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ORIGINAL PAPER

Longitudinal Associations Between Parental SES and Adolescent Health-Related Quality of Life Using Growth Curve Modeling

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Abstract

We evaluate how two aspects of socioeconomic status, parental objective and subjective social status, are associated with health-related quality of life in three racial/ethnic groups during pre- to mid-adolescent development, using growth curve modeling. In a longitudinal cohort study, 4,048 Black, Latinx, or White adolescents were assessed in 5th, 7th and 10th grade. Objective social status (OSS) was based on parent-reported highest household educational attainment and total household income, and subjective social status (SSS) was measured with the MacArthur Scale, through which parents indicated their social standing in reference to community and national norms. Adolescents completed the Pediatric Quality of Life Inventory to measure their physical and psychosocial health-related quality of life. Based on growth curve modeling of the intercept, adolescents whose parents have higher OSS levels reported better health-related quality of life, whereas parental SSS was not associated with adolescent health-related quality of life in 5th grade. These findings were largely consistent across racial/ethnic groups. Based on growth curve modeling of the developmental slopes (or growth curves), higher objective social status was associated with a slower positive growth of health-related quality of life from 5th to 10th grade, which was largely consistent across racial/ethnic groups. The opposite appeared for parental SSS and physical health-related quality of life, and only for Latinx, where higher parental perceived social status was associated with an acceleration of positive change. Family income and education may influence health-related quality of life at the start of adolescence, but its effect appears to diminish as youth mature. However, in Latinx youth, parents' perceived social status may continue to influence improvement in their physical health-related quality of life as they mature.

Keywords Adolescence · Health-related quality of life · Socioeconomic status · Race · Ethnicity

Highlights

- Socioeconomic status (SES) is known to influence health throughout the lifespan, but the potentially different influence from different components of SES during adolescent development is unknown.
- Parental income and education level are positively associated with health-related quality of life (HRQOL) for youth in 5th grade.
- However, the role of parental income and education fades as adolescents mature, generally consistently across racial/ethnic groups.
- Yet, in Latinx adolescents, parents' perceived social status may continue to influence improvement in their physical HRQOL as they mature.

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Socioeconomic status (SES) is a well-known predictor of health and well-being. The association between SES and health has been documented to form a gradient (Adler et al., 1994; Marmot & Bell, 2016), such that each increment of SES is related to better physical health (Allen et al., 2014), mental health (Diaz et al., 2014), morbidity (Marmot et al., 2001), and health-related quality of life (HRQOL) (Varni et al., 2005). Consequently, people in a lower level of SES

experience poorer health on average than those in a higher level. Thus, the basic association between SES and health and well-being has been well established and is considered to be universal (Hämmig & Bauer, 2013; Marmot & Bell, 2016). However, whereas SES is increasingly considered to be multidimensional, the role of its components in health is less clear (Bateman, 2014). Two major components include objective and subjective social status.

Traditionally, SES has overwhelmingly been defined by indicators such as financial resources and educational attainment (Singh-Manoux et al., 2005), reflecting objective social status (OSS). Although considerably correlated, income and education have distinctive characteristics capturing related but different aspects of a person's objective social position (Braveman et al., 2005). Income provides more opportunities in life to access cultural, educational, and social experiences (Duncan & Murnane, 2011), while education reflects social prestige (Chen, Martin, & Matthews, 2006) and access to knowledge in making decisions (Sanders et al., 2009). The vast majority of research into the influence of SES on health has been based on OSS indicators.

Despite the wealth of support for the role of OSS in health, an argument has been made that a person's subjective sense of social position is also important (Singh-Manoux et al., 2003). Subjective social status (SSS) represents individuals' perceptions of their rank on the social hierarchy (Goodman et al., 2001). Whereas this is partly based on one's own interpretation of past and current OSS, such as income and education, SSS is also dependent on one's social context (Singh-Manoux et al., 2005). It has been argued that the relative social standing may be associated with health outcomes linked to psychosocial and behavioral processes (Subramanyam, 2012). For instance, when people perceive themselves to be subordinate to others, they report lower self-esteem and greater stress (Bogart et al., 2014), which are linked to worse health outcomes (Rarick et al., 2017). More specifically, studies examining adult populations have found that SSS is inversely related mainly to stress-related conditions, such as cardiovascular risk (Goodman et al., 2003) and hypertension (Adler et al., 2008), as well as biological markers of stress such as greater morning rise in cortisol (Wright & Steptoe, 2005).

Yet, the influences of SES on health begins early in life, with lasting impact well into adulthood (Chen et al., 2002; Miller et al., 2011). The influence of OSS is so pervasive that it shapes family context. For example, families with higher income are more likely to provide structure and predictability at home, such as regular bedtime and family mealtime (Evans & Wachs, 2010). Moreover, parents with resources are more likely to give guidance, nurturance, and practical help (Conger et al., 2010). Therefore, parental OSS is positively related to adolescent HRQOL (Kim et al., 2018) and emotional and functional development (Bradley & Corwyn, 2002). Unlike the well-substantiated link between parental OSS and adolescent health, in the only study we are aware of that has examined parental SSS and HRQOL in youth, no link was found for 10~11-year-olds (Kim et al., 2018). Still, parental SSS warrants further examination in youth across development because parents influence their youth knowingly or unknowingly through various aspects of daily lives. Parents may unwittingly shape the home environment as less supportive, or even hostile, when they perceive themselves being chronically exposed to unfavorable experiences due to their perceived lower social standing.

