADHD symptoms and controls

To test hypotheses 1–3, we computed a MANOVA with ADHD group status as the independent variable, justice and rejection sensitivity subscales and frequencies of perceived injustice as dependent variables, and gender and age as control variables. There was a significant group effect [$F(8,1224) = 7.76$, $p < 0.001$, $\eta_p^2 = 0.048$; see Table 1 for details on the subscale level]. In line with hypothesis 1, participants from the ADHD symptoms group rated their victim sensitivity significantly higher ($p = 0.001$) and their perpetrator sensitivity significantly lower ($p = 0.002$) than controls. However, there were no differences in observer sensitivity. In line with hypothesis 2, participants from the ADHD symptoms group reported significantly more frequent perceptions of injustice from the victim's perspective, but contrary to hypothesis 2, also from the observer's and perpetrator's perspective (*p* ranging from <0.001 to 0.012). It should be noted that this includes significantly higher ratings of perceived injustice as a perpetrator, although perpetrator sensitivity ratings were significantly lower in persons with ADHD symptoms. As indicated by hypothesis 3, participants from the ADHD symptoms group also expressed significantly higher anxious and angry rejection sensitivity than controls ($p < 0.001$, respectively). Due to considerable differences in sample sizes, we repeated our analyses with separate *U* tests, which yielded identical results. A separate MANOVA also revealed significant differences in related problems [$F(3, 1229) = 46.48$, $p < 0.001$, $\eta_p^2 = 0.10$], with significantly higher ratings of conduct problems ($p < 0.001$) and depressive symptoms ($p < 0.001$) as well as lower ratings of self-esteem ($p = 0.002$) in participants with ADHD symptoms than in controls.

The group effect for the sensitivity measures remained even after controlling for conduct problems [$F(8, 1221) = 2.66$, $p = 0.007$, $\eta_p^2 = 0.02$]. On the subscale level, there were significant differences in anxious and angry rejection sensitivity ($p < 0.001$ and $p = 0.001$) and marginally significant differences with regard to victim sensitivity ($p = 0.055$) and total perceptions of injustice ($p = 0.061$). Thus, differences between participants with ADHD symptoms and controls could not be accounted for by comorbid conduct problems alone. In line with our reasoning, however, there were no longer any differences between the ADHD symptoms group and controls in terms of perpetrator sensitivity ($p = 0.177$) and perceptions of injustice as a perpetrator ($p = 0.205$) when conduct problems were controlled for. Thus, aggressive and disruptive behavior, as is often shown by children and adolescents with ADHD and as reflected in conduct problems, explained the lower perpetrator sensitivity in the ADHD symptoms group as well as the more frequent perceptions of injustice from the perpetrator perspective.

Table 2 Intercorrelations

		2	3	4	5	6	7	8	9	10	11	12	13	14
1	SDQ-HY	0.11***	−0.02	−0.12***	0.14***	0.07**	0.20***	0.18***	0.25***	0.24***	0.43***	0.30***	−0.18***	−0.10***
2	JS-victim	–	0.49***	0.23***	0.28***	0.21***	0.23***	0.32***	0.20***	0.18***	0.13***	0.26***	−0.13***	0.18***
3	JS-observer		–	0.58***	0.16***	0.22***	0.01	0.18***	0.10***	0.02	−0.03	0.16***	−0.03	0.08**
4	JS-perpetrator			–	0.07*	0.05	−0.19***	−0.02	0.08**	−0.06*	−0.20***	0.07*	−0.01	−0.03
5	*f* Victim				–	0.34***	0.30***	0.75***	0.26***	0.21***	0.20***	0.38***	−0.22***	0.04
6	*f* Observer					–	0.35***	0.78***	0.06*	0.05	0.11***	0.20***	−0.03	0.05
7	*f* Perpetrator						–	0.71***	0.14***	0.16***	0.30***	0.19***	−11***	0.08**
8	Mean *f* injustice							–	0.21***	0.19***	0.27***	0.34***	−0.16***	0.07*
9	RS-anxious								–	0.64***	0.15***	0.36***	−0.21***	−0.10***
10	RS-angry									–	0.25***	0.28***	−0.16***	−0.15***
11	Conduct problems										–	0.30***	−0.15***	−0.03
12	Depressive symptoms											–	−0.39***	0.10***
13	Self-esteem												–	−0.05
14	Age													–

