Journal of Attention Disorders
2015, Vol. 19(8) 715–727

DOI: 10.1177/1087054712466914
jad.sagepub.com
SAGE

The Kind Nature Behind the Unsocial Semblance: ADHD and Justice Sensitivity—A Pilot Study

Thomas Schäfer[1] and Thomas Kraneburg[1]

Abstract

Objective: Although ADHD is largely associated with antisocial behavior, those affected are often said to show pronounced justice sensitivity. To investigate this assumption, the authors compared participants with ADHD with healthy controls. **Method:** An experimental game was used to investigate decisions associated with social justice. A questionnaire was used to measure four dimensions of justice sensitivity: observer, profiteer, perpetrator, and victim sensitivity. **Results:** Participants with ADHD produced higher values in observer and profiteer sensitivity than the control group. There were no differences in perpetrator sensitivity. Questionnaire results reveal that the inattentive subtype exhibited higher justice sensitivity than the hyperactive/impulsive and combined subtypes and the control group on all dimensions. **Conclusion:** The results confirm that justice sensitivity is indeed more pronounced in people with ADHD, particularly in the inattentive subtype. It is suggested that pronounced justice sensitivity may be a coping strategy for inferring appropriate social behavior. *(J. of Att. Dis. 2015; 19(8) 715-727)*

Keywords

ADHD, justice sensitivity, antisocial behavior, prosocial behavior, experimental game

When it comes to social behavior, people with ADHD do not come off well. ADHD is strongly associated with antisocial behavior and a lack of social competencies in childhood, adolescence, and adulthood (e.g., Herpertz-Dahlmann, Konrad, & Herpertz, 2007; Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1998; McKay & Halperin, 2001). However, there is hardly an Internet forum, self-help book, or case study that does not emphasize the pronounced justice sensitivity shown by people with ADHD, who are said to be more sensitive to injustice or unfairness (e.g., Moulton Sarkis, 2008). Yet, to date there has been no research about justice sensitivity in ADHD patients. We aimed to address this absence. Do people affected by ADHD really exhibit more pronounced justice sensitivity than comparable people without ADHD? To answer this question, we conducted an empirical pilot study in which people with ADHD and healthy controls were confronted with different forms of social injustice in a game simulation.

We will first outline the characteristics of the social behavior associated with ADHD, then discuss the concepts of prosocial behavior and justice sensitivity, and finally present the design of our study. We will distinguish the subtypes of ADHD: the inattentive type, the hyperactive/impulsive type, and the combined type (see the *Diagnostic and Statistical Manual of Mental Disorders* [4th ed.; *DSM-IV*]; American Psychiatric Association [APA], 1994).

Characteristics of the Social Behavior Associated With ADHD

People with ADHD exhibit a lack of social competencies. They display (a) verbal and physical aggression, breach of the rules, hostility, and control addiction (Buhrmester, Whalen, Henker, MacDonald, & Hinshaw, 1992; Cunningham & Siegel, 1987; Erhardt & Hinshaw, 1994), (b) erratic behavior that is not context adequate, hyperactivity, and resistance to admonition (Barkley, 1997), and (c) a dreamy, shy, anxious, slow character (Landau & Milich, 1988; Whalen, Henker, Collins, McAuliffe, & Vaux, 1979). The first two sets of habits are associated with the hyperactive/impulsive and the combined subtypes; the third is associated with the inattentive subtype.

[1]Chemnitz University of Technology, Germany

Corresponding Author:
Thomas Schäfer, Department of Psychology, Chemnitz University of Technology, 09107 Chemnitz, Germany.
Email: thomas.schaefer@psychologie.tu-chemnitz.de

To understand social behavior correctly, it should be seen as a feedback process. More than cognitive and emotional factors—which are genetically determined to a certain extent—it is autobiographical experiences that predominantly shape the development of social behavior over time. For instance, children learn quite early to help selectively to protect themselves from exploitation (Warneken & Tomasello, 2006). Twenge, Baumeister, Tice, and Stucke (2001) demonstrated that social exclusion results in more aggression, which is a very important evidence given that those affected by ADHD experience social exclusion far more frequently than others.

People with ADHD often experience problems and conflicts in their private and vocational environments. During childhood, they suffer from social exclusion by their peers, and they feel less understood and less loved by their parents (Rucklidge, Brown, Crawford, & Kaplan, 2006). They also seem to recognize early that they have deficits in their social behavior and that they get socially excluded (King & Young, 1982). Children with ADHD have fewer friendships and get chosen for friendships less often (Nijmeijer et al., 2008). During adulthood, they change their profession more often and get divorced more often (Barkley, Murphy, & Fischer, 2008). From a clinical perspective, the lack of social competencies can also result in comorbid disorders, which are very common in ADHD patients.

In sum, the clinical picture of ADHD is that of a behavior largely characterized by difficulties and deficiencies in social behavior. People with ADHD generally know that they are different and that they often do something wrong, but they do not know what because they have difficulties recognizing social norms and desirable behavior. It is thus very likely that they would want to know what correct *prosocial* behavior is. As prosocial behavior depends on an adequate sense of justice and fairness, it is conceivable that pronounced justice sensitivity is a coping strategy people with ADHD use to infer the right social behavior. We now discuss what prosocial behavior is before introducing the concept of justice sensitivity.

Prosocial Behavior

The willingness to cooperate is the driving force behind social norms, which include common goal-directed activities, the adherence to and enforcement of rules, and the punishment of deviants. The coevolution of moral emotions and social norms can be seen as a classic example of the interaction of biology and culture. Humans depend on successful integration into a social and cultural context with complex norms (Richerson & Boyd, 2005), and to do so, they need the willingness to help others altruistically, to communicate, and to share resources (Behne, Carpenter, & Tomasello, 2005; Fehr, Bernhard, & Rockenbach, 2008; Warneken & Tomasello, 2009).

There is a long-standing debate in psychology, philosophy, and anthropology on whether altruistic behavior is innate or acquired. According to Warneken and Tomasello (2009), even 1-year-old infants exhibit cooperative behavior. The authors provide a list of reasons why prosocial behavior in infants is *not* a result of socialization: Prosocial behavior cannot be enhanced by reinforcement at this age (Warneken, Hare, Melis, Hanus, & Tomasello, 2007; Warneken & Tomasello, 2008); it can be observed in chimpanzees, as well, even when it is not reinforced (Warneken & Tomasello, 2006); it is observed in cultures where parents intervene often in the development of their children as well as in cultures where parents wield less influence (Callaghan et al., 2011); and it is affected by innate sympathy (Vaish, Carpenter, & Tomasello, 2009). Thus, children show a period of encompassing altruism in early childhood. However, according to Tomasello (2010), the older they grow, the more they are exposed to the following social influences, which can partially reduce altruistic behavior: (a) direct social experiences such as observed reactions and results of actions; for instance, the observation that cooperative behavior will in turn not only cause cooperative behavior but also include the risk of being exploited and (b) indirect social experiences through social norms; children are aware early on that others pass judgment on them, that they use social and cultural norms as a measurement, and that these judgments can lead to either punishment or reward. That is, social behavior that deviates from the norm—such as the problematic social behavior associated with ADHD—is the result of individual experiences, the ability or inability to recognize and understand social norms, and concern about the social judgment of oneself by others. In situations new to them, children will always try to recognize what social norms are expected and will try to defend them later on (Kalish & Shiverick, 2004; Rakoczy, Warneken, & Tomasello, 2008). This is exactly where children with ADHD fall behind. It is known that they have difficulties recognizing and understanding social norms, which can, in turn, result in the impression that they do not care about the social judgment of themselves (Crick & Dodge, 1994; Fletcher & Henson, 2001; Funahashi, 2006; Perner, Kain, & Barchfeld, 2002). Note, however, that people with ADHD are comparable with healthy people in empathy and the ability to feel guilt and shame, which distinguishes ADHD from conduct disorder.