Consequently, previous research on the association between SES and health in youth has been primarily focused on the effects of OSS, and SSS has been examined very little. More generally, the developmental transitions into and through adolescence in the relationship between SES and health remain unclear. As an attempt to understand the impact of exposure to low OSS, there has been a substantial debate about how the timing and duration of such exposure can influence health (Chen et al., 2006). Whereas some studies found that the disparities in health related to OSS increase with age, other studies have reported no differences related to age (Kim & Durden, 2007). Also, some argue that low SES is impactful only in a particular life phase, while others emphasize that duration of exposure is more detrimental to health (Schreier & Chen, 2013). However, this previous research has been conducted only with adults. A longitudinal study of the relationship between SES and health in adolescence might suggest whether there are sensitive periods for this important relationship. Particularly, simultaneous testing of both OSS and SSS on adolescent health in a longitudinal design can help researchers to better understand subtle differential effects between OSS and SSS on health as a function of development. Very little research exists on how parental SSS influence children's health and well-being (Kim et al., 2018).

However, because SSS is based in part on individual choices of social comparison, it can be situational and related to group identification (Wolff et al., 2010). Thus, different racial/ethnic groups may apply different referent groups for social comparison, leading to diverse interpretations of SSS for individuals in different groups. For example, Black and Latinx individuals perceived their income to be lower than their friends and families more often than Whites (Stiles & Kaplan, 2004). In contrast, Black individuals perceived their SSS to be higher than their OSS, whereas the opposite holds for White individuals (Goodman et al., 2007). These differences between OSS and SSS raise the possibility that they may have different

roles in influencing HRQOL in different racial/ethnic groups, which may warrant different interventions. We know little about how SSS in families influence the health of their offspring, regardless of race or ethnicity. We are aware of no research that has explored the potentially differential roles of OSS and SSS in the health and well-being in different racial/ethnic groups applying a developmental perspective, that is addressing the question whether the roles of OSS and SSS may change across important developmental transitions.

This is important because the number of adolescents in the U.S. of non-White racial/ethnic groups is rapidly growing and projected to constitute half of all children aged under 18 by 2060 (Colby & Ortman, 2015). Yet, racial/ethnic disparities are present across many indicators of health in childhood (Flores, 2010), including HRQOL in youth (Limbers et al., 2009; Schuster et al., 2012). To begin to reduce these health disparities, it will be important to understand what contributes to them. Although many factors are influential (Adler & Stewart, 2010), racial/ethnic health disparities are at least partially explained by the uneven distribution of SES across groups (Schuster et al., 2012). On average, White youth grow up in families situated higher in OSS, whether defined by family income, education, occupational prestige, or wealth. These structural advantages have significant impacts on health from early in life through various mechanisms (Chen et al., 2002). Indeed, White children and adolescents have on average better health outcomes than Black or Latinx peers (Flores, 2010).

Adolescent development is defined by numerous and encompassing biological, psychological, and social changes (Jackson & Goossens, 2020). One well-established development that occurs in adolescence that may be informative for understanding the possible changes in roles of OSS and SSS in adolescent HRQOL is the separation-individuation process (Daniels, 1990). Research systematically shows that adolescents indeed separate from their parents: during the course of adolescence, they start to spend less time with their parents, the closeness with their parents declines, and they communicate less with their parents (Holmbeck, 1996; Keijsers & Poulin, 2013), leading to individuation from, yet not rejection of, parental influences. Consequently, the influence on adolescent' self-reported HRQOL from parental OSS and SSS, being transmitted through verbal and affective channels from parent to adolescent, would be hypothesized to wane from pre- to mid-adolescence.

This hypothesis has not yet been directly investigated pertaining to HRQOL, and there is scant research more broadly into the link between adolescent development of individuation from parental influences and other health-related behaviors and indicators. We find only a few studies indirectly supporting this waning of parental influence

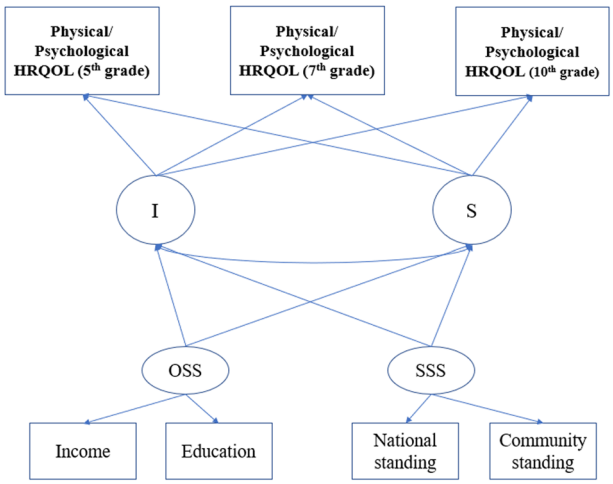

Fig. 1 Hypothesized model. HRQOL health-related quality of life, I intercept, S slope, OSS objective social status, SSS subjective social status

hypothesis. For example, as adolescents evidence increasing separation and individuation from parents, they experience less parental support, but the importance of parental support for their emotional adjustment declines (Meeus et al., 2005). Moreover, increased individuation during the middle school years, when coupled with family cohesion, has been related to less alcohol use in diverse adolescents in 8th grade (Bray et al., 2001). It is curious that even though individuation is a central development in adolescence, the role of changing influences from parents on adolescent health has not been examined further. This study may contribute to beginning to fill this gap focusing here on parental influences in the form of their SES on broadly construed HRQOL in adolescence.

