



Socioeconomic status across the life course and smoking cessation among older adult smokers in the U.S

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ARTICLE INFO

Keywords:

Socioeconomic Status
Smoking Cessation
Tobacco
Health and Retirement Study

ABSTRACT

Introduction: Socioeconomic status (SES) at different stages of the life course impacts late-life health. However, whether SES across the life course impacts smoking cessation in late-life is not known. Purpose: Assess how life course SES impacts smoking cessation among older smokers.

Methods: We identified 5,124 smokers, 50 years and older, from the 1998 to 2018 waves of the Health and Retirement Study. The outcome was self-reported smoking cessation. The main exposure was life course SES, defined as: low child and low adult SES (persistent low); low child, high adult SES (upward mobility); high child, low adult SES (downward mobility); and high child, high adult SES (persistent high). A multilevel mixed-effect logistic model was used to examine how life course SES predicts smoking cessation at age 65 and over time, adjusted for covariates.

Results: Compared to those with persistent high SES, those with persistent low SES, upward and downward SES were more likely to be Hispanic or non-Hispanic Black. The adjusted results showed that at age 65, compared to those with persistent high SES, those with persistent low SES (OR= 0.69, 95 % CI = [0.51–0.92]), upward SES (OR= 0.49, [0.32–0.75]), and downward SES (OR= 0.55, [0.40–0.76]) were less likely to quit. However, as age increased, only those with downward or persistent low SES were significantly less likely to quit compared to those with persistent high SES.

Discussion: Social mobility of SES from childhood to adulthood significantly impacts smoking cessation. Both stages of the life course should be considered to understand smoking behaviors.

1. Introduction

Cigarette smoking remains the leading cause of preventable disease, disability, and death in the United States (U.S.) (National Center for Chronic Disease Prevention & Health Promotion, 2014). In 2020, 12.5 % of U.S. adults or approximately 30.8 million adults were current cigarette smokers (Cornelius et al., 2022). The health consequences of smoking have long been established, and today, more than 16 million U. S. adults live with a disease caused by smoking, including but not limited to cancer, stroke, lung diseases, and chronic obstructive pulmonary disease (COPD) (National Center for Chronic Disease Prevention & Health Promotion, 2014).

Trends in smoking prevalence between 2005 and 2015 showed that while there was a 22–46 % decline in current smoking among those age 18–64 years old, smoking rates in adults 65 years and older have been steady (declined by only 2.1 %) (Jamal et al., 2016). Further evidence showed that the smoking prevalence and smoking cessation rates among older adults 65 and older enrolled in Medicare did not change significantly between 2005 and 2015 (Isenberg et al., 2016). Older adult smokers have greater all-cause mortality and lung cancer rates than never smokers, older former smokers, and younger smokers (Gellert et al., 2012; National Center for Chronic Disease Prevention & Health Promotion, 2014).

In addition to the burden of tobacco use among older adults, smoking

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<https://doi.org/10.1016/j.addbeh.2022.107454>

Received 24 March 2022; Received in revised form 25 July 2022; Accepted 27 July 2022

Available online 30 July 2022

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is a leading contributor to socioeconomic inequalities in health (Petrovic et al., 2018). Tobacco use is most prevalent among those with an annual household income <\$35,000; uninsured adults and those receiving Medicaid; and those whose highest level of educational attainment was a General Educational Development (GED) certificate (Cornelius et al., 2020). On the other hand, smokers with higher education and income have greater intentions to quit and are more likely to achieve smoking abstinence for 1 to 6 months (Reid et al., 2010); (Assari, 2021). For example, the proportion of those who quit for at least 1 month among those who attempted to quit before was 23.3 % for those with less than high school education, 22.9 % for those with some college education and 28.3 % for those with a college degree or more (Reid et al., 2010).

