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Kidney360

The Impact of Pediatric CKD on Educational and Employment Outcomes

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Key Points

- This study evaluates educational and employment outcomes in patients with pediatric kidney disease and assesses predictors of educational attainment and employment in young adulthood.
- Despite high rates of high school graduation, nearly 20% of patients with CKD are unemployed or receiving disability at long-term follow-up.

Abstract

Background Pediatric patients with CKD are at risk for neurocognitive deficits and academic underachievement. This population may be at risk for lower educational attainment and higher rates of unemployment; however, published data have focused on patients with advanced CKD and exist in isolation from assessment of neurocognition and kidney function.

Methods Data from the CKD in Children (CKiD) cohort study were used to characterize educational attainment and employment status in young adults with CKD. We used ratings of executive function as a predictor of future educational attainment and employment status. Linear regression models predicted the highest grade level completed. Logistic regression models predicted unemployment.

Results A total of 296 CKiD participants aged 18 years or older had available educational data. In total, 220 of 296 had employment data. By age 22 years, 97% had completed high school and 48% completed 2+ years of college. Among those reporting employment status, 58% were part-time or full-time employed, 22% were nonworking students, and 20% were unemployed and/or receiving disability. In adjusted models, lower kidney function ($P = 0.02$), worse executive function ($P = 0.02$), and poor performance on achievement testing ($P = 0.004$) predicted lower grade level completed relative to expectation for age.

Conclusions CKiD study patients appear to have a better high school graduation rates (97%) than the adjusted national high school graduation rate (86%). Conversely, roughly 20% of participants were unemployed or receiving disability at study follow-up. Tailored interventions may benefit patients with CKD with lower kidney function and/or executive function deficits to optimize educational/employment outcomes in adulthood.

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Introduction

Children with CKD are at risk for academic underachievement—even before disease progression to RRT.[1] This is salient as childhood academic achievement predicts later career success in the general population.[2] Existing single-center data indicate that children with CKD experience higher rates of supplementary school service usage,[3–5] frequent school absenteeism and grade retention,[6] and lower graduation rates.[3,7] Limited single-center data suggest that

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adults with a history of pediatric CKD have difficulty obtaining employment.[7]

Academic differences are not exclusively attributable to disease-related school absences[4,5] but instead may correlate with cognitive behavioral deficits experienced by the individual.[8] Children with CKD are at risk for neurocognitive deficits, particularly in executive function.[9,10] Executive function predicts academic performance in otherwise healthy pediatric populations.[11] It is reasonable to consider that even subtle concerns for executive dysfunction may perpetuate academic underachievement and employment challenges in young adults with CKD.

There is a scarcity of large-scale, contemporary data on the topic of educational attainment and employment outcomes among adults with a history of pediatric CKD. The literature on this topic reflects data published before the year 2000 and has focused on end-stage kidney disease and/or kidney transplant.[10] No published studies have analyzed educational/employment outcomes in tandem with a concurrent assessment of kidney function and neurocognition. The CKD in Children (CKiD) study is a prospective cohort study which has characterized pediatric CKD progression and concomitant risk for CKD-associated sequelae. As part of CKiD study participation, longitudinal neurocognitive assessment is performed in parallel with self-reported educational and employment outcomes.

We leveraged data from the CKiD study to (*1*) characterize the highest educational level attained and employment status among young adults with a history of pediatric CKD and (*2*) evaluate kidney function in parallel with parent-reported executive function and academic achievement to predict educational attainment and future employment status.

Methods

The CKiD study is a multicenter study that has been conducted at 56 pediatric nephrology centers in North America since 2003.[9,12] The details of CKiD study design, inclusion and exclusion criteria, and methods have been published previously.[12] The CKiD protocol was independently approved by each center's Institutional Review Board.

For this analysis, inclusion required (*1*) completion of either an in-person or phone-in-person visit at/after age 18 years and (*2*) completion of at least one neurocognitive assessment between age 10 and 16 years with concurrent measurement of eGFR and proteinuria. Children with intellectual disabilities and those with genetic syndromes with nervous system manifestations were excluded from participation by study design. Figure 1 details subject selection.

