Childhood ADHD Symptoms and Adolescent Big Five Personality Traits:

A Longitudinal Study in Girls

By

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Abstract

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Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by symptoms of inattention (IA) and/or hyperactivity/impulsivity (HI). An under-explored area of research is the linkage between ADHD symptom dimensions and Big Five personality trait dimensions. The few investigations of longitudinal relations between ADHD symptom dimensions and personality have tended to rely on retrospective methods. Herein, we prospectively examine the links between (a) childhood IA and HI and (b) adolescent personality domains in girls, with emphasis on minimizing shared method variance. Data emanated from the Berkeley Girls with ADHD Longitudinal Study, in which participants were followed longitudinally over two waves of data collection. Via zero-order correlations, multiple regression models, and hierarchical regressions, we examined the relations between childhood ADHD (diagnostic status, as well as IA and HI) and self-reported adolescent personality traits (Conscientiousness, Agreeableness, Neuroticism, Openness to Experience, and Extraversion). Consistent with hypotheses, IA independently and negatively predicted adolescent Conscientiousness, and HI independently and negatively predicted Agreeableness, whereas neither predicted adolescent Neuroticism. Contradictory to our expectations, IA negatively and independently predicted adolescent Openness whereas HI positively and independently predicted
this variable. Findings were robust to the removal of directly overlapping items across symptom and personality measures. Overall, IA, and HI predict negative self-perceptions in later life among females, perhaps pointing to a potential explanation as to why females with ADHD remain at high risk for many negative life outcomes, regardless of ADHD persistence.

Keywords: personality, psychopathology, ADHD, Big Five, longitudinal, childhood, adolescence, self-concept
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Where does personality end and psychopathology begin? Are these separate constructs? Does psychopathology represent “extreme” levels of personality traits? For persons with mental illness, how much of their experience and behavioral patterns can be attributed to underlying personality and how much to an underlying “disorder”? Such philosophical questions drive the present prospective, longitudinal investigation.

Personality is defined as a person’s habitual pattern of thinking, feeling, and behaving (Pervin et al., 2005), commonly viewed as a collection of such characteristics that are fairly stable over time. In comparison, psychopathology is often viewed as an illness or disease rather than a collection of qualities intrinsic to a person. Yet personality is actually more malleable than commonly believed (Srivastava et al., 2003); intriguingly, both psychopathology and personality can change in response to psychotherapy (Chapman et al., 2014). Research on the comparative temporal stability of different types of psychopathology and personality characteristics is largely undeveloped: Although it is generally assumed that personality is more stable than psychopathology, there is not much literature to support this assertion. Without evidence to the contrary, it is possible that some types of psychopathology might actually be more stable and enduring than one’s Big Five personality profile, whereas other types of psychopathology may be fleeting (Baca-Garcia et al., 2007).

Although personality and psychopathology are often conceptualized as distinct constructs, heavy conceptual overlap exists between measures of personality/temperament and psychopathology (for a review, see De Pauw & Mervielde, 2010). For example, almost all items on the Big Five Inventory (BFI) that tap the personality dimension of neuroticism can be found on clinical measures of depression and/or anxiety. Furthermore, substantial overlap exists across items from attention-deficit/hyperactivity disorder (ADHD) and temperament/personality measures, as described below.

ADHD is a neurodevelopmental disorder characterized by behavioral symptom dimensions of inattention and/or hyperactivity/impulsivity. Inattentive symptoms include behaviors such as making frequent careless mistakes, having difficulty paying attention, getting distracted easily, disorganization, and forgetfulness; hyperactive/impulsive symptoms include frequent fidgeting, leaving one’s seat, and climbing or running when it is inappropriate to do so, difficulty working or playing quietly, and frequently interrupting (American Psychiatric Association, 2013). Given the strongly heritable nature of the dimensions of inattention and hyperactivity/impulsivity (Barkley, 2015b), it is often assumed that ADHD carries strong temperamental underpinnings (in transaction with the environment), where temperament is defined as consistent, early-appearing individual differences in behavior and affect, with much temperament research focusing on infancy and toddlerhood (see Rothbart, 2007).

Where temperament leaves off and personality traits begin is the subject of considerable debate (Widiger, 2017). There are several theories of temperament, but they converge on four temperamental dimensions: emotionality, activity level, sociability vs. social inhibition, and persistence/effortful control (De Pauw & Mervielde, 2010). One highly influential model of personality (the Five Factor Model [FFM]) posits five fundamental, bipolar factors: Conscientiousness, Agreeableness, Neuroticism (i.e., Negative Emotionality), Openness to Experience, and Extraversion (Widiger, 2017). Conscientiousness generally encompasses traits such as responsible, organized, and persistent; Agreeableness: helpful, cooperative, and trusting; Neuroticism: depressed, moody, and anxious; Openness to Experience: curious and aesthetically
appreciative; and Extraversion: outgoing and assertive (John et al., 2008).