Justice Sensitivity

People differ in their perception and recognition of justice, and in their motivation to restore justice. Nonetheless, most people would agree that justice is—or at least should be—a significant element of social coexistence. Consequently, a sound sense of justice is a prerequisite for prosocial behavior. The psychology of justice emerged from social psychology in the 1960s when Adams (1965) introduced his

Table 1. Dimensions of Justice Sensitivity and the Associated Emotions and Motivations.

Dimension of justice sensitivity	Associated emotions	Associated motivations
Victim	Anger	Punishment, retaliation
Perpetrator	Guilt, shame	Redemption, self-punishment
Profiteer	Guilt, shame	Support the victim
Observer	Indignation	Punishment, compensation

equity theory. Adams sought to explain how individuals respond to experienced fairness or unfairness. Unfairness was thought to cause negative emotions such as anger, rage, or envy, which motivate people to restore fairness. Huseman, Hatfield, and Miles (1987) later introduced the concept of *equity sensitivity*, after observing that people differ systematically in their sensitivity to violations of fairness or justice. Individual sensitivity to justice/injustice is determined by the following variables (Schmitt, Neumann, & Montada, 1995): (a) the frequency of remembered experiences of injustice, (b) the affective intensity of experienced injustice, (c) the cognitive perseverance and rumination about experienced injustice, and (d) the felt motivation to restore justice through adequate punishment or retaliation.

Justice sensitivity has been defined as a personality trait. Schmitt, Gollwitzer, Maes, and Arbach (2005) suggested considering the different emotions and motivations people exhibit in situations of injustice, which resulted in a system of different dimensions of justice sensitivity. Based on this notion and on the results of empirical studies, we can distinguish four dimensions (see Table 1; Boll, 1998; Montada & Schneider, 1989; Schmitt, Behner, Montada, Müller, & Müller-Fohrbrodt, 2000; Tobey-Klass, 1978). Each dimension is associated with a particular motivation to restore justice in social situations. This need for justice can be differentiated into a global moral justice for everyone and an egocentric justice for oneself, which we will refer to in the following.

Egocentric Versus Altruistic Justice Sensitivity

How are the four dimensions of justice sensitivity associated with egocentrism and altruism? It has been shown that victim sensitivity strongly correlates with egoistic traits such as Machiavellianism, suspicion, and revengefulness but not with prosocial traits such as empathy; profiteer and observer sensitivity strongly correlate with prosocial traits and not with egoistic traits (Schmitt et al., 2005). Compared with profiteer-sensitive individuals, victim-sensitive people exhibit less prosocial behavior when others are in emergency situations, and they are more often afraid of being cheated (Gollwitzer, Schmitt, Schalke, Maes, & Baer, 2005). In addition, victim-sensitive individuals are more willing to commit infringements such as fare evasion, whereas profiteer- and perpetrator-sensitive individuals are more conscientious (Gollwitzer et al., 2005). Schmitt et al. (2009) suggested that victim-sensitive people respond more strongly to unmoral behaviors or intentions of others. It is not that they want to redress an experienced disadvantage but that they suspect others of having egoistic intentions that causes them to behave rather antisocially. Such anxiety about exploitation may be functional, but it is inappropriate and not helpful in many situations. To sum up, victim sensitivity seems to be associated with egoistic behavior, whereas perpetrator, profiteer, and observer sensitivity seem to be associated with altruistic behavior.

Justice Sensitivity and Civil Courage

Civil courage is a prosocial behavior defined as the intervention against violated moral or social norms under acceptance of negative consequences for oneself. Whereas in the case of helping behavior, the focus is on the person in need, in the case of civil courage, the focus is on the perpetrator (Greitemeyer, Fischer, Kastenmüller, & Frey, 2006). According to Schmitt et al. (2009), one should expect observer sensitivity to be the most important determinant of intervention, a notion confirmed by Baumert, Halmburger, Hauer, Krettek, and Schmitt (2009). The authors found that individuals high in observer sensitivity were more likely to intervene in arbitrary discrimination against weaker persons.

Justice Sensitivity and Experimental Games

The dimensions of justice sensitivity can be studied very effectively in game simulation settings, which are known as *ultimatum games* or *dictator games*. Usually, in these games, two anonymous individuals interact with each other: One person has the power to allocate money; the other person is either powerless (dictator game) or has the power to refuse the allocation so that none of the players will get anything (ultimatum game). Fetchenhauer and Huang (2004) investigated the effect of justice sensitivity using an extension of the two classical settings and introducing three players: Person A can allocate a fixed amount of money to him- or herself and to Persons B and C. Person B can subsequently accept or reject the suggested allocation of A. Person C is helpless and can only observe the allocation. When in Position A, profiteer- and observer-sensitive individuals are more willing to allocate the money equally to the three players. In addition, when in Position B, they more often intervene if Person C is discriminated against, investing their own resources to prevent injustice. Victim-sensitive individuals, however, more often accept an unequal allocation. Interestingly, they also accept

a disadvantage for themselves when in Position B, probably for the purpose of profit maximization. In sum, it seems that the willingness to give away one's own resources to prevent injustice or restore justice is more often associated with profiteer and observer sensitivity than with victim sensitivity.

Aim of the Present Study

We have delineated that the behavior resulting from the individual pattern of justice sensitivity is a facet of prosocial behavior and as such is determined by psychosocial and biological influences (Bischof-Köhler, 2000; Decety & Chaminade, 2003; Murphy, Nimmo-Smith, & Lawrence, 2003; Panksepp, 1986; Schmitt et al., 2009). These influences are quite similar to the parameters included in the etiology model of ADHD (Sonuga-Barke, 2002). Thus, we can expect differences in justice sensitivity between those affected by ADHD and healthy controls. To our knowledge, this expectation has not been tested before. Numerous reports in forums and case studies have led us to expect higher justice sensitivity in people with ADHD. Although they are known to be more aggressive, their aggression is predominantly reactive and thus probably a pure reaction to experienced injustice. We set out to explore whether and how strongly they are motivated to redress discrimination of themselves or of others and to gain advantages at somebody else's expense. We used an experimental game paradigm to analyze the participants' reactions to different types of unfair situations and a follow-up questionnaire to assess the four dimensions of justice sensitivity. Three groups were compared: adults with ADHD, by subtype, one group of the inattentive subtype (inatt) and one group of the hyperactive/impulsive or combined subtypes (HI/comb), and healthy controls (control). We grouped the hyperactive/impulsive and combined subtypes together, as they are very similar to each other but very dissimilar to the inattentive subtype in terms of the pattern of cognitive and emotional deficits (see Castellanos, Sonuga-Barke, Milham, & Tannock, 2006).

Method

The study was conducted online and consisted of three parts: Participants had to fill in an ADHD self-assessment questionnaire, take part in a justice game, and complete a questionnaire covering the dimensions of justice sensitivity 1 week after the game.

Sample

Participants (inatt and HI/comb) were recruited via German, Austrian, and Swiss Internet forums on ADHD. In the forums, a thread was built that included an invitation to the study. In addition, voluntary patients of an ADHD psychotherapy group from Münster, Germany, took part in the study. Members of the control group were recruited from the authors' personal circle of acquaintances. They were selected to match the personal characteristics (age, gender, and education) of the ADHD groups, which are all shown in the upper half of Table 2. All in all, 50 respondents participated in the study. Due to technical problems during online data recording or missing values, 7 participants had to be excluded from the justice game analysis so that the data of 43 participants could be analyzed.

