The Association Between PTSD and ADHD: Does the Association Reveal a PTSD-Somatoform Subtype?

To the Editor: Spencer et al[1] recently published the findings of their meta-analysis in which they report a robust bidirectional association between attention-deficit/hyperactivity disorder (ADHD) and posttraumatic stress disorder (PTSD). One of the most peculiar results found by Spencer et al was that "the increased risk for PTSD in individuals with ADHD cannot be explained solely by an increased rate of trauma exposure in this population,"[1(p80)] suggesting other environmental and biological factors may be involved.

Schottenfeld and Cullen[2] discussed a PTSD subtype that may clinically present as a somatoform disorder and is quite likely attributable to hypersensitivity to certain occupational-induced exposures including air pollution ("All of the patients with atypical posttraumatic stress disorder attempted to avoid exposure to such odors, often by limiting work, hobbies, or other activities. One patient habitually wore a gas mask whenever she left her house"[2[p200]]). Giacobo et al[3] showed that subjects with ADHD exhibit functional somatic symptoms, suggesting that atypical PTSD may share some physiological similarities with diagnosed ADHD.

Geracioti et al[4] demonstrated higher norepinephrine concentrations in the cerebrospinal fluid of male combat veterans versus healthy male controls, suggesting that a heightened central noradrenergic baseline may characterize typical PTSD pathology. Certain environmental exposures, though, may elicit similar neurologic effects as those found in typical PTSD and thus contribute to not only an atypical presentation of PTSD (ie, without trauma) but ADHD as well.

I have previously suggested that daily exposure to certain environmental air pollutants, principally nitrous oxide (N_2O), may contribute to the development of neuropathology, including ADHD.[5] Zhang et al[6] reported that the analgesic action of N_2O is thought to involve the release of norepinephrine in the spinal cord and that certain pharmaceutical agents, like naltrexone, can abrogate this action. This pharmacologic property may explain why naltrexone has been repeatedly found to be an effective treatment in the management of PTSD and associated comorbidities.[7,8]

This discussion posits a neurobiological explanation for the association between PTSD and ADHD, as shown by Spencer et al[1] in their meta-analysis. More work is needed to better characterize the nature of this association and the underlying physiological mechanisms and determine whether certain subtypes of the disorders (ie, atypical vs typical PTSD, hyperactive versus inattentive ADHD) are more closely associated than others. Understanding these neurobiological interactions may be helpful for clinicians and scientists in their efforts to better monitor and treat patients with various presentations of the 2 disorders (typical PTSD, atypical PTSD with comorbid ADHD, etc).

References

1. Spencer AE, Faraone SV, Bogucki OE, et al. Examining the association between posttraumatic stress disorder and attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. *J Clin Psychiatry*. 2016;77(1):72–83.
2. Schottenfeld RS, Cullen MR. Occupation-induced posttraumatic stress disorders. *Am J Psychiatry*. 1985;142(2):198–202.
3. Giacobo RS, Jané MC, Bonillo A, et al. ADHD and functional somatic symptoms: structural equations of a conceptual model. *Child Adol Ment H-UK*. 2014;19(2):83–89.
4. Geracioti TD Jr, Baker DG, Ekhator NN, et al. CSF norepinephrine concentrations in posttraumatic stress disorder. *Am J Psychiatry*. 2001;158(8):1227–1230.
5. Fluegge K. A reply to Wang T, Shan L, Du L, Feng J, Xu Z, Staal WG, Jia F. Serum concentration of 25-hydroxyvitamin D in autism spectrum disorder: a systematic review and meta-analysis. *Eur Child Adolesc Psychiatry*. 2016;25(4):453–454. 10.1007/s00787-015-0786-1
6. Zhang C, Davies MF, Guo TZ, et al. The analgesic action of nitrous oxide is dependent on the release of norepinephrine in the dorsal horn of the spinal cord. *Anesthesiology*. 1999;91(5):1401–1407.
7. Foa EB, Yusko DA, McLean CP, et al. Concurrent naltrexone and prolonged exposure therapy for patients with comorbid alcohol dependence and PTSD: a randomized clinical trial. *JAMA*. 2013;310(5):488–495.
8. Qazi H, Wijegunaratne H, Savajiyani R, et al. Naltrexone and prazosin combination for posttraumatic stress disorder and alcohol use disorder. *Prim Care Companion CNS Disord*. 2014;16(4):10.4088/PCC.14l01638. 10.4088/PCC.14l01638

Keith Fluegge, BA[a]
keithfluegge@gmail.com

[a]Institute of Health and Environmental Research, Cleveland, Ohio

Potential conflicts of interest: None.

Funding/support: None.

J Clin Psychiatry 2016;77(9):e1149
dx.doi.org/10.4088/JCP.16lr10630

It is illegal to post this copyrighted PDF on any website.

Drs Spencer and Biederman Reply

To the Editor: We thank Mr Fluegge for his commentary on our recently published article. Our meta-analysis showed a robust and bidirectional association between ADHD and PTSD and included only studies that operationalized the diagnoses of ADHD and PTSD using standardized tools and *DSM* criteria. Therefore, our study did not address any connection between PTSD-like or ADHD-like symptoms that do not meet *DSM* criteria or that may be considered atypical presentations of either disorder. We also did not show a specific association with environmental toxins in our meta-analysis.

All subjects with PTSD had, by definition, experienced trauma. Trauma is necessary for the development of PTSD, but not all individuals who are traumatized develop PTSD. Our findings that the association between ADHD and PTSD was not fully explained by trauma indicate that among groups of people who have experienced similar trauma, those with ADHD are more likely to develop PTSD, and those who develop PTSD are more likely to have ADHD. The link we discovered was not between ADHD and trauma, but rather specifically between ADHD and the development of PTSD following a traumatic experience. This finding suggests that individuals with ADHD may have a vulnerability to developing PTSD following a traumatic experience and certainly warrants future investigation.

Andrea E. Spencer, MD[a,b]
aespencer@partners.org
Joseph Biederman, MD[a]

[a]Clinical & Research Program in Pediatric Psychopharmacology & Adult ADHD, Massachusetts General Hospital, Boston
[b]Harvard Medical School, Boston, Massachusetts

Potential conflicts of interest: None.
Funding/support: None.
J Clin Psychiatry 2016;77(9):e1150
dx.doi.org/10.4088/JCP.16lr10630a

It is illegal to post this copyrighted PDF on any website.