In terms of overlap between ADHD and temperament/personality, inattentive symptoms overlap with items tapping the persistence/effortful control dimension of temperament, and they are highly conceptually related to the FFM’s conscientiousness dimension of personality. Hyperactive/impulsive symptoms are captured, in part, by activity level, persistence/effortful control, and emotionality dimensions of temperament, and to a lesser extent by the FFM’s extraversion dimension of personality. Although not an official component of ADHD, emotional dysregulation (often manifesting as “emotional impulsivity”) is commonly conceptualized as highly related to the ADHD syndrome (see Barkley, 2015a; Faraone et al., 2019), corresponding to the negative emotionality dimension of temperament as well as to higher neuroticism. Finally, ADHD is associated with social difficulties, including increased levels of peer conflict and aggression (Hinshaw, 2018), with apparent correspondence to low agreeableness.

Even though the constructs of psychopathology and personality clearly overlap—particularly between inattention and conscientiousness in this instance—the two constructs are often viewed as at least partially distinct. Some of the distinction emanates from the ways in which they are measured. More specifically, ADHD measures (as well as psychopathology measures more generally) often ask about a person’s particular symptoms within a specific time span, whereas personality measures ask questions about personal perceptions or views of characteristics in a global (e.g., “how much does this seem characteristic of you”) rather than time-bound (e.g., “did you experience this within the past week”) manner. Even more, for children and adolescents, adult informants are the preferred source of ADHD symptom measures, whereas personality scales are typically self-reported. It follows that self-reported personality, then, can be conceptualized as a measure of a person’s identity (how an individual perceives herself; Back et al., 2009; McAdams, 1995; Widiger, 2017).

With this definition of “self-reported personality as identity” in mind, examining how personality and psychopathology unfold, interact, and transact over time becomes an intriguing prospect. The issues are complex, as there are many potential (and not mutually exclusive) linkages between these constructs. Personality may predict later personality; psychopathology may predict later psychopathology; personality could predict later psychopathology; and psychopathology could predict later personality. (Omitted from this discussion are additional linkages between temperament and either construct.) To gain a foothold, investigators would ideally exert initial focus on a smaller piece of the larger question. Thus, we leveraged data from the Berkeley Girls with ADHD Longitudinal Study (BGALS) to test whether ADHD in childhood predicts personality constructs in adolescence.

A recent meta-analysis (Gomez & Corr, 2014)—spanning clinical, community, adult, and child samples—revealed cross-sectional associations between ADHD symptoms and personality traits. Specifically, inattention, hyperactivity/impulsivity, and an ADHD diagnosis were all linked to higher Neuroticism, lower Conscientiousness (stronger for inattention), and lower Agreeableness (stronger for hyperactivity/impulsivity). That is, on average, people with more severe ADHD symptoms tend to concurrently perceive themselves as more sad, anxious, unreliable, disorganized, unhelpful, and uncooperative than those with fewer ADHD symptoms. Most relevant research has been cross-sectional, performed chiefly with adults (Gomez & Corr, 2014). Few studies have examined the longitudinal relations between ADHD dimensions and personality, and these tend to rely on retrospective methods (Wallace et al., 2016). One notable exception is the investigation by Miller et al. (2008), which did investigate prospective, longitudinal links between a childhood ADHD diagnosis and late adolescent personality (self-
rated on the NEO PI-R), taking into account persistence and desistence of ADHD. Specifically, childhood ADHD (categorically defined) was negatively predictive of adolescent Conscientiousness regardless of whether ADHD persisted to late adolescence, but childhood ADHD negatively predicted Agreeableness and positively predicted Neuroticism only in the group of participants whose ADHD persisted into late adolescence. However, a very small proportion (only 20 participants of the overall sample of 170) were female, so questions remain about how generalizable these findings are to females with ADHD.

Childhood ADHD, including the constituent dimensions of inattention and hyperactivity/impulsivity, predict a wide range of long-term, broad-based negative outcomes: impaired academic/work performance (Lundervold et al., 2017; Owens et al., 2017), accidental injury/death (Nigg, 2013; Reinhardt & Reinhardt, 2013), substance abuse/dependence (Nigg, 2013; Reinhardt & Reinhardt, 2013), cigarette smoking (Nigg, 2013), psychological maladjustment (Hinshaw et al., 2012), and self-harm, including suicide attempts (Hinshaw et al., 2012; Nigg, 2013). Individuals with a childhood diagnosis of ADHD are at much higher risk (compared to those without a history of ADHD) for many of these poor life outcomes even if their symptoms remit (Owens et al., 2017). Addressing whether childhood ADHD symptoms predict later personality traits might point to a potential mechanism by which these negative outcomes occur, given that personality traits are concurrently associated with academic/occupational performance, criminality, mental health, suicidality, addiction, and relationship quality (Newton-Howes et al., 2015; Ozer & Benet-Martínez, 2006).

In terms of personality traits relevant for ADHD, (1) lower Conscientiousness and higher Neuroticism are associated with poorer academic and occupational performance, and (2) high Neuroticism and low Agreeableness predict self-harm (Ozer & Benet-Martínez, 2006). Adolescence is a particularly important developmental period for relevant investigations, as most existing research on the linkages between personality traits and life outcomes features adults (Ozer & Benet-Martínez, 2006). Cross-sectionally, Big Five personality characteristics in adults have been found to mediate associations between (a) retrospectively-reported childhood inattention and hyperactivity/impulsivity and (b) adult substance use/problems (Wallace et al., 2016), but strong inference requires prospective designs.

