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Financial Dependence of Young Adults with Childhood ADHD

Amy R. Altszuler¹, Timothy F. Page², Elizabeth M. Gnagy¹, Stefany Coxe¹, Alejandro Arrieta², Brooke S. G. Molina³, and William E. Pelham Jr.¹

¹Department of Psychology, Center for Children and Families, Florida International University, 11200 SW 8th St AHC1 140, Miami, FL 33199, USA

²Department of Health Policy and Management, Florida International University, 11200 SW 8th St., AHC5 447, Miami, FL 33199, USA

³Departments of Psychiatry and Psychology, University of Pittsburgh, 3811 O'Hara St., Pittsburgh, PA 15213, USA

Abstract

This study used data from the Pittsburgh ADHD Longitudinal Study (PALS) to evaluate financial outcomes of young adults (YA) with ADHD relative to comparisons. Participants for this study included 309 individuals who had been diagnosed with ADHD (DSM-III-R or DSM-IV) in childhood and 208 comparison YA without childhood ADHD diagnoses (total $N=517$) who were followed through age 25. Participants were predominately male (88 %) and Caucasian (84 %). Diagnostic interviews were conducted in childhood. Young adults and their parents reported on financial outcomes and a number of predictor variables. Young adults with ADHD experienced greater financial dependence on family members ($p<0.05$) and the welfare system ($p<0.01$) and had lower earnings ($p<0.05$) than comparisons. ADHD diagnostic status, education attainment, and delinquency were significant predictors of financial outcomes. A projection of lifetime earnings indicated that ADHD group participants could expect to earn \$543,000–\$616,000 less over their lifetimes than comparisons. Due to the propensity of individuals with ADHD to underreport problems, the data are likely to be underestimates. These findings support the need for interventions to improve labor market outcomes as well as the development of interventions that target the management of personal finances for individuals with ADHD in young adulthood.

Keywords

ADHD; Young adult; Finances; Longitudinal outcomes

Attention-deficit/hyperactivity disorder (ADHD) is a chronic mental health disorder characterized by inattention, impulsivity, and hyperactivity (American Psychiatric Association 2013) that is present in 5–10 % of individuals in the U.S. (Kessler et al. 2006; Visser et al. 2014). Children with ADHD experience significant functional impairment in a variety of domains including relationships with adults, academic achievement, classroom

[✉]Timothy F. Page, tpage@fiu.edu.

Compliance with Ethical Standards

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behavior, and sibling and peer relationships (Pelham et al. 2005). In the majority of cases, ADHD symptoms persist into young adulthood (Barkley et al. 2002; Sibley et al. 2012a, b) and continue to be associated with numerous difficulties in daily life functioning including unabated problems in educational, vocational, and interpersonal domains, with a minority experiencing more serious problems in substance use and delinquency (Kent et al. 2011; Mannuzza et al. 1993, 1998; Molina and Pelham 2014; Sibley et al. 2011).

A half dozen follow-up studies on childhood samples have reported broadly on outcomes in adulthood and have published numerous reports showing that adults with ADHD continue to experience academic problems in postsecondary educational settings, with an associated low rate of achievement and degree attainment compared to non-ADHD samples, are underemployed compared to matched controls, are more likely to have interpersonal and attentional problems in the workplace, and are more likely to get fired/change jobs more frequently (Barkley et al. 2006, 2008; Biederman et al. 2006; Kuriyan et al. 2013; Mannuzza et al. 1993; Weiss and Hechtman 1993). In other words, there is a substantial body of literature documenting that individuals with ADHD continue to have symptoms and associated problems in multiple domains and multiple settings as they become adults.

Surprisingly, given the nature of the fundamental deficits in ADHD (inattention, disorganization, and impulsivity) and its impact on daily functioning in most life domains, almost no research has focused on one of the most important areas of adult functioning—the individual's own economic status and finances. Just as children with ADHD often mismanage academic work and fail to turn in assignments as a result of their inattention and disorganization, adults with ADHD may experience similar problems with making payments on time or keeping track of spending. Additionally, poor impulse control among adults with ADHD may lead to impulsive buying and spending more money than earned. Given the significance of these potential problems combined with the related educational and vocational underachievement mentioned above, there is clear reason to focus on the financial status of adults diagnosed with ADHD in childhood.

Prior research has demonstrated the impact of ADHD on economic outcomes important at the societal level (e.g., Doshi et al. 2012; Pelham et al. 2007), but only a small number of studies have focused on the economic outcomes for the affected individuals. Two recent studies found that ADHD was associated with reduced earnings among adult-recruited samples (Biederman and Faraone 2006; Fletcher 2014). Additionally, the UMASS Adult ADHD study (Barkley et al. 2008) found that individuals diagnosed with ADHD in adulthood had significantly more problems managing money (e.g., difficulty saving and paying bills on time, buying things impulsively) compared to controls. However, for a variety of reasons, samples of individuals identified in adulthood as ADHD are arguably different from and less severely symptomatic and impaired compared to individuals with ADHD identified in childhood and followed up (Barkley et al. 2008). It is therefore important to use prospective, long-term studies of children with and without ADHD to evaluate adult functioning. In addition, such studies can provide information on risk and protective factors in childhood that contribute to the development of individuals' economic problems over time.

To our knowledge, the only prospective study that includes information on the financial outcomes of young adults (YA) with ADHD who were well diagnosed in childhood is the Milwaukee study (Barkley et al. 2008; Fischer and Barkley 2006). At the 21 year-old follow-up (Fischer and Barkley 2006), YA diagnosed as hyperactive in childhood earned 30% more per month compared to typically developing peers. However, most YA have not yet completed post-high school education by age 21. Therefore, this surprising result is likely explained by higher enrollment in postsecondary education programs and therefore lower employment (e.g., part time jobs while in school full time) among participants in the comparison group relative to the hyperactive group (Fischer and Barkley 2006). In contrast, at the 27 year-old follow-up, ADHD group individuals earned up to 38 % less than comparisons and had significantly more problems managing their personal finances (Barkley et al. 2008).