1.1. Life course SES and smoking cessation

There is also robust evidence that socioeconomic status (SES) over one's life course impacts late-life health (Kuh et al., 2004; Mishra et al., 2009; Palloni et al., 2009; Pollitt et al., 2005). A study on financial strain over the life course found that long-term financial hardship affects health outcomes at late-life, even when current financial circumstances are considered (Kahn and Pearlin, 2006). Studies have also found that lower childhood SES was associated with worse health outcomes in later life, but that the negative impact of low childhood SES could be partially ameliorated if people with low SES shifted to higher SES in adulthood (Luo and Waite, 2005).

This evidence is anchored in the life course epidemiology framework. This framework proposes that biological, structural, behavioral and psychosocial exposures impact health throughout the developmental stages of life (Ben-Shlomo et al., 2014; Kuh et al., 2004). Life course theory proposes several models by which these life course exposures impact health. The simple distinction of these models is that exposures impact late life health either within a critical period or through an accumulation of risks (Ben-Shlomo et al., 2014; Cable, 2014). These two models are divided into other pathways. The critical period model proposes that there is a specific time period where an exposure can have an impact on later life health, independent of the exposures in other life periods. On the other hand, the accumulation of risks model proposes that life course exposures are not limited to a critical period in life. Instead, it is the gradual accumulation of these exposures throughout one's life that impacts health (Ben-Shlomo et al., 2014). Independent of the pathway, it is important to consider an individual's SES over the life course when evaluating the impact of SES on health outcomes, including smoking cessation.

The impact of SES over the life course on adult and older adult smoking behavior has been examined by several authors (Parnia and Siddiqi, 2020; Paavola, 2004; Puolakka et al., 2018; Gilman, 2003; Tian et al., 2019). Among adults, greater childhood SES predicted lower initiation of cigarette use (Gilman, 2003). Further, both child and adult SES were independently associated with lower progression to regular smoking after initiation. However, only greater adult SES was associated with greater probability to quit smoking (Gilman, 2003). Among older adults, Parnia and colleagues combined childhood SES measures with adulthood SES measures to create a cumulative life course SES measure (Parnia and Siddiqi, 2020). Their results showed that compared to those in the top SES quartile, those in the bottom quartile of SES combining both child and adult measures were more than four times as likely to be current smokers (Parnia and Siddiqi, 2020). While this study assessed current smoking status, it did not assess how SES at different stages of the life course predicted quitting behavior or how social mobility between child and adulthood impact smoking cessation.

Considering the growing proportion of older adults in the U.S., older smokers are an increasingly important group that benefit from tobacco-related harm reduction, including smoking cessation, smoking reduction and switching to less harmful products. Although this age group has been recognized as a priority population for smoking cessation interventions and tobacco-related research, there continues to be a paucity

of research focused on older smokers (Kleykamp and Heishman, 2011). Health care professionals and public health agencies continue to focus on younger smokers while believing older adult smokers are less likely to be interested in quitting, contributing to the overall institutionalized ageism seeing in tobacco control (McAfee et al., 2021). The objective of this study was to assess how SES over the life course impacts smoking cessation among older adult smokers in the U.S. This study examined the relationship between both childhood and adulthood SES factors and smoking cessation among older adult smokers in the Health Retirement Study. Given previous findings on the association between low SES and difficulty in quitting, we hypothesized that older smokers with persistent low SES, upward and downward SES mobility would be less likely to quit smoking over time compared to older smokers with persistent high SES.

2. Methods

2.1. Study population

The Health and Retirement Study (HRS) is a nationally representative longitudinal, biennial survey of individuals 50 and older in the U.S. and their spouses. The first HRS cohort has been followed every-two years since 1992, and new study cohorts are added every-six years. Our study included 10 HRS waves, from 1998 to 2018, including four study cohorts: War Babies and earlier cohorts in 1998, born in 1947 or earlier; the Early Baby Boomers in 2004, born 1942–1947; the Mid-Baby Boomers in 2010, born 1954–1959; and the Late Baby Boomers, born 1960–1965. The RAND HRS longitudinal file of 2018 was used in this study. This is a longitudinal cohort of the HRS managed by the RAND Corporation (Bugliari et al., 2018).