The current study constitutes the first step of a more ambitious investigation designed to understand whether prospective linkages between (a) childhood ADHD (considered both categorically and dimensionally) and (b) important young-adult impairments are mediated by adolescent personality traits. In this initial investigation, our aim is to prospectively examine the link between childhood inattention and hyperactivity/impulsivity (as well as the diagnostic category of ADHD per se) and adolescent personality traits, using different data sources at different time points in order to minimize shared method variance. Our sample provides us a unique opportunity for such examination in females, who are typically understudied in the area of ADHD (Hinshaw, 2018). Based on the literature, we hypothesize that childhood inattention, hyperactivity/impulsivity, and categorical ADHD will all negatively predict adolescent Conscientiousness and Agreeableness and positively predict adolescent Neuroticism. Given the lack of significant cross-sectional correlations between ADHD and Openness to Experience and Extraversion (Gomez & Corr, 2014), we hypothesize no significant longitudinal predictions to those personality dimensions. Additionally, we predict that (a) regression-based predictions to adolescent Conscientiousness will be stronger for childhood inattention than for hyperactivity/impulsivity and (b) regression-based predictions to Agreeableness will be stronger for childhood hyperactivity/impulsivity than for inattention. As described in more detail below,
we also take pains to remove items between ADHD measures and personality measures that are essentially identical, as failing to do so could spuriously inflate predictive associations.

**Method**

**Overview of Procedures**

Data were drawn from a longitudinal dataset (Berkeley Girls with ADHD Longitudinal Study [BGALS]), which features prospective predictions from childhood ADHD and its dimensions (inattention, hyperactivity/impulsivity) to crucial early-adult outcomes (for an overview, see Owens et al., 2016). Participants were followed prospectively for approximately 16 years across four waves of data collection: Wave 1 (childhood), age 6-12 years, \( M = 9.6 \) years; Wave 2 (adolescence), age 11-18 years, \( M = 14.2 \) years; Wave 3 (emerging adulthood), age 17-24 years, \( M = 19.6 \) years; and Wave 4 (early adulthood), 21-29 years, \( M = 25.6 \) years. Retention rates at all waves ranged from 92-95%. For the present investigation, we focus on predictions from Wave 1 ADHD symptoms to Wave 2 personality dimensions.

**Participants**

Participants were girls with (\( N = 140 \)) or without (\( N = 88 \)) carefully diagnosed childhood ADHD who were recruited from schools, doctors’ offices, mental health care settings, and advertisements. The sample was ethnically and socioeconomically diverse; the clinical and comparison samples were group-matched on age, neighborhood and ethnicity. They participated alongside one another in enrichment summer research programs in 1997, 1998, or 1999 (see Hinshaw, 2002, for details on Wave 1 sample ascertainment and baseline findings).

**Measures**

**Inattention (IA) and Hyperactive/Impulsive (HI) symptoms, Wave 1.** At Wave 1, measures of childhood IA and HI were collected via validated parent and teacher reports on the Swanson, Nolan, and Pelham 4 (SNAP-IV) questionnaire, a dimensionalized checklist of the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM–IV; American Psychiatric Association, 1994) items for ADHD IA, HI, and oppositional defiant disorder (ODD; not included in the present study). Informants rated each item on a 4-point Likert metric: 0 = Not at all, 1 = Just a little, 2 = Pretty much, and 3 = Very much. The SNAP-IV is widely used as an ADHD screener (e.g., in the Multimodal Treatment Study of Children with ADHD [MTA]; MTA Cooperative Group, 1999) and has acceptable to excellent internal consistency, test-retest reliability, and validity statistics (Swanson, 1992). For each participant, composite scores were calculated for each reporter on each symptom dimension by calculating the mean rating of the corresponding items. A cross-observer aggregate score was then calculated for each symptom dimension by averaging the composite scores of the primary caregiver and teacher.

The primary caregiver was the participant’s mother or other female relative for all but two participants, for whom their fathers were considered the primary caregivers. One participant was missing a teacher report but was homeschooled, so the primary caregiver’s mean ratings were used in place of the cross-observer aggregate scores for this individual. Descriptive statistics, alpha reliabilities, and intercorrelations among SNAP-IV variables are reported in Table 1. All analyses reported in subsequent tables used the multi-informant composite scores for IA and HI.

**ADHD diagnosis, Wave 1.** DSM-IV diagnostic status for childhood ADHD (diagnosed/not) was determined using the Diagnostic Interview Schedule for Children (4th ed.; DISC-IV; Shaffer et al., 2000) via parent-report. That is, following a given child’s surpassing of symptom-based thresholds on the SNAP (see above), a full DISC-IV structured interview occurred with the family. The child had to meet full criteria for either the Inattentive or
Combined presentation of ADHD on the basis of the DISC-IV for study inclusion. Study clinicians supplemented the DISC-IV interview with the use of no more than two items on the teacher-report form of the SNAP-IV. The comparison sample did not meet criteria for ADHD. For details, see Hinshaw (2002). The DISC-IV parent-report has acceptable to excellent test-retest reliability and testing validity (Shaffer et al., 2000).