While the Barkley et al. (2008) studies provide information on personal finances, neither study reports on reliance on others for financial support, a key factor in determining one's financial health. The extent to which an individual is financially independent depends on a variety of factors including debts, management of credit cards, residential status (e.g., living with parents vs. living independently), reliance on family members for regular and/or emergency financial support, and reliance on funds from government programs. Gathering data on multiple indices of financial independence provides a more comprehensive understanding of an individual's financial profile; however, only one prior study has considered financial outcomes relating to dependence on others. Fletcher (2014) found that adult-recruited individuals endorsing ADHD histories were 10 percentage points more likely than adults who did not report ADHD histories to receive government assistance. In contrast, the current study offers new evidence on the impact of ADHD on earnings and financial independence from a prospective study of individuals identified in childhood and assessed at age 25.

Compared to a generation ago when the existing ADHD longitudinal studies (e.g., Barkley et al. 2008; Mannuzza et al. 1997; Weiss and Hechtman 1993) were conducted, we expect that achieving successful financial independence will be even more problematic for those with ADHD in the current generation. Recent reports indicate that many YA are achieving financial independence at later ages, with a rising number of 25 to 29 year-olds (41 %) reporting that they currently live with their parents or have moved back home in the recent past for economic reasons and nearly half (44 %) reporting financial linkage with their parents (Parker 2012). Contributing to this trend are increases in the earnings gap between workers with and without postsecondary educations and increases in unemployment among the latter (Pew Research Center 2014). As mentioned previously, individuals with ADHD are less likely to complete postsecondary degrees and are more likely to have the kinds of jobs/professions that are in the low range of remuneration compared to non-ADHD peers (Barkley et al. 2008; Kuriyan et al. 2013; Mannuzza et al. 1993), putting them at an increased risk for experiencing financial dependence. For those who do enroll in college, higher student and other debts and difficulty finding gainful employment in light of carrying that debt (Pew Research Center 2014; Fry 2014) may make it more likely that these YA will move home. Given the lower GPAs and greater number of course withdrawals among

individuals with ADHD who do attend college (Barkley et al. 2008), these YA may be less competitive on the job market and consequently less able to pay back student loans.

Finally, we expect that there will be individual differences in financial outcomes, as we have found in other studies examining different outcomes from the data set used in the current study—the Pittsburgh ADHD Longitudinal Study (PALS) and as other longitudinal studies have reported. We have previously reported that a number of factors account for differential outcomes among adolescents and YA in the PALS, with one of the most consistent predictive factors being family socioeconomic status as measured by parental education level (Kent et al. 2011; Kuriyan et al. 2013; Molina et al. 2012). Controlling for parental education level, we have found that school disciplinary problems/delinquency predict lower post-high school education attainment and increased substance use, and that post-high school education attainment predicts occupational attainment in young adulthood (Kuriyan et al. 2013; Molina et al. 2012).

The current study used data from the PALS to evaluate financial outcomes among YA diagnosed with ADHD in childhood compared to those without a diagnosis. We hypothesized that those with childhood ADHD followed into adulthood would be more likely to experience negative financial indicators, less likely to experience positive financial indicators, and more likely to live at home compared to those without childhood ADHD. Childhood ADHD diagnosis, educational attainment, and delinquency were examined as predictors of financial independence. We hypothesized that having a diagnosis of ADHD in childhood would predict financial outcomes above and beyond these predictors due to the relevant vulnerabilities that characterize ADHD (e.g., disorganization, impulsive behavior at work). Lastly, we predicted that the projected lifetime earnings of YA with ADHD would be less than that of comparison YA.

Method

Participants

ADHD Group—Participants in the ADHD group were recruited from a pool of 516 individuals who had been diagnosed with DSM-III-R or DSM-IV ADHD and treated at the Summer Treatment Program (STP) at Western Psychiatric Institute and Clinic in Pittsburgh, PA between 1987 and 1996. The average age at initial evaluation was 9.40 years old ($SD=2.27$, range=5.0–16.92), with 90 % of participants falling between 5 and 12 years of age. Of the 516 potential participants, 493 were re-contacted an average of 8.35 years ($SD=2.79$) after their initial childhood evaluation for participation in the PALS and 364 (70.5 %) enrolled.

Participants were admitted to the study on a rolling basis from 1999 to 2003 and completed the first follow-up interview immediately upon enrollment. At the time of the first follow-up interview, participants ranged in age from 11 to 28, with 99 % of participants falling between 11 and 25 years old. Those who enrolled in the PALS were compared with nonparticipants on a variety of demographic (i.e., age at first treatment, race, parental education level and marital status) and diagnostic (i.e., parent and teacher ratings of ADHD symptomology) variables. Of the 14 comparisons, only one was statistically significant at

the $p < 0.05$ level; conduct disorder (CD) symptom scores, as indicated by composite parent and teacher ratings, were slightly higher for nonparticipants ($M = 0.53$ on a 4-point scale) compared to participants ($M = 0.43$).

At baseline, diagnostic information for the ADHD group was collected from multiple sources, including parent and teacher ratings on the Disruptive Behavior Disorders scale (DBD; Pelham et al. 1992) and a semi-structured clinical interview administered to parents by a Ph.D. level clinician. The clinical interview assessed DSM-III-R or DSM-IV symptoms of ADHD, ODD, and CD and situational and severity factors (instrument available at <http://ccf.fiu.edu>). Using DSM guidelines, diagnoses were made if either parents or teachers endorsed a sufficient number of symptoms. Two Ph.D. level clinicians reviewed ratings and interviews independently to confirm diagnoses. If disagreement occurred, a third clinician reviewed the file and the majority decision was used. Children were excluded from participation in the STP based on the following criteria: estimated full-scale IQ < 80, history of seizures or other instances of impending danger or harm to self or others. Follow-up interviews in adolescence and young adulthood were conducted by post-baccalaureate research staff. Questionnaires (paper and pencil or web-based) were completed privately by participants and their parents. Teachers and guidance counselors completed questionnaires by mail. In cases where distance prevented travel to the clinic, mail and telephone correspondence were used, with home visits as necessary. A Certificate of Confidentiality was obtained from the Department of Health and Human Services and the study protocol was approved by the University of Pittsburgh Institutional Review Board.

