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## Variability in self-rated health trajectories from adolescence to young adulthood by demographic factors

Rebecca Sokol, MSPH<sup>a</sup>, Susan Ennett, PhD<sup>a</sup>, Nisha Gottfredson, PhD<sup>a</sup>, and Carolyn Halpern, PhD<sup>b</sup>

<sup>a</sup>Department of Health Behavior, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, 135 Dauer Drive, Chapel Hill, NC, USA 27599-7440

<sup>b</sup>Department of Maternal and Child Health, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, 135 Dauer Drive, Chapel Hill, NC, USA 27599-7440

### Abstract

Self-rated health (SRH) is a robust measure of general health status and an indicator of where and when to target disease prevention efforts—especially in adolescent populations when clinical endpoints are rare. This study’s purpose was to model SRH trajectories from ages 13 to 31 and identify whether and when differences between demographic groups emerge. We employed a conditional latent growth model of SRH in December 2016 using a nationally representative sample of 11,512 adolescents from the National Longitudinal Study of Adolescent to Adult Health data collected in 1994–2008. The average SRH trajectory is curvilinear: SRH increases until age 21 and then decreases. This trajectory contains significant between-individual variability in the intercept and linear slope. Males and self-identified non-Hispanic Blacks had higher SRH at age 13 but experienced steeper linear declines than their demographic counterparts. Individuals who grew up in households without two parents and whose parents did not graduate college had consistently lower SRH compared to those living in households with two parents and whose parents graduated college. Self-rated health is not stable over the span of early adolescence to young adulthood; demographic factors account for differences in individual variability around the starting point and overtime changes in SRH. Because these differences are apparent as early as age 13 years, prevention efforts targeting demographic-based disparities should occur early in life.

### Introduction

Self-rated health (SRH) is a robust measure of general health status and valid predictor of morbidity and mortality.<sup>1</sup> It is typically assessed by asking: “In general, how would you rate your health?” Because SRH is associated with health outcomes, it is appropriate for early life when clinical endpoints are rare.<sup>2–4</sup> However, few studies assess SRH trajectories in

Corresponding author: Rebecca L Sokol, rwoodke@live.unc.edu, Phone: 810-287-8844.

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adolescence or young adulthood, as research assumes SRH is robust and stable during this period.<sup>5</sup> Yet, it is important to investigate whether there is variability in SRH across adolescence and young adulthood—and if demographic differences account for variability—in order to direct preventive medicine efforts. Studies among adults indicate individuals with higher income, higher education, or who self-identify as White fare better in SRH.<sup>5–7</sup> These disparities may originate in adolescent development, but research has yet to explore this.

Among the few studies that evaluate SRH during adolescence, most consider SRH at a single time point. An analysis by Heard demonstrated adolescents who lived in non-traditional household structures had lower SRH compared to individuals living in traditional households, and parent education was positively associated with SRH.<sup>8</sup> A small number of studies have evaluated SRH trajectories in adolescence and young adulthood. Boardman found adolescent SRH was relatively stable and largely determined by previous SRH rather than changes in physical health.<sup>9</sup> The analysis, however, covered only one year. Bauldry considered a timespan of 14 years and found SRH was higher across adolescent developmental for males, White individuals, those who lived with two parents, and those whose parents had higher educational attainment compared to their demographic counterparts.<sup>2</sup> The models, however, did not assess growth differences.

SRH may behave differently in adolescents compared to adults—with respect to both risk factors and health outcomes associated with poor SRH. The present analyses focus on the demographic correlates of SRH trajectories during adolescent development, as these factors have been given great attention among older populations and little consideration within younger groups.<sup>10, 11</sup> Research has documented the emergence of various health disparities in adolescence, including substance use,<sup>12</sup> physical inactivity,<sup>13</sup> and sexual risk behavior.<sup>14</sup> Given that adolescence and young adulthood has been overlooked as a developmental stage when SRH disparities appear between groups, here we model SRH trajectories from adolescence to early adulthood to: 1) Characterize the shape of the average SRH trajectory from adolescence to early adulthood; and 2) Identify whether differences in SRH between demographic groups appear during this life stage.

