Health Lifestyles, Socioeconomic Status, and the Transition to Adulthood

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Abstract

We argue that health lifestyles contribute importantly to the strong, robust, and widening health differences across socioeconomic status (SES). This study seeks to identify how SES, adult roles, and earlier health lifestyles shape health lifestyles across the transition to adulthood. We used U.S. data from the National Longitudinal Study of Adolescent to Adult Health (Add Health; N=6,863), which offers information on health behaviors and SES from adolescence into young adulthood. Results showed that adolescent health lifestyles and SES partially influence later health lifestyles but leave much room for change over time. Life course changes throughout young adulthood—including experimentation with riskier lifestyles, shifts from SES of origin to achieved SES, and adopting adult roles—shape individuals' health lifestyles in late young adulthood. These results demonstrate the utility of an integrated model for the development of health disparities that combines both stability and change.

Health Lifestyles, Socioeconomic Status, and the Transition to Adulthood

Like income inequality more generally, socioeconomic disparities in health and mortality have been widening in the last 20 years (Sasson 2016). Although macrolevel and institutionalized factors are important for understanding growing inequalities, health behaviors and lifestyles have also contributed to these trends. Research has demonstrated a strong and robust relationship between health behaviors and socioeconomic status (Cutler and Lleras-Muney 2010; Lawrence 2017; Pampel et al. 2010). For example, compared to college graduates, those with less than a high school diploma are almost 4 times as likely to currently smoke, nearly 5 times as likely to abstain from exercise, and, reflecting diet and physical activity behaviors, nearly twice as likely to be obese (Pampel et al. 2010). Perhaps more disconcerting, however, is the increase in disparities: Those with the lowest education have increasingly compromised health compared to their more highly educated counterparts. Among some subgroups, those with the lowest education appear to be living shorter lives than people in this group 20 years ago, a shocking finding in an era when we assume longevity will only improve (Case and Deaton 2017; Sasson 2016). Alcohol, drugs, suicide, and heart disease are culprits in the recent mortality rise (Case and Deaton 2017; Masters et al. 2018), but poor diet, obesity, and limited exercise have also become increasingly concentrated among lower socioeconomic groups and have contributed to long-term trends in health inequalities (Chetty et al. 2016).

Despite the convincing evidence of growing health inequalities and the crucial role of health behaviors in generating the inequalities, we know little about how socioeconomic differences in health behaviors emerge. Global forces affecting employment and economic opportunities and general trends in income inequality certainly affect health (Truesdale and Jencks 2016) but say little about why individuals of different socioeconomic levels engage in

such different health behaviors. A more micro approach has attempted to answer this question by examining the influence of factors that mediate the relationship between education and healthy behavior (Cutler and Lleras-Muney 2010) or by more carefully isolating the causal impact of education (Lawrence 2017). We seek to extend this micro approach with two additional insights. First, we argue that separate health behaviors can be better understood when viewed as part of a person's underlying health lifestyle. Second, we bring the life course perspective more explicitly to bear in understanding the emergence of socioeconomic inequalities in health lifestyles in early life.

Conceptualizing health behaviors as part of broader, underlying health lifestyles can shed light on the SES-health behavior relationship. Health lifestyles are clusters of health behaviors within individuals that are rooted in group-based identities and norms (Cockerham 2005). Documenting how adults adopt different health lifestyles and how individuals express their identity and social class through health lifestyles links health behaviors that are otherwise treated as distinct, offering a more integrated perspective on health disparities. In addition, inequality in health lifestyles among adults emerges over the life course, which means that a full understanding requires attention to the life phases preceding adulthood in which these lifestyles form. The transition to adulthood is an important life course stage when individuals grow beyond the influence of their parents to adopt their own identities and habits. This life stage serves as an important turning point for health, as adolescent experimentation can either become a lifelong habit or be redirected in healthy ways. Further, it is an important developmental phase when daily activities may shift, long-term career opportunities appear, and health behaviors become habits lasting for decades to come (Benson 2014). Thus, we examine a nationally representative cohort of individuals across the transition to adulthood as they adopt adult roles and identities

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and achieve adult social statuses. We build on a prior study that describes the prevalent health lifestyles in the adolescent, early young adult, and late young adult life stages and their associations with young adult health (author citation). We replicate the creation of these health lifestyles and use them to test a theoretical model of the development of health lifestyles over the transition to adulthood and their associations with SES and adult roles. Our study examines processes leading to adult health inequality by addressing a key question that links health lifestyles and a life course perspective: To what extent are SES-based differences in health lifestyles redirected or reinforced during the transition to adulthood? The results of this study can help us to understand why individuals of different SES engage in different patterns of health behaviors, an unsolved puzzle that is fundamental to addressing a crucial issue in today's U.S. society: social inequalities in health.

Health Lifestyles

The concept of health lifestyles brings together core sociological theories on group-based identities, the routinization of individual behavior, life course development, and social inequality. As an integrative concept, *health lifestyles* link health behaviors to subjective definitions of group membership, values, and norms. They meaningfully organize a diversity of behaviors that researchers otherwise tend to treat separately. Health lifestyles are not an arbitrary grouping of behaviors, but rather represent a coherent set of practices that exist as collective phenomena (Cockerham 2005). The coherent grouping of individual health behaviors reflects broader, socially based motivations or meanings that are lost when treating health behaviors as separate. For example, college students often view smoking, alcohol use, and limited sleep as part of a lifestyle that is linked specifically to parties, clubs, and socializing, and they expect that

lifestyle to change upon leaving college (Nichter 2015). In contrast, smoking, alcohol use, and limited sleep among similarly aged workers who are not enrolled in college may reflect a response to chronic stress that could continue well into adulthood.