Table 2. Personal Characteristics of the Participants Who Took Part in the Justice Game (n = 43) and Completed the Follow-Up Questionnaire (n = 37).

Group	n	M age (SD) in years	Median education	Gender
Justice game				
Inatt	11	33.9 (9.6)	7	8 female, 3 male
HI/comb	18	35.6 (10.5)	7	10 female, 8 male
Control	14	31.2 (4.9)	8	10 female, 4 male
Follow-up questionnaire				
Inatt	9	37.6 (11.1)	7	7 female, 2 male
HI/comb	13	35.3 (11.0)	7	7 female, 6 male
Control	15	30.1 (3.7)	8	8 female, 7 male

Note. Inatt = inattentive subtype of ADHD; HI/comb = hyperactive/impulsive and combined subtypes of ADHD. Education was ranked on an Ordinal scale from 1= *left school before secondary school qualification* to 8 = *completed university education*.

Material and Procedure

Self-assessment ADHD questionnaire. We used the German self-assessment questionnaire ADHS-SB (Aufmerksamkeitsdefizit-Hyperaktivitätsstörung-Selbstbeurteilungsskala; Rösler et al., 2004) to verify that the participants in the two ADHD groups actually showed ADHD symptoms. The questionnaire refers to the diagnostic criteria of the international statistical classification of diseases and related health problems (ICD-10; World Health Organization, 2008) and *DSM-IV* (APA, 1994), and distinguishes the inattentive from the hyperactive/impulsive and combined subtypes. It has proven high consistency for its subscales and its total score (α = .72-.90). According to the authors, a total score of 15 or higher indicates the presence of ADHD. We applied a somewhat stricter criterion of 18 or higher to include the participants in one of the two ADHD groups. Respondents who did not reach a score of 18 were allowed to participate in the game, but their data were not analyzed.

Justice game. We extended the classic three-person game by adding the position of a referee. Over four rounds, participants played each position once. At each position except "the helpless," they had to make a particular decision (see Table 3).

Table 3. Positions and the Associated Decisions to Be Made in the Justice Game.

Position	Decision	Measurement	Justice sensitivity dimension
Allocator	To allocate 100 lottery tickets to oneself, the decision maker, and the helpless	Lottery ticket allocation	Perpetrator
Decision maker	To accept or reject an unfair allocation that disadvantages the helpless	Acceptance or rejection	Profiteer
The helpless	No power of decision	—	Victim
Referee	To initiate or abandon the risky restoration of justice	Restoration of justice	Observer

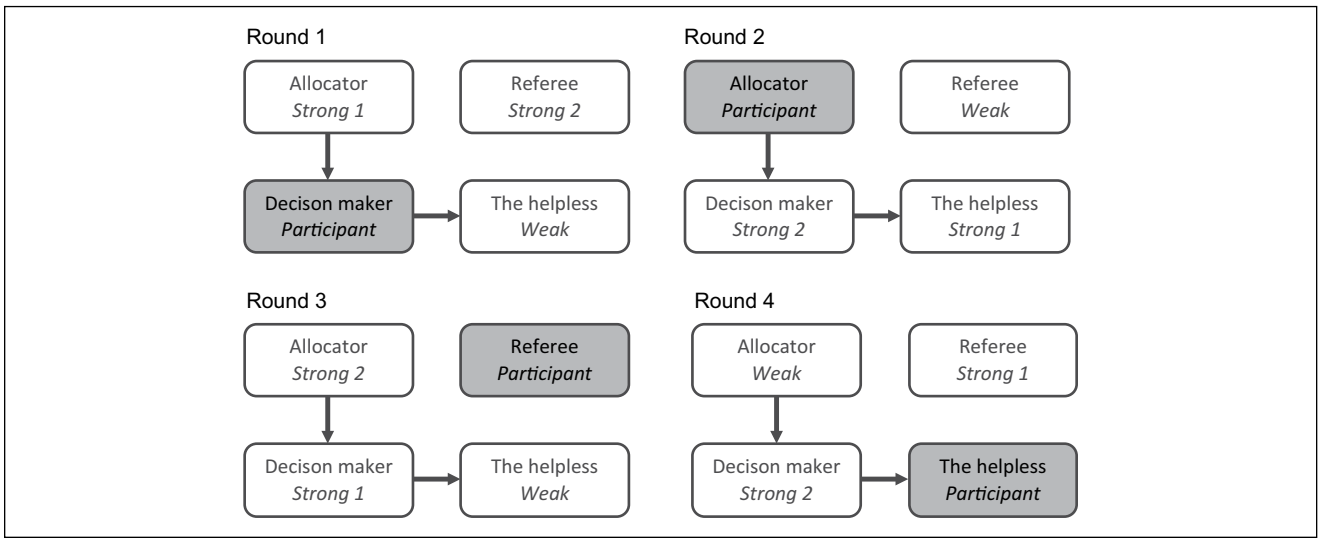

Figure 1. The four rounds of the justice game.
Note. Strong and Weak refer to the socioeconomic characteristics of the players.

All teammates were fictional, but participants were told that they would be playing against real people. The teammates had fixed characteristics that could be observed by the participants at any time. Demographic characteristics were held constant in that all teammates were male and their ages were not given. Regarding the socioeconomic characteristics, there was a distinction between two "strong" players and one "weak" player. This manipulation was introduced to make potential unfair behavior even more salient, in the hope that potential differences in justice sensitivity would be easier to detect. The game was manipulated so that the two strong players repeatedly treated the weak player unfairly. The fictional teammates were Paul (*Strong 1*, single, no children, actuary, annual income 55,000-65,000 euros), Tim (*Strong 2*, divorced, one child, business lawyer, annual income 65,000-75,000 euros), and Uwe (*Weak*, married, three children, geriatric nurse, annual income 15,000-25,000 euros). The names were chosen to enhance the differences in socioeconomic status: Paul and Tim are deemed attractive, intelligent, and modern, whereas Uwe is deemed rather unattractive, less intelligent, and old fashioned (Rudolph, Böhm, & Lummer, 2007).

The game consisted of four rounds. Each participant received the same fixed order and played the game only once. Each player could collect lottery tickets throughout the game. The score of the tickets was visible to the participants at all times. The introduction made them believe that all players were randomly assigned to the four positions in each round. This faked information was given to prevent the participants from planning their behavior in the next round in advance.

The four rounds and the associated positions the participants could be in are shown in Figure 1. In each round, one player had to allocate 100 lottery tickets as desired. In Round 1, Strong 1 allocated the lottery tickets unfairly to himself (60) and the participant (40). Weak did not get any tickets. The participant had to decide whether to permit the unfair allocation or prevent it at personal expense. In this round, the profiteer sensitivity is measured. In Round 2, the participants allocated the lottery tickets to themselves, Strong 1, and Strong 2. In this position, participants would be able to punish the unfair allocation of Strong 1 in Round 1. How fairly people allocate the lottery tickets (perpetrator sensitivity) is measured in this round. In Round 3, Strong 2

allocated the tickets unfairly to himself (50), Strong 1 (45), and Weak (5). The participant now knew that Strong 1 and Strong 2 would have a much higher score than Weak when this allocation was granted. Being in the position of referee, participants could allow the allocation or intervene. Should they choose to intervene, they could take away 10 tickets from each of two players and give them to the third player. However, there was a 10% risk that they lose 10 of their own tickets with this intervention. This manipulation was used simply to avoid that each participant intervenes in this position. People with higher observer sensitivity should more often change the allocation. In Round 4, the participants were the helpless ones and were not able to do anything. This round was included only to make the game complete and seem authentic. Participants were told that the lottery tickets they had collected during the game would be entered into a raffle of four 10-euro vouchers for an electronic market. Actually, however, the number of gained tickets did not influence the chances of winning. The vouchers were drawn by lot after the study was finished and the winners were contacted by email.