Thus, our overall objective was to evaluate how parental OSS and parental SSS, two aspects of SES, are associated with HRQOL in three racial/ethnic groups during adolescence. We are motivated to continue to examine the role of SES in the health and well-being in children because over 20% of children in the U.S. live below the poverty line, and 42% are classified as low-income meaning their families do not earn enough to meet basic needs (Chau et al., 2010). The model in Fig. 1 depicts developmental relationships among OSS, SSS, and HRQOL, in the form of a growth curve model, leading to two specific aims to investigate: First, we examine the longitudinal relationships between OSS and SSS and adolescent HRQOL. We hypothesize based on the separation-individuation process during adolescence (Daniels, 1990) that the influence on adolescent self-reported HRQOL from SES decreases through their development in this phase. Second, we explore whether these longitudinal associations differ among Black, Latinx, and White adolescents given the differential role these components of SES may play across groups. In the absence of prior research or relevant theory, this remains an exploratory aim without a hypothesis to test.

A prospective longitudinal cohort design will be used to address these aims where the same individuals are repeatedly observed over time. More specifically, we will use growth curve modeling (GCM), which is an analytical technique that estimates between-person differences in change in within-person change over time and can compare those differences among groups (Curan et al., 2010). Thus, we will be able to capture differences in rates of change and potential influences on such changes. Moreover, GCM enables examination of relationships among multiple variables simultaneously (Kaplan et al., 2002). Therefore, GCM will allow us to examine how both OSS and SSS are associated with both base level (intercept) and rate of change (slope) with an important indicator of health in adolescence, namely HRQOL.

Methods

Data came from Healthy Passages™, a multi-site longitudinal cohort study in three communities where participants were prospectively followed in 5th grade (Time 1), two years later when most were in 7th grade (Time 2), and three years later in 10th grade (Time 3) (Schuster et al., 2012). Institutional review boards at all research sites approved this study, which was conducted in compliance with ethical standards in the treatment of participants.

Participants

The study sampled fifth-graders in regular classrooms at 118 public schools containing 11,532 students, representing 99% of all fifth-graders enrolled in regular classrooms in 10 contiguous school districts in Birmingham, Alabama; 25 contiguous school districts in Los Angeles County, California; and the largest school district in Houston, Texas. These communities were selected in part because they could, in the aggregate, provide a sample with approximately an equal distribution across the three major racial/ethnic groups in the United States and adequate SES variability. To ensure adequate sample sizes of (non-Latinx) Black, Latinx, and (non-Latinx) White youth, a random sample of schools was taken using probabilities that were a function of how closely a school's racial/ethnic mix corresponded to the racial/ethnic target of that community.

Of the 6,663 parents or primary caregivers (hereafter referred to as parent) who agreed to be contacted after receiving information about the study, interviews were completed for 5,147 youth and parent dyads. Youth were excluded from participation if they were not attending a regular academic classroom or if they or their parent could not complete interviews in English or Spanish. There were no other inclusion or exclusion criteria. To focus on the three largest racial/ethnic groups, the 6% who were not identified as being Black, Latinx, or White were omitted because there were too few in any one group to support the analysis. This led to 4,823 Black, Latinx, and White (age $M = 11.16$) being enrolled in the study sample at 5th grade (Time 1). This sample closely resembled the sampled population and all eligible students on basic demographic characteristics (Schuster et al., 2012). After 2 (7th grade) and 5 years (10th grade), 4,441 (92% retention) and 4,048 (84% retention) dyads completed follow-up assessments, when the vast majority of youth were in 7th (age $M = 13.10$) and 10th (age $M = 16.12$) grade, respectively. Detailed demographic information has been presented elsewhere (Schuster et al., 2012).

Procedures

The same procedures were applied across all three assessments. For each dyad, two trained interviewers administered the Healthy Passages™ protocol with the adolescent and parent. The parent (mother, 88%; father, 6%; other, 6%) provided informed consent, and the adolescent provided assent. The interviews were conducted in private spaces with the adolescent and parent separated at their home or another setting, using both computer-assisted personal interview and computer audio self-interview methods.

Measures

Objective social status (OSS) was based on highest household educational attainment and total household income and assessed at 5th grade. The parent reported highest education completed, which was coded as (1) 8th grade or less, (2) some high school, (3) high school graduation or GED, (4) some college or two-year college degree, (5) four-year college degree, and (6) more than four-year college degree. The parent also reported total household income for the past 12 months from among 20 income ranges (referenced as per week, month, and year). Multiple examples were provided to consider all sources of income from all household members. Income was transformed to percentage of federal poverty level (FPL) and adjusted for household size, by dividing reported total household income by the government-defined poverty level for the number of people reported in the household. Higher scores indicate higher net household income. Because FPL was positively skewed (skewness = 1.99, kurtosis = 4.70), a square root transformation was applied to improve normality (skewness = 0.59, kurtosis = 0.31).