Current Study

The current study used data from the childhood assessments conducted with the ADHD group and follow-up interviews completed with the ADHD and comparison groups. Data on financial indicators were taken from the assessment at which each participant was 25 years old ($M = 24.8$, $SD = 0.45$). This sampling resulted in 517 participants (309 ADHD participants; 208 comparison participants), described in Table 1, whose 25 year-old interviews took place between 1999 and 2013. There were no significant group differences in gender or racial/ethnic background; however, parental education level was marginally different across the ADHD ($M = 7.16$, $SD = 1.65$) and comparison groups ($M = 7.44$, $SD = 1.65$, $p = 0.06$), where 7 = Associate's or 2-year degree and 8 = College or university graduate.

Measures Collected at Follow-Up

Demographic Information—Participants and their parents completed an annual demographic questionnaire developed for this study. Participants were asked about their age, living arrangements, income, and marital status.

Financial Information—All financial data were collected using parent- and/or self-report. The Finances Questionnaire was developed for PALS to assess financial situation, debt, earnings, living situation, regular and emergency familial support, and government support. Participants and their parents completed this questionnaire annually beginning at age 16. Items consisted of *yes* or *no* and open-ended questions. The self-report version of the Finances Questionnaire consisted of 14 initial items that were asked of all participants and

15 follow-up items that were presented if a participant endorsed one of the initial items, for a total of 28 items. For example, one initial *yes* or *no* item asked, “Do you have debts (excluding house, car, or student loans)?” If participants responded *yes*, they were then asked several follow-up questions including the amount they were in debt. The parent-report version of the Finances Questionnaire consisted of 7 initial items and 9 follow-up items, for a total of 16 items. Self-report data on the Finances Questionnaire was available for all 517 participants; parent-report was available for 387 of 517 participants (ADHD: 222, Comparison: 165).

Participants also reported financial events on the Inventory of Small Life Events (ISLE; Zautra et al. 1986) on a yearly basis. The ISLE assesses the frequency of current financial hassles including incurring unexpected expenses, running out of money, and not receiving payments on time. Responses ranged from 0 (never) to 3 (more than 10 times) in the past week. The total score of the 7 financial items from the ISLE was used. The Cronbach’s alpha of the abbreviated version of the ISLE used in the current study was 0.57. Data on the ISLE was available for 412 of 517 participants (ADHD: 224, Comparison: 188).

Educational Attainment—Educational attainment by age 22 was measured using parent and participant report on the Education History Questionnaire, a measure developed for the PALS. At the first PALS interview, participants provided retrospective reports from kindergarten through their current grade for a number of academic variables including school attended and year attended. At subsequent interviews, participants provided updated information for the time that had elapsed since their last interview. Education attainment was coded as: no high school diploma, high school diploma or GED, enrollment in vocational/technical school, enrollment in junior/community college, 4-year enrollment in a public/private university or college, completed vocational training, completed associate’s degree, and completed bachelor’s degree. Community college, junior college, vocational school, and technical school were defined as 2-year institutions with community/junior colleges resulting in associate’s degrees and vocational/technical schools resulting in certification towards a specific occupational skill set (e.g., automotive technology). Four-year colleges/universities were defined as institutions offering bachelor’s degrees. The ADHD and comparison groups differed significantly on this variable, $\chi^2(7) = 139.34, p < 0.001$, such that the majority of ADHD group participants had attained partial junior/community college degrees by age 22 whereas the majority of comparison participants had attained partial 4-year degrees.

Delinquency—A summary variable reflecting delinquency by age 18 was calculated using data from the Self-Reported Delinquency questionnaire (SRD; Elliot et al. 1985). Previous research reports that the test-retest reliability of the SRD is relatively high, ranging from 0.85 to 0.99, and reports acceptable external validity with the majority of responses on the SRD matching arrest records (Huizinga and Elliot 1986). Starting with the second annual interviews, parents and participants reported on lifetime engagement in 37 delinquent acts, including age at initiation of the act, setting, and value of the damage caused by the act. An act was counted if endorsed by either parent- or self-report. The total number of delinquent

acts committed prior to age 18 was significantly different for the ADHD ($M=2.65$, $SD=1.54$) and comparison groups ($M=2.09$, $SD=1.44$), $t(511)=-4.12$, $p<0.001$.

IQ—An estimate of Intelligence Quotient (IQ) was calculated from the vocabulary and block design subtests of the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler 1981). Participants completed the WAIS at either a) their first PALS interview for those age 17 or older or b) the annual interview at which they had turned age 17. The IQ score for the ADHD ($M=101.02$, $SD=15.79$) and comparison groups ($M=111.35$, $SD=14.39$) differed significantly, $t(509)=7.52$, $p<0.001$.

Data Analytic Plan

Analyses were conducted in SPSS 19.0 and MPLUS 7.0. First, group differences in financial outcome items were examined for all participants at age 25 using Chi-square tests, ANOVAs, and Poisson regressions as appropriate. Missing data on financial outcome items was determined to be missing completely at random (MCAR) using Little's MCAR test (Little 1988), $\chi^2(59)=39.02$, $p=0.98$. To control for Type I error rate, a Benjamini-Hochberg false discovery rate (FDR; (Benjamini and Hochberg 1995) was applied. Using this method, each p -value below the a priori family-wise alpha level of 0.05 is ranked in ascending order, i through M , where M is the rank of the largest p -value. These p -values are then compared iteratively to an adjusted alpha level, α/M , until one of the p -values is no longer significant (k). When this occurs, k and all values ranked after k are considered nonsignificant.

Next, exploratory factor analysis (EFA) was used to consolidate the financial outcome items into several meaningful composites. Three broad financial composites – positive financial indicators, negative financial indicators, and living at home – were formed by standardizing and averaging items. Potential predictors of the three composites were evaluated using linear regression models. Multicollinearity of predictors and covariates (parental education, WAIS scores, YA education attainment, and delinquency) was assessed; variance inflation factor scores were all less than 1.50 and tolerance statistics were above 0.70, minimizing concern for multicollinearity. Grand-mean centering was used for continuous independent variables. Predictor analyses were conducted in three steps: covariates (parental education and estimated IQ) first, education attainment and delinquency second, and ADHD status third. Linear and logistic regressions were used for predictor analyses.