Our analytical sample consisted of adults 50 and older in the 1998 HRS or when they entered the study in 2004, 2010 or 2016. The sample was restricted to current smokers at baseline. Current smokers were those that answered yes to two questions: "Have you ever smoked cigarettes? By smoking we mean more than 100 cigarettes in your lifetime. Do not include pipes or cigars" and "Do you smoke cigarettes now?" Current smokers were followed over time until death, loss to follow-up, or the last HRS wave available (2018). From the 42,233 individuals in the longitudinal HRS, 6,683 were current smokers of age 50 or older at their baseline wave. The final sample was restricted to 5,124 individuals as 585 were excluded due to missing information on two or more waves of data and 332 were missing study variables. See Fig. 1 for sample selection criteria.

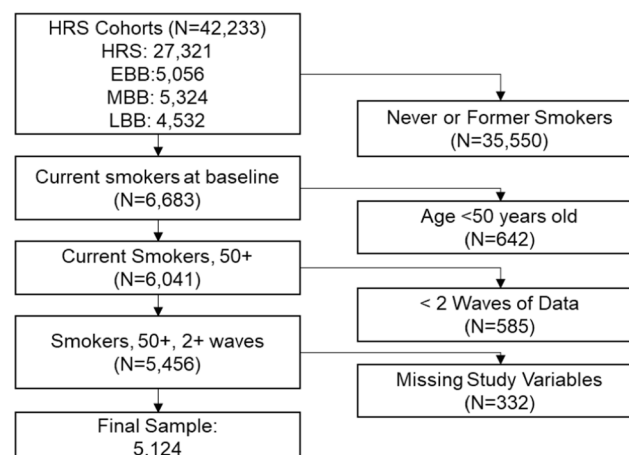


Fig. 1. Sample Selection Criteria from the 1998–2018 HRS Data.

2.2. Outcome variable

We examined smoking cessation between waves as the key outcome variable. All of the respondents were smokers at baseline. Thus, smoking cessation was measured in all waves as a change in smoking status from current to former smoker in a subsequent wave based on an answering “No” to the question “Do you smoke cigarettes now?” This measure has also been used to assess smoking abstinence in other studies using the HRS (Bandiera et al., 2016).

2.3. Independent Variable: Life course socioeconomic status

The main exposure variable was both childhood and adulthood SES, as conceptualized by other studies using the HRS (Parnia and Siddiqi, 2020; Nandi et al., 2014). We operationalized childhood and adulthood SES as latent factors using full-information maximum likelihood confirmatory factor analysis (CFA).

The childhood SES factor was retrospectively assessed with the following variables, based on previous HRS studies (Parnia and Siddiqi, 2020; Nandi et al., 2014): level of maternal and paternal education, father’s occupation, being born in southern U.S. states and if the subject grew up in a rural area. The adulthood SES variables were the following: respondent’s educational attainment, occupation of longest job, labor force status, household income and household wealth.

The factor scores from the CFA for each latent variable were turned into quartiles. Those in the lowest SES quartile group for each SES measure were defined as “low” and the remaining three quartiles were defined as “high” (Parnia and Siddiqi, 2020; Nandi et al., 2014). Based on these specifications, life course SES was operationalized into 4 categories to reflect social mobility: persistent low SES (low child SES, low adult SES); low child SES, high adult SES (i.e., upward mobility); high child SES, low adult SES (i.e., downward mobility); persistent high SES (high child SES, high adult SES). Further detail on this methodology is provided in the Electronic Supplementary Methods.

2.4. Covariates

Baseline covariates included birth cohort (War Baby, born in 1947 or earlier; Early Baby Boomer, born 1948–53; Mid Baby Boomer, born 1954–59; Late Baby Boomer, born 1960–65), sex (male/female), and race/ethnicity (Non-Hispanic White; Non-Hispanic Black; Non-Hispanic Other; Hispanic). Time varying covariates included age (49–59; 60–79; 80 + for the descriptive results and continuous, centered at age 65 for the regression), marital status (married/civil; widowed; other), type of health insurance (none; public; private), doctor visit in the past 12 months (No/Yes), number of cigarettes smoked per day and comorbidities (0, 1, 2 or more of any of the following conditions: stroke; heart attack/coronary heart disease/angina/congestive heart failure/other heart problems; hypertension; diabetes; cancer) (Keenan, 2009; Patel et al., 2009; Westmaas et al., 2015). Death as reason for loss to follow-up (yes vs no) and number of waves completed were also included as time-varying covariates.