Subjective social status (SSS) was measured at 5th grade with the MacArthur Scale of Subjective Social Status (Adler et al., 2000). The parent was asked to indicate his or her social standing on two 10-rung ladders where the best-off

are located at the top and the worst-off at the bottom. One ladder reflected standing with respect to one's community and the other with respect to the nation, resulting in two indicators of SSS.

Health-related quality of life (HRQOL) was measured at 5th, 7th, and 10th grade with the adolescent completing the Pediatric Quality of Life Inventory Version 4.0 (PedsQL) (Varni et al., 2001), a widely used, well-validated measure of HRQOL in childhood. The short-form PedsQL provides scores for physical (5 items) and psychosocial (10) domains, the latter consisting of items addressing emotional, social, and school functioning. This scale structure and internal consistency reliability have been replicated across multiple racial/ethnic groups, exceeding the recommended minimum Cronbach's coefficient alpha standard of .70 for group comparisons (Limbers et al., 2009). Each item asks how much a certain behavior has been a problem in the past month (e.g., "it is hard for you to run," "you feel afraid or scared"). Responses are reported on 5-point scales (0 = never a problem, 4 = almost always a problem), but scale scores are constructed so that higher scores indicate better HRQOL on a scale 1-100.

Race/ethnicity was classified based on the parent indicating which one or more of seven racial/ethnic categories described the adolescent according to U.S. 2000 Census categories, which included Hispanic or Latino/a (35.2%), American Indian/Alaska Native (0.2%), Asian or Pacific Islander (2.9%), Black or African American (34.1%), White (24.4%), and Multi-racial (3.2%) and Other (0%). Following Census classification, the adolescent was classified as Latinx if so indicated, regardless of other racial/ethnic indication. Those not categorized as Latinx were classified as (non-Latinx) Black, (non-Latinx) White, or Other (the 6% reporting Other was removed from analysis).

Statistical Analyses

All analyses were performed with Mplus version 7.4 using design weights to account for differential probabilities of selection of students according to their school, as well as a cluster variable to account for clustering of students within schools, sampling design, and non-response to follow-up (see Schuster et al., 2012). Consequently, weighted results reported here adjust for bias due to differential attrition over time and represent the population in the sampling frame of three defined communities. A value of $\alpha = 0.05$ was set for statistical significance.

The measurement models of relationships between latent variables (OSS and SSS) and observed variables (household income, parental education for OSS, and placement on national ladder and community ladder for SSS) were evaluated to ensure a good fit, using confirmatory factor analysis (CFA) (Bryne, 2012). Three goodness-of-fit indices were examined to determine how well the model reproduced characteristics of the observed data: comparative fit index (CFI), Tucker Lewis index (TLI), and root mean square error of approximation (RMSEA). CFI and TLI values above 0.95 are considered to indicate adequate fit while values greater than 0.90 are considered to indicate acceptable fit (Hu & Bentler, 1998). RMSEA values of 0.05 or less indicate a close fit, whereas values of 0.08 or less indicate adequate fit (Hu & Bentler, 1998).

After ensuring the adequate fit of the measurement models for OSS and SSS, GCM was conducted of the model depicted in Fig. 1, separately for the total group and then using multi-group approach with the three racial/ethnic groups, Because parental OSS and SSS remained with little-to-no change, OSS and SSS were included as time-invariant covariates acting as predictors of the growth parameters (i.e., the intercept and slope). When specifying a GCM, altering the loadings tied to the latent slope term can accommodate unequal spacing between time-points (Bollen & Curran, 2005), which was a feature in our longitudinal design. Therefore, the loadings tied to the slope parameter were set at 0, 2, and 5 to reflect the intervals between measurement times. Also, because only three time points were assessed per the design, only linear change could be estimated.

Results

Descriptive statistics are presented in Table 1, and correlations among variables and factor loadings are shown in Table 2. All observed variables loaded significantly onto their respective latent factors (household income and parental education on OSS and parent-reported national standing, and parent-reported community standing on SSS) based on the CFA (Table 2). Given that each latent factor had only two observed variables, CFA was conducted including all four variables simultaneously. The measurement model showed a close fit ($\chi^2 = 0.02$, $df = 1$, CFI = 1.00, TLI = 1.00, RMSEA = .00). Figure 2 presents the main effect of OSS and SSS on linear changes of adolescent physical and psychosocial HRQOL of the total sample and each race and ethnicity.