Assessment of Educational Attainment and Employment Status

In-person and phone-in-person visits were used for participants aged 18 years or older to collect data on their highest level of schooling completed and current employment status. Because of the impact of coronavirus disease 2019, analyses were restricted to education and employment data collected before January 2020.

Assessment of CKD

Creatinine-based and cystatin-C–based estimations of kidney function[13] were obtained at each study visit in addition to other risk factors for CKD progression, including assessment of proteinuria, as defined by a first-morning urine protein to creatinine ratio. Date of initiation of RRT (need for dialysis or transplantation) was also collected.

Assessment of Academic Achievement and Executive Function

Assessment of Academic Achievement

The Wechsler Individual Achievement Test, second edition, abbreviated (WIAT-II-A)[14] estimates children's composite academic performance (Total Achievement score) and assigns individual domain scores in reading, math,

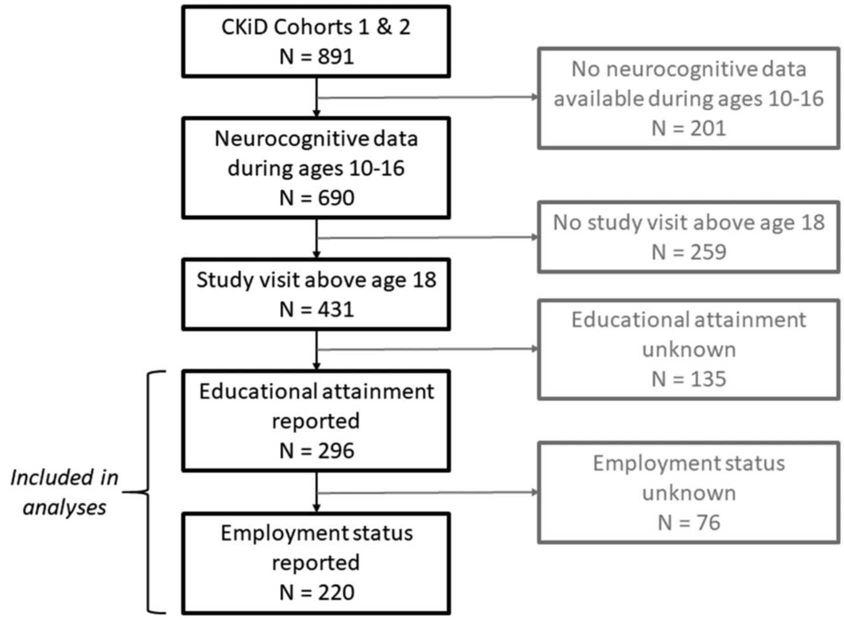

Figure 1. CONSORT diagram showing selection of the study population from the within larger CKiD study cohort. CKiD, CKD in Children.

and spelling. WIAT-II-A has a standard score of 100 and a SD of 15. Scores of 85 or less indicate low achievement. WIAT-II-A was administered as part of the CKiD neurocognitive assessment protocol until it was discontinued at the third year of the CKiD study.

Assessment of Executive Function

Assessment of executive function was completed using the Behavior Rating Inventory of Executive Function (BRIEF) Global Executive Composite (GEC) score,[15,16] a caregiver's rating of their child's cognitive regulatory behaviors. The BRIEF is a well-validated, widely used proxy measure of executive function. This BRIEF GEC yields a t-score with a mean of 50 and a SD of 10, with higher scores reflecting worse ratings. This measure was completed within the first 6 months of study entry and every 2 years thereafter per CKiD protocol.

Statistical Analyses

Our primary aim was to determine the distribution of highest grade level completed and current employment status for participants aged 18 years or older. We compared the most recent participant-reported educational data available to an estimated age-expected outcome. To determine this estimation, we considered 12 years of educational attainment equivalent to high school graduation with additional years of education counting as college/higher education. Data were captured from participants as young as 18 years, many of whom could still be completing high school. Grade retention is not queried as part of CKiD study visit protocols; as a proxy, we derived a variable called *grade level relative to expectation for age.* Here, for participants younger than 22 years, we subtracted 6 years from the participant age and then subtracted the numerical value of the highest grade completed. Six years was chosen based on US national data indicating the majority of children begin kindergarten by/before age 6 years.[18] Thus, a 19-year-old who has completed 11th grade would receive a proxy value of (19–6)–11=2. For participants 22 years or older, we calculated grade level by subtracting the highest grade completed from 16, to account for a standard 4-year college education, but not necessitate an education beyond a 4-year degree. Values ≥2 were interpreted as grade level completion *below* expectation for age.