## Methods

### Study sample

Data are from the National Longitudinal Study of Adolescent to Adult Health (Add Health), a longitudinal study of a nationally representative sample of adolescents in grades 7–12 during 1994–95 (ages 13–18), with additional data collection seven (ages 18–26) and 13 years (ages 24–31) later.<sup>15</sup> We leverage the cohort-sequential design to model the trajectory of SRH from ages 13 to 31. The analytic sample includes 11,512 respondents who provided complete information on covariates at Wave I (20,745 adolescents were interviewed at Wave I, and 15,197 and 15,701 were re-interviewed at Wave III and Wave IV). As the present study was a secondary data analysis, the UNC-Chapel Hill IRB granted exemption from human subjects' research approval.

## Measures

Questionnaires assessed SRH at each wave via asking: “In general, how is your health?” Respondents reported SRH on a five-point scale ranging from 1 (poor) to 5 (excellent). Demographic measures included respondent gender (female [reference]), racial identity (self-identified non-Hispanic White [reference], non-Hispanic Black, Hispanic, or other), highest level of education attained by either parent (college graduate [reference], some college, high school, or less than high school), and household structure (two-parent [reference] or other structure). Of respondents who lived in a two-parent household, 76% were from households with two biological parents and 24% were from two-parent households where at least one parent was not a biological parent (e.g. adoptive or step-parent). In the present analyses, we collapse the two-parent household categories into one group due to the similarities between two-parent structures with respect to family life, child well-being, and child behaviors.<sup>16</sup>

## Statistical analyses

We conducted analyses in December 2016. We structured the data by age and used latent growth modeling to model the average SRH trajectory, assess individual variability around the intercept (at age 13) and linear slope, and assess whether and when demographic variables accounted for individual variability. Due to complex survey design, analyses adjust variance estimates to account for clustering and include sampling weights. We estimated the model in Mplus v.7.31 with full information maximum likelihood and Huber-White standard errors to accommodate non-normality. To identify when group differences emerge, we probed regions of significance using a plotting utility by Preacher and colleagues.<sup>17</sup>

## Results

Approximately half of respondents were male (50.3%); 66.2% self-identified as non-Hispanic White, 15.7% non-Hispanic Black, 11.6% Hispanic, and 6.4% as another race/ethnicity. Most lived in two-parent households during adolescence (83.7%). Regarding parent education, 31.8% had college degrees, 29.3% completed some college, 27.2% completed high school, and 11.7% achieved less than high school.

The average 13-year-old reported relatively good SRH that increased until age twenty-one and then marginally declined. Figure 1 depicts average SRH trajectories for each demographic group; the shaded area around each solid trajectory depicts the inter-quartile range of subject-specific SRH within each group. The width and overlapping nature of the subject-specific bands presented in Figure 1 indicate between-person heterogeneity in SRH trajectories within different demographic groups. Overall, the present model demonstrates good fit to the data (RMSEA<0.01; CFI/TLI=0.92).

The significant variability in age 13 SRH ( $s^2=0.309$ ,  $p<0.01$ ) and linear slope ( $s^2=0.002$ ,  $p<0.01$ ) allows us to examine individual differences in starting values and in SRH growth. Males had higher SRH at age 13 ( $B=0.195$ ,  $p<0.001$ ), but a more negative linear slope ( $B=-0.007$ ,  $p=0.006$ ) than females. Yet, males maintained significantly higher SRH throughout the study period. Similarly, non-Hispanic Blacks had higher initial SRH compared to non-

Hispanic Whites ( $B=0.091$ ,  $p=0.003$ ), but a more negative linear slope ( $B=-0.010$ ,  $p=0.003$ ). Compared to self-identified White individuals, Black individuals had significantly higher SRH from age 13–17.5, but exhibited significantly poorer SRH beginning at age 28.5.