Growth Curve Model for Total Sample

As shown in Table 3, GCM fit was satisfactory for both physical and psychosocial HRQOL. Figure 3 shows that OSS was significantly positively associated with the intercept in both physical and psychosocial HRQOL, meaning that higher OSS was correlated with higher initial mean score for both types of HRQOL. SSS was not associated with the intercepts of either type of HRQOL. OSS was

Table 1 Descriptive statistics for study variables for total sample and by race/ethnicity

		Mean (SD)				Comparison among Racial/Ethnic Groups	
	Scale	Total ($n = 4048$)	Black ($n = 1497$)	Latinx ($n = 1512$)	White ($n = 1039$)	*F*	*p*
Objective social status (parent-report)							
Highest education of caregiver	0–6	3.56	3.73[a]	2.50[b]	4.87[c]	1747.99	<0.001
		(1.53)	(1.06)	(1.44)	(1.03)		
Household income as % FPL	%	269.32	171.30[a]	159.57[a]	556.45[b]	975.36	<0.001
		(295.26)	(177.81)	(175.78)	(360.27)		
Subjective social status (parent-report)	1–10						
Community standing		6.11	6.16[a]	5.68[b]	6.63[c]	67.55	<0.001
		(2.04)	(2.11)	(2.07)	(1.75)		
National standing		5.60	5.47[a]	4.97[b]	6.70[c]	250.94	<0.001
		(2.05)	(1.98)	(2.00)	(1.74)		
Health-Related Quality of Life	1–100						
Physical 5th grade		83.58	83.31[a]	80.50[b]	88.45[c]	77.32	<0.001
		(16.21)	(16.92)	(16.86)	(12.64)		
Physical 7th grade		90.18	91.08[a]	87.99[b]	92.07[a]	39.03	<0.001
		(12.60)	(12.94)	(13.59)	(10.42)		
Physical 10th grade		89.75	89.98	89.35	90.00	193.37	0.370
		(13.89)	(14.06)	(13.71)	(13.90)		
Psychosocial 5th grade		73.01	71.51[a]	71.44[a]	77.48[b]	49.04	<0.001
		(17.04)	(18.01)	(16.32)	(15.83)		
Psychosocial 7th grade		78.21	78.20[a]	76.00[b]	81.42[c]	36.35	<0.001
		(15.91)	(16.34)	(15.56)	(15.21)		
Psychosocial 10th grade		76.01	76.70[a]	76.07[b]	74.94[b]	4.79	0.010
		(14.61)	(14.51)	(13.83)	(14.06)		

FPL Federal Poverty Level. Mean age at 5th grade = 11.16, 7th Grade = 13.10, and 10th Grade = 16.12

[a,b,c]Different letter superscripts indicate racial/ethnic groups that are significantly different in mean level from one another based on Tukey post-hoc test

significantly negatively related to the slope for both physical and psychosocial HRQOL, which means that higher OSS was associated with a deceleration of the rate of change in both types of HRQOL. The coefficient between SSS and the slope was significantly positive only for physical HRQOL, meaning that higher SSS was associated with an accelerated rate of change in physical HRQOL.

Growth Curve Model for Racial/Ethnic groups

As shown in Table 3, the multi-group GCM resulted in reduced model fit, typically due to a smaller sample size for sub-groups compared with the total samples. However, based on the acceptable model fit from the total sample, we argue that the model fits the data sufficiently and that it is still informative to examine racial/ethnic differences from the multi-group GCM. In the first iteration of implementing the multi-group model to examine physical HRQOL, the Black and White groups produced a negative (and non-significant) residual variance terms linked to the slope. This situation is common when there is little-to-no variation in the slopes across individuals, and a solution is to fix the variation to zero and remove the negative variance from the model (Muthén (2005)). Following this approach, we determined that the optimal solution was to fix the residual variance for the slope terms to 0 for the Black and White groups. However, we still allowed the slope variance tied to physical HRQOL to be freely estimated for Latinx because the residual variance did not exhibit the same problem. With this adjustment, the model properly estimated all parameters.

Figure 3 summarizes findings concerning coefficient patterns for the GCM across the race/ethnic groups. Significant results for a coefficient indicate that it was significantly different from zero. This phase allowed us to explore the overall model results across the three racial/ethnic groups. We found that OSS had a significant relationship with intercept values for physical HRQOL for

Table 2 Correlations and factor loadings among variables in total sample

Correlations	1	2	3	4	5	6	7	8	9	10
1. OSS Household education	1									
2. OSS Household Income	0.61*	1								
3. SSS National standing	0.38*	0.44*	1							
4. SSS Community standing	0.26*	0.31*	0.60*	1						
5. Physical HRQOL at 5th grade	0.20*	0.20*	0.11*	0.09*	1					
6. Physical HRQOL at 7th grade	0.14*	0.09*	0.08*	0.06*	0.35*	1				
7. Physical HRQOL at 10th grade	0.04*	0.05*	0.05*	0.06*	0.22*	0.30*	1			
8. Psychosocial HRQOL at 5th grade	0.17*	0.18*	0.13*	0.09*	0.50*	0.23*	0.14*	1		
9. Psychosocial HRQOL at 7th grade	0.12*	0.09*	0.08*	0.07*	0.25*	0.42*	0.20*	0.41*	1	
10. Psychosocial HRQOL at 10th grade	−0.04*	−0.04*	0.02	0.04*	0.17*	0.22*	0.38*	0.28*	0.43*	1
Factor Loadings										
OSS	[0.74*]	[0.82*]								
SSS			[0.64*]	[0.93*]						

OSS objective social status, *SSS* subjective social status, *HRQOL* health-related quality of life

*All correlations and factor loadings $p < 0.05$

Black and Latinx adolescents. All three racial/ethnic groups exhibited a significant relationship between OSS and the intercept of psychosocial HRQOL. SSS was not associated with the intercept for either type of HRQOL in any of these three groups.