Figure 2 describes employment status. Respondents could answer affirmatively to multiple options (*e.g.*, both working part-time and student). We created a single descriptor of employment status as follows: working (full-time, part-time, or self-employed), nonworking student, on disability, unemployed (seeking work), and unemployed (not seeking work).

For our second objective, we used linear regression to predict grade level achieved relative to expectation for age and logistic regression to predict unemployment. Predictors of interest tested in both models included parent/caregiver ratings of executive function (BRIEF GEC), kidney function (eGFR), proteinuria, RRT, and academic achievement (WIAT-II-A). Kidney function was taken as the median of all available values between age 10 and 16 years. If participants had multiple BRIEF GEC entries, participants' first available scores between age 10 and 16 years were used. Regression analyses for grade level achieved used the full cohort in addition to the participant subsample with available WIAT-II-A data. WIAT-II-A data were dichotomized into low achievement, (one SD below the mean, total achievement score 85 or less) and non-low achievement for analysis.

The most recent values of kidney function (eGFR) and proteinuria were used in models predicting employment status. Participants who did not respond to employment status questions were omitted from employment models. We included the educational outcome of grade level relative to expectation for age as a binary predictor of unemployment. As an approximation, we fit models both with and without this predictor.

Logistic and linear regression models controlled for age, maternal education, annual household income, and individualized educational plan/504 plan use.

Missing Data Management

Statistical models used complete case analysis such that participants with any covariate data missing were omitted. We sought to account for differences between the participants with complete data used in regression models and other CKiD participants who conceivably could contribute

What is the **highest** grade or level of school that *(name of participant)* has COMPLETED? **For example, if the participant is currently in the 12th grade, then enter "11", or if the participant is currently in the 6th grade, then enter "5". In addition, if the participant is in 1st grade, kindergarten or pre-school/pre-K, then enter "0" or if the participant is a sophomore in college, then enter "13".**
______ Grade
Don't Know
Not applicable/child less than 5 years old and does not attend pre-school/pre-K
What is the current employment status of *(name of participant)*?
Working full-time (35 hours of more per week)
Working part-time (less than 35 hours per week)
Disability income
Currently enrolled student
Unemployed but seeking work
Unemployed not seeking work
Is *(name of participant)* self-employed?
Yes
No
Don't Know

Figure 2. CKiD in-person follow-up and phone-in-person questionnaire prompts and answers. CKiD, CKD in Children.

education/employment data but did not have complete data for study inclusion. There were no differences between groups in terms of socioeconomic status, intelligence, attention deficit hyperactivity disorder diagnoses, individualized education plan/504 use, proteinuria, or (for those with data) WIAT-II-A total achievement. Our selected sample for regression models did demonstrate higher eGFR (median 47.0 versus 37.7, $P < 0.0001$) and lower GEC (median 53 versus 55, $P = 0.01$), suggesting that CKD progression *could* have had some effect on those with available, complete outcomes for predictive models (Supplemental Table 1).

SAS 9.4 (SAS Institute, Cary, NC) and R 3.6.3 were used for statistical analyses and figure generation.

Results

Sample Description

A total of participants met inclusion criteria for assessment of educational attainment, and 220 of 296 participants reported current employment status. Educational attainment and employment status were collected at a median participant age of 20.5 (interquartile range 19.0–22.5) years. Table 1 displays group characteristics. At the most recent follow-up visit, the median participant eGFR was 47 ml/min per 1.73 m^2 (37–60), and the median urine protein/creatinine was 0.87 (0.21–2.14). RRT was required by 28% of this cohort during the observation period.