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

We repeated our analyses with a control group matched by age, gender, and school type. When using this smaller control group, differences between groups were even more pronounced and effect sizes were larger. In particular, when controlling for the influence of conduct problems [$F(8, 164) = 3.68$, $p = 0.001$, $\eta_p^2 = 0.152$], there were still significant differences with regard to victim sensitivity ($p = 0.013$), perceptions of injustice as a victim ($p = 0.007$), total perceptions of injustice ($p = 0.009$), and anxious and angry rejection sensitivity ($p = 0.005$ and 0.033, respectively). Because testing with the large control group seemed more conservative, and to meet the requirements of structural equation models in terms of sample size, we continued using the larger comparison sample in the subsequent latent analyses.

Justice and rejection sensitivity as mediating factors

In line with our expectations, the results from our study did not yield evidence for generally higher justice sensitivity in persons with ADHD symptoms, but did indicate positive links between victim sensitivity, rejection sensitivity, ADHD symptoms, and comorbid problems, as well as negative correlations with perpetrator sensitivity. We therefore tested the assumption that justice and rejection sensitivity mediate the link between ADHD symptoms and conduct problems, depressive symptoms, and low self-esteem via three separate latent path analyses in the total sample ($N = 1{,}235$) using Mplus7. We used single items as indicators for all constructs (i.e., five items each for the justice sensitivity and SDQ subscale, six items for the rejection sensitivity scales, four items for the self-esteem scale) apart from depressive symptoms, which were indicated by the two subscales of the depression questionnaire. To account for similarities in item wordings within and between justice sensitivity scales, we modeled two additional wording factors when more than one justice sensitivity subscale was used in a model (Fig. 1a, b). As inspections of modification indices suggested correlations between error terms, we allowed for correlations of two items in the ADHD subscale with similar contents. We also allowed for correlations between two victim sensitivity items if only one justice sensitivity subscale was used in a model. We were able to replicate the intended factor structure of our measures as used in the mediation models in separate confirmatory factor analyses [hyperactivity: $\chi^2(df = 4) = 14.22$, $p = 0.007$, RMSEA = 0.045, SRMR = 0.017; justice sensitivity, victim and perpetrator: $\chi^2(df = 27) = 181.90$, $p = 0.000$, RMSEA = 0.068, SRMR = 0.058; victim sensitivity: $\chi^2(df = 3) = 6.20$, $p = 0.103$, RMSEA = 0.029, SRMR = 0.008; anxious rejection sensitivity: $\chi^2(df = 9) = 21.68$, $p = 0.010$,