Justice sensitivity questionnaire. To measure differences in justice sensitivity in our participants, we used the questionnaire from Schmitt et al. (2009), which includes scales for victim, perpetrator, profiteer, and observer sensitivity. Each of the 40 items could be answered on a 6-point rating scale from 1 = *not at all* to 6 = *absolutely true*. Victim sensitivity measures how people experience situations that turn out to the advantage of others and to the disadvantage of themselves (e.g., "It bothers me when others receive something that ought to be mine"). Perpetrator sensitivity measures the experience of situations where people exploit others or treat them unfairly (e.g., "It bothers me when I take something that others ought to have"). Observer sensitivity measures the experience of situations where others are exploited or treated unfairly (e.g., "It bothers me when someone gets something he/she doesn't deserve"). Profiteer sensitivity measures the experience of situations that turn out to the respondent's advantage and to the disadvantage of others (e.g., "It disturbs me when I receive what others ought to have").

Results

We now present the results of the participants' decisions in the particular game positions. To analyze the results statistically, we ran contrast analyses (see Rosenthal, Rosnow, & Rubin, 2000). To test our hypothesis—that people with ADHD show higher justice sensitivity than healthy controls—we assigned the following contrast weights (lambda weights) to the three groups: inatt, $\lambda = -1$; HI/comb, $\lambda = -1$; control, $\lambda = 2$. Lower values indicate fairer decisions. We report the correlations between the contrast weights and the raw data as effect sizes of the analyses, which shows how well the data fit the hypothesis. Finally, we present the results of the self-assessment questionnaire.

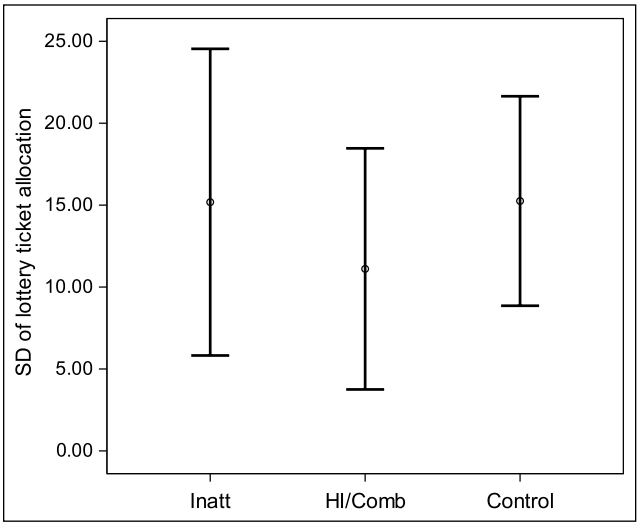

Figure 2. Mean standard deviations (with 95% confidence intervals) of the lottery ticket allocation in the three groups.
Note. Inatt = group with inattentive subtype of ADHD; HI/comb = group with hyperactive/impulsive and combined subtypes of ADHD. Note that 100 tickets had to be allocated to three players.

Perpetrator Sensitivity

Perpetrator sensitivity was measured by the allocation of lottery tickets when participants were in the position of the allocator. A fair decision would mean that all tickets were allocated equally to the three players; that is, the standard deviation of the three numbers of tickets should be small. The standard deviations for the three groups are shown in Figure 2. As can be seen, there are no differences, which is also visible in the results of the contrast analysis: $r(43) = .09$, $p = .56$. When people were in the position of allocator, they delivered the lottery tickets quite equally, and there were no differences between the ADHD groups and the control group.

Profiteer Sensitivity

When participants were in the position of decision maker, they were able to decide whether to accept an unfair decision of the allocator (egocentric) or reject it at their own expense (prosocial). Egocentric decisions were coded with 1 and prosocial ones with 0, so that lower values indicate more prosocial decisions. Figure 3 shows the means of these decisions for the three groups. The contrast analysis yields a significant result: $r(43) = .352$, $p = .021$. That is, the ADHD groups more often prevented the unfair treatment of a helpless person than the control group.

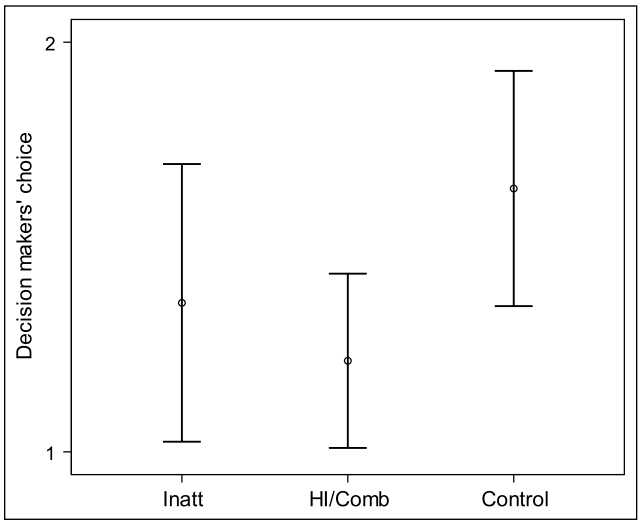

Figure 3. Means (with 95% confidence intervals) of the decision makers' choices to reject (1) or accept (2) an unfair but self-advantageous allocation of lottery tickets, by group.
Note. Inatt = inattentive subtype of ADHD; HI/comb = hyperactive/impulsive and combined subtypes of ADHD. Lower values equal more prosocial decisions.

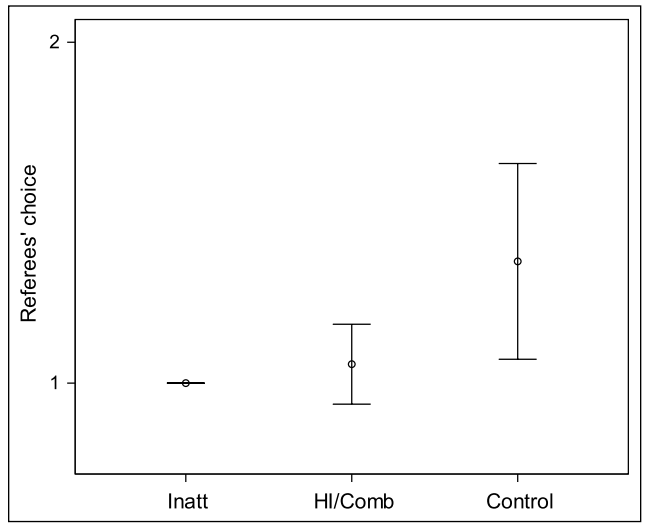

Figure 4. Means (with 95% confidence intervals) of the referees' choices to prevent (1) or permit (2) an unfair allocation of lottery tickets under the risk of losing their own resources, by group.
Note. Inatt = inattentive subtype of ADHD; HI/comb = hyperactive/impulsive and combined subtypes of ADHD. Lower values equal more prosocial decisions.

Observer Sensitivity

When participants were in the position of referee, they were able to restore justice by initiating a reallocation of the lottery tickets, which involved the risk of losing 10 of their own tickets (altruistic). Alternatively, they could leave everything as it was (egocentric). Again, egocentric decisions were coded with 1 and prosocial ones with 0, so that lower values indicate more prosocial decisions. The mean values are shown in Figure 4. The contrast analysis yields a significant result: $r(43) = .436$, $p = .003$. That is, the ADHD groups were more often motivated to restore justice—despite the risk of losing their own resources—than the control group.

