



## Original article

Childhood Chronic Health Conditions and Educational Attainment:  
A Social Ecological ApproachSteven W. Champaloux, Ph.D., M.P.H.<sup>a,\*</sup>, and Deborah R. Young, Ph.D.<sup>b</sup><sup>a</sup> Department of Epidemiology and Biostatistics, University of Maryland School of Public Health, College Park, Maryland<sup>b</sup> Department of Research and Evaluation, Kaiser Permanente Southern California, Pasadena, California

Article history: Received January 30, 2014; Accepted July 22, 2014

Keywords: Chronic health conditions; Educational attainment; Social ecological approach

## A B S T R A C T

**Purpose:** This study examined the association between types of chronic health conditions reported during childhood and adolescence and their impact on educational attainment. School and neighborhood environments and potential mediating factors from academic and psychosocial variables were investigated.

**Methods:** Using the National Longitudinal Survey of Youth—Cohort 1997, multivariate logistic regression models were fit to estimate the association between chronic health conditions and educational attainment, adjusting for confounders. Chronic health conditions were defined as a parental (1997) or participant (2002) report of a chronic health condition and classified into (1) asthma; (2) cancer, diabetes, and epilepsy; (3) heart conditions; and (4) other. Educational attainment was defined as receiving a high school diploma or Graduate Equivalency Degree by age 21, determined from self-report.

**Results:** Youth who reported having a chronic health condition had higher odds of low educational attainment compared with youth who did not report a condition ( $n = 6,795$ ; odds ratio [OR], 1.47; 95% confidence interval [CI], 1.22–1.76). Specifically, youth with asthma (OR, 1.63; 95% CI, 1.31–2.02) and those with cancer, diabetes, or epilepsy (OR, 1.96; 95% CI, 1.13–3.37) had higher odds of low attainment. For youth who reported cancer, diabetes, or epilepsy, the variables “school absences,” “repeated a grade,” and “depressive symptoms” attenuated the association and were considered mediators.

**Conclusions:** Youth with chronic health conditions had lower educational attainment. Students with cancer, diabetes, or epilepsy who had a high number of absences, had repeated a grade, or had a high-depressive symptoms score were particularly impacted.

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IMPLICATIONS AND  
CONTRIBUTION

Youth with chronic health conditions have lower educational attainment. Chronic conditions are increasing among children and adolescents, which may lead to more youth at risk of low attainment. Potential pathways were identified that may mitigate these associations and keep these youth on a successful educational trajectory.

Chronic disease is a term for diseases that are potentially life threatening, have a long duration, frequent reoccurrence, and generally slow progression [1]. It is a broad term for many types of conditions. Although prevalence of chronic health conditions

widely differs by definition, there are an estimated 32 million children that have at least one of 20 chronic health conditions in the United States [2]. In the past four decades, the number of children with chronic health conditions has quadrupled, the percentage has increased from 1.8% in the 1960s to more than 7% in 2004 [3,4]. Although they are unique conditions, there are similarities with respect to how each affects youth [5]. Depending on the severity of the condition, children may require hospitalizations, home health care, and extensive medical care [5].

\* Address correspondence to: Steven W. Champaloux, Ph.D., M.P.H., Women's Health and Fertility Branch, Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 4770 Buford Highway, Atlanta, GA 30341.

E-mail address: SChampaloux@cdc.gov (S.W. Champaloux).

They may have a host of medical burdens compounded by everyday life challenges, including completing standard education by graduating high school or obtaining a Graduate Equivalency Degree (GED).

Although previous literature in the United States has been mixed [6–8], more recent studies have identified an association between childhood chronic health conditions and poorer educational attainment [9,10]. For example, Maslow et al. found that young adults with chronic health conditions were significantly less likely to graduate high school and gain employment compared with their healthy peers [9]. Haas and Fosse suggested that the association between chronic health conditions and educational attainment may be mediated by academic and psychosocial variables (i.e., school absences, class achievement, feeling safe at school, and cognition) after adjusting for demographic variables [11]. Both studies assessed educational attainment with students who had completed a high school diploma or GED. Using the National Longitudinal Survey of Youth—1997, Haas and Fosse used a measure of educational attainment that was based on “timely completion” to account for their young sample.