After examining predictors of financial outcomes, ADHD group differences in lifetime earnings were estimated. Self-reported earnings (adjusted to 2013 dollars), education attainment by age 25 (i.e., partial high school to completed bachelor's degree), and current employment status (i.e., unemployed, part-time employed, full-time employed) were entered into Day and Newburger's (2002) 5-year growth model of synthetic work-life earnings. Descriptive statistics for the variables used in the model are presented in Table 1. The projected work-life earnings represent the income that individuals with the same educational level and work status could expect to earn, on average, during a hypothetical 40-year working life (i.e., from age 25 through age 64). As in Day and Newburger (2002), the baseline case assumed no future unemployment for participants who were working at age

25, and permanent unemployment for unemployed participants. To evaluate the impact of the latter assumption, the baseline case was compared with a second case that accounted for the fact that some of the unemployed were unemployed due to being in college or graduate school. In the second case, those who were unemployed and in school at the time of the survey were assumed to have earnings equal to those in their cohort (ADHD or comparison) with a bachelor's degree. The present value of all work-life future earnings were expressed in 2013 dollars. Independent sample *t* tests were used to test for significant mean differences.

Results

Group Differences in Financial Outcomes

The results displayed in Table 2 show that the ADHD group was more likely to experience a number of financial difficulties in young adulthood. Parents of ADHD participants were more than twice as likely to report that they provided regular funds for living expenses (ADHD=25.42 %; Comparison= 12.12 %), $\chi^2(1)=4.50$, $p<0.05$, and while only approaching significance, parents of ADHD participants were over 20 % more likely to report that they provided emergency funds (ADHD=54.10 %; C=44.00 %), $\chi^2(1)=3.89$, $p=0.05$. Parents of ADHD group participants also reported providing housing assistance at a higher rate: they were more than twice as likely as comparison parents to report that their offspring had moved back home after living independently (excluding being away at school or in the military; ADHD=44.44 %; C= 18.00 %), $\chi^2(1)=8.74$, $p<0.05$.

While several items related to financial dependence were significant according to parent-report, only one of these items was significant when self-report was used. Young adults in the ADHD group reported that they were 40 % more likely than comparisons to be living at home (ADHD=38.63 %; C= 27.41 %), $\chi^2(1)=6.49$, $p<0.05$. There were no significant group differences reported for regularly receiving money from parents, moving back home after living independently, or receiving emergency funds from parents.

For items in which parent reported data were not collected, several significant group differences were found. As reported previously, ADHD YA were more likely to live with their parents, and consequently they paid 25 % less on average for housing each month relative to comparisons, $F(1, 426)= 9.63$, $p<0.01$. In addition to housing assistance, individuals in the ADHD group were over 80 % more likely than comparisons to receive government assistance (ADHD=11.23 %; C= 1.53 %), $\chi^2(1)=16.14$, $p<0.01$. The two groups also differed in respect to personal financial resources. Relative to comparisons, YA with ADHD earned 25 % less per month, $F(1, 471)=15.28$, $p<0.05$; experienced more money-related hassles, $F(1, 418)=12.15$, $p<0.05$; had fewer credit cards, $F(1, 468)=7.42$, $p<0.05$, and had less debt due to running up a credit card, $\chi^2(1) =17.61$, $p<0.05$. Lastly, compared to those without the disorder, YA in the ADHD group had 50 % less money in a savings account, $F(1, 457)=7.08$, $p<0.05$, and had over 80 % less money in a savings account when debts were considered, $t(215.10)=2.26$, $p<0.05$.

No significant group differences were found for the following self-reported items: having debts, amount in debt, number of times turned down for a credit card, and number of times a

credit card was cancelled by the issuer. Lastly, parent-report of being a co-signer on a loan did not differ by group.

Summarizing Financial Outcomes

In order to consolidate financial outcomes into summary variables for the analyses of predictors of financial status, we used several data reduction techniques. All financial outcome items that included both parent and young adult report were combined such that an item was considered endorsed if either party responded *yes*. An EFA of these items was conducted in MPLUS 7.0. A two-factor solution (Table 3) resulted in the best model fit and theoretically sound factors. All fit indices suggested excellent model fit: the chi-square test for this model was nonsignificant, $\chi^2(4, N=517)=1.45, p=0.83$; the root mean square error of approximation (RMSEA)=0.00; the standardized root mean square residual (SRMSR)=0.02; and the comparative fit index (CFI)=1.00. The first factor represented positive financial indicators and the second factor represented negative financial indicators. Each item was transformed into a *z* score. Monthly salary and the amount of money in a savings account were averaged to form the “positive financial indicators” composite; having debts, receiving emergency funds from parents, regularly receiving funds from parents and/or government sources, and money-related hassle items from the ISLE were averaged to form the “negative financial indicators” composite.

The item “currently lives at home” did not load strongly with other financial items in the EFA. This may be due to the complicated relationship that living at home status has with personal finances (i.e., individuals may live at home due to poor personal finances, or may have positive personal finances due to the reduced cost associated with living at home). Therefore, living at home was analyzed as a third outcome variable (in addition to the positive and negative finance composites from the EFA). Parent and young adult report were combined for this outcome such that if either party responded *yes* to the item, the item was coded as *yes*.

Predictors of Financial Outcomes

Linear and logistic regressions were used to determine whether ADHD diagnosis, education by age 22, and delinquency predicted financial outcomes in young adulthood when controlling for IQ and parental education. Covariates (i.e., parental education level and estimated full scale IQ) were entered into the model first and were not significantly related to outcomes on their own. Therefore, only models in which both covariates and predictor variables were entered are presented and discussed below (see Table 4).