Self-Assessment of the Justice Sensitivity Dimensions

One week after the justice game, participants were asked to complete a self-assessment questionnaire covering the four dimensions of justice sensitivity. A total of 37 of the initial 50 participants responded to the questionnaire. Their characteristics are shown in the bottom rows of Table 2. Figure 5 shows the mean ratings for the three groups. As can be seen, respondents in the inatt group gave significantly higher ratings, and respondents in the HI/comb group hardly differed from the control respondents. This is why the contrast analyses yielded only marginal effects (see Table 4). Given these results, we ran two additional group comparisons to analyze the differences between (a) the inatt group and the control group and (b) the HI/comb group and the control group, respectively. The results (Table 4) indicate

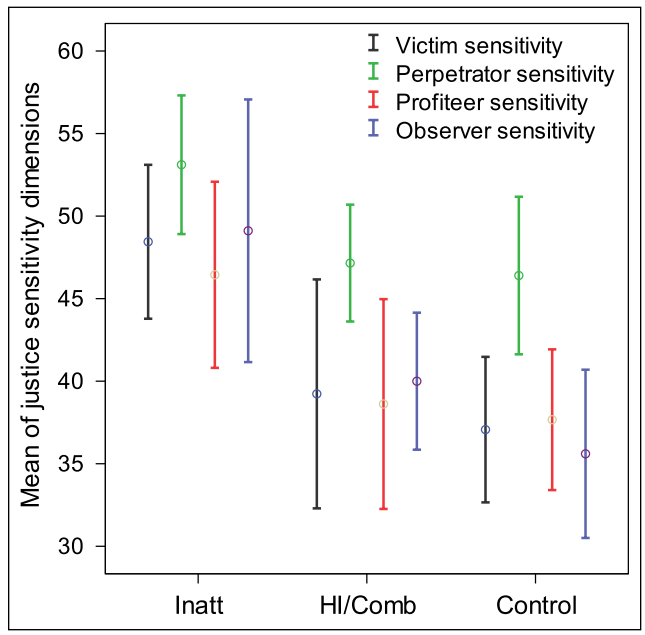

Figure 5. Means (with 95% confidence intervals) of the four dimensions of justice sensitivity (self-assessment), by group.
Note. Inatt = inattentive subtype of ADHD; HI/comb = hyperactive/impulsive and combined subtypes of ADHD. Note that the scores could range from 10 to 60.

Table 4. Contrast Analyses and Group Comparisons for the Dimensions of Justice Sensitivity.

	Contrast analyses		Group comparisons	
Dimension	*r*	*p*	Inatt vs. control (*d*)	HI/comb vs. control (*d*)
Victim	**.30**	.073	**1.57**	0.25
Perpetrator	.22	.202	**0.89**	0.11
Profiteer	.22	.183	**1.17**	0.12
Observer	**.40**	.014	**1.42**	**0.60**

Note. Inatt = inattentive subtype of ADHD; HI/comb = hyperactive/impulsive and combined subtypes of ADHD. Effect sizes of at least medium size are in boldface.

that particularly participants with the inattentive ADHD subtype produced significantly higher values on all dimensions of justice sensitivity, whereas the differences between participants with the other two subtypes and the healthy control participants were negligible to medium.

Correlations Among the Measures of Justice Sensitivity

We used the justice game and the self-assessment questionnaire as two alternative approaches to measuring justice sensitivity. Although the self-assessment questionnaire is a validated tool, the justice game was adapted to be used in the present scenario. The two instruments have never been used to measure justice sensitivity in people affected by ADHD. Thus, it is interesting to have a look at (a) the correlations among the variables of the justice game and the correlations among the variables of the questionnaire as well as (b) the correlations between the behavioral measures and the self-assessment measures. The Pearson correlation coefficients (see Table 5) are based on the data of 30 respondents who finished both the justice game and the questionnaire. Clearly emerging are the high correlations between the four scales of the self-assessment questionnaire, indicating that these scales are facets of justice sensitivity rather than distinct or independent dimensions. Among the scales measured in the justice game, only perpetrator sensitivity and profiteer sensitivity correlated significantly; observer sensitivity can be clearly distinguished from perpetrator sensitivity and profiteer sensitivity. Remarkably, there are no substantial correlations between the behavioral measures and the self-assessment measures, indicating a lack of convergent validity of the two types of measures.

Discussion

We aimed at dissolving the paradox that ADHD has been associated concurrently with antisocial behavior and higher justice sensitivity. Different results emerged for the subtypes of ADHD. When comparing the results of the justice game and the self-assessment of the justice sensitivity dimensions, we found some congruencies and some discrepancies. Looking at the self-assessment, justice sensitivity of the HI/comb group was similar to that of the control group, whereas the inatt group exhibited higher values. In the justice game, both ADHD groups exhibited higher values than the control group.

Victim sensitivity was assessed only by the questionnaire. People of the inattentive subtype reported a much stronger sensitivity to experienced injustice against themselves than people of the hyperactive/impulsive or combined subtypes and the control group. The missing effect of the HI/comb group is quite interesting because these two subtypes are clearly associated with antisocial behavior (Barkley, 1997; Barkley et al., 2008), and antisocial behavior was considered a potential effect of higher victim sensitivity (Schmitt et al., 2009). This does not seem to be the case. Future studies should include victim sensitivity in the game simulation to analyze whether people take vengeance on players who acted unfairly in earlier games. *Perpetrator sensitivity* was assessed by the allocation of lottery tickets in the game. There were no differences between any of the three groups. However, the questionnaire results again revealed that the inatt group was much more perpetrator sensitive than the other two groups. *Profiteer sensitivity* was assessed by the acceptance or rejection of an unfair but self-beneficial decision of another person. Both ADHD groups were less willing to accept such unfair decisions than the control group. Yet, again, the questionnaire results were not consistent with the game results: Only the inatt group exhibited higher values on perpetrator sensitivity. *Observer sensitivity* was assessed by the motivation to restore justice for others, at the risk of losing personal resources. Both ADHD groups intervened more often against unfair decisions than the control group. This is congruent with the results of the questionnaire: Both ADHD groups reported being more observer sensitive than the control group.

To discuss the reported effects, we will refer to the mechanisms, introduced above, that reduce the encompassing altruism after early childhood. These include idiosyncratic experiences, the recognition of social norms, and concern about one's own assessment.

Idiosyncratic experiences. Children with ADHD often exhibit a high level of activity and therefore are often in conflict with their environment (Billman & McDevitt, 1980). They have more problems in social relations and are aware of this tendency. Their interactions with family members are intense but predominantly negative (Barkley, 2006). Such conflictual experiences may result in a more pronounced justice sensitivity, in particular, victim and observer sensitivity, because they have had more experience with situations they deem unfair. Yet, Twenge,

Table 5. Pearson Correlation Coefficients (and *p*-Values) for All Measured Justice Sensitivity Variables.

	Justice game			Justice questionnaire			
	Perpetrator	Profiteer	Observer	Perpetrator	Profiteer	Observer	Victim
Justice game							
Perpetrator	—	**.555** (<.001)	–.027 (.86)	.094 (.62)	–.301 (.11)	–.136 (.47)	.011 (.95)
Profiteer		—	.086 (.58)	.154 (.42)	.035 (.86)	–.140 (.46)	.037 (.85)
Observer			—	–.121 (.52)	.134 (.48)	–.135 (.48)	.094 (.62)
Justice questionnaire							
Perpetrator				—	**.631** (<.001)	**.761** (<.001)	**.476** (.008)
Profiteer					—	**.633** (<.001)	**.553** (.002)
Observer						—	**.433** (.017)

Note. Significant correlation coefficients are in boldface. All coefficients are based on the data of 30 respondents who finished both the justice game and the self-assessment questionnaire.