Grade Level Attainment and Employment Status

Table 1 illustrates grade level completion and employment status for the cohort. Among individuals who completed follow-up visits by age 22 or older (n=90), only 3 (3%) had not completed high school. Forty-four participants (49%) had graduated high school and completed 1 year or less of college. The remaining sample (n=43, 48%) completed 2 years or more of college.

Employment outcomes were available for 220 individuals. A total of 128 individuals (58%) reported working (full-time, part-time, or self-employed) while 48 participants (22%) reported nonworking student status. The remainder were divided into disability status (n=16, 7%), seeking work (n=15, 7%), or not seeking work (n=13, 5%).

Selected Correlates of Grade Attainment and Employment Status

Table 2 displays linear regression models for the grade level relative to expectation for age at the time of the most recent CKiD visit outcome. Two regression models were performed, one including only individuals (n=122) with WIAT-II-A data and the other without WIAT-II-A data including individuals with complete data (n=266) from the eligible sample. For those with WIAT-II-A data, a total achievement score of 85 or less predicted lower educational attainment relative to expectation ($P = 0.004$). Lower median eGFR between 10 and 16 years of age was associated with lower educational attainment relative to expectation in the model containing achievement data ($P = 0.02$). Worse performance on the BRIEF GEC predicted lower educational attainment relative to expectation ($P = 0.02$) in models including academic achievement data. In models without WIAT-II-A data, no variables significantly predicted educational attainment.

Table 1. Pertinent demographic, physiologic, neurocognitive, educational, and employment data for CKD in Children study participants (N=296)

Characteristic	Median (IQR) or n (%)
Age at neurocognitive assessment	14.2 (11.9–15.9)
Age at education/employment assessment	20.5 (19.0–22.5)
Glomerular etiology	109 (37%)
Age at CKD onset	0.0 (0.0–8.5)
CKD duration at education/employment assessment	18.9 (13.5–21.0)
U25eGFR, ml/min per 1.73 m^2	
Median during school years	47 (37–60)
Most recent available	47 (28–66)
Urine protein/creatinine ratio, mg/mg	
Median during school years	0.50 (0.18–1.16)
Most recent available	0.87 (0.21–2.14)
African American race	61 (21%)
Hispanic ethnicity	44 (15%)
Maternal education	
High school or less	111 (39%)
Some college	79 (27%)
College or more	98 (34%)
Household income <$36,000/yr	105 (37%)
RRT	82 (28%)
ADHD history	36 (12%)
IEP/504 plan history	128 (46%)
WIAT-II-A achievement score	96 (81–108)
BRIEF GEC	53 (45–61)
Educational attainment (all patients)	
Not completed high school	54 (18%)
High school, 0–1 yr of college	173 (58%)
2–3 yr of college	54 (18%)
4 yr of college	15 (5%)
Educational attainment (age 22+, N=90)	
Not completed high school	3 (3%)
High school, 0–1 yr of college	44 (49%)
2–3 yr of college	29 (32%)
4 yr of college	14 (16%)
Employment status (N=220)	
Working	128 (58%)
Nonworking student	48 (22%)
Disability	16 (7%)
Seeking work	15 (7%)
Not seeking work	13 (6%)

IQR, interquartile range; U25eGFR, under age 25 eGFR; ADHD, attention deficit hyperactivity disorder; IEP, individualized education plan; 504, individualized educational accommodation plan; WIAT-II-A, Wechsler Individual Achievement Test, second edition, abbreviated; BRIEF, Behavior Rating Inventory of Executive Function; GEC, Global Executive Composite.

Table 3 displays the logistic regression models for employment status. Adjusted models were performed both with and without the derived variable of *grade level relative to expectation for age*, a proxy measure of grade retention. No predictors showed significant effects on unemployment.