**Big Five personality, Wave 2.** Personality characteristics in adolescence (Wave 2) were measured using self-report on the Big Five Inventory (BFI; John et al., 1991; John & Srivastava, 1999), which generates reliable composite scores for each dimension of the Five Factor Model of personality. In response to the prompt, “I see myself as someone who...” each adolescent girl rated herself for 44 descriptive items, on a 5-point Likert scale with the following response options: 1 = Disagree strongly, 2 = Disagree a little, 3 = Neither agree nor disagree, 4 = Agree a little, and 5 = Agree strongly. Composite scores were generated for each of the Big Five traits by taking the mean rating of items for each personality dimension. Internal consistency and test-retest reliability are in the good to excellent range across most adult samples, with clearly differentiated factors; the five-factor structure of this measure holds for individuals as young as 10 years of age (though, controlling for acquiescence is recommended for respondents under the age of 14 years; Soto et al., 2008).

Descriptive statistics and alpha reliabilities for each personality dimension for our sample at Wave 2 are reported here as follows: Conscientiousness ($M = 3.39$, $SD = 0.71$, $\alpha = .81$), Agreeableness ($M = 3.86$, $SD = .62$, $\alpha = .79$), Neuroticism ($M = 2.64$, $SD = 0.68$, $\alpha = .77$), Openness to Experience ($M = 4.07$, $SD = 0.54$, $\alpha = .75$), and Extraversion ($M = 3.71$, $SD = 0.67$, $\alpha = .76$).

**Data Analytic Plan**

Following data collection but prior to any analysis of the data, we preregistered study methods, hypotheses, and data analytic plan on the Open Science Foundation (OSF; osf.io) platform. The preregistration can be accessed here: [https://osf.io/xjrsy/?view_only=4dc63e76facb4ab285f70df5c0012080](https://osf.io/xjrsy/?view_only=4dc63e76facb4ab285f70df5c0012080)

Zero-order correlations were calculated between the childhood predictors (i.e., Wave 1 multi-informant composite scores for IA and HI, Wave 1 ADHD diagnostic status) and adolescent outcome variables (composite scores for each personality dimension at Wave 2). To examine the independent effect of each symptom dimension as a predictor, we also conducted five separate multiple regressions with Wave 1 IA and HI both predicting a single personality dimension at a specific time point (Wave 2), examining the corresponding standardized beta coefficients.

Additionally, to separate the predictive effects of the ADHD syndrome from the effects of individual IA or HI symptom dimensions, we conducted ten 2-step hierarchical multiple regressions, with categorical childhood ADHD predicting a single adolescent personality dimension in Step 1 for all analyses, and with categorical childhood ADHD and a single childhood symptom dimension (IA or HI) predicting a single adolescent personality dimension in Step 2.

To address the artifactual overlap between SNAP-IV Inattention items and BFI Conscientiousness items, we created a list of overlapping items, identified three “seriously overlapping” items, and randomly (using a random number generator) chose one item from each pair of overlapping items to remove from the scale (see Table 2). We removed the item “Is easily distracted” from the SNAP-IV Inattention scale and the items “Can be somewhat careless” and “Tends to be disorganized” from the BFI Conscientiousness scale. The rationale, again, was to
prevent spurious predictions from nearly-identical items. We re-calculated the average rating for each scale with the smaller sets of items and re-conducted analyses as a check on robustness.

Results

As shown in Table 3, childhood ADHD, and its constituent symptom dimensions of IA and HI, were negatively correlated with adolescent Conscientiousness and Agreeableness, positively associated with adolescent Neuroticism, and not significantly associated with Openness to Experience or Extraversion. Within the sample, the correlation between Wave 1 IA and HI was strong, \( r = .76 \). Still, because there is nearly half of the variance not shared between these dimensions, we continued to examine their independent contributions to the personality measures at Wave 2.

Next, as displayed in Table 3, in multiple regressions examining both childhood IA and HI as simultaneous predictors of each Big Five personality dimension at Wave 2, IA negatively predicted adolescent Conscientiousness, but HI was no longer a significant predictor. In parallel, HI negatively predicted adolescent Agreeableness, but IA was no longer a significant predictor. Neither symptom dimension significantly predicted adolescent Neuroticism or Extraversion. Finally, adolescent Openness to Experience was negatively predicted by childhood IA and positively predicted by childhood HI.

Table 4 depicts the results for analyses conducted with item overlap removed between the SNAP-IV IA scale and the BFI Conscientiousness scale. Results were nearly indistinguishable from the results reported in Table 2.

Results from two-step hierarchical multiple regressions are reported in Table 5. In Step 1 of each, categorical childhood ADHD diagnosis (yes/no) negatively predicted adolescent Conscientiousness and Agreeableness and positively predicted adolescent Neuroticism. In the Step 2 analyses for which ADHD diagnosis and IA were entered as predictors, childhood IA independently and negatively predicted adolescent Conscientiousness above and beyond the ADHD diagnosis but did not independently predict any other adolescent personality characteristics. In the Step 2 analyses for which ADHD diagnosis and HI were entered as predictors, childhood ADHD independently and negatively predicted adolescent Conscientiousness and Openness to Experience, whereas childhood HI negatively predicted adolescent Agreeableness and positively predicted adolescent Openness to Experience.