All covariates and predictors of the positive financial indicator composite were entered simultaneously in the model. Individuals with higher levels of education attainment by age 22 were more likely to experience positive financial outcomes, whereas individuals diagnosed with ADHD in childhood were less likely to experience financial success. Predictors of the negative financial indicator composite were examined next, using the same procedure described above for the positive indicator composite. Higher levels of delinquency during adolescence predicted greater likelihood of experiencing negative financial outcomes in young adulthood. With all other predictors in the model, childhood ADHD diagnosis did

not significantly predict negative financial outcomes. In order to determine whether ADHD diagnosis would significantly predict negative financial outcomes on its own, an additional model (not displayed in Table 4) was run. When controlling for parental education and IQ, childhood ADHD diagnostic status predicted negative financial outcomes, $b=0.92$, $SE=0.29$, $t=3.16$, $p<0.01$. Lastly, predictors of living at home status were examined. While delinquency decreased the likelihood that participants would be living at home, having a childhood ADHD diagnosis significantly increased the likelihood of this outcome.¹

Projection of Lifetime Earnings

Group differences in annual earnings are displayed in Table 5. On average, YA with ADHD earned \$8100 less per year than did non-ADHD comparisons—unadjusted mean annual incomes for the two groups of \$22,275.11 (ADHD) and \$29,634.82 (Comparison). This difference remained significant after controlling for gender and race/ethnicity. Most of this gap is explained by larger unemployment and part-time work rates and lower education attainment among ADHD group participants relative to comparisons. After controlling for gender, race/ethnicity, education attainment, and work status, the difference in annual earnings at age 25 is \$4100.

Because education attainment and current work status partially accounted for differences in earnings between the ADHD and comparison groups at age 25, these factors were included in the earnings growth model. Over the lifetime, individuals diagnosed with childhood ADHD are expected to earn \$543,000 less than their non-ADHD counterparts. When those who were unemployed and in school were assigned earnings equal to those in their cohort with a bachelor's degree, this lifetime earnings differential increased to \$616,000 (Table 6).

Discussion

As expected, regarding our first aim, significant group differences were found for nearly all variables, with the ADHD group, on average, having poorer personal finances relative to the comparison group. The second aim revealed that diagnostic group status (childhood ADHD versus no childhood ADHD), delinquency, and educational attainment were significant predictors of financial outcomes in young adulthood. Regarding the final aim, those with ADHD had lower projected lifetime earnings. We discuss each of these results in turn below.

Group Differences in Financial Outcomes

As displayed in Table 2, according to parent-, but not self-, report, YA in the ADHD group were more likely than comparisons to receive financial support from their parents, including housing and “emergency” and regular funding from parents and other relatives. Participants in the ADHD group were also more likely to receive government assistance than were comparisons. Our findings extend Fletcher's (2014) cross-sectional results showing an association between ADHD and public assistance among YA ($M=29$ years-old) to a sample of individuals identified as ADHD in childhood and followed prospectively.

¹To evaluate the effect of educational attainment and delinquency on financial outcomes independent of ADHD, all predictor analyses were also performed excluding childhood ADHD status. These analyses revealed that education attainment was a protective factor against negative financial outcomes ($p<0.05$) and living at home ($p<0.05$).

Additionally, according to self-report, YA with ADHD had fewer personal financial resources. On average, ADHD participants earned 25 % less per year than comparison group participants. These results are consistent with an estimated 20–30 % loss in earnings attributable to ADHD among adult-recruited samples (Biederman and Faraone 2006; Fletcher 2014). Our findings are also consistent with the Milwaukee age 27 follow-up study in which participants diagnosed in childhood who continued to meet ADHD DSM-IV diagnostic criteria earned 38 % less than comparisons, while those whose symptoms had at least partially remitted earned 20 % less than comparisons (Barkley et al. 2008).

Together, these findings add to a small body of literature documenting the effect of mental health problems on earnings. Kessler et al. (2008) estimated that adults with serious mental illness earn \$16,306 (42 %) less annually than those without serious mental illness. Another study estimated annual earnings losses resulting from a variety of mental health disorders and demonstrated that the impact of anxiety, depression, and antisocial personality disorders had significant impact on earnings of lower income individuals (Marcotte and Wilcox-Gök 2003). Two studies estimated the annual economic burden of depression and found that individuals with depression experience higher unemployment levels and less earnings than those without depression (Greenberg et al. 2003; Whooley et al. 2002).

While we found a significant reduction in earnings among ADHD group participants, we found an even greater reduction in savings (50 %) relative to comparisons. Our findings are in line with the Barkley et al. (2008) UMASS study which reported that individuals ($M=32$ years-old) diagnosed with ADHD in adulthood had more difficulty saving money and were not saving for retirement. In addition to the aforementioned problems, in the Milwaukee 27 year-old follow up individuals with ADHD saved 3–4 % of their income whereas controls saved 11 % (Barkley et al. 2008). Notably, there were no significant group differences in regards to debts (excluding student, car, and house loans) in the current study. However, despite debts being about equal, individuals in the ADHD group were much less likely than comparisons to be saving in light of their debts; these YA had over 80 % less money in savings when debts were considered. This is especially troubling given that comparison participants contributed more to their own expenses (e.g., rent) and received less financial support from their families. Thus, it appears that individuals with ADHD continue to experience impairments related to planning and organization and delay of gratification into early adulthood—in this case regarding their financial affairs rather than schoolwork.

Our findings, along with those of our cross-sectional and prospective predecessors (e.g., Barkley et al. 2008; Biederman and Faraone 2006; & Fletcher 2014) provide compelling evidence that ADHD is associated with lower earnings and greater financial difficulties in adulthood. The current study adds to the literature that YA with ADHD experience significantly greater financial dependence compared to those without the disorder, especially when parent-report is considered. As a result of their greater financial dependence, ADHD YA place a greater burden on their families, many of whom continue to provide financial support and housing for these individuals long after childhood and adolescence.