Table 2. Linear regression models for prediction of delayed educational attainment (*grade level achieved below expectation for age*)

Predictor	With WIAT-II-A (n=122)		Without WIAT-II-A (n=266)	
	Estimate (95% CI)	P Value	Estimate (95% CI)	P Value
GEC, per 10[a]	0.34 (0.05 to 0.63)	0.02[b]	0.19 (−0.01 to 0.38)	0.06
Median eGFR between age 10 and 16 yr, per 10% lower	0.13 (0.02 to 0.24)	0.02[b]	0.06 (−0.01 to 0.13)	0.08
Urine pr/cr during school years, per doubling	−0.11 (−0.30 to 0.07)	0.23	−0.05 (−0.18 to 0.07)	0.41
ME: Some college	−0.04 (−0.78 to 0.70)	0.92	−0.23 (−0.76 to 0.29)	0.38
ME: College degree or more	−0.18 (−0.93 to 0.56)	0.63	−0.54 (−1.09 to 0.005)	0.052
HH income >$36,000/yr	−0.41 (−1.06 to 0.25)	0.22	−0.46 (−0.94 to 0.03)	0.07
RRT (before age 18)	0.88 (−0.00 to 1.76)	0.0501	0.36 (−0.28 to 1.00)	0.27
IEP/504 plan history	−0.19 (−0.87 to 0.49)	0.58	0.08 (−0.34 to 0.51)	0.70
Low academic achievement	1.13 (0.38 to 1.89)	0.004[b]	—	—

Positive variable coefficients indicate lower educational attainment relative to expectation. Models with and without WIAT-II-A (academic achievement) are presented. Models include only persons with complete data. This reduced the sample size of the model from 296 to 266 persons because of missingness in the following variables: IEP/504 plan history (n=15), maternal education (n=8), household income (n=10), and urine protein/creatinine ratio (n=2). Missing WIAT achievement scores subsequently diminished the model sample size from 266 to 122 persons. Note, median eGFR values were used to account for those participants whose kidney function rapidly deteriorates during later years of study participation because we would not expect later declines to affect earlier education. WIAT-II-A, Wechsler Individual Achievement Test, second edition, abbreviated; CI, confidence interval; GEC, Global Executive Composite; pr/cr, protein creatinine ratio; ME, maternal education; HH, household; IEP, individualized education plan; 504, individualized educational accommodation plan.
[a]Global Executive Composite score per 10 units higher on GEC scale: higher scores reflect worse executive function.
[b]Designates significance at $p < 0.05$.

Discussion

This study is the first to characterize educational and employment outcomes among young adults with a history of pediatric CKD in parallel with cognitive and kidney function data. Although 97% of patients with CKD successfully completed 12th grade by age 22 years, nearly half did not pursue postsecondary education. Strikingly, nearly 20% of participants were unemployed or receiving disability at follow-up.

The adjusted national high school graduation rate in 2018–2019 was 86%.[18] Pediatric patients with CKD appear to have better high school graduation rates than the adjusted national rate for high school graduation; however, this rate limits successful graduation to persons completing high school within 4 years of starting high school. By contrast, we allowed for the possibility of late graduation in parallel with contemporary accommodations for delayed graduation.

Table 3. Logistic regression models for prediction of employment status (*N*=220)

Predictor	Grade Level Below Expectation for AgeIncluded		Grade Level Below Expectation for AgeExcluded	
	Odds Ratio (95% CI)	P Value	Odds Ratio (95% CI)	P Value
GEC, per 10	1.15 (0.78 to 1.72)	0.37	1.19 (0.80 to 1.77)	0.40
Most recent U25eGFR, per 10% lower	0.97 (0.90 to 1.05)	0.47	0.97 (0.90 to 1.05)	0.44
Current urine pr/cr, per doubling	1.19 (0.93 to 1.52)	0.17	1.20 (0.94 to 1.54)	0.15
ME: Some college	1.01 (0.37 to 2.75)	0.99	0.97 (0.36 to 2.65)	0.96
ME: College degree or more	0.43 (0.11 to 1.66)	0.22	0.40 (0.10 to 1.50)	0.17
HH income >$36,000/yr	0.65 (0.24 to 1.72)	0.38	0.61 (0.23 to 1.60)	0.31
RRT (ever)	0.80 (0.30 to 2.14)	0.65	0.85 (0.32 to 2.25)	0.74
IEP/504 plan history	0.70 (0.28 to 1.72)	0.44	0.72 (0.29 to 1.76)	0.47
Grade level below expectation for age	1.82 (0.71 to 4.68)	0.21	—	—