Baumeister, DeWall, Ciarocco, and Bartels, (2007) demonstrated that social rejection reduces prosocial behavior. Negative social experiences may lead to a stronger egocentric victim sensitivity and to the strict application of the tit-for-tat rule to protect the fragile self. Twenge et al. underlined this notion by the observation that socially rejected individuals are open to new friendships but that they are also motivated to protect themselves from further exploitation.

Impaired recognition of social norms. The understanding of one's congeners as intentional beings is the foundation of the recognition of social norms (see Tomasello & Carpenter, 2007). This understanding requires cognitive abilities such as *theory of mind* (ToM; the ability to attribute certain mental states to others) and the recognition of others' emotions. Those affected by the inattentive subtype of ADHD show a lack of executive functions and should therefore have more difficulty recognizing social norms. Perner et al. (2002) showed that especially children of this subtype have difficulty with first-order ToM tasks (i.e., ability to distinguish between reality and one's own beliefs) but not with second-order ToM tasks (i.e., understanding that someone else has a false belief about reality). Because of their deficits in inhibition processes, people of the HI/comb subtypes are also likely to lag behind in their ToM development. Thus, it is necessary to consider the development of empathy of ADHD children, for instance, to explain why they are very likely to ascribe vicious intentions to others (*hostile attribution bias*). The inattentive type exhibits difficulties in cognitive flexibility, information selection, and situation awareness (Crick & Dodge, 1994; Fletcher & Henson, 2001; Funahashi, 2006). The lag in ToM development should therefore manifest in difficulty understanding the mental state of others and, in turn, in communicating with and manipulating the social environment. This suggestion is underpinned by neuroscientific studies: The neuronal correlate of the inattentive subtype's deficits is also responsible for ToM (Krippl & Karim, 2011; Zelazo & Müller, 2002). The symptomatic social impoverishment—especially of the inattentive subtype—is therefore mainly due to deficient, one-way social interactions where many social offers of communication are simply not recognized. As a result, highly egocentric victim sensitivity can be seen as a protection against disadvantage because of the missing knowledge about the actual social norms. Furthermore, the high values of altruistic justice sensitivity (perpetrator, profiteer, and observer) can be explained, as well, when the encompassing altruistic period in early childhood and the deficient recognition of social norms are taken into account.

Let us now turn to the people with hyperactive/impulsive and combined subtypes, who have deficits in their development of social cognition, as well. Deficits in inhibitory ability have been considered a possible explanation. Inhibition is an important prerequisite of social cognition (Bjorklund & Kipp, 2001): Irrelevant but possibly very salient stimuli have to be suppressed. Kochanska, Murray, Jacques, Koenig, and Vandegeest (1996) argued that individual temper is the important link between inhibition and the internalization of social norms. That is, high excitability, motoric activity, and exaggerated affectivity—which are symptomatic of the hyperactive/impulsive and combined subtypes—hinder the successful recognition of less salient but very important social cues. Again, the orbito-prefrontal regions that are involved in the impaired inhibition processes in these subtypes are also associated with ToM (Krippl & Karim, 2011; Zelazo & Müller, 2002).

Seemingly missing concern about one's own assessment. During their 2nd year of age, children learn that they are assessed according to social norms (Bischof-Köhler, 2000). As the recognition of social norms is impaired in those affected by ADHD, they often convey the impression that they are not worried about their own assessment. Such predispositions lead these people into a real predicament: They have problems recognizing the social norms, they behave

inappropriately, they get rejected without knowing why, and they know that they did something wrong but do not know what. Finally—as social emotions such as guilt and shame are intact—all this results in negative affect, which clearly influences several comorbidities, such as depression. Interestingly, De Pauw and Mervielde (2011) demonstrated that children with ADHD are timid and self-confident to similar extents as their healthy peers; anxiety disorders and depression appear only in later stages, most likely as an effect of the experienced negative affect (Barkley et al., 2008). In sum, we argue that higher justice sensitivity in people with ADHD is a coping strategy to prevent the impression that they do not care about social norms and thus to avoid social conflicts and denigration.

There are some limitations of our study. First, we should emphasize that our study was a first step in investigating an issue that has not been previously explored scientifically. We tried to gather objective behavioral data (the justice game) and subjective self-assessment data (the questionnaire), but these are only two of many possible instruments that can be used to measure justice sensitivity, and we strongly recommend collecting further evidence by using alternative instruments in the future. Our correlation analyses have revealed a lack of convergent validity of the behavioral measures and the self-assessment measures. Although the nonsignificant correlations might be due to a lack of power (see below), the coefficients are far from substantial. This raises the question of which of the two types of measures is the more appropriate. Behavioral measures are less prone to social desirability; self-assessment measures might be more sensitive and do not depend on artificial experimental settings. We would like to argue that, first, more studies should be conducted to explore the relationship of the two types of measures in more detail, and, second, as long as the convergent validity is so small, both types of measures should be used to gain a comprehensive picture of justice sensitivity.

Second, there are limitations to the sample. Most importantly, the sample size was quite small, resulting in a low power of the analyses we ran. The low power also carries the risk that potential correlations and group differences could not be detected although they might exist in the population. We therefore consider our investigation as a pilot study and would like to see the results verified in future studies using larger samples. Moreover, we recruited voluntary participants from Internet forums and from a psychotherapy group. There may be a bias in this sample because we cannot be sure that the sample is representative of the population of ADHD patients. Furthermore, we were not able to make a clinical diagnosis of our respondents. Participants stated that they had ADHD and completed the self-assessment questionnaire (which is only one of several available clinical assessment instruments), but these were our only means of ensuring that they had ADHD. Not least, the justice game obviously bears several degrees of freedom regarding the characteristics of the teammates, the number of rounds and games to be played, respectively, and the order of the rounds. Future studies could, for instance, incorporate a way to analyze tit-for-tat behavior.

Conclusion

Characteristic in people with ADHD are overly negative experiences in their lives and an impaired understanding of social norms. The motivation to follow social norms but the experience of not being able to do so may be the foundation of higher justice sensitivity. Repeated confrontations with the social environment might serve to sharpen the perception of justice and injustice. Participants with all ADHD subtypes were more sensitive to social injustice, but they also showed reactive behavior when they were the victim of injustice. That is, they protected themselves from injustice just as healthy people would do, but they were more permissive and generous.

Egocentric and prosocial behaviors are not mutually exclusive; the same extent of justice that is claimed for others will be claimed for oneself. It is a task for future research to uncover the determinants of egocentric victim sensitivity on one hand and prosocial justice sensitivity on the other hand. Studies should focus on social factors, such as parental education, peers, and developmental support in schools, together with factors influencing the development of empathy. Most importantly, the pronounced sense of justice of people with ADHD provides a valuable resource that can be used in the development of therapy and individual care. This study has shown how fine the line is between egocentrism and altruism in individuals with ADHD, and that these people have the potential to develop a stable empathic sense of prosocial cooperation and justice.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

Adams, J. S. (1965). Inequity in social exchange. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 2, pp. 267-299). New York, NY: Academic Press.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of

ADHD. *Psychological Bulletin*, *121*, 65-94. doi:10.1037/0033-2909.121.1.65

Barkley, R. A. (2006). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (3rd ed.). New York, NY: Guilford.