The coefficients for the slope indicate that OSS was associated with the slower positive growth in both physical and psychosocial HRQOL in each racial/ethnic group, except for psychosocial HRQO among White adolescents. In contrast, SSS was associated with an accelerated rate of change for physical HRQOL, but only for Latinx adolescents, showing that the initial advantage of SSS increases over time. SSS was not associated with rate of change in psychosocial HRQOL in any of the groups. This multiple group analysis examined whether parameters differed significantly from zero. This analysis enabled us to explore differences in significance patterns across the three racial/ethnic groups, of which we found some important differences according to Fig. 3.

As a follow-up, we were also interested in examining whether specific parameters differed across the racial/ethnic groups. We narrowed down the parameters of interest for comparing across groups to the four regression paths from OSS and SSS to the latent growth factors. We then compared two different models. Model 1 was the comparison model, with all parameters freely estimated across groups (akin to the multiple group analysis presented in Fig. 3). Model 2 was the nested model, with the four regression coefficients held fixed across groups. A chi-square difference test was used to compare Models 1 and 2 to assess whether these parameters differed significantly across groups. Given that we used robust maximum likelihood estimation, we needed to implement the Satorra-Bentler scaled chi-square different test (Satorra & Bentler, 2010), which uses a scaling correction. Upon implementing this correction, the chi-square difference was non-significant ($\chi^2(8) = 3.36$). Likewise, results for the physical model were non-significant ($\chi^2(8) = 8.52$). These results indicated that the model was working comparably for all three groups; that is, there were no significant parameter differences for these paths across racial/ethnic groups. However, overall significance patterns differed in important ways according to the multiple group model results in Fig. 3.

Discussion

Finding positive associations between parental OSS with adolescents' initial levels of HRQOL was largely consistent with the previous literature demonstrating the relationship between OSS and broadly construed health (e.g., Adler et al., 1994; Schuster et al., 2012). Adolescents whose parents have higher income and educational attainment levels report better HRQOL. In contrast, parents' perceived social status appears not to be associated with adolescent HRQOL in 5th grade (Kim et al., 2018). This pattern of

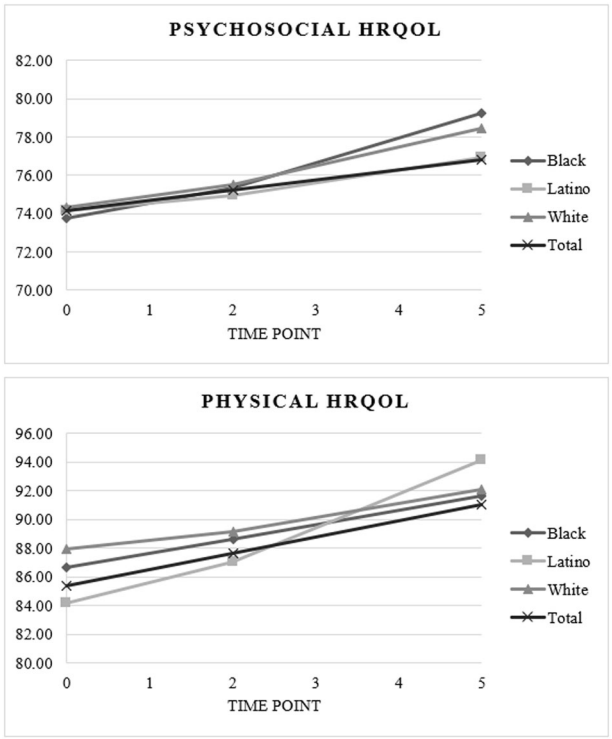

Fig. 2 Trajectory plots of growth curve modeling indicating changes in mean scores of Psychosocial (upper panel) and Physical (lower panel) HRQOL by racial/ethnic group after applying covariates such as parental objective social status and subjective social status. The X-axis indicates relative duration between measurement points (Time Point $0 = 5^{th}$ Grade, Time Point $2 = 7^{th}$ Grade, Time Point $5 = 10^{th}$ Grade). The Y-axis indicates score Psychosocial and Physical HRQOL on their measured scales (0-100). HRQOL = health-related quality of life