2.5. Statistical analyses

Weighted demographic, health and smoking characteristics at baseline were compared by life course SES using chi-square tests and a one-way ANOVA. Descriptive results were weighted with the HRS respondent level survey weights to account for the sampling design and to produce nationally representative estimates, including stratum and cluster differences (Institute for Social Research, 2019).

An unweighted multilevel mixed-effects logistic regression model with a random intercept was estimated to test the effect of life course SES on smoking cessation over time. Age was defined as the time variable and was centered at 65 years old. The model was adjusted for life course SES, age centered at 65 years old, the interaction between life

course SES and age, sex, race/ethnicity, marital status, health insurance, visit to the doctor in the past 12 months, number of cigarettes smoked per day, comorbidities, number of waves, death, and birth cohort. All analyses were conducted with STATA 16.1 (College Station, TX).

3. Results

Study participants were followed for an average of 6 years (range: 2–11 years). The majority of older smokers had persistent high life course SES (61.0 %), followed by downward mobility (18.6 %), persistent low SES (14.9 %) and upward mobility (5.5 %). Those with persistent high SES were more likely to be 49–59 years old than those with persistent low SES and upward mobility (57.7 % vs 42.8 %, 39.2 %, $p < 0.001$). However, those with persistent high SES were less likely to be 60–79 than those with persistent low, upward or downward SES mobility (Table 1).

Compared to those with persistent high SES, those with persistent low SES, upward mobility and downward mobility were more likely to be Hispanic (3.1 % vs 26.5 %, 16.4 %, 6.2 %, $p < 0.001$) or non-Hispanic Black (8.9 % vs 23.2 %, 16.2 %, 22.5 %, $p < 0.001$), respectively. Those with persistent high SES were also less likely to be uninsured, to have public health insurance and to have two or more comorbidities than those with persistent low SES or downward mobility. Mean cigarettes per day (CPD) was similar across SES at baseline (Table 1).

Further, Hispanic smokers were more likely to have persistent low and upward mobility than Non-Hispanic White, Black and Other smokers. Non-Hispanic Black smokers were more likely to have downward mobility and Non-Hispanic White smokers were more likely to have persistent high SES compared to their counterparts (Electronic Supplementary Table 3).

3.1. Regression results

At age 65, compared to those with persistent high SES, those with downward mobility, upward mobility, and persistent low SES were less likely to quit smoking (OR = 0.69, 95 %CI: 0.51–0.92; OR = 0.49, 95 %CI: 0.32–0.75; OR = 0.55, 95 %CI: 0.40–0.76, respectively) Table 2. Those with downward mobility or persistent low SES were also less likely to quit as age increased, compared to those with persistent high SES (OR: 0.97, 95 %CI: [0.95; 0.99] and OR: 0.96, 95 %CI: [0.94; 0.98]), respectively). Further, as age increased, the odds of quitting smoking also increased (OR: 1.32 [1.30; 1.34]). Compared to those born in the oldest birth cohort, those of earlier birth cohorts were more likely to quit Table 2. The Electronic Supplementary Figure 2 shows the predicted probability from these models. The results show that at age 65, the probability to quit was 29.8 % for those of persistent high SES, 26.7 % for those with downward mobility, 23.9 % for those with upward mobility and 24.9 % for those with persistent low SES. By age 80, the probability to quit was 70.6 % for those of persistent high SES, 63.0 % for those with downward mobility, 60.7 % for those with upward mobility and 59.8 % for those with persistent low SES.