Barkley, R. A., Murphy, K. R., & Fischer, M. (2008). *ADHD in adults: What the science says*. New York, NY: Guilford.

Baumert, A., Halmburger, A., Hauer, J., Krettek, C., & Schmitt, M. (2009, September1-4). *Sensibilität für Ungerechtigkeit und Zivilcourage: Vermittelnde Emotionen* [Injustice sensitivity and civil courage: Mediating emotions]. Presentation given at the 12th Tagung der Fachgruppe Sozialpsychologie, Luxembourg, Germany.

Behne, T., Carpenter, M., & Tomasello, M. (2005). One-year-olds comprehend the communicative intentions behind gestures in a hiding game. *Developmental Science*, *8*, 492-499. doi:10.1111/j.1467-7687.2005.00440.x

Billman, J., & McDevitt, S. C. (1980). Convergence of parent and observer ratings of temperament with observations of peer interaction in nursery school. *Child Development*, *51*, 395-400. doi:10.2307/1129272

Bischof-Köhler, D. (2000). Empathie, prosoziales Verhalten und Bindungsqualität bei Zweijährigen [Empathy, prosocial behavior, and quality of attachment in two-year-olds]. *Psychologie in Erziehung und Unterricht*, *47*, 142-158.

Bjorklund, D. F., & Kipp, K. (2001). Social cognition, inhibition and theory of mind: The evolution of human intelligence. In R. J. Sternberg & J. C. Kaufmann (Eds.), *The evolution of intelligence* (pp. 27-53). Mahwah, NJ: Lawrence Erlbaum.

Boll, T. (1998). Intentionalitätstheoretische Forschungsstrategie für moralische Eotionen [Intentionality based research strategy for moral emotions]. In B. Reichle & M. Schmitt (Eds.), *Verantwortung, Gerechtigkeit und Moral* (pp. 173-187). Weinheim, Germany: Juventa.

Buhrmester, D., Whalen, C. K., Henker, B., MacDonald, V., & Hinshaw, S. P. (1992). Prosocial behavior in hyperactive boys: Effects of stimulant medication and comparison with normal boys. *Journal of Abnormal Child Psychology: An Official Publication of the International Society for Research in Child and Adolescent Psychopathology*, *20*, 103-121. doi:10.1007/BF00927119

Callaghan, T., Moll, H., Rakozcy, H., Warneken, F., Liszkowski, U., Behne, T., & Tomasello, M. (2011). Early social cognition in three cultural contexts. *Monographs of the Society for Research in Child Development*, *76*, vii-viii, 1-142.

Castellanos, F., Sonuga-Barke, E. S., Milham, M. P., & Tannock, R. (2006). Characterizing cognition in ADHD: Beyond executive dysfunction. *Trends in Cognitive Sciences*, *10*, 117-123. doi:10.1016/j.tics.2006.01.011

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*, 74-101. doi:10.1037/0033-2909.115.1.74

Cunningham, C. E., & Siegel, L. S. (1987). Peer interactions of normal and attention-deficit-disordered boys during free-play, cooperative task, and simulated classroom situations. *Journal of Abnormal Child Psychology: An Official Publication of the International Society for Research in Child and Adolescent Psychopathology*, *15*, 247-268. doi:10.1007/BF00916353

Decety, J., & Chaminade, T. (2003). Neural correlates of feeling sympathy. *Neuropsychologia*, *41*, 127-138. doi:10.1016/S0028-3932(02)00143-4

De Pauw, S. W., & Mervielde, I. (2011). The role of temperament and personality in problem behaviors of children with ADHD. *Journal of Abnormal Child Psychology: An Official Publication of the International Society for Research in Child and Adolescent Psychopathology*, *39*, 277-291. doi:10.1007/s10802-010-9459-1

Erhardt, D., & Hinshaw, S. P. (1994). Initial sociometric impressions of attention-deficit hyperactivity disorder and comparison boys: Predictions from social behaviors and from nonbehavioral variables. *Journal of Consulting and Clinical Psychology*, *62*, 833-842. doi:10.1037/0022-006X.62.4.833

Fehr, E., Bernhard, H., & Rockenbach, B. (2008). Egalitarianism in young children. *Nature*, *454*, 1079-1083. doi:10.1038/nature07155

Fetchenhauer, D., & Huang, X. (2004). Justice sensitivity and distributive decisions in experimental games. *Personality and Individual Differences*, *36*, 1015-1029. doi:10.1016/S0191-8869(03)00197-1

Fletcher, P. C., & Henson, R. N. A. (2001). Frontal lobes and human memory: Insights from functional neuroimaging. *Brain*, *124*, 849-881. doi:10.1093/brain/124.5.849

Funahashi, S. (2006). Prefrontal cortex and working memory processes. *Neuroscience*, *139*, 251-261.

Gollwitzer, M., Schmitt, M., Schalke, R., Maes, J., & Baer, A. (2005). Asymmetrical effects of justice sensitivity perspectives on prosocial and antisocial behavior. *Social Justice Research*, *18*, 183-201. doi:10.1007/s11211-005-7368-1

Greitemeyer, T., Fischer, P., Kastenmüller, A., & Frey, D. (2006). Civil courage and helping behavior: Differences and similarities. *European Psychologist*, *11*, 90-98. doi:10.1027/1016-9040.11.2.90

Herpertz-Dahlmann, B., Konrad, K., & Herpertz, S. C. (2007). The role of ADHD in the etiology and outcome of antisocial behavior and psychopathy. In A. Felthous & H. Saß (Eds.), *The international handbook of psychopathic disorders and the law: Laws and policies* (pp. 199-216). Chichester, UK: Wiley.

Huseman, R. C., Hatfield, J. D., & Miles, E. W. (1987). A new perspective on equity theory: The equity sensitivity construct. *Academy of Management Review*, *12*, 222-234. doi:10.2307/258531

Kalish, C. W., & Shiverick, S. M. (2004). Children's reasoning about norms and traits as motives for behavior. *Cognitive Development*, *19*, 401-416. doi:10.1016/j.cogdev.2004.05.004

King, C., & Young, R. D. (1982). Attention deficits with and without hyperactivity: Teacher and peer perceptions. *Journal of Abnormal Child Psychology*, *10*, 483-495.

Kochanska, G., Murray, K., Jacques, T. Y., Koenig, A. L., & Vandegeest, K. A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development*, *67*, 490-507. doi:10.2307/1131828

Krippl, M. M., & Karim, A. A. (2011). "Theory of mind" und ihre neuronalen Korrelate bei forensisch relevanten Störungen ["Theory of mind" and its neural correlates in forensic related disorders]. *Der Nervenarzt*, *82*, 843-852. doi:10.1007/s00115-010-3073-x

Landau, S., & Milich, R. (1988). Social communication patterns of attention-deficit-disordered boys. *Journal of Abnormal Child Psychology: An Official Publication of the International Society for Research in Child and Adolescent Psychopathology*, *16*, 69-81. doi:10.1007/BF00910501

Mannuzza, S., Klein, R. G., Bessler, A., Malloy, P., & LaPadula, M. (1998). Adult psychiatric status of hyperactive boys grown up. *American Journal of Psychiatry*, *155*, 493-498.

McKay, K. E., & Halperin, J. M. (2001). ADHD, aggression, and antisocial behavior across the lifespan: Interactions with neurochemical and cognitive function. In J. Wasserstein, L. E. Wolf, & F. F. LeFever (Eds.), *Adult attention deficit disorder: Brain mechanisms and life outcomes* (pp. 84-96). New York: New York Academy of Sciences.