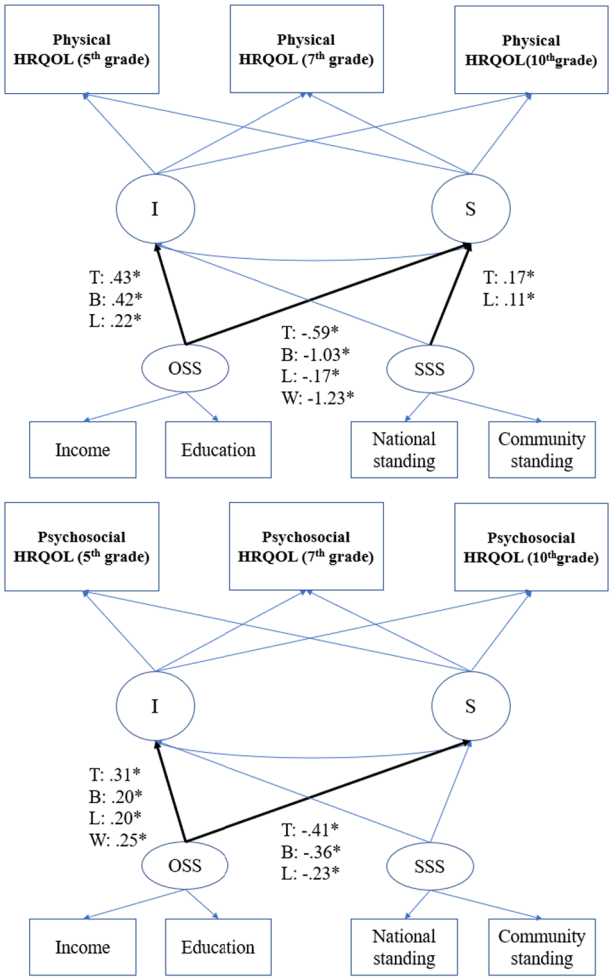

Fig. 3 Upper panel presents growth curve model analysis for physical health-related quality of life (HRQOL) and lower panel for psychosocial HRQOL. From each analysis standardized path coefficients are indicated for the intercept (I) and slope (S) for objective (OSS) and subjective (SSS) social status among Total sample (T), Black (B), Latinx (L), and White (W) adolescents. Only significant ($p < .05$) standardized path coefficients are reported

Table 3 Model fit, intercept and slope of growth curve analysis

	RMSEA	CFI	TLI	Intercept	Slope
Physical HRQOL					
Total Sample	0.08	0.95	0.90	85.39*	1.13*
Multi-Group Model	0.14	0.65	0.47	–	–
Black				86.61*	1.00*
Latinx				84.16*	1.42*
White				87.91*	0.60*
Psychosocial HRQOL					
Total Sample	0.07	0.97	0.93	74.18*	0.52*
Multi-Group Model	0.15	0.66	0.43	–	–
Black				73.74*	0.79*
Latinx				74.14*	0.40*
White				74.35*	0.59*

Model included OSS and SSS as time-invariant covariates acting as predictors of the latent growth parameters (i.e., the intercept and slope). Unstandardized values are reported to keep in original metric

RMSEA root mean square error of approximation, *CFI* comparative fit index, *TLI* Tucker Lewis index, *HRQOL* health-related quality of life

associations appears largely consistent across racial/ethnic groups, excepting physical HRQOL in White adolescents.

However, using GCM provides additional information about the role of parental SES in *the developmental changes* in HRQOL during a period of adolescence. Interestingly, the paths from parental OSS to the slopes were negative. Because the slope in the GCM describes change over time, a negative association with the slope indicates that higher parental income and education are associated with a deceleration in change in adolescent HRQOL. Therefore, we interpret this negative association to mean that the role of parental OSS in HRQOL fades as adolescents mature. This assocation was generally consistent across racial/ethnic groups (excepting psychosocial HRQOL in White adolescents). These findings thus were largely consistent with our

hypothesis based on the normative adolscent seprataion-individuation process.

The opposite appears for SSS, where higher parental perceived status was associated with an acceleration of change over time, but only for physical HRQOL. The racial/ethnic analysis then confirmed this association only for Latinx adolescents. These findings thus were largely inconsistent with our hypothesis. The contrasting relationships for objective and subjective aspects of SES suggest that objective aspects may become less important for both psychosocial and physical HRQOL as adolescents develop, whereas subjective aspects may become more important for physical HRQOL, at least in the case of Latinx adolescents. We discuss later this specific exception for Latinex youth.

Numerous studies that have examined the impact of SES on health have argued that adversity in early life can incubate for disease later, because the hardships experienced in younger age may foster vigilance and hostility, which are main stressors to health, thus increasing risk for chronic inflammatory disease later (Miller, Chen, & Parker, 2011). However, in what we believe to be the first longitudinal test to date with adolescents, our results show that parental SES may exert less influence on adolescent HRQOL as they mature. The current findings resonate with and extend downwards in age reports of a decrease in SES-related disparities in health later in life. For example, in studies with adult populations, the education-based gap in self-rated health (Lynch, 2003) and SES disparities in disease prevalence (Dupre, 2007) diminished in older age.

Low family SES is considered detrimental to health in part due to the lack of resources (Lynch, Smith, Kaplan, & House, 2000). However, as adolescents mature, they individuate from their parents and influence from sources other than parental SES would be expected to increase. Social influences external to the family, such as peers and media, rise in their influence as adolescents become autonomous and spend increasing time outside of the home. For example, research has shown that neighborhood SES contributed to adolescents' basal cortisol levels independent of family SES (Chen & Paterson, 2006).

Also, adolescents in lower SES families may buffer the detrimental effects of low resources by drawing from social support. For instance, adults who grew up in low SES but received more maternal warmth and support displayed reduced inflammatory activity compared to those who received less (Chen, Miller, Kober, & Cole, 2011). Chen and Miller cautiously proposed the shift-and-persist model to describe individuals who reappraise adversity and idealize values of endurance (i.e., shift), find meaning and stay optimistic about the future (i.e., persist) (Chen & Miller, 2012). The key to the shift-and-persist model is the modeling by an attachment figure, such as parent, sibling, extended family member, or teacher. This model should be examined in future research into the role of components of SES on health in adolescence.