Individuals from households that did not contain two parents had lower values of SRH at age 13 compared to those in two-parent households ( $B=-0.116$ ,  $p<0.001$ ). Individuals whose parents graduated college had higher values of SRH at age 13 compared to individuals whose parents achieved less than high school ( $B=-0.292$ ,  $p<0.001$ ), high school ( $B=-0.151$ ,  $p<0.001$ ), or some college ( $B=-0.161$ ,  $p<0.001$ ). These differences persisted into early adulthood such that individuals from households without two parents and those whose parents did not graduate college fared worse in SRH compared to their peers throughout adolescent development.

## Discussion

Adolescence and young adulthood are often considered the healthiest life stages,<sup>2</sup> but these analyses demonstrate average SRH does not follow a stable high trajectory but slightly increases over adolescence before declining in young adulthood. Moreover, individual differences in early-life SRH trajectories were partially explained by demographic factors.

Paralleling previous analyses,<sup>2, 8</sup> effects of parental education and household structure appeared early; SRH was persistently higher among youth whose parents had more education and among youth raised in households with two parents. Additionally, self-identified non-Hispanic Blacks and males had higher initial SRH compared to females and self-identified non-Hispanic Whites, respectively; however, self-identified non-Hispanic Blacks and males also experienced greater linear slope declines in SRH over time compared to their demographic counterparts. These declines mirror differences in SRH that become more extreme later in the life course.<sup>5</sup> Perhaps the burden of racial discrimination, which is associated with poorer SRH in adulthood,<sup>18</sup> begins to manifest in late adolescence. Similarly, males may exhibit greater declines in SRH compared to females due to the emergence of hegemonic masculinity ideals that manifest in adolescence. Previous work has illustrated that these masculine ideals are associated with risky health behaviors such as binge drinking,<sup>19</sup> multiple sex partners,<sup>20</sup> and less mental health self-care,<sup>21</sup> and may accordingly influence SRH.

The differences in SRH observed between demographic groups—although significant—are small in absolute size. It is unclear whether these SRH differences contribute to physical or mental health disparities in adulthood. Moreover, SRH may differ in its association with health outcomes by demographic groups during adolescence. Studies among adult populations have suggested that SRH is more strongly associated with mortality among individuals at higher income brackets, at higher levels of educational attainment, and among individuals who self-identify as White compared to other racial identities.<sup>10, 11</sup> Future analyses should: 1) investigate the extent to which the predictive validity of SRH differs by demographic groupings among adolescents, and 2) evaluate if these patterns resemble those found in older samples.

## Limitations

Demographic characteristics explained a small percentage of the variance in SRH trajectories. However, the aim of this study was not to predict trajectories but rather understand how demographic variables are related to SRH growth. Given that demographic characteristics are not changeable, future work should consider under which conditions the relationship between demographics and SRH exists.

## Conclusion

This study demonstrates that SRH trajectory differences between demographic groups appear in early adolescence and persist or widen into early adulthood. Demographic-based disease prevention efforts may need to occur early to reduce the population-level impact of health disparities associated with racial identity, gender, parent education, and household structure.