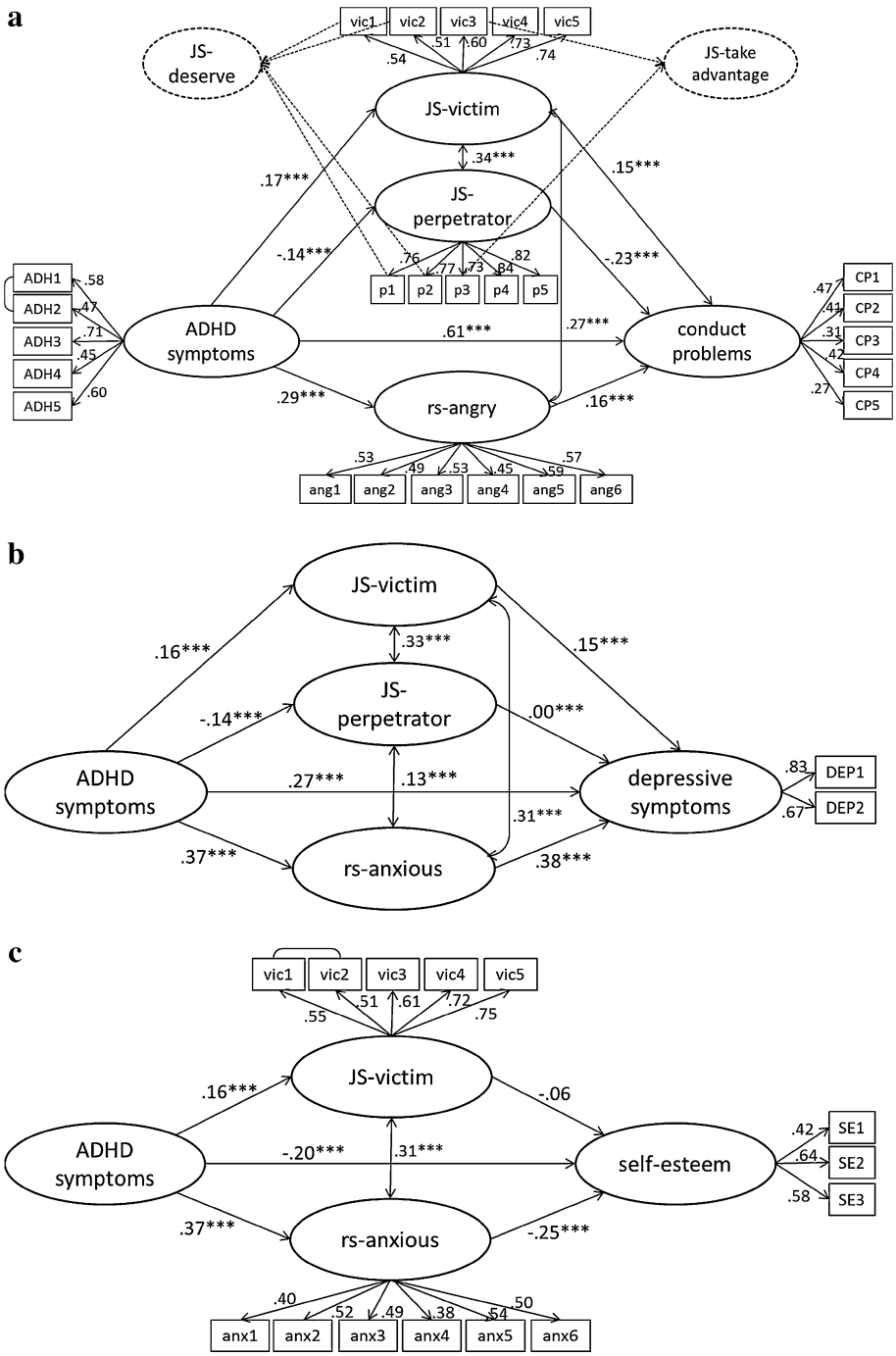

Fig. 1 Direct and indirect effects of ADHD symptoms on conduct problems, depressive symptoms, and self-esteem. All models controlled for age and gender (*$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$). **a** $\chi^2 = 794.84$, $df = 329$, $p \leq 0.001$, $N = 1{,}235$, RMSEA = 0.032, SRMR = 0.036, $R^2 = 0.622$ total direct: $\beta = 0.608$***; total indirect: $\beta = 0.103$***, JS-victim: $\beta = 0.025$**, JS-perpetrator: $\beta = 0.033$***, rs-angry: $\beta = 0.045$**. **b** $\chi^2 = 749.60$, $df = 253$, $p \leq 0.001$, $N = 1{,}235$, RMSEA = 0.038, SRMR = 0.039, $R^2 = 0.424$ total direct: $\beta = 0.269$***; total indirect: $\beta = 0.163$***, JS-victim: $\beta = 0.025$**, JS-perpetrator: $\beta = 0.000$, rs-anxious: $\beta = 0.138$*** (measurement model as displayed in Fig. 1a, factor loadings rs-anxious as in Fig. 1c). **c** $\chi^2 = 509.56$, $df = 175$, $p \leq 0.001$, $N = 1{,}235$, RMSEA = 0.039, SRMR = 0.040, $R^2 = 0.214$ total direct: $\beta = -0.249$***; total indirect: $\beta = -0.081$***, JS-victim: $\beta = -0.008$, rs-anxious: $\beta = -0.073$***

RMSEA = 0.034, SRMR = 0.020; angry rejection sensitivity: $\chi^2(df = 9) = 19.44$, $p = 0.022$, RMSEA = 0.031, SRMR = 0.017; conduct problems: $\chi^2(df = 5) = 11.68$, $p = 0.040$, RMSEA = 0.033, SRMR = 0.018; self-esteem: $\chi^2(df = 1) = 0.74$, $p = 0.388$, RMSEA = 0.000, SRMR = 0.010; depression: not estimated in a separate model because the model is not identified due to only two indicators] and in a single CFA including all dependent and independent measures with correlated latent factors [$\chi^2(df = 767) = 1{,}545.77$, $p = 0.000$, RMSEA = 0.029, SRMR = 0.042], compared to the baseline model, respectively. In each case, all indicators showed significant loadings on their latent factors. We included gender and age as intercorrelated control variables in the mediation models, regressed on mediators and outcomes, and allowed for correlations with ADHD symptoms (not displayed in Fig. 1). We used a robust MLM estimator to account for non-normally distributed data.