It is noteworthy that on items for which both YA and parent-report were available, the ADHD group participants' reports of their finances were much less problematic than were

their parents' reports. Consistent with past research demonstrating that adolescents and YA with ADHD underreport their problems relative to their parents (e.g., Barkley et al. 2002; Sibley et al. 2012a, b), ADHD group participants in the current study underreported their problems by approximately 25–30 %. Further, such discrepancies were not observed between the reports of comparison participants and their parents, demonstrating that the unreliability of self-report is apparently unique to the ADHD sample. Given this information, parent-report is likely most accurately reflective of financial outcomes for YA in the ADHD group and the questions for which parent-report was not collected (e.g., receipt of government support, earnings, savings) may also be exaggerated by the positive self-report of ADHD participants. In the future, obtaining direct financial records (e.g., credit scores, pay stubs, Internal Revenue Service forms) from participants will be crucial to resolving the reporter discrepancy between YA with ADHD and their parents.

Predicting Young Adult Financial Outcomes

This study also examined predictors of financial outcomes (Table 4). As hypothesized, those identified with ADHD in childhood were less likely to experience financial success and were more likely to be living at home. When controlling for ADHD diagnosis, delinquency and educational attainment were also predictive of financial outcomes.

Higher levels of delinquency predicted poorer personal finances (i.e., having debts, more money-related hassles, and greater reliance on family/government for financial support). Although ADHD did not directly predict the negative financial indicator composite, ADHD in childhood is a significant predictor of elevated levels of delinquency later in life (Sibley et al. 2011). Additionally, children with ADHD and increased discipline problems are at greater risk for course failure, lower enrollment in postsecondary education, and lower occupational attainment (Kent et al. 2011; Kuriyan et al. 2013). Thus, delinquency is associated with a number of problems that predict poorer financial outcomes among individuals with ADHD. Interestingly, delinquency decreased the likelihood that an individual would be living at home while ADHD increased this likelihood. Though findings from the present study do not show this directly, perhaps those with ADHD and high levels of antisocial behavior are less welcome in their parents' home than are those with ADHD and low levels of antisocial behavior.

One protective factor emerged when controlling for ADHD diagnosis: individuals with higher levels of education were more likely to experience financial success, including earning a higher salary and having money in a savings account. However, relative to those without the disorder, individuals with ADHD experience greater academic problems and lower education attainment (Barbarese et al. 2007; Barkley et al. 2006; Barkley et al. 2008; Kent et al. 2011; Kuriyan et al. 2013). Therefore, a childhood ADHD diagnosis is not only directly predictive of less financial success in young adulthood, but may also be indirectly related through educational attainment. These findings underscore the importance of developing supports for ADHD young adults that continue to target educational attainment—for example, counseling or tutoring programs for those in community college and, if appropriate, medication.

Our results indicate that with the exception of the negative financial indicator composite, ADHD remains a significant predictor of financial outcomes even when controlling for highly related factors such as delinquency and education attainment, which themselves are direct results of ADHD. Thus, it appears that a constellation of behaviors associated with ADHD put children who are diagnosed with the disorder at a disadvantage for achieving financial success in young adulthood.

Projecting Differences in Lifetime Earnings

Our results demonstrate that individuals with ADHD will earn approximately \$543,000–\$616,000 less over the lifetime compared to those without the disorder. This is significantly more than the \$160,000 estimated lifetime earnings gap for adults with diabetes (Fletcher and Richards 2012) and suggests substantial productivity losses attributable to ADHD. Because study participants have not yet reached their full earnings potential at age 25, this estimated differential is likely an underestimate of the true lifetime earnings gap. Additionally, given their underreporting of impairment in other areas, the self-report of ADHD participants regarding their income is likely to be exaggerated, meaning that actual lifetime earnings difference may be much larger than we reported herein. While a precise estimate of the annual societal economic burden resulting from this earnings reduction is difficult to estimate given that the projection was based on a single data point at a single age from a non-nationally representative sample, an earnings reduction of that magnitude among those with a condition approaching 10 % prevalence among individuals in the U.S. (Kessler et al. 2006; Visser et al. 2014) suggests a significant annual societal economic burden (e.g., a reduction in the Gross Domestic Product) due to ADHD. Additionally, these data can strengthen existing cost of illness estimates, the most recent of which (Doshi et al. 2012) assumed an annual cost of \$84 to \$138 billion attributable to income and productivity losses among adults with ADHD. Notably, the studies included in Doshi et al.'s review relied on adult-recruited samples, and our findings suggest that those results would have been more striking had they been limited to follow-ups of children identified with ADHD.

Strengths and Limitations

The results of this study must be considered within the context of its limitations. While our sample was demographically representative of Allegheny County, PA, the county where the study occurred, many participants came from middle-class families. Thus, the results of this study may be most generalizable to middle-class, racial-majority males whose parents completed high school. Parent-reported data was only available for 75% of participants; therefore, parent-reported results can only be generalized to a portion of the sample. Another potential limitation is the age that financial outcome data were collected. At age 25, many individuals may not have met their full earning potential and lifetime unemployment rates may be overrepresented. Additionally, as mentioned previously, outcomes that relied solely on self-report are likely exaggerated among ADHD group participants. To address these problems, this study should be replicated once financial data are available for our sample in their 30s and should include measures in addition to self-report to allow for more precise estimates of financial outcomes, earnings potential, and growth trajectory.

Another limitation that may have influenced our findings was that comparison participants had significantly higher IQ scores relative to the ADHD group (Comparison: $M=111.35$; ADHD: $M=101.02$). Therefore, it is possible that the poorer financial outcomes of ADHD group participants relative to comparisons are at least partially due to poorer intellectual functioning among these participants. However, IQ did not contribute to group differences in financial outcomes when other related factors (e.g., education attainment) were considered (see Table 4). This was true when IQ was examined as both a continuous and a categorical (e.g., Average, High Average) variable. Moreover, while the difference in IQ scores is considerable, this finding is consistent with the literature (e.g., Frazier et al. 2004; Jepsen et al. 2009), and may at least partially reflect poorer IQ test performance due to ADHD-related impairment (e.g., inattention, impulsivity) rather than poorer intellectual functioning among ADHD group participants.