4. Discussion

Our study investigating whether SES across the life course impacted smoking cessation among older adults showed that at the age of 65, those with persistent low SES, upward and downward SES mobility were less likely to quit than those with persistent high SES. However, the interaction with age showed that this association was only significant over time for those with persistent low SES or downward mobility compared to those with persistent high SES. The longitudinal effect of upward mobility on smoking behavior was likely not observed because the consequences of low childhood SES are already fixed and are not getting worse over time, whereas low adult SES may continue to impact smoking cessation over time as lower income, education, wealth, occupation and employment status in adulthood are associated with

Table 1
Weighted descriptive characteristics of older adult smokers at baseline. Comparisons between SES groups, Health and Retirement Study.

Characteristics	Overall	Persistent low SES	Upward SES Mobility	Downward SES Mobility	Persistent high SES	p-value
Total N (%)	5,124	981 (14.9)	322 (5.5)	1,080 (18.6)	2,741 (61.0)	
Sex						
Male	52.6	50.3	47.1	48.4**	55.0 ⁺	0.002
Female	47.4	49.7	52.9	51.6**	45.0 ⁺	
Mean age at enrollment (SD)	56.2 (6.3)	58.4 (9.1)	57.9 (8.3)	56.5 (6.7)	55.5 (5.2)	<0.001
Age at enrollment (years)						
49–59	55.1	42.8***	39.2***	60.7	57.7 ⁺	<0.001
60–79	18.7	28.5***	25.8**	20.0**	15.3 ⁺	
80+	26.3	28.7	34.9*	19.3***	27.0 ⁺	
Race/Ethnicity						
Non-Hispanic White	73.3	45.3***	62.9***	66.0***	83.3 ⁺	<0.001
Non-Hispanic Black	13.9	23.2***	16.2**	22.5***	8.9 ⁺	
Non-Hispanic Other	4.9	5.0	4.8	5.3	4.7 ⁺	
Hispanic	7.9	26.5***	16.1**	6.2*	3.1 ⁺	
Marital Status						
Married	57.8	45.9***	69.3	38.0***	65.6 ⁺	<0.001
Widowed	8.5	15.5***	7.4	13.0***	5.5 ⁺	
Other	33.8	38.5***	23.3	49.0***	28.9 ⁺	
Health Insurance						
None	18.0	27.9***	10.3	28.7***	13.0 ⁺	<0.011
Public	20.5	37.9***	11.7	38.4***	11.6 ⁺	
Private	61.5	34.2***	78.0	32.9***	75.4 ⁺	
Visits to the doctor						
No	13.0	18.4*	8.3	20.3**	13.0 ⁺	<0.001
Yes	87.0	81.6*	91.7	79.7**	87.0 ⁺	
Number of comorbidities						
0	52.3	48.6**	48.7	43.9***	56.0 ⁺	<0.001
1	31.4	29.4	32.1	32.6	31.5 ⁺	
2	16.3	22.0***	19.2	23.5***	12.5 ⁺	
Mean number of cigarettes smoked per day (SD)	15.9 (11.9)	14.9 (14.2)	14.7 (12.9)	16.1 (12.4)	16.3 (11.1)	0.07

Proportions calculated within SES groups (% Column). *p-value < 0.05; **p-value < 0.01; ***p-value < 0.001 comparing persistent high SES with the other three SES groups in each study variable. + Reference group.

reduced opportunities for access to tobacco cessation treatment and advice to quit, and poorer health literacy.

The lower probability to quit at age 65 for those with persistent low SES, upward and downward SES mobility compared to those with persistent high SES show that SES over the life course impacts smoking cessation. Importantly, the effect of low childhood SES on smoking cessation was observed at age 65 even when greater SES was achieved in adulthood. If only adulthood SES were considered, as in most studies assessing smoking cessation, the important contributions of childhood SES for late-life smoking cessation could not be measured. Our results also showed that individuals who had upward social mobility from low child to high adult SES were still significantly less likely to quit than those with persistent high SES. Other studies examining social mobility have also showed that the health of those with upward social mobility were still worse than those with stable high position, but that those with upward social mobility have better health than those with stable low or downward social mobility (Cable, 2014; Hallqvist et al., 2004).