First, we investigated indirect effects in terms of the association between ADHD symptoms and conduct problems. In separate latent path analyses, victim ($\beta = 0.019$*), perpetrator ($\beta = 0.019$**), and angry rejection sensitivity ($\beta = 0.058$***) each had significant indirect effects on conduct problems. We therefore included all three mediator variables into one model, allowing for correlations between victim and perpetrator sensitivity and victim and angry rejection sensitivity. The model explained 62.2 % of the variance in conduct problems. There was a significant direct effect of ADHD symptoms on conduct problems ($\beta = 0.608$***) and a significant total indirect effect ($\beta = 0.103$***). All three mediator variables significantly contributed to the total indirect effect (victim sensitivity: $\beta = 0.025$**, perpetrator sensitivity: $\beta = 0.033$***, angry rejection sensitivity: $\beta = 0.045$**; $\chi^2(df = 329) = 794.84$, $p = 0.000$, RMSEA $= 0.034$, SRMR $= 0.038$).

Second, we investigated indirect effects on the link between ADHD symptoms and depressive symptoms. In separate latent path analyses, victim ($\beta = 0.042$***), perpetrator ($\beta = -0.013$*), anxious ($\beta = 0.156$***) and angry rejection sensitivity ($\beta = 0.089$***) each had significant indirect effects on depressive symptoms. Due to high correlations between latent rejection sensitivity scales ($r = 0.90$), we only included anxious rejection sensitivity, victim sensitivity, and perpetrator sensitivity in a single path analysis, allowing for correlations between all three mediator variables. The model explained 42.4 % of the variance in depressive symptoms. There was a significant direct effect of ADHD symptoms on depressive symptoms ($\beta = 0.269$***) and a significant total indirect effect ($\beta = 0.163$***). However, when all three mediator variables were included in the model, only victim sensitivity ($\beta = 0.025$**) and anxious rejection sensitivity ($\beta = 0.138$***) significantly contributed to the indirect effect [$\chi^2(df = 253) = 749.60$, $p = 0.000$, RMSEA $= 0.040$, SRMR $= 0.040$].

Finally, we tested indirect effects on the link between ADHD symptoms and low self-esteem. In separate latent path analyses, victim ($\beta = -0.019$*), angry rejection ($\beta = -0.064$*), and anxious rejection sensitivity ($\beta = -0.093$***) each showed significant indirect effects on self-esteem. We included anxious rejection and victim sensitivity in one path analysis, allowing for correlations between the two mediator variables. The model explained 23.5 % of the variance in self-esteem. There was a significant direct effect of ADHD symptoms on self-esteem ($\beta = -0.222$***) and a significant total indirect effect ($\beta = -0.093$***). However, when both mediators were included in the model, only anxious rejection sensitivity contributed significantly to the indirect effect [$\beta = -0.086$***, victim sensitivity: $\beta = -0.007$; $\chi^2(df = 194) = 582.21$, $p = 0.000$, RMSEA $=$ 0.040, SRMR $= 0.040$].

In line with hypothesis 4, victim sensitivity, perpetrator sensitivity, and rejection sensitivity had indirect effects on the link between ADHD symptoms and conduct problems and depressive symptoms. Contrary to the hypothesis, the link between ADHD symptoms and low self-esteem was only mediated by rejection sensitivity.

Discussion

The present study examined the links between ADHD symptoms and justice sensitivity subscales and rejection sensitivity in a large sample of children and adolescents. Previous research concentrated on adult samples and produced somewhat unexpected findings. Therefore, the present study investigated whether these previous findings could be transferred to children and adolescents. Beyond examining group differences between participants with severe ADHD symptoms and controls, we also investigated the mediating role of the sensitivity constructs in a series of latent path analyses and considered their joint mediating influences on related internal and external problems. Thus, our study sought to contribute to the understanding of the emergence and maintenance of negative behavior patterns and related problems in children and adolescents with ADHD symptoms from the perspective of personality dispositions, thereby linking personality and clinical psychology.