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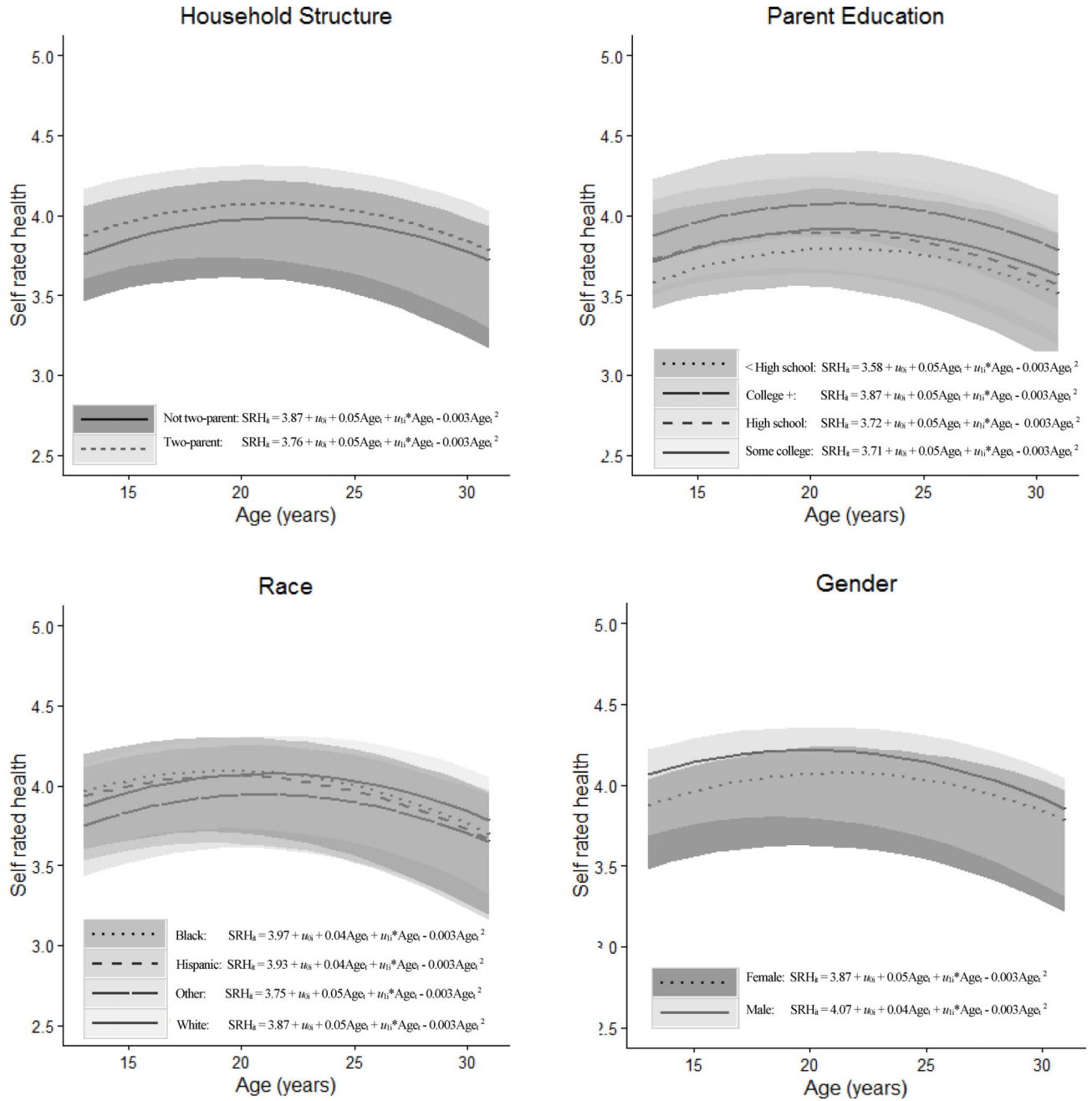
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### Highlights

- SRH varies over adolescent development, both within and between individuals
- Gender, race, parent education, and household structure explain trajectory variability
- Prevention efforts targeting demographic-based disparities should occur early in life





**Figure 1.** Average trajectories of self-rated health from ages thirteen to thirty-one (lines) across various demographic groups with shaded 25<sup>th</sup> and 75<sup>th</sup> percentile of subject-specific trajectory estimates within each group: National Longitudinal Study of Adolescent to Adult Health, 1994–2008

*Note:* Estimates based on 11,512 respondents. All estimates account for respondent clustering and weighting. Y-axis limited to SRH between 2.5 and 5 for image clarity. Intercept  $R^2 = 0.068$ ; Slope  $R^2 = 0.019$