# The Unique Contribution of Emotional Impulsiveness to Impairment in Major Life Activities in Hyperactive Children as Adults

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**Objective:** Emotional impulsiveness (EI) may be a central feature of attention-deficit/hyperactivity disorder (ADHD) contributing impairment beyond the two ADHD dimensions of inattention and hyperactivity–impulsivity. **Method:** We evaluated EI in hyperactive (N = 135) and control (N = 75) children followed to adulthood (mean age 27 years). The hyperactive cases were subdivided into those individuals whose ADHD persisted (ADHD-P) and did not persist (ADHD-NP) to adulthood. We examined the additional contribution of EI apart from ADHD symptoms to global ratings of impairment in 10 major life activities, adverse occupational and educational outcomes, criminal and driving outcomes, and money management difficulties at ages 21 and 27. **Results:** The ADHD-P group reported more EI symptoms than either the ADHD-NP or community control groups. EI uniquely contributed to seven of 10 major life domains and to overall impairment beyond ADHD symptoms. Severity of EI uniquely contributed to numerous impairments in occupational, educational, criminal, driving, and financial outcomes beyond ADHD symptoms. **Conclusions:** EI is as much a component of ADHD as are its two traditional dimensions and is associated with impairments beyond those contributed by the two traditional dimensions. J. Am. Acad. Child Adolesc. Psychiatry, 2010;49(5):503–513. **Key Words:** emotional impulsiveness, hyperactivity, attention-deficit/hyperactivity disorder (ADHD), longitudinal research, impairment

Two dimensions of age-inappropriate behavior comprise the central elements in the current conceptualization of attention-deficit/hyperactivity disorder (ADHD), these being inattention and hyperactivity–impulsivity.[1] This conceptualization may ignore an equally compelling and central role of emotional impulsivity (EI) in the disorder.[2-4] These impulsive emotions are impatience, low frustration tolerance, hot-temperedness, quickness to anger, irritability, and easily emotionally excitable.[2,4] Emotional self-control may involve at least two stages: (1) the inhibition of the emotional reactions provoked by events, and (2) the subsequent self-regulation of the emotional state to be more socially appropriate and consistent with longer-term goals.[2,3,5,6] These two stages may map directly onto the two dimensions of ADHD,[2] with EI being a part of hyperactivity–impulsivity arising from deficits in the "hot" executive frontal network.[7] Problems with the self-regulation of emotion may be part of the inattention dimension,[2] that arises from deficits in the "cool" or "what" and "when" executive networks[7,8] causing difficulties in the "top down" management of emotions.

EI seems to be inherent in ADHD for numerous reasons.[2] First, history reflects the longstanding inclusion of EI in its precursor disorders from 1798 to the mid-1970s[2,9,10] when it was relegated to an associated feature in the DSMs.[2] Second, contemporary models include emotional inhibition in the executive functions disrupted in ADHD.[7,8,11] Third, neuro-imaging studies identify prefrontal networks involved in ADHD[12,13] that include pathways inhibiting emotions and subsequently self-regulating them.[14,15] Fourth, EI is frequently observed in ADHD cases.[2] Fifth, including EI in ADHD may better explain its comorbidity, especially with oppositional defiant disorder (ODD). EI may actually comprise the

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emotional element of the two-factor (emotional/social) structure of ODD.[2] Finally, EI may better account for impairments that are not easily explained by the two dimensions of ADHD, such as social rejection, parent–child interaction conflicts, parenting stress, road rage, and impaired workplace interpersonal functioning.[2]

Even so, EI may serve only as a proxy for the other two ADHD dimensions with which it is associated and may not actually contribute any effects beyond them. We therefore examined the extent of EI in ADHD and the degree to which it contributes uniquely to major life impairments. We used the most recent follow-up (mean age 27 years) of hyperactive and control children at adulthood. The impairments in numerous domains identified at this follow-up were previously published.[16] Those measures permitted us to evaluate here the contribution of EI to impairment. So that we did not exclusively rely on self-report of EI and impairment, we used some measures of impairment from other sources (employers, significant others, archival records) from an earlier follow-up.

## METHOD

### Participants

This study used a group rigorously diagnosed as hyperactive in childhood (N = 158) and a community control group (N = 81) followed concurrently. The groups have been described previously in this journal[17] and elsewhere.[16] At this (age 27 years) follow-up, we saw 135 of the original hyperactive participants (H) (85%) and 75 of the original 81 control (C) participants (93%). Because DSM-IV criteria were developed only on children and their utility for adult diagnosis has been challenged on numerous grounds,[16,18] we used modified criteria to establish the persistence of ADHD to age 27 years as recommended elsewhere.[16] The symptom threshold was reduced from six to four on either list to capture cases of individuals who may outgrow DSM criteria while remaining highly symptomatic, impaired, and developmentally inappropriate.[19] Likewise, requiring one area of impairment, rather than two or more as required in DSM-IV, identifies adults as developmentally inappropriate.[16] A total of 55 (44%) H participants met those modified criteria for ADHD at follow-up (i.e., whose ADHD persisted into adulthood [ADHD-P]). The remaining 80 participants were those whose ADHD did not persist into adulthood (ADHD-NP).

The three groups did not differ in their sex composition (84% to 93% male). A slightly yet significantly lower percentage of the H group consisted of self-identified white ethnicity (81% to 84%) compared with the C group (97%); 7% of the H group were African American, 4% Hispanic/Latino, and 7% were classified as "other," mostly Native American. The figures for the C group were 0%, 0%, and 3%, respectively. The groups did not differ in their age, but the H group was less educated and had a lower IQ at all follow-ups relative to the C group. In each ADHD group, 7% to 14% of individuals were currently taking psychiatric medication; the groups did not differ in this respect. Individuals receiving medication (N = 14) did not differ from those not on medication on current and childhood ADHD symptoms and impairments. Thus current medication use is not likely to have influenced the independent variable in this study (ADHD severity).

### Procedures

All participants were contacted by phone and given an explanation of the study. They were then scheduled for their evaluations over a 2-day period when written consent was obtained. They were next given a battery of measures that assessed psychiatric disorders, history of mental health treatments, outcomes in major life activities, antisocial activities and drug use, and medical history, psychological tests, and rating scales. All interviews were conducted by an experienced psychological assistant under the supervision of a licensed neuropsychologist. This assistant was not blind to original group membership but was blind to the ADHD designation at follow-up. Participants were paid a stipend. The project was approved by the Medical College of Wisconsin human research board.

### Measures—Age 27 Years

*Vocabulary and Block Design Subtests—Wechsler Adult Intelligence Scale Third Edition.*[20] Scaled scores from these two subtests provided a proxy for verbal and nonverbal intelligence and were chosen for having high correlations with the Verbal and Nonverbal IQ scores, respectively, from the full test.

*Structured Clinical ADHD Interview.*[21] This interview contains DSM-IV criteria for ADHD and was used for the diagnoses of ADHD. Six domains of impairment were reviewed and had to be impaired often or more frequently to count as affirmative. Interjudge agreement was acceptable (85% to 91%) in our prior study.[16]

*Adult ADHD Symptoms Scale.*[21] This scale contains the 18 ADHD items (DSM-IV) each answered on a scale of 0 to 3 (Not At All, Sometimes, Often, and Very Often). Impairment was rated in 10 major life activities: home life, work, social interactions, community activities, educational activities, dating or marriage, money management, driving, leisure activities, and handling daily responsibilities. Each domain represented a single item and each was rated on the same