Whereas parental SSS was associated with acceleration in improvement of physical HRQOL over time, this was mainly for Latinx adolescents. Latinx parents' perception of their social position may be transmitted to Latinx adolescents, which may affect positive change in physical HRQOL from pre- to mid-adolescence. This influence from parental perceived social status may be explained by the strong ties common among Latinx families. Often referred to as "*familismo,*" this encompasses trust between family members, expectation that the family will be the primary support, and commitment to family over individual needs and desires (Rivera et al., 2008). Therefore, Latinx parents reinforce family closeness (Dixon et al., 2008), which may enable them to influence their adolescents longer into adolescent development.

Limitations

Potential biases in adolescents' self-report of HRQOL is among several limitations that warrant mention. Information was only available on the primary parent's, typically the mother's, perception of her subjective social status, and this may differ between the parents. Moreover, future research should examine social status perception of adolescents themselves to provide a fuller understanding of its role in their health across development to illuminate the role of broader social determinants of health. These findings might not generalize to the population of the United States because participants were sampled from three defined geographic areas. Because Latinx participants had roots primarily in Central America, caution must be exercised in generalizing to Latinx groups with other origins. Also, other races/ethnicities were excluded from the study.

Finally, we recognize model fit decreased in the multigroup analysis as compared to the total group analysis. In part, this is likely due to the smaller and disparate sample sizes being examined across groups, but it could also be due to specific group differences that appeared in the multiple group assessment. Upon further analysis examining groups separately, we found that, according to fit measures, physical HRQOL appeared to fit differently for Whites compared to the other races. The current work has allowed us to uncover the potential for these differences and may act as a springboard for further inquiry. Future work examining exact group differences via measurement invariance testing may further benefit our understanding of these group differences.

Conclusion

The main findings from this study suggest that objective social status of the family may influence HRQOL at the

start of adolescence, but its effect appears to decrease as they mature. Despite the ubiquitous effects of SES on peoples' lives including attitude, values, and preferences, as well as their physical and mental health (Kraus & Stephens, 2012), the current findings suggest that the detrimental impact of low SES in early childhood may not necessarily interfere as strongly with broadly construed health in adolescents as they age. Future research on various aspects of SES, beyond family OSS, and adolescents' own SSS could further illuminate the important relationship between SES and adolescent health and well-being.

Implications

The current study highlights that parental income and education may become less important in influencing perceived health as youth mature from pre-adolescence through mid-adolescence, which may suggest that adolescents especially in low SES families engage in shift-and-persist (Chen & Miller, 2012), as noted above. *Shifting* is hypothesized to involve cognitive reappraisals, for example reframing the meaning of a stressor to be less threatening and seeing benefits that can come from difficult life situations. Coping via efforts to accommodate to stressors may be particularly beneficial when stressors are largely uncontrollable and when resources for dealing with them are limited, as may be the case for adolescents in low SES contexts. At the same time, for those adolescents, successful adaptation may be achievable through enduring adversity with strength by developing purpose in life and holding on to hope, despite adversity, that the future may be better. *Persisting* in this manner may be beneficial because it allows individuals in low-SES contexts to focus on a larger purpose to life when they are confronting current adversities, which may facilitate the maintenance of hope during times of difficulty. Targeting these cognitive and affective strategies may be one useful approach to develop in future studies to begin to ameliorate the striking disparities in health outcomes that exist in our society already in adolescence (Chen et al., 2015).

Further research is desired on the how this shift-and-persist approach may be improved in adolescents through interventions. Self-affirmation interventions, where participants write about core personal values, may serve this purpose (Cohen & Sherman, 2014). Indeed, values affirmations have been shown to result in lasting improvements in the grades of low SES Black and (Cohen et al., 2006, 2009) and Latinx (Sherman et al, 2013) middle school students. Given that self-affirmation interventions have also shown to reduce sympathetic nervous system activation during stressors, lead overweight people to lose weight, increase treatment compliance, and improve intergroup and interpersonal relations in adults (Cohen & Sherman, 2014), the effects of self-affirmation intervention on the health and well-being of low SES adolescents should be investigated.

In addition, peer mentorship programs for young adolescents of less advantaged families may benefit vulnerable youth by instilling a resilient mindset. Such mentoring complements and actively supports classroom-based health instruction by helping adolescents overcome personal and social barriers. There is encouraging evidence for its effectiveness in skill development, self-efficacy, sense of self-worth, and health outcomes, as well as changing health behaviors in adolescents (Petosa & Smith, 2014). Moreover, given that Latinx parents may have a higher likelihood of transmitting their perception of lower social standing on average onto their youth, family-level interventions designed to increase productive interaction among low-SES Latinx families may also warrant future attention. Encouraging findings have been reported for a seven-week family intervention aimed at improving parenting, strengthening family relationships, and building youth competencies in low-SES families (Miller et al., 2014). Results from a randomized controlled trial with mothers and their 11-year old Black youth showed that eight years later, at age 19, these adolescents evidenced reduced inflammation in their blood compared to those in a control condition. These approaches have the potential to increase health and quality of life in vulnerable adolescents and warrant further investigation.

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Author Contribution K.W.K. performed the statistical computation and S.D. verified the analytical methods and provided further calculations. K.W.K. wrote the manuscript in consultation with J.L.W. and S.D. M.N.E. and M.A.S. contributed to the original data collection, discussed the results, and contributed to the final document. J.L.W. supervised this study.

Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

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