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Attention-Deficit/Hyperactivity Disorder symptoms in an adult sample: Associations with Rothbart's temperament dimensions

Rapson Gomez [a,*], Chantelle Kyriakides [b], Elaine Devlin [b]

[a] School of Health Sciences, University of Ballarat, Australia
[b] School of Psychology, University of Tasmania, Australia

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ABSTRACT

Relationships between Rothbart's 13 temperament sub-dimensions and the Attention-Deficit/Hyperactivity Disorder (ADHD) factors for the 2-factor model [inattention (IA) and hyperactivity/impulsivity (HI) domains] and the bifactor model (general ADHD, and specific factors for IA and HI) were examined in 267 adults from the general population. Regression analyses revealed that (1) both the IA and HI factors in the 2-factor model and the general ADHD factor in the bifactor model were predicted positively by sad, discomfort and associative sensitivity, and negatively by activation control, (2) the HI domain factor in the 2-factor model was also predicted negatively by inhibitory control, (3) the specific IA factor in the bifactor model was predicted negatively by activation control and attention control, and (4) the HI specific factor in the bifactor model was predicted negatively by inhibitory control and positively by sociability. These theoretical and clinical implications of the findings are discussed.

1. Introduction

Temperament is generally viewed as constitutionally based individual differences in reactivity and self-regulation. It differs from personality, in that, it does not include specific cognitions, beliefs and values that are included in personality (Evans & Rothbart, 2007). According to Evans and Rothbart, temperament is the etiological agent of psychopathology. Thus, establishing links between psychological disorders and psychopathological constructs with temperament dimensions are valuable in improving our understanding of the diatheses, cause, progression, prognosis, and treatment of psychological disorders. The aim of this study is to examine how the temperament dimensions proposed by Rothbart, Ahadi, and Evans (2000), Evans and Rothbart (2007), referred to henceforth as Rothbart's model, are related to dimensions of Attention-Deficit/Hyperactivity Disorder (ADHD; American Psychiatric Association, APA, 2013) in a group of adults from the general community.

For diagnosis of ADHD, the current edition of the Diagnostic and Statistical Manual (DSM-5, APA, 2013) and the previous edition (DSM-IV TR, 2000) list eighteen symptoms under two separate symptom groups, namely inattention (IA) and hyperactivity/impulsivity (HI), with nine symptoms in each group. DSM-IV-TR indicates that there are three types of ADHD: inattentive type, hyperactive/impulsivity type, and combined type. DSM-5 has replaced subtypes with presentation specifiers that map directly to the prior ADHD subtypes. Studies have shown that 50% of children diagnosed with ADHD will continue to have this disorder as adults (Biederman et al., 1993). For adults, there is general decline of the ADHD symptoms with age, with the decline being more evident for IA than HI (Murphy & Barkley, 1996). Also, the average prevalence estimate is around 4.4%, and (as in children), it is highly comorbid with other disorders as well as considerable role disability (Kessler et al., 2006).

Dual pathways theories of ADHD suggest that "top-down" control processes underlie the IA symptoms, while "bottom-up" control processes underlie the HI symptoms (Martel & Nigg, 2006; Sonuga-Barke, 2003). Top-down control processes reflect executive, deliberate and effortful forms of control. They are goal-directed, resource-demanding, and involve focused and sustained attention in order to complete tasks. They involve prefrontal circuitry regions. Bottom-up control processes reflect stimulus-driven activation, and they are more influenced by immediate incentive or affective response. They are more reactive, and involve the parietal cortex or subcortical regions.

In terms of structural organization of the ADHD symptoms, the commonly accepted view is that they reflect a 2-factor model, with separate, but correlated, factors for the IA and HI (e.g., Gomez, Harvey, Quick, Scharer, & Harris, 1999). Fig. 1 (left side) depicts the path diagram of this model. In this model, the IA and HI factors explain the coherency of the symptoms within the IA and HI

* Corresponding author. Address: School of Health Sciences, University of Ballarat, University Drive, Mt Helen, PO Box 663, Ballarat, Victoria 3353, Australia. Tel.: +61 3 5327 6087.
E-mail address: rapson.gomez@ballarat.edu.au (R. Gomez).