This study did not test a specific life course model to understand how SES over the life course impacts smoking cessation. Several authors recognize the challenge to analytically disentangle these theoretical pathways and propose that these may be better understood as nested within each other (Ben-Shlomo et al., 2014; Hallqvist et al., 2004; Mishra et al., 2009; Pickles et al., 2007; Singh-Manoux et al., 2004). In this hierarchical framework, the accumulation of risk model is the default, with the critical period model being a special type of accumulation model (Ben-Shlomo et al., 2014). We understand our results within this nested framework because both child and adult SES impacted smoking cessation, and even those with upward SES mobility had a lower probability to quit compared to those with persistent high SES.

We observed that the majority of the older smoker population had persistent high SES, followed by downward mobility, persistent low, and upward mobility. However, there were racial/ethnic disparities in the

life course of older smokers. Non-Hispanic Black and Hispanic smokers were more likely to have persistent low SES compared to their Non-Hispanic White counterparts. Despite this disparity, these groups were more likely to quit than their Non-Hispanic White counterparts. Most of the literature shows that Non-Hispanic Black and Hispanic smokers are less likely to quit than their Non-Hispanic White counterparts, and that their lower SES contributes to this disparity (Babb et al., 2017; Nollen et al., 2019; Trinidad et al., 2011). However, the conflicting results observed in this study have also been shown by Bandiera et al. using data from the HRS (Bandiera et al., 2016). They observed that Black and Hispanic smokers were more likely to have 20-year smoking cessation at 20-year follow-up than their White counterparts. Importantly, this result was not observed after adjusting for cigarettes smoked per day (CPD), suggesting that older Black and Hispanic smokers were more likely to be light smokers compared to their White counterparts, and consequently more likely to quit (Bandiera et al., 2016). In our study, the results remained significant after adjusting for CPD. The CPD at baseline was 17.7 for White smokers, 10.8 for Black smokers and 9.3 for Hispanic smokers (results not shown in the results section). These results were likely different due to adjustment of different covariates, as well as different analytical samples and need to be further studied.

Beyond the effect of age, we also observed a cohort effect on smoking cessation. Compared to those born in 1947 or earlier, older adults of more recent birth cohorts are more likely to quit smoking. This may be due to the fact that older adults born earlier grew up in a context where the harmful effects of smoking were unknown and also had an early tobacco use initiation. They also have been smoking for a longer period in a context that was largely unregulated. The older adults that aged in later years have experienced the change in the tobacco control landscape and may be more likely to quit as a result of evidence about tobacco harm, tobacco control policies and changes in social norms (Laaksonen et al., 1999; Alamar and Glantz, 2006; Kang and Cho, 2020).

Table 2
Mixed effect logistic model for the effect of SES over the life course on smoking cessation, Health and Retirement Study 1998–2018.

	OR (95 % CI)
Life Course SES	
Persistent high	(Ref)
Downward mobility	0.69 (0.51; 0.92) **
Upward mobility	0.49 (0.32; 0.75) ***
Persistent low	0.55 (0.40; 0.76) ***
Age, years ^a	1.32 (1.30; 1.34) ***
Age*Life Course SES	
Persistent high	(Ref)
Downward mobility	0.97 (0.95; 0.99)**
Upward mobility	0.98 (0.94; 1.00)
Persistent low	0.96 (0.94; 0.98)***
Sex	
Male	(Ref)
Female	0.95 (0.76; 1.18)
Race/ Ethnicity	
Non-Hispanic White	(Ref)
Non-Hispanic Black	1.37 (1.04; 1.82) *
Non-Hispanic Other	1.67 (0.95; 2.94)
Hispanic	1.87 (1.26; 2.77) **
Marital Status	
Married	(Ref)
Widowed	0.43 (0.30; 0.62)***
Other	0.98 (0.76; 1.26)
Health Insurance	
None	(Ref)
Public	0.65 (0.46; 0.91)**
Private	1.38 (1.02; 1.89) *
Visited the doctor in the past 12 months	
No	(Ref)
Yes	1.11 (0.81; 1.53)
Number of comorbidities	
0	(Ref)
1	2.77 (2.34; 3.27) ***
2	8.15 (6.71; 9.91) ***
Number of cigarettes smoked per day ^a	0.97 (0.96;0.97) ***
Number of study waves completed, (w)	1.17 (1.10; 1.25) ***
Death	
No	(Ref)
Yes	0.45 (0.33; 0.62) ***
Birth Cohort	
Born in 1947 or earlier	(Ref)
Born 1948–1953	4.41 (3.03; 6.43) ***
Born 1954–1959	5.54 (3.53; 8.70) ***
Born 1960–1965	2.81 (1.45; 5.44) ***