Attrition. We had 10.5% attrition from Wave 1 (childhood) to Wave 2 (adolescence), because of missingness related to the outcome variables of interest (BFI scales). We conducted t-and Mann-Whitney U tests to ascertain whether any differences on baseline measures existed between the analytic sample (possessing complete data for all relevant study measures, \( n = 204 \)) and participants missing the Wave 2 BFI measure (excluded from analyses, \( n = 24 \)). As demonstrated in Table 6, the tests revealed that excluded participants were higher in both IA and HI compared to the analytic sample.

Discussion

In this study of the prospective, longitudinal links between childhood ADHD symptoms and adolescent Big Five personality traits among females, we examined whether largely concurrent/cross-sectional findings from past research (see Gomez & Corr, 2014) would hold on a longitudinal time scale. In line with prior literature, we found that childhood IA, HI, and ADHD diagnostic status were all associated with lower adolescent Conscientiousness and Agreeableness and higher adolescent Neuroticism, with no significant correlations between childhood symptom measures and adolescent Openness to Experience or Extraversion. We further extended prior work by conducting pre-planned multiple regression analyses in which
CHILDHOOD ADHD AND ADOLESCENT BIG FIVE PERSONALITY

Childhood IA and HI simultaneously predicted each adolescent Big Five personality dimension, allowing us to separate the effects of IA and HI from each other. Finally, we conducted 10 exploratory hierarchical regressions to separate effects of each symptom dimension from the ADHD syndrome per se. Consistent with our hypotheses, IA independently and negatively predicted adolescent Conscientiousness, and HI independently and negatively predicted Agreeableness, whereas neither independently predicted adolescent Neuroticism. Interestingly (and contradictory to our expectations), IA and HI both significantly and independently predicted adolescent Openness to Experience in these analyses, with IA negatively predicting this variable and HI positively predicting this variable. Note that findings were robust to the removal of seriously overlapping items across measures.

We believe that the present findings are novel and important, particularly because they emphasize longitudinal links between the individual ADHD symptom dimensions of IA and HI with adolescent personality—and allow for independent effects of each (via hierarchical regressions), which also afford examination of the separation of prediction from ADHD dimensions from the overall ADHD syndrome. We reduced shared method variance by focusing on adult-informant reports of ADHD symptoms in childhood and self-reported personality in adolescence. The findings also expand on the small body of previous longitudinal research (e.g., Miller et al., 2008) by focusing on the understudied population of girls with ADHD.

To assist with interpretation of the findings, we highlight the BFI administration itself. An adolescent completing a self-reported BFI would respond to each question, “I see myself as someone who…” (for example, “is talkative”), and then indicate her level of agreement with that statement. Thus, as noted in the Introduction, one way of defining personality (at least when looking at self-report data) is “how an individual perceives herself.” In other words, an individual’s BFI responses signal to the researcher, “these are the enduring personal qualities I perceive in myself,” which may or may not be true to actual patterns of thinking, feeling, and behaving. For elaboration, see Back et al. (2009), who discuss of the “explicit self-concept of personality (propositional representations of the self).”

What can conceptualizing personality as self-perception or identity tell us? First, having ADHD in childhood may lead to more negative self-perceptions in later life. Girls who are higher in childhood IA view themselves five years later as less conscientious (that is, less planful and organized) and less open to experience (that is, less clever, curious and imaginative) than those lower in childhood IA. Furthermore, girls who are higher in childhood HI tend to view themselves as less agreeable (that is, less helpful, kind, and cooperative), but more open to experience than those with lower HI. Girls who have a childhood ADHD diagnosis and/or high childhood IA and HI symptoms view themselves as more neurotic (that is, more moody, anxious, and depressed) five years later. However, childhood ADHD symptoms did not appear to have any bearing on an individual’s Extraversion in adolescence.

Why does this matter? Girls with ADHD are at dramatically increased risk of self-harm and suicide attempts compared to those without ADHD by early adulthood. They are also at increased risk for broad-based underachievement at school and at work—and at hugely increased risk for unplanned pregnancy—even when ADHD symptoms have remitted (Owens et al., 2017). A next step for the program of research presented herein is to examine the linkages between adolescent personality traits and such important outcomes, including a test of whether adolescent personality partially or fully mediates the predictive associations from childhood ADHD to these important clinical outcomes. Before such analyses, however, it is certainly plausible that a consolidation of negative self-perceptions by adolescence could help explain why patterns of
underperformance and poor mental health appear in this sample by adulthood, even after symptoms have partially or fully remitted.