Although limitations exist, this study also has several strengths. This study improves on its predecessors (Biederman and Faraone 2006; Fletcher 2014) by using a sample of YA who were rigorously diagnosed with ADHD in childhood and followed prospectively. The diagnostic procedures used at baseline of the PALS, which relied on parent-, teacher-, and clinician-report, are the gold-standard in the field (Pelham et al. 2005). Additionally, this study extends past prospective work (Barkley et al. 2008; Fischer and Barkley 2006) by including information on financial dependence and using parent-report to confirm self-report of financial outcome information when possible. The current study also uses a considerably larger sample (ADHD: 309, Comparison: 208) than the Milwaukee age 27 follow-up study (Hyperactive: 135, Comparison: 208). Furthermore, this is the first study to report predictors of financial dependence in young adulthood and to project the lifetime earning differential.

Conclusions and Clinical Implications

This study adds to a growing body of literature demonstrating that, as with other chronic health conditions, ADHD continues to cause impairment in daily life functioning in adulthood. Our study shows that at age 25, YA with ADHD are less likely to experience financial success and independence. Lower education attainment and higher rates of delinquency among this population contributed to poorer financial outcomes. When earnings were projected over the lifetime, individuals with ADHD were predicted to earn far less than those without the disorder.

Given the increased risk for children diagnosed with ADHD to experience financial difficulty in young adulthood, programming targeting personal finances and related domains is indicated. Currently, little research exists that examines how to effectively prevent or improve financial problems among YA with ADHD. To curb the development of financial problems, future research should evaluate the efficacy of prevention efforts with youth focused on teaching appropriate money management skills—particularly those transitioning from high school to young adulthood. For example, the Summer Treatment Program for Adolescents (STP-A; Pelham et al. 2010), provides adolescents with ADHD the opportunity to earn and manage money. Similar programming could be integrated into school curricula and other existing psychosocial interventions for youth with ADHD.

In regards to treatment of existing financial problems, stimulant medication is often the first-line treatment for adults with ADHD (Wilens et al. 2001). However, adherence to medication regimens is poor (Safren et al. 2007) and, of those who do take medication, many do not show adequate response (Wilens et al. 2001). Further, little is known about the effect of medication on functional impairments related to occupational performance or management of personal finances. Therefore, skills-based psychosocial interventions may be necessary to treat the functional impairments that lead to poor management of finances among adults with ADHD.

To date, the research on psychosocial interventions for adults with ADHD is limited (Knouse and Safren 2010). While recent controlled trials of cognitive behavioral therapy (CBT; Safren et al. 2005; Safren et al. 2010) and metacognitive therapy (Solanto et al. 2010) demonstrate a reduction of ADHD symptoms, data examining the effect of these therapies on impairment are limited to open trials conducted with college students (e.g., Anastopoulos and King 2015; Eddy et al. 2015; LaCount et al. 2015). These initial studies provide encouraging preliminary support for the utility of CBT-based approaches in improving functional outcomes for YA including academic and work performance, life skills, and self-concept. However, controlled trials with larger samples are needed to fully understand the impact of these interventions on domains related to personal finances. Lastly, future research should focus on incorporating specific skills training on managing personal finances into existing psychosocial interventions for young adults, a topic not typically included in high school and junior college curricula.

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Table 1

Demographic variables

	ADHD (<i>n</i> =309)	Comparison (<i>n</i> =208)	χ^2 or <i>F</i>
Gender (% Male)	88.35	88.46	0.002
Racial Minority (%)	17.48	14.90	0.60
African American (%)	11.00	9.13	0.47
Other (%)	6.47	5.77	0.11
Highest Parent Education			12.05
High School Grad or GED (%)	10.46	7.69	1.12
Technical/Specialized Training (%)	6.86	9.62	1.28
Partial College (%)	16.01	12.02	1.60
Associate's/2-year Degree (%)	14.39	8.17	4.56**
College or University Grad (%)	25.49	26.44	0.06
Graduate Training (%)	26.47	36.06	5.38**
Age 25 Education Level			104.21*
No High School (%)	7.44	0.96	11.35*
High School Grad or GED (%)	20.06	3.37	29.98*
Partial College (%)	56.31	59.62	0.56
Associate's/2-year Degree (%)	10.68	3.37	9.32*
Bachelor's Degree (%)	5.18	32.69	69.16*
Age 25 Employment Status			26.45*
Unemployed (%)	26.21	15.38	8.54*
Part-time Employed (%)	20.38	9.13	11.80*
Full-time Employed (%)	48.54	67.79	18.71*
Baseline Full-Scale IQ (<i>M</i> , <i>SD</i>)	101.02 (15.79)	111.35 (14.39)	7.52*

Chi-square tests were conducted for categorical variables and ANOVAs were conducted for continuous variables

*
 $p < 0.01$,

**
 $p < 0.05$

Table 2

Self- and parent-report of group differences

	Self-Report (n=517)				Parent-Report (n=387)			
	ADHD	C	p	Phi or Partial η^2	ADHD	C	p	Phi
Currently living with family (%)	38.63	27.41	<0.05	0.12	36.20	26.54	0.05	0.10
Has moved back home after living independently (%)	27.90	21.32	>0.05	0.08	44.44	18.00	<0.05	0.15
Regularly receives money for living expenses (%)	11.55	10.66	>0.05	0.01	-	-	-	-
Regularly provides money for living expenses (%)	-	-	-	-	25.42	12.12	<0.05	0.11
Receives money from welfare/government programs (%)	11.23	1.53	<0.01	0.19	-	-	-	-
Receives "emergency funds" (%)	38.31	31.77	>0.05	0.07	-	-	-	-
Provides "emergency funds" (%)	-	-	-	-	54.10	44.00	0.05	0.10
Another adult provides financial assistance for child (%)	-	-	-	-	18.10	11.00	0.05	0.10
Parent co-signed a loan for child (%)	-	-	-	-	7.25	11.56	>0.05	0.07
Money paid in housing monthly in \$ (M, SD)	325.47, 329.41	431.47, 372.93	<0.01	0.02	-	-	-	-
Monthly earnings before taxes in \$ (M, SD)	1613.22, 1432.90	2162.94, 1607.03	<0.05	0.03	-	-	-	-
Money in a savings account in \$ (M, SD)	2029.18, 5774.31	4075.98, 7718.77	<0.05	0.02	-	-	-	-
Has debts (excluding house, car, and student loans; %)	41.82	38.10	>0.05	0.04	-	-	-	-
Amount in debt in \$ (M, SD)	1482.60, 2603.66	1500.00, 2638.18	>0.05	0.02	-	-	-	-
Has debt due to running up a credit card (% , n)	57.89 (66/114)	86.67 (65/75)	<0.05	0.01	-	-	-	-
Amount in savings account less debt in \$ (M, SD)	515.88, 6337.59	3911.96, 19964.01	<0.05	0.02	-	-	-	-
Number of credit cards owned (M, SD)	1.21, 1.89	2.36, 2.35	<0.05	-	-	-	-	-
Number of times turned down for credit card (M, SD)	1.57, 3.6	1.08, 4.1	>0.05	-	-	-	-	-
Number of times credit card cancelled by issuer (M, SD)	0.28, 0.95	0.25, 0.82	>0.05	-	-	-	-	-
Money-related hassles (M, SD)	1.16, 1.58	0.70, 0.95	<0.05	0.03	-	-	-	-