Justice and rejection sensitivity in children and adolescents with ADHD symptoms

In line with our predictions and partly contrary to previous research, children and adolescents with ADHD symptoms reported significantly higher victim sensitivity, more perceptions of injustice as a victim, and higher anxious and angry rejection sensitivity, but significantly lower perpetrator sensitivity than controls. No differences were found in terms of observer sensitivity. Contrary to our expectations, participants with ADHD symptoms also perceived injustice as an observer and as a perpetrator more frequently than controls.

Our findings indicate that children and adolescents with ADHD symptoms are particularly sensitive to experiences of injustice and rejection as a victim. This is also demonstrated by lower thresholds of perceiving unjust situations or of perceiving situations as unjust, as reflected by higher ratings of perceptions of injustice from the victim's perspective. Higher victim sensitivity as well as higher anxious and angry rejection sensitivity in these children and adolescents indicates that they show more intense reactions

to these unjust events by ruminating or by experiencing negative emotions such as anger or anxiety. These negative cognitions and emotions are likely to cause additional strain in children and adolescents with ADHD symptoms, thereby presumably further increasing their vulnerability. They should also show increased tendencies to retaliate against perpetrators of injustice. Considering impulsiveness and difficulties in social behavior associated with ADHD symptoms, our findings may help to explain the link between ADHD and related problems. Indeed, both victim sensitivity and rejection sensitivity independently mediated the link between ADHD symptoms and related problems from a cross-sectional perspective, adding to the negative effects of ADHD symptoms. Both higher victim sensitivity and higher rejection sensitivity predicted higher ratings of conduct problems and depression as well as lower ratings of self-esteem.

Our findings are therefore in line with previous research linking ADHD to prevalent experiences of rejection, disruptive behavior, and emotional problems [9, 13, 16, 32, 44] and linking high victim sensitivity, low perpetrator sensitivity, and high rejection sensitivity to aggression, conduct problems, and emotional problems [6, 7, 12, 29, 30, 40–42]. Furthermore, our results support the cognitive-behavioral model of ADHD by Safren and colleagues [38], which suggests that the link between ADHD and subsequent emotional problems is mediated by relationship problems and negative thoughts and beliefs. Our findings suggest that victim sensitivity and rejection sensitivity may work to promote dysfunctional thoughts and beliefs and may further burden social relationships. This reasoning is also in line with assumptions of the social information processing model, which explains the genesis and maintenance of maladaptive, aggressive behavior [10]. The authors postulate that individual characteristics, such as the hostile attribution bias, promote aggressive behavior by leading to negative (mis)interpretations of the situation and negative attributions of others' intentions. Our results indicate that victim sensitivity and rejection sensitivity may be accompanied by a hostile attribution bias, which has also been described as a part of the suspicious mindset associated with victim sensitivity [18].

Correlations between justice and rejection sensitivity suggest a general vulnerability and disposition to intense reactions to negative social experiences. In line with our hypothesis, however, justice and rejection sensitivity independently mediated the link between ADHD symptoms and related problems even when considered simultaneously. When testing our measurement model, we were unable to create one single sensitivity measure from victim and rejection sensitivity. Thus, the two measures apparently account for distinct negative social cues and cannot be reduced to one single factor of interpersonal sensitivity. This suggests that the adverse effects of high victim and rejection sensitivity are additive. In the present study, rejection sensitivity generally showed stronger indirect effects than justice sensitivity. Anxious rejection sensitivity was evidently a better predictor of emotional or internalizing problems, whereas angry rejection sensitivity appeared to be a better predictor of externalizing problems. Among the justice sensitivity scales, victim sensitivity showed the most consistent and strongest indirect effects even when controlling for the effects of rejection sensitivity on latent level, but perpetrator sensitivity independently added to the indirect effect on conduct problems.

In contrast to previous research, but in line with our assumptions, children and adolescents with ADHD symptoms reported significantly lower perpetrator sensitivity than controls. These findings imply that these children and adolescents generally perceive themselves to be the perpetrator of injustice less frequently, and have lower tendencies to respond to self-perpetrated injustice with feelings of guilt and a cognitive preoccupation. They should also show less prosocial behavior (e.g., compensate the victim) and less inhibition of antisocial behavior. When considered in conjunction with victim sensitivity and anxious rejection sensitivity, perpetrator sensitivity did not add to the prediction of depressive symptoms. It did, however, show a negative indirect effect on conduct problems over and above victim sensitivity and angry rejection sensitivity. In other words, high perpetrator sensitivity predicted low levels of conduct problems. Thus, given its underlying prosocial motivation, high perpetrator sensitivity may work to buffer the adverse effects of high victim and rejection sensitivity on conduct problems even in persons with high levels of ADHD symptoms.