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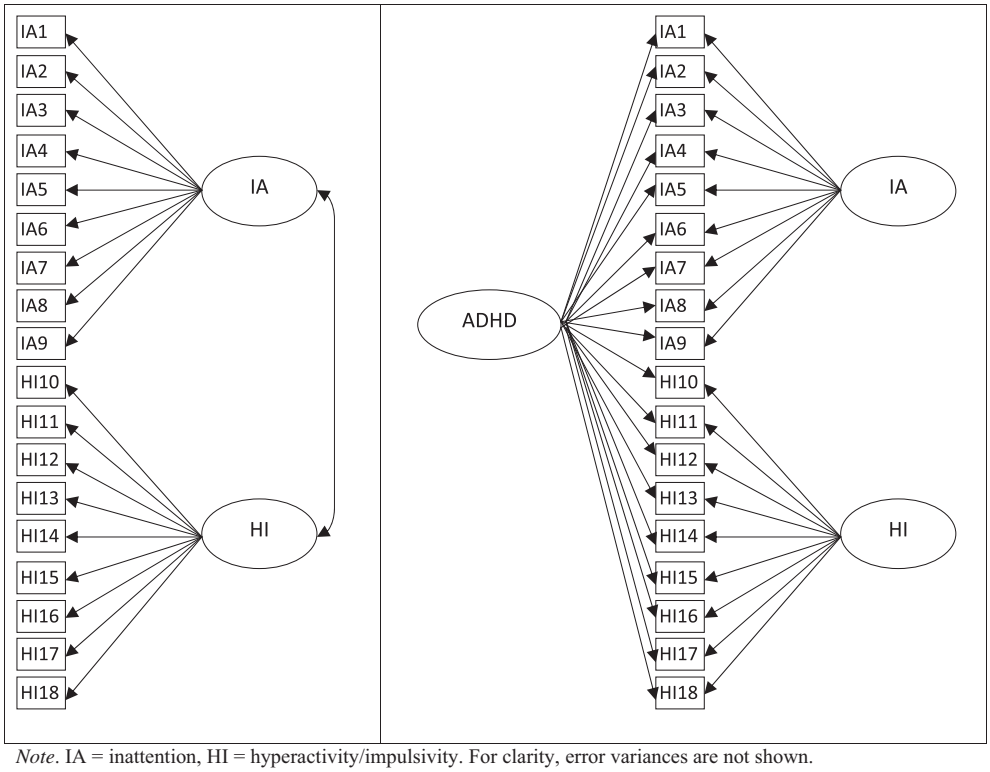

Note. IA = inattention, HI = hyperactivity/impulsivity. For clarity, error variances are not shown.

Fig. 1. Schematic representation of path diagrams of the ADHD 2-factor (left) and bifactor (right) models.

symptom groups, respectively. Recently, researchers have suggested a bifactor model (Gibbins, Toplak, Flora, Weiss, & Tannock, 2012; Martel, von Eye, & Nigg, 2010; Toplak et al., 2009). Fig. 1 (right side) shows the path diagram for the ADHD bifactor model. A bifactor model is a latent structure with a general factor, on which all items load, and two or more domain specific factors. The general and specific factors are uncorrelated (orthogonal model). In the case of the ADHD bifactor model, the general factor represents what is common among all the 18 ADHD symptoms, and there are two specific factors, one for the 9 IA symptoms, and another one for the 9 HI symptoms. These specific factors represent specific symptom response variances in the IA and HI symptom groups that are not accounted for by the general factor.

A dominant model of temperament is that proposed by Rothbart et al. (2000). Rothbart's model comprises major dimensions for extraversion/surgency (the tendency to sociability, display positive affect and enjoy high intensity activities), negative affectivity (the tendency to respond intensely, especially to negative emotional cues), effortful control (aspects of behaviour associated with regulation) and orienting sensitivity (the degree to which an individual is sensitive to cues in the individual's environment). The effortful control includes subscales for activation control, attention control, and inhibitory control. The distinction between activation/attention control and inhibitory control is featured in the Eisenberg et al. (2005) extension of Rothbart's model. Called effortful control and reactive control, respectively, they tap mostly top-down and bottom-up control processes, respectively.

Although many studies have examined the relationships of ADHD with personality dimensions, only a few studies, all involving children or adolescents, have examined the relationships of ADHD with temperament dimensions. For Rothbart's model, Goldsmith, Lemery, and Essex (2004) found negative correlations for effortful control and negative affect with ADHD. De Pauw and Mervielde (2011) found that ADHD was associated with low effortful control and high negative affectivity. For Eisenberg's model, Martel and Nigg (2006) found that resiliency (ability to engage in flexible modulation of reactive or effortful control) and effortful control correlated negatively with IA, while reactive control correlated negatively with HI. Recently, Martel, Roberts, Gremillion, von Eye, and Nigg (2011) examined the relationships of temperament dimensions of reactive control, effortful control, negative emotionality, and resiliency with the general and specific factors of the ADHD bifactor model. The findings showed that effortful control and reactive control were associated negatively with the HI specific factor and the general ADHD factor, whereas reactive control was associated positively with the IA specific factor. Also, negative affectivity was positively associated with the specific HI factor and the general factor. Resiliency was associated negatively with all three factors.

Despite some existing data on the relationships of ADHD with temperament dimensions, there are limitations. First, no study has examined the relationships of temperament dimensions with ADHD among adults. Second, as past studies have primarily used correlation analyses, the findings do not reflect the unique relationships of the temperament dimensions with ADHD as there are substantial shared variance across the temperament dimensions (Evans & Rothbart, 2007). The unique relationships could be ascertained using multiple regression analysis in which all the temperament dimensions are entered simultaneously as predictors of ADHD. Third, although age and sex are known to influence ADHD symptom levels, their effects were not controlled in most previous studies. Fourth, all past studies have examined broad temperament dimensions, and not the sub-dimensions. In this respect, the major dimensions in Rothbart's model comprise three to four sub-dimensions (described in the Method section). It is conceivable that examination of how the sub-dimensions of temperament are related to ADHD would provide a more comprehensive understanding of the temperament-ADHD relationship.