Montada, L., & Schneider, A. (1989). Justice and emotional reactions to the disadvantaged. *Social Justice Research*, *3*, 313-344.

Moulton Sarkis, S. (2008). *Making the grade with ADD: A student's guide to succeeding in college with attention deficit disorder*. Oakland, CA: New Harbinger.

Murphy, F. C., Nimmo-Smith, I., & Lawrence, A. D. (2003). Functional neuroanatomy of emotions: A meta-analysis. *Cognitive, Affective, & Behavioral Neuroscience*, *3*, 207-233. doi:10.3758/CABN.3.3.207

Nijmeijer, J. S., Minderaa, R. B., Buitelaar, J. K., Mulligan, A., Hartman, C. A., & Hoekstra, P. J. (2008). Attention-deficit/hyperactivity disorder and social dysfunctioning. *Clinical Psychology Review*, *28*, 692-708. doi:10.1016/j.cpr.2007.10.003

Panksepp, J. (1986). The psychobiology of prosocial behaviors: Separation distress, play, and altruism. In C. Zahn-Waxler, E. M. Cummings, & R. Iannotti (Eds.), *Altruism and aggression: Biological and social origins* (pp. 19-57). Cambridge, UK: Cambridge University Press.

Perner, J., Kain, W., & Barchfeld, P. (2002). Executive control and higher-order theory of mind in children at risk of ADHD. *Infant and Child Development*, *11*, 141-158. doi:10.1002/icd.302

Rakoczy, H., Warneken, F., & Tomasello, M. (2008). The sources of normativity: Young children's awareness of the normative structure of games. *Developmental Psychology*, *44*, 875-881. doi:10.1037/0012-1649.44.3.875

Richerson, P. J., & Boyd, R. (2005). *Not by genes alone: How culture transformed human evolution*. Chicago, IL: University of Chicago Press.

Rosenthal, R., Rosnow, R. L., & Rubin, D. B. (2000). *Contrasts and effect sizes in behavioral research: A correlational approach*. New York, NY: Cambridge University Press.

Rösler, M., Retz, W., Retz-Junginger, P., Thome, J., Supprian, T., Nissen, T., & Trott, G. E. (2004). Instrumente zur Diagnostik der Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung (ADHS) im Erwachsenenalter. Selbstbeurteilungsskala (ADHS-SB) und Diagnosecheckliste (ADHS-DC) [Diagnostic instruments for ADHD in adults. Self-assessment scale (ADHS-SB) and diagnostic checklist (ADHS-DC)]. *Der Nervenarzt*, *75*, 888-895.

Rucklidge, J. J., Brown, D. L., Crawford, S., & Kaplan, B. J. (2006). Retrospective reports of childhood trauma in adults with ADHD. *Journal of Attention Disorders*, *9*, 631-641. doi:10.1177/1087054705283892

Rudolph, U., Böhm, R., & Lummer, M. (2007). Ein Vorname sagt mehr als 1000 Worte: Zur sozialen Wahrnehmung von Vornamen [A first name is worth 1,000 words: On the social perception of first names]. *Zeitschrift für Sozialpsychologie*, *38*, 17-31. doi:10.1024/0044-3514.38.1.17

Schmitt, M., Baumert, A., Fetchenhauer, D., Gollwitzer, M., Rothmund, T., & Schlösser, T. (2009). Sensibilität für Ungerechtigkeit [Injustice sensibility]. *Psychologische Rundschau*, *60*, 8-22. doi:10.1026/0033-3042.60.1.8

Schmitt, M., Behner, R., Montada, L., Müller, L., & Müller-Fohrbrodt, G. (2000). Gender, ethnicity, and education as privileges: Exploring the generalizability of the existential guilt reaction. *Social Justice Research*, *13*, 313-337. doi:10.1023/A:1007640925819

Schmitt, M., Gollwitzer, M., Maes, J., & Arbach, D. (2005). Justice sensitivity: Assessment and location in the personality space. *European Journal of Psychological Assessment*, *21*, 202-211. doi:10.1027/1015-5759.21.3.202

Schmitt, M., Neumann, R., & Montada, L. (1995). Dispositional sensitivity to befallen injustice. *Social Justice Research*, *8*, 385-407.

Sonuga-Barke, E. S. (2002). Psychological heterogeneity in AD/HD—A dual pathway model of behaviour and cognition. *Behavioural Brain Research*, *130*, 29-36. doi:10.1016/S0166-4328(01)00432-6

Tobey-Klass, E. (1978). Psychological effects of immoral actions: The experimental evidence. *Psychological Bulletin*, *85*, 757-771.

Tomasello, M. (2010). *Warum wir kooperieren* [Why we cooperate]. Berlin, Germany: Suhrkamp.

Tomasello, M., & Carpenter, M. (2007). Shared intentionality. *Developmental Science*, *10*, 121-125. doi:10.1111/j.1467-7687.2007.00573.x

Twenge, J. M., Baumeister, R. F., DeWall, C., Ciarocco, N. J., & Bartels, J. (2007). Social exclusion decreases prosocial behavior. *Journal of Personality and Social Psychology*, *92*, 56-66. doi:10.1037/0022-3514.92.1.56

Twenge, J. M., Baumeister, R. F., Tice, D. M., & Stucke, T. S. (2001). If you can't join them, beat them: Effects of social exclusion on aggressive behavior. *Journal of Personality and Social Psychology*, *81*, 1058-1069. doi:10.1037/0022-3514.81.6.1058

Vaish, A., Carpenter, M., & Tomasello, M. (2009). Sympathy through affective perspective taking and its relation to prosocial behavior in toddlers. *Developmental Psychology*, *45*, 534-543. doi:10.1037/a0014322

Warneken, F., Hare, B., Melis, A. P., Hanus, D., & Tomasello, M. (2007). Spontaneous altruism by chimpanzees and young children. *PLoS Biology*, *5*, e184. doi:10.1371/journal.pbio.0050184

Warneken, F., & Tomasello, M. (2006). Altruistic helping in human infants and young chimpanzees. *Science*, *311*, 1301-1303. doi:10.1126/science.1121448

Warneken, F., & Tomasello, M. (2008). Extrinsic rewards undermine altruistic tendencies in 20-month-olds. *Developmental Psychology*, *44*, 1785-1788. doi:10.1037/a0013860

Warneken, F., & Tomasello, M. (2009). The roots of human altruism. *British Journal of Psychology*, *100*, 455-471. doi:10.1348/000712608X379061

Whalen, C. K., Henker, B., Collins, B. E., McAuliffe, S., & Vaux, A. (1979). Peer interaction in a structured communication task: Comparisons of normal and hyperactive boys and of methylphenidate (Ritalin) and placebo effects. *Child Development*, *50*, 388-401.

World Health Organization. (2008). *ICD-10: International statistical classification of diseases and related health problems* (10th Rev. ed.). New York, NY: Author.

Zelazo, P., & Müller, U. (2002). Executive function in typical and atypical development. In U. Goswami (Ed.), *Blackwell handbook of childhood cognitive development* (pp. 445-469). Malden, MA: Blackwell. doi:10.1002/9780470996652.ch20

Author Biographies

Thomas Schäfer, PhD, is a research associate at the Department of Psychology, Chemnitz University of Technology. His research is mainly focused on the psychology of music, human motivation, attention disorders, and cultural differences. He teaches statistics, research methods, and philosophy of science.

Thomas Kraneburg, M.Sc., is a psychologist and works as a trainee at the Bavarian Private Academy of Psychotherapy in Munich. His research is focused on attention disorders in children and adults.