Comparison with previous research

Although the findings of the present study are in line with our theoretical considerations, they contradict previous research, which found higher justice sensitivity [39] and——unexpectedly—did not find higher rejection sensitivity [8] in adults with ADHD as compared to controls. There are several potential explanations for these differences:

First, they can be attributed to differences in sample ages. Although a variety of studies have yielded evidence of ADHD in adults, the diagnosis and relevant symptoms of ADHD in this age range remains controversial. Consequently, it might be difficult to compare adult ADHD samples with child and adolescent samples. Furthermore, the ability or the insight to apply heightened justice sensitivity to compensate for a lack of social competencies as proposed by Schäfer and Kraneburg [39] may only be acquired in adulthood. In this case, however, the question remains to be answered of whether this can be considered

to be a conscious process. Conceptualizing justice sensitivity as an acquired strategy, that is, a mere consequence of ADHD symptoms, contradicts research findings that consider justice sensitivity to be a trait. Although research has provided evidence for changes in justice sensitivity with age and as a consequence of serious experiences of injustice, it is generally considered as a trait which is only prone to gradual change [2, 40] and which is formed early in life [6]. It therefore seems more likely that existing differences in justice sensitivity become somewhat more pronounced due to experiences of injustice and rejection following from ADHD symptoms. Moreover, findings by Schäfer and Kraneburg [39] indicate that heightened justice sensitivity is primarily shown by adults who predominantly or only show attention-deficit symptoms. These persons, however, are not primarily characterized by social problems (not even in childhood). Thus, high justice sensitivity in adults with attention-deficit symptoms may not constitute a compensation strategy, but rather reflect a strong distractibility by social cues in general.

Second, differences between our results and previous findings may be explained by methodological differences: Schäfer and Kraneburg [39] reported low correlations between questionnaire and experimental measures of justice sensitivity, whereas the present study only employed questionnaire data. Thus, experimental data might yield different results regarding the link between justice sensitivity and ADHD symptoms in children and adolescents.

In addition, Canu and Carlsson [8] had also expected to find higher rejection sensitivity in an adult sample. Indeed, they also found that persons with ADHD showed somewhat higher rejection sensitivity ratings than controls, but the differences were not significant. Thus, the present study may merely have had higher power to identify significant differences, also given small effect sizes.

Third, differences between present findings and anecdotal evidence of high justice sensitivity in persons with ADHD may be attributed to amateurish definitions of justice sensitivity. In daily life, people are likely to be considered justice-sensitive if they frequently perceive injustice and are sensitive to injustice to their own disadvantage, that is, if they are victim-sensitive. Indeed, children and adolescents with ADHD symptoms in our sample showed high victim sensitivity and reported more frequent perceptions of injustice from different perspectives. Furthermore, high victim sensitivity was positively correlated with frequent perceptions of injustice from all perspectives. Taken together, laypersons may consider persons with ADHD symptoms to be highly justice-sensitive because they are highly victim-sensitive. This assumption is supported by a further finding of the present study: High ratings of perceptions of injustice as a perpetrator may generally be interpreted as reflecting a high sensitivity to causing injustice to others. In combination with self-reports on low perpetrator sensitivity, however, instead of merely reflecting a high sensitivity for one's own actions, these perceptions apparently reflect an actually higher prevalence of self-perpetrated unjust behavior as compared to controls. These behaviors can be explained by comorbid conduct problems in participants with ADHD. Finally, reports of frequent perceptions of injustice or rejection by persons with ADHD symptoms may also not only reflect a particularly high sensitivity to these cues, but an actually higher frequency of such events in the lives of persons with ADHD symptoms due to their problems in social relationships.

Fourth, differences between the findings in adult samples and in the present sample may be explained by other variables. For example, even if justice sensitivity serves to compensate for a lack of social competencies, it may not necessarily lead to prosocial behavior due to further problems in persons with ADHD (e.g., lack of impulse control). Instead, it might constitute a verbal strategy that only signals the understanding of social norms on a theoretical level. This strategy may be more pronounced in adults than in children and adolescents due to higher verbal competencies. The finding that participants with ADHD symptoms in our sample did perceive injustice more frequently than controls, also from the observer perspective, may support this interpretation.