Models with and without *grade level below expectation for age* are presented. Grade level below expectation for age is a calculated/derived variable whereby a *grade-level-below-expectation value of 2* or greater is considered to reflect grade level below expectation for age. Note, most recent values of kidney function were used to reflect the current physiological and pathological condition of kidney function on concurrent ability to engage in the workforce. CI, confidence interval; GEC per 10, Global Executive Composite, per 10 units higher on GEC scale; U25eGFR, under age 25 eGFR; pr/cr, protein creatinine ratio; ME, maternal education; HH, household; IEP, individualized education plan; 504, individualized educational accommodation plan.

International data illustrate concerns for educational and employment outcomes in this population. Among a European study of 617 adults with a history of pediatric CKD, 41% either never attended or failed to graduate from secondary schooling.[7] Similarly, only 31% of 244 French patients with CKD obtained the equivalent of a high school diploma and nearly one-third completed only primary school.[19] Contrasting with our cohort, these studies entirely comprised RRT patients and encompass data collected over 30 years ago, whereas only a quarter of our contemporary sample had undergone RRT.[4,7,20] Since then, CKD therapy has advanced, allowing for improved patient outcomes, potentially mitigating adverse educational outcomes. Although 28% of our cohort progressed to RRT, the median eGFR did not decrease. In combination with high-quality nephrology care, those who received healthy, functioning kidney transplants would have experienced a higher eGFR compared with before transplantation. This resulted in an overall stable eGFR and likely provided an environment for patients with CKD to achieve educational and employment goals at higher rates compared with historical cohorts.

Our cohort demonstrated higher rates of unemployment compared with the general population. In 2019, the unemployment rate in the United States for individuals aged 16–24 years ranged from 8.0% to 8.9%.[20] In the fourth quarter of 2019, those with disabilities had reported unemployment rates between 7.5% and 7.9% lower values compared with the rates we report. Our cohort demonstrated improved workforce capability compared with historical data. Previous European cohorts have reported unemployment rates between 44% and 57% in the CKD population, with difficulties finding work attributed to lack of schooling.[3,7] It is plausible that our improved employment outcomes reflect the general wellness of our sample with only a moderate degree of CKD and lower rate of RRT compared with historical data.

Most notably, among those with academic achievement data (WIAT-II-A), worse kidney function between ages 10 and 16 years was associated with poorer educational attainment at/after age 18 years. This aligns with previous reports suggesting that kidney function (eGFR) predicts performance on intelligence testing and academic performance.[6,9,21] Accordingly, higher achievement in the setting of better kidney function could enhance educational attainment. Kidney function predicting educational attainment was not predictive without academic achievement data, suggesting one's actual academic achievement is possibly an effect modifier in the relationship between kidney function and educational attainment (*i.e.*, the higher the academic achievement level, the higher the educational attainment). Furthermore, we conducted a *post hoc* analysis comparing eGFR and RRT status of those with 1 year of college or less and those with more than 1 year of college. Renal function and RRT status were not different between groups. Because disease duration has the potential to impact neurocognition, we performed a separate *post hoc* analysis with the inclusion of glomerular etiology covariate because glomerular etiologies tend to occur later in life. There were no significant findings when compared with models without glomerular effect.

We also provide evidence of an association between executive function and educational attainment. Many individuals within this cohort experience subtle executive dysfunction.[9,22] Executive function is multidimensional and encompasses the mental processes of planning, initiation, goal formation, and behavioral inhibition[23] and is likely critical for successful navigation of school resources, finding employment, and overall day-to-day functioning. Caregiver-reported executive function predicted educational attainment among persons with WIAT-II-A data; however, this finding was not maintained in the larger sample without WIAT-II-A.