One prominent limitation of the present research is that a childhood personality measure was not collected in the BGALS study, meaning that we cannot measure change in personality from baseline (childhood) in our analyses—or test the directionality of the relation between ADHD symptoms and personality from childhood through adolescence. One related issue, however, pertains to the validity of self-reported personality in children, though a growing body of research suggests that personality can be measured by self-report as early as 5 years of age, and by adult informants as early as 2 years old (reviewed in De Pauw & Mervielde, 2010; Measelle et al., 2005). Moreover, we did not collect any data for participants prior to age 6 years. Children typically are diagnosed with ADHD between the ages of 6 and 7 years old and can get diagnosed as early as 4 years old (American Academy of Pediatrics, 2011, 2019). Although measures of temperament and/or personality from the preschool years would be ideal, this will be a priority for future research endeavors.

Second, there is considerable conceptual overlap between the IA and Conscientiousness constructs; three of the nine IA symptoms (as described by the *DSM*) seriously overlap with Big Five Conscientiousness items, almost word for word, and several others are conceptually similar (see Table 2). Additionally, although discussion on this paper has focused on ADHD and personality, it is important to note that ADHD is also suspected to have a significant temperamental component, particularly since its symptom dimensions map closely on to temperament constructs such as attentional control, activity level, and impulsivity (De Pauw & Mervielde, 2010). In an attempt to address the item overlap between IA and Conscientiousness, we deleted three items with the most serious overlap in a robustness test—and all subsequent analyses yielded nearly identical results (see Tables 3 & 4). Still, the conceptual question remains: what is the distinction between psychopathology and personality? That is, are ADHD IA symptoms and Conscientiousness tapping into different “poles” of the same dimensional trait? How much of the separation between these constructs is semantic, and how much reflects true underlying structural differences? Disentangling these three constructs (ADHD, temperament, and personality) remains an area of particular interest for future research.

A third limitation, related to the item-overlap concern, is that we have not included adolescent measures of IA and HI in our models as of yet. If we are to definitively say that childhood IA predicts adolescent *Conscientiousness* (and not just adolescent IA), we will need to take into account persistence of ADHD symptoms from childhood to adolescence. Until that time, findings from Miller et al. (2008) may help shed some light on the topic. In their prospective, longitudinal study in a predominantly male sample, a key finding was that correlations between childhood ADHD and late adolescent Conscientiousness remained significant regardless of whether participants’ ADHD remitted from childhood to late adolescence. Yet they did not examine relations between specific ADHD dimensions and personality, so further research is needed to better understand the nuanced relations among these variables.

Fourth, the age ranges for each wave of data collection are very wide, even partially overlapping. We plan on “binning” the sample into narrower age ranges, allowing a within-study replication as well. Finally, the excluded participants (i.e., participants without adolescent personality measures) had significantly higher baseline IA and HI scores compared to the participants in the analytic sample (see Table 6), which may have biased the results.
Debate is still ongoing as to whether (i) ADHD and personality separately stem from early temperament (Nigg, Blaskey, Huang-Pollock, Hinshaw, et al., 2002), (ii) ADHD symptoms shape personality over the course of development via neurobiological mechanisms (Nigg, Blaskey, Huang-Pollock, Hinshaw, et al., 2002) in concert with dynamic interactions with the environment, (iii) personality shapes ADHD symptoms over time, or even (iv) ADHD is an “extreme personality trait” (Nigg, Blaskey, Huang-Pollock, & John, 2002; Nigg, Blaskey, Huang-Pollock, Hinshaw, et al., 2002). At this point, we still cannot answer these questions, but the present study provides a piece of the puzzle, suggesting strong links between ADHD and self-reported personality spanning childhood to adolescence.

“Niche-building” research in personality psychology suggests that a person’s personality traits shape the individual’s environment in a way that then deepens the person’s existing traits (Caspi et al., 2005). Similar work has been done in clinical psychology, suggesting that a person’s symptoms can elicit responses from the environment, which then reinforce the maintenance of these symptoms (e.g., coercive exchange in parent-child relationship; see Patterson, 2016). Both personality and psychopathology have the potential to shape and be shaped by the environment, which suggest that both may also have the potential to affect each other.

Finally, although psychosocial and pharmacological treatments are both evidence-based for ADHD, youth with ADHD remain at much higher risk (compared to typically-developing children) for comorbid psychiatric conditions, academic and occupational underachievement, victimization, nonsuicidal self-injury, and suicide in later life, even if their symptoms remit fully or partially. Personality dimensions are concurrently related to many functional life outcomes, and our findings that teen girls with a childhood history of ADHD tend to view themselves as less conscientious, less agreeable, and more neurotic may suggest a potential mechanism by which negative outcomes are perpetuated regardless of symptoms. Personality is not as “fixed” as often believed, in fact showing considerable malleability (Srivastava et al., 2003). Thus, if it turns out that adolescent personality (or adolescent “identity”) partially accounts for the relation between childhood ADHD and later outcomes, it could potentially become a target for potential therapies or prevention-based interventions (e.g., “inoculating” girls with ADHD against negative self-perceptions).
References
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Table 1
Descriptive Statistics, Alpha Reliabilities, and Correlations for Childhood SNAP-IV Scores by Scale and Informant