a Included as a continuous variable; *p-value < 0.05; **p-value < 0.01; ***p-value < 0.001

This study makes important contributions. First, it uses a nationally representative cohort study to examine the older smoker population in the U.S. Second, it accounts for both age and cohort effects by including different birth cohorts in a longitudinal design (Pickles et al., 2007). Further, this study examines how changes in social mobility based on a robust and multi-dimensional measure of child and adult SES impact smoking cessation among older adults. However, this study has limitations. The primary limitation is that the HRS is not a tobacco study and only has one measure of self-reported smoking assessing current tobacco use. The HRS does not assess cigarette use in the past 30 days or 12 months, nor biologically verifies smoking abstinence. Another limitation is that assessing the use of other tobacco products is not possible as the HRS only assesses the use of cigarettes.

In conclusion, this study shows that individuals who experienced low SES in either childhood or adulthood are less likely to quit smoking at age 65 than those with high SES over the life course. However, over time, only those with low adult SES or persistent low SES were significantly less likely to quit than those with persistent high SES. This study showed that social mobility of SES from childhood to adulthood significantly impacts smoking cessation, and that both stages of the life course should be considered to understand smoking behaviors of older adults. This study highlights how critical it is to consider childhood SES

to understand the social determinants of health among adults and older adults.

Future studies should examine the relationship between low childhood SES and quitting behavior and the mechanisms linking early-life SES to late-life smoking behavior. Further, it may also be important to develop interventions that target these disparities to help ‘heal the scar’ of childhood poverty on late-life health. A critical first step is ensuring that researchers and clinicians assess childhood SES along with adult SES. After identifying potential mechanisms underlying the observed disparities, researchers may seek to examine whether extant or novel smoking cessation interventions (e.g., nicotine replacement therapies, Varenicline, contingency management, and other behavioral approaches) demonstrate particular effectiveness in increasing smoking cessation for individuals with low childhood SES. Such interventions may be clinically tailored to target older adult smokers at particular risk of poor smoking cessation outcomes due to their own life-course SES.

5. Research ethics approval

This study uses data from a publicly available study and is exempt from IRB review. The Health and Retirement Study was approved by the IRB at the University of Michigan.

CRediT authorship contribution statement

Jaqueline C. Avila: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Sangah Lee:** Conceptualization, Data curation, Formal analysis, Writing – original draft, Writing – review & editing, Visualization. **Ezinwa Osuoha:** Conceptualization, Data curation, Formal analysis, Writing – original draft, Writing – review & editing, Visualization. **Dale Dagar Maglalang:** Conceptualization, Methodology, Writing – review & editing, Visualization. **Alexander Sokolovsky:** Conceptualization, Methodology, Data curation, Writing – review & editing, Visualization. **Jasjit S. Ahluwalia:** Conceptualization, Methodology, Data curation, Validation, Writing – review & editing, Visualization, Supervision, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

This is a publicly available dataset and can be downloaded at: <https://hrs.isr.umich.edu/>

Acknowledgements

The HRS (Health and Retirement Study) is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan.

The authors Avila, Maglalang, Sokolovsky and Ahluwalia are partially or fully funded by an NIH-funded Center of Biomedical Research Excellence (COBRE) (P20GM130414). The author Sokolovsky is also funded by NIDA (K08DA048137).

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.addbeh.2022.107454>.

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