Logistic regression models failed to demonstrate any relationship between employment status and biological/demographic variables defined *a priori* and the derived variable of grade level relative to expectation for age. This diverges somewhat with findings from healthy individuals whereby childhood grade retention *is* a risk factor for young adulthood unemployment.[24] It is plausible that there are unidentified biological and/or psychosocial risk factors to which the CKiD cohort is uniquely sensitive and could explain the observed rates of employment among the CKiD cohort. This is a much-needed area of research given the risk for prolonged unemployment associated with dialysis dependence in adulthood.[25]

The relationship between the social determinants of health, educational attainment, and employment status are complex. We observed that low household income and maternal education showed trends toward significance in models of educational attainment but only in the absence of achievement data. The significance of these findings cannot fully be inferred from the analytical approach used but emphasizes the need for approaching pediatric CKD care in an interdisciplinary, holistic approach with support for the whole family.

This study has limitations. Our observational study does not allow for randomization or determination of causality. The cohort comprised individuals committed to participating in longitudinal research and may have support that is not reflective of the general pediatric CKD population, thus risking selection bias. The median age at educational and employment query was 20.5 years, when participants may still be in formal schooling or seeking employment. This limited our sample size for characterizing educational attainment and employment. Furthermore, the WIAT-II-A was only administered for the first 3 years of the study which limited academic achievement data.

Regarding regression models, the follow-up time interval may not have allowed for some participants to finish schooling or begin working, therefore, confounding our outcomes. We recognize the assumptions and psychometric limitations of the derived grade equivalent metric; however, this allows us to gain an estimated grade placement on the basis of chronological age. Importantly, our intention with this estimation was not to generate precise calculations, but, rather, to provide a description of overall educational attention of the CKiD participants. Our methodology permitted us to obtain a consistent estimated grade placement across all our participants but does not consider the various nuances of how individuals, particularly those with a chronic illness, move through the educational system. Refinement of these estimates is required.

Our grade level relative to expectation variable assumes intent to obtain 4 years of education after high school. Unfortunately, our cohort lacks information on which participants attended college immediately after high school or had other plans, such as trade school, gap years, or ceasing education. The manner of employment assessment cannot exclude the possibility an individual had stable work previously and/or is between work. Our findings indicate the need for a longer follow-up period into young adulthood when the importance of employment status increases. Future studies should also directly examine employment outcomes using the same measures in select patient populations, such as CKD and the general young adult population.

Despite these limitations, our study addresses a needed, contemporary assessment of young adulthood educational and employment outcomes among persons with a history of pediatric CKD. Our multicenter sample size is robust, allowing us to better describe the relationship between kidney function, executive function, academic achievement, and education/employment outcomes. Although we recognize other variables could be of interest and affect our outcomes, this study provides an innovative attempt to tackle the complexity of such factors in adolescents and young adults with CKD.

Perhaps the most striking aspect of this work is that worse kidney function in early adolescence is associated with risk for lower educational attainment. This signals a critical need to pursue early interventions for potential academic barriers in parallel with tailored interventions for adolescents and young adults with CKD to address their educational needs and future employment possibilities.

Disclosures

C. Wilson reports the following: Consultancy: Redport Information Assurance. A. Dawson reports the following: Honoraria: MedEdon the go; My Med Edge. B.A. Warady reports the following: Consultancy: Amgen; Bayer; GlaxoSmithKline; Lightline Medical; Reata; Relypsa, UpToDate; Research Funding: Baxter Healthcare; Honoraria: Amgen; Bayer; Reata; Relypsa; UpToDate; and Advisory or Leadership Role: Vice-President, North American Pediatric Renal Trials and Collaborative Studies; National Kidney Foundation Board of Directors; NTDS Board of Directors; Midwest Transplant Network Governing Board. R.J. Johnson reports the following: Honoraria: Nutrishare (honoraria for speaking to parent group); Vitaflo (honoraria for speaking); and Advisory or Leadership Role: Editorial board, *Clinical Practice in Pediatric Psychology* (journal), unpaid. All remaining authors have nothing to disclose.

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Data Sharing Statement

Anonymized data created for the study are or will be available in a persistent repository upon publication. Aggregated Data; Statistical Analysis Plan; NIDDK Repository; https://repository.niddk.nih.gov/studies/ckid/.

Supplemental Material

This article contains the following supplemental material online at http://links.lww.com/KN9/A379.

Supplemental Table 1. Comparison of patients with and without education/employment data.

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