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<td>4. Mother</td>
<td>227</td>
<td>1.19</td>
<td>0.96</td>
<td>.95</td>
<td>.77</td>
<td>.62</td>
<td>.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Teacher</td>
<td>227</td>
<td>0.82</td>
<td>0.88</td>
<td>.95</td>
<td>.53</td>
<td>.68</td>
<td>.64</td>
<td>.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Cross-observer aggregate</td>
<td>228</td>
<td>1.00</td>
<td>0.84</td>
<td>.96</td>
<td>.72</td>
<td>.71</td>
<td>.76</td>
<td>.92</td>
<td>.90</td>
<td></td>
</tr>
</tbody>
</table>

Note. All correlations are significant with \( p < .001 \). All values rounded to hundredths place.

a The cross-observer aggregate scores for each participant were computed for each domain by averaging the mean rating for the primary caregiver-report and the mean rating for the teacher-report.

b Alphas for the cross-observer aggregate were computed by first averaging the primary caregiver- and teacher-reported scores for each item, then computing the alpha using these mean item scores.
### Table 2
**Overlapping Items between SNAP-IV and BFI**

<table>
<thead>
<tr>
<th>SNAP-IV Inattention items</th>
<th>BFI Conscientiousness items</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Fails to give close attention to details or makes careless mistakes in schoolwork, work or other activities</strong></td>
<td>3. Does things carefully and completely (R)</td>
</tr>
<tr>
<td></td>
<td><strong>8. Can be somewhat careless †</strong></td>
</tr>
<tr>
<td></td>
<td>34. Does things efficiently (quickly and correctly) (R)</td>
</tr>
<tr>
<td></td>
<td><strong>8. Can be somewhat careless †</strong></td>
</tr>
<tr>
<td></td>
<td>34. Does things efficiently (quickly and correctly) (R)</td>
</tr>
<tr>
<td>2. Has difficulty sustaining attention in tasks or play activities</td>
<td>29. Keeps working until things are done (R)</td>
</tr>
<tr>
<td>3. Does not seem to listen to what is being said to him or her</td>
<td></td>
</tr>
<tr>
<td>4. Does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)</td>
<td>13. Is a reliable worker (R)</td>
</tr>
<tr>
<td></td>
<td>39. Makes plans and sticks to them (R)</td>
</tr>
<tr>
<td><strong>5. Has difficulty organizing tasks and activities</strong></td>
<td><strong>18. Tends to be disorganized †</strong></td>
</tr>
<tr>
<td>6. Avoids, expresses reluctance about, or has difficulties engaging in tasks that require sustained mental effort (such as schoolwork or homework)</td>
<td>24. Tends to be lazy</td>
</tr>
<tr>
<td>7. Loses things necessary for tasks or activities (e.g., school assignments, pencils, books, tools, or toys)</td>
<td></td>
</tr>
<tr>
<td><strong>8. Is easily distracted †</strong></td>
<td><strong>45. Is easily distracted; has trouble paying attention</strong></td>
</tr>
<tr>
<td>9. Is forgetful in daily activities</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* SNAP-IV = Swanson, Nolan, and Pelham Scale, 4th edition. BFI = Big Five Inventory. (R) = opposite direction of SNAP-IV item. All items from the SNAP-IV Inattention scale and BFI conscientiousness scale are reproduced here and grouped by conceptual overlap. Seriously overlapping items are bolded. For each pair of seriously overlapping items across scales, one item was randomly removed from one of the two scales for the analyses shown in Table 4. † = item removed from the scale.
Table 3
Correlations and standardized beta coefficients between childhood ADHD Measures and Adolescent Self-Reported Big Five personality domains.

<table>
<thead>
<tr>
<th>ADHD Measures (Childhood)¹</th>
<th>Big Five Personality (Adolescence), self-report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conscientiousness</td>
</tr>
<tr>
<td>Correlations</td>
<td></td>
</tr>
<tr>
<td>ADHD Diagnosis</td>
<td>-.330***</td>
</tr>
<tr>
<td>Inattention</td>
<td>-.360***</td>
</tr>
<tr>
<td>Hyperactivity/Impulsivity</td>
<td>-.198**</td>
</tr>
<tr>
<td>Regression betas, two simultaneous predictors b</td>
<td></td>
</tr>
<tr>
<td>Inattention</td>
<td>-.478***</td>
</tr>
<tr>
<td>Hyperactivity/Impulsivity</td>
<td>.158</td>
</tr>
</tbody>
</table>

Note. N = 204. Mean age at Wave 1 (childhood) = 9.56 years. Mean age at Wave 2 (adolescence) = 14.08 years.
* p < .05, ** p < .01, *** p < .001

¹ ADHD Diagnosis is a categorical (yes/no) variable. The symptom dimension (inattention and hyperactivity-impulsivity) scores used in these analyses are calculated for each participant by: (1) calculating the mean rating across all items for each symptom dimension and informant (primary caregiver, teacher), then (2) for each symptom dimension, taking the average of the primary caregiver’s and teacher’s mean ratings to form a cross-observer aggregate score.

b Standardized betas are reported from five separate regression analyses in which childhood inattention and hyperactivity-impulsivity both predict a single adolescent personality dimension.
Table 4
Correlations and Standardized Betas between Childhood ADHD and Adolescent Big Five Personality – Comparison to Results When Serious Item Overlap is Removed