A lack of a consensus definition for youth with chronic health conditions may be partially responsible for different results noted in the previous work [9]. Asthma is a unique chronic condition that may need to be separately evaluated from other chronic conditions with respect to educational attainment. For example, young adults with asthma were found to have better educational attainment outcomes compared with nonasthmatic chronic health conditions [9]. Additionally, van der Lee et al. [12] found discrepancies between studies with respect to type of chronic conditions, which also may influence educational attainment. Expanding on this literature, Mokkink et al. [13] developed a consensus definition of childhood chronic health conditions designed for use in large epidemiological studies [9]. Our study attempted to apply this framework when examining individual chronic conditions.

The purpose of our study was to examine the impact that chronic health conditions and the specific types of chronic health conditions may have on a youth's educational attainment. By implementing a social ecological framework, one that takes into account the impact on the individual from family, neighborhood, and school, the results of the present study may reveal influential contextual factors involved in the association of chronic health conditions and poor educational attainment from the youth's family, school, and neighborhood [14,15]. The influence of academic and psychosocial factors on this association including potential mediation was also investigated. To the best of our knowledge, the social ecological framework and mediation analysis has yet to be applied to the association of chronic health conditions and educational attainment.

## Methods

### Participants

This study was a secondary analysis that used the National Longitudinal Survey of Youth—Cohort 1997 (NLSY'97), a publicly available data set [16]. The NLSY'97 is a nationally representative cohort of 8,984 youths aged 12 to 16 years as of December 31, 1996 [17]. Baseline data were collected in 1997 from parents and youth interviews, and participants were annually resurveyed through 2009 to examine the youths' transition from school to

work and adulthood [17]. These interviews asked about the youth's childhood as well as their health status, academics, and schooling.

Additional information was obtained from the students' high school transcripts and a cognitive examination that was completed in 1997 through 1998, which were all publicly available. We acquired on-site access at the Bureau of Labor Statistics that provided the participant's primary sampling unit, census tract residence in 1997, and a school-based survey [18]. The study was approved by the University of Maryland Institutional Review Board.

### Measures

**Exposure.** A childhood or adolescent chronic physical health condition was identified from the parent interview (1997) or youth interview (2002). If the parent or participant reported a condition at one of these times, this was recorded as a chronic health condition.

At each interview, the participant or parent was asked to describe the specific chronic health condition. From these responses, we categorized chronic health conditions using a consensus definition described in a study by Mokkink et al. [13]. The criteria are based on whether the chronic health condition is present for more than 3 months, will likely last more than 3 months, or has occurred three times or more during the past year and will most likely reoccur again [13]. Based on these criteria, the chronic health conditions that were not included in our categorized measure were allergies, anemia, infectious diseases, and other sexually transmitted diseases besides human immunodeficiency virus.

We classified chronic health conditions into four groups: (1) asthma; (2) cancer, diabetes, or epilepsy; (3) heart and cardiovascular conditions; and (4) other. Based on the previous work of Maslow et al. [9], we included cancer, diabetes, or epilepsy as one category and separated asthma as a separate category. These categories were also based on the literature that showed that nonasthmatic chronic health conditions (defined as cancer, diabetes, or epilepsy) may have a greater impact on educational attainment compared with asthma [9]. Cancer, diabetes, or epilepsy was also combined due to small individual sample sizes. Heart and cardiovascular conditions were a separate category because of (1) the limited literature concerning these conditions and educational attainment and (2) their high frequency. All other chronic conditions were grouped separately because there was an incomplete record of the conditions that were reported.

**Outcome.** Educational attainment was defined as completion of a high school degree or GED by 21 years of age. We chose the age of 21 as a conservative definition of completion of secondary education. Participants were asked at each survey period (annually from 1997 through 2009) when or if they had completed high school.

**Individual level: control variables.** The following control variables were considered core covariates and used in all analyses: (1) participant's age; (2) gender; (3) race/ethnicity; (4) parent education; and (5) household composition (one vs. two parents). These variables are consistently associated with educational attainment [9,11]. Participant's race/ethnicity was categorized as (1) black, non-Hispanic; (2) Hispanic; (3) mixed race; and

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