Practical implications

Therapy in children and adolescents with ADHD often concentrates on behavioral interventions primarily designed to strengthen impulse control and attention. The findings of the present study imply that persons with ADHD may also benefit from cognitive interventions and cognitive restructuring. For example, these interventions may train persons with ADHD symptoms to think of alternative explanations for people's alleged negative behavior other than their being unjust, rejecting, or even mean. They should also be taught about how their own behavior might contribute to others' unfavorable reactions. These two steps may work together to reduce the number of occasions that promote impulsive or even disruptive reactions in such individuals. Safren et al. [38] pointed out that negative thoughts and beliefs may promote comorbid problems in adults with ADHD. Our results indicate that these assumptions can also be transferred to younger age groups. According to the present findings, cognitive interventions should be particularly useful in children and adolescents with comorbid conduct problems, because these problems accounted for group differences in perpetrator justice sensitivity as well as in the frequency of the perception of self-perpetrated injustice. Comorbid conduct problems, however, did not account for differences in victim sensitivity, the perceived frequency of

injustice, and rejection sensitivity. Therefore, a stronger consideration of cognitive factors and cognitive restructuring also seems important in children and adolescents with mere ADHD symptoms.

Limitations and outlook

Our study has several strengths, including the large sample size as well as the simultaneous consideration of justice and rejection sensitivity and of several additional problems frequently associated with ADHD. Nevertheless, there are some limitations to our study that require discussion. These include the marginally acceptable internal consistencies of some of our measures, although these are less serious in latent analyses, which do not require item correlations. Due to time constraints, we did not employ the beneficiary justice sensitivity subscale in our study. Due to the unexpected divergent correlation patterns in observer and perpetrator sensitivity in the present study, the scale might be of particular interest for future studies in children and adolescents. Although the large sample size is an advantage of our study, it also works to detect statistical significance more easily. Thus, it should be taken into account that some of the effects were small when interpreting the study results.

The prevalence of ADHD in our study was similar to previous studies. However, we were only able to screen for ADHD symptoms. Future studies should use more detailed measures of ADHD symptoms, which would also allow for a clearer distinction between participants with mere attention-deficit and additional hyperactivity symptoms. This would enable differences in justice sensitivity in the two ADHD subgroups to be examined, as has been done previously in adult samples. Moreover, future studies may employ additional sources of information other than self-ratings.

Finally, our data provide some evidence for the notion that justice sensitivity is a potential risk factor for maladaptive behavior in childhood and adolescence. However, to identify potential causal effects of justice and rejection sensitivity on problem behavior, our cross-sectional findings require replication in longitudinal studies. Due to τ-equivalence of correlational data, the model fit would have been equally good for other combinations and sequences of our variables. Indeed, these other combinations and sequences would also seem reasonable. For example, justice and rejection sensitivity may not only predict, but also be promoted by, depressive symptoms. Furthermore, there might be differential effects between the sensitivity constructs and problem behavior, depending on the problem behavior or the sensitivity construct under question. For example, justice sensitivity is considered to be a trait, but rejection sensitivity is considered to be an acquired characteristic. Following this reasoning, it should be more likely that justice sensitivity precedes different kinds of problem behavior and that rejection sensitivity is a consequence. The primary interest of the present article was to investigate the potential role of justice and rejection sensitivity as risk factors for emotional or behavioral problems in persons with ADHD symptoms. Nevertheless, future longitudinal studies might be interested in the two sensitivity constructs as consequences of these problems or mutual influences.

Despite these limitations, the present study provides first information on the link between justice and rejection sensitivity and ADHD symptoms in a large sample of children and adolescents, thereby linking personality psychology and clinical psychology. Our findings help to explain some symptoms that are often associated with ADHD symptoms as well as their relation with subsequent problems. Because our findings pertain to latent variables, they allow for estimates of direct and indirect effects that are free from measurement error. Our findings thus add to explaining the link between ADHD symptoms and comorbid emotional and behavior problems. They may also provide some starting points for future interventions in persons with ADHD. Finally, the findings of the present study further support the notion that justice and rejection sensitivity might constitute risk factors for different emotional and behavioral problems in childhood and adolescence.

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