<table>
<thead>
<tr>
<th>ADHD measure (Childhood)</th>
<th>Big Five Personality, self-report (Adolescence)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conscientiousness</td>
</tr>
<tr>
<td><strong>Correlations</strong></td>
<td></td>
</tr>
<tr>
<td>Inattention</td>
<td>-.363***</td>
</tr>
<tr>
<td>Hyperactivity/Impulsivity</td>
<td>-.193**</td>
</tr>
<tr>
<td><strong>Regression betas, two simultaneous predictors</strong></td>
<td></td>
</tr>
<tr>
<td>Inattention</td>
<td>-.478***</td>
</tr>
<tr>
<td>Hyperactivity/Impulsivity</td>
<td>.158</td>
</tr>
</tbody>
</table>

*Note. N = 204. Analyses were conducted identically to those outlined in Table 3 with the following exception: One item from the Swanson, Nolan, and Pelham (SNAP-IV) questionnaire’s Inattention scale and two items from the Big Five Inventory (BFI)’s Conscientiousness scale were removed prior to calculating the cross-observer aggregate score used in these analyses. Mean age at Wave 1 (childhood) = 9.56 years. Mean age at Wave 2 (adolescence) = 14.08 years.  
  *p < .05, **p < .01, ***p < .001
  a The symptom dimension (inattention and hyperactivity-impulsivity) scores used in these analyses are calculated for each participant by (a) calculating the mean rating across all items for each symptom dimension (except for the removed “seriously overlapping items” and informant (primary caregiver, teacher) and (b) then taking the average of the primary caregiver’s and teacher’s mean ratings. ore.  
  b Standardized betas are reported from five separate regression analyses in which childhood inattention and hyperactivity-impulsivity both predict a single adolescent personality dimension.
Table 5
Hierarchical Multiple Regression Results for Adolescent Big Five Personality Outcomes

<table>
<thead>
<tr>
<th>Step</th>
<th>Predictor Variables (Childhood)</th>
<th>Big Five Personality, self-report (Adolescence)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Conscientiousness</td>
<td>Agreeableness</td>
<td>Neuroticism</td>
<td>Openness to Experience</td>
<td>Extraversion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\beta$</td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
<td>$\Delta R^2$</td>
</tr>
<tr>
<td>1</td>
<td>ADHD Diagnosis</td>
<td>-.330***</td>
<td>.109***</td>
<td>-.195**</td>
<td>.038**</td>
<td>.188**</td>
<td>.035**</td>
<td>-.033</td>
<td>.001</td>
<td>.058</td>
<td>.003</td>
</tr>
<tr>
<td>2</td>
<td>ADHD Diagnosis</td>
<td>-.042</td>
<td>.021*</td>
<td>-.137</td>
<td>.001</td>
<td>.227</td>
<td>.000</td>
<td>-.004</td>
<td>.000</td>
<td>-.039</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>Inattention</td>
<td>-.323*</td>
<td>.021*</td>
<td>-.065</td>
<td>.001</td>
<td>-.043</td>
<td>.000</td>
<td>-.032</td>
<td>.000</td>
<td>.108</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>ADHD Diagnosis</td>
<td>-.429***</td>
<td>.007</td>
<td>-.012</td>
<td>.001</td>
<td>.109</td>
<td>.004</td>
<td>-.250*</td>
<td>.034**</td>
<td>-.081</td>
<td>.014</td>
</tr>
<tr>
<td></td>
<td>Hyperactivity/Impulsivity</td>
<td>.130</td>
<td>-.240*</td>
<td>.024*</td>
<td>.004</td>
<td>.004</td>
<td>.285**</td>
<td>.250**</td>
<td>.181</td>
<td>.014</td>
<td></td>
</tr>
</tbody>
</table>

Note. $N = 204$. Results of ten two-step hierarchical multiple regressions. In Step 1 analyses, categorical childhood ADHD predicts a single adolescent personality dimension. In Step 2 analyses, categorical childhood ADHD and a single childhood symptom dimension (inattention or hyperactivity-impulsivity) predict a single adolescent personality dimension.

Mean age at Wave 1 (childhood) = 9.56 years. Mean age at Wave 2 (adolescence) = 14.08 years.

* $p < .05$, ** $p < .01$, *** $p < .001$

$p$-values in this column refer to the significance of the F-statistic.
<table>
<thead>
<tr>
<th>Test</th>
<th>Wave 1 (Childhood) Measure</th>
<th>Analytic Sample&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Excluded Participants&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$Mdn$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$M$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t(27.41) = 1.80^*$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$U = 3202^{**}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$U = 2989^*$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6**

Comparison of Analytic Sample to Participants Excluded Due to Missingness

*Note.* Results rounded to hundredths place. Mean age at Wave 1 (childhood) = 9.56 years.

* $p < .05$, ** $p < .01$, *** $p < .001$

<sup>a</sup> $N = 204$. Includes all participants who completed all relevant measures at Waves 1 and 2 (SNAP-IV, DISC-V, and BFI).

<sup>b</sup> $N = 24$. Participants who did not complete a BFI in adolescence.