C= Comparison. Parent-report was not available for all participants, resulting in different sample sizes for self- and parent-reported items. Chi-square tests were conducted for categorical outcomes; percentages of endorsement by group are reported for these items and Phi values are reported as estimates of effect size. ANOVAs were conducted for continuous variables and Poisson regressions were conducted for count variables; group means are reported for these items. Partial eta squared values are reported as an estimate of effect size for ANOVAs

Table 3

Two factor solution of financial items

	Positive Indicators	Negative Indicators
Monthly salary before taxes	0.85 **	0.01
Amount of money in a savings account	0.33 **	-0.39 **
Has debts	0.20 **	0.58 **
Money-related hassles (ISLE)	0.08	0.55 **
Receives emergency funds (combined parent and self-report)	-0.03	0.67 **
Regularly receives funds from parents and/or government (combined parent and self-report)	-0.55 **	0.35 **

N=517 young adults

**
=p<0.05

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Table 4

Predictors of financial outcomes

Positive Indicators	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>p</i>	β	95 % <i>CI</i>
Highest Parental Education Level	0.01	0.01	0.29	0.77	0.01	(-0.08, 0.10)
IQ	0.01	0.05	1.00	0.32	0.05	(-0.01, 0.02)
Education by Age 22	0.16	0.04	3.97	0.00	0.21	(0.08, 0.24)
Delinquency	-0.02	0.05	-0.43	0.67	-0.02	(-0.12, 0.08)
ADHD ^a	-0.46	0.16	-2.80	0.01	-0.14	(-0.78, -1.23)
Negative Indicators	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>p</i>	β	95 % <i>CI</i>
Highest Parental Education Level	-0.01	0.09	-0.13	0.77	-0.01	(-0.08, 0.10)
IQ	-0.01	0.01	-0.40	0.69	-0.02	(-0.01, 0.02)
Education by Age 22	-0.13	0.09	-1.72	0.09	-0.11	(-0.28, 0.02)
Delinquency	0.40	0.09	4.31	0.00	0.24	(0.21, 0.57)
ADHD ^a	0.48	0.30	1.60	0.11	0.10	(-0.11, 1.08)
Lives at Home ^b	<i>B</i>	<i>SE B</i>	<i>Wald</i>	<i>p</i>	<i>OR (95 % CI)</i>	
Highest Parental Education Level	-0.12	0.07	2.69	0.10	0.89	(0.78, 1.02)
IQ	-0.01	0.01	0.55	0.46	0.99	(0.98, 1.01)
Education by Age 22	-0.10	0.07	2.17	0.14	0.91	(0.80, 1.03)
Delinquency	-0.16	0.08	4.80	0.03	0.85	(0.73, 0.98)
ADHD ^a	0.50	0.26	3.82	0.05	0.61	(0.37, 1.00)

B = linear or logistic regression coefficient. Positive Indicators = $F(5, 457)=10.70, p<0.001$; Negative Indicators = $F(5, 298)=7.74, p<0.001$; Lives at Home = $\chi^2(5)=20.52, p<0.01, R^2=0.03$ (Cox & Snell), 0.03 (Nagelkerke)

^aComparison is the reference group (ADHD=1, Comparison=0)

^bCurrently living at home=1, Not living at home=0

Table 5

Differences in ADHD and comparison earnings at 25 years old (2013 dollars)

	<i>a</i> Difference	95 % CI	<i>F</i>
Model 1 (No covariates)	8,107.67 *	(3,892.6, 12,322.7)	14.31 *
Model 2 (Covariates: Gender, Race)	8,075.52 *	(3,882.8, 12,268.2)	5.37 *
Model 3 (Covariates: Gender, Race, Work status)	5,085.5 ***	(1,007.2, 9,163.8)	12.79 *
Model 4 (Covariates: Gender, Race, Education)	7,149.09 *	(2,461.0, 11,837.2)	3.59 *
Model 5 (Covariates: Gender, Race, Work status, Education)	4,128.44 ***	(-391.1, 8,647.9)	8.24 *

^aDifference in average earnings between ADHD and comparison working participants (unemployed excluded)*
 $p < 0.01$,**
 $p < 0.05$,***
 $p < 0.10$

Table 6

Life-work earning differences by diagnostic status (2013 thousand dollars)

	Sample	Case 1	Case 2
Comparison	182	1,556,680	1,696,040
ADHD	261	1,013,350	1,080,090
Difference	443	543,330 *	615,960 *

Projected earnings from age 25 to age 64, by education attainment and work status. Sample size reduced due to missing values in earnings and work status. Case 1: Individuals who were unemployed at age 25 were assumed to be unemployed for the remainder of the work-life. Case 2: Individuals who were unemployed but in school at age 25 were assigned earnings equal to someone in their cohort with a bachelor's degree.

*
 $p < 0.01$

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