Health lifestyles can be concordant or discordant (Saint Onge and Krueger 2017). At the extremes, a positive concordant health lifestyle involves the avoidance of multiple, uniformly unhealthy behaviors, while a negative concordant health lifestyle involves the maintenance of multiple, uniformly unhealthy behaviors. Discordant health lifestyles involve a mix of healthy and unhealthy behaviors. Studying a single health behavior divorced from the context of the health lifestyle in which it is rooted may not be fruitful, as changes in a specific behavior may be difficult to effect without changes to the underlying lifestyle. For example, a young person entering marriage may change multiple behaviors as part of a shifting lifestyle, as this transition is associated with less substance use but also compromised diet and exercise (Ross, Hill, and Mirowsky 2016). Recent research has pointed to the usefulness of health lifestyles in understanding behavioral patterns (e.g. Daw et al. 2017; Olson et al. 2017) and has demonstrated important associations with mortality and morbidity (author citation; Burdette et al. 2017; Saint Onge and Krueger 2017).

Health lifestyles and SES

Health lifestyles are theoretically rooted in longstanding sociological research on the relationship between lifestyles and social class. Marx and Engels ([1848]1970), Veblen ([1899]2007).), Weber ([1922]1978), and Bourdieu (1984) have all described the importance of social conditions for the lifestyles of individuals. Weber's notion that social class plays out in everyday life through group-based lifestyles comprised of behaviors and consumption patterns has been used

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to focus in particular on health behaviors (Cockerham 2005; Frohlich and Potvin 1999).

Consistent with these arguments, the associations between health behaviors and SES are well

established (Cutler and Lleras-Muney 2010; Pampel et al. 2010), and nascent research suggests

that overarching health lifestyles are also related to indicators of SES (Mollborn et al. 2014;

Skalamera and Hummer 2016).

Further, lifestyles are expressions of socioeconomic identities (Weber [1922]1978).

People choose health lifestyles to express their identities, yet they typically select from among

the lifestyle options available to members of their group in a particular context (Cockerham

2005). As social contexts change, people's health lifestyles may also change. The transition of

adulthood is a time of frequent geographic mobility (Brazil and Clark 2017), resulting in shifts in

social contexts, peer groups, group-based identities, and available lifestyle options. Beyond

change in health lifestyles resulting from changing contexts, SES often shifts during the

transition to adulthood (Lui et al. 2014). SES of origin may decrease in importance as young

people form independent households and build human capital by starting careers or forgoing

income to complete an education. At the same time, attained SES—which is shaped by, but

distinct from, SES of origin—begins to form in young adulthood, resulting in potential identity

changes.

SES has been shown to constrain health behaviors through multiple, changing

mechanisms (Freese and Lutfey 2010), such as stress, financial resources, self-efficacy,

community resources, and social support (Pampel et al. 2010), and similar processes may operate

for health lifestyles. Prior research indicates that youth health lifestyles are indeed patterned

across family SES (Daw et al. 2017; Mollborn et al. 2014; Mollborn and Lawrence 2018), and

there is evidence that education is associated with healthier lifestyles (Skalamera and Hummer 2016).

Health Lifestyle Development over the Life Course

Despite the emergent relationship between SES and health during adolescence and adulthood, little research has examined the developmental, temporal process of adopting lifestyles. The transition to adulthood,[1] when individuals establish their social identities and develop their own habits and behaviors (Harris 2010), is likely a critical life stage for this process. Linking childhood and adulthood, at this time individuals step out from the influence of their parents (Rindfuss 1991). The transition to adulthood is usually defined as beginning around age 18 and continuing through about age 30.

Specific health behaviors demonstrate marked patterns across the transition to adulthood, evidencing relationships with age and markers of adulthood (Bachman et al. 2002; Frech 2012; Jeffery and Rick 2002). For example, smoking shows distinct age patterns, with the biggest changes occurring across the transition to adulthood, and is associated with educational attainment, employment, financial well-being, marriage, and parenthood (Pampel et al. 2014; Staff et al. 2010). Health lifestyles are also likely related to the completion of adult role transitions, such as marriage, paid work, financial independence, establishing a household, and parenthood. Normative behaviors may shift as individuals take on adult roles and experience changes in freedoms and responsibilities (Bachman et al. 2002). Getting married, taking on a new job, and becoming a parent are associated with changes in specific health behaviors (Umberson et al. 2010).

We present two opposing frameworks describing the developmental process of health lifestyles in the transition to adulthood. The first perspective, termed "path dependency," highlights the intergenerational and institutional reproduction of inequality. Health lifestyles are established early, and while there may be some developmental changes, generally follow from earlier health lifestyles. Similarly, SES shapes health lifestyles early in life and maintains close connections as individuals transition to adulthood, regardless of adult roles. In contrast, the second perspective, called "developmental specificity," focuses on turning points, agency, and critical developmental stages, emphasizing the relationship between health lifestyles and conditions that are specific to life stage. In this framework, health lifestyles are expected to be relatively volatile across the early life course, as are their connections to SES.

Path dependency

The path dependency approach expects consistency across the transition to adulthood in individuals' health lifestyles and their relationship to SES. Research has indicated the importance of early conditions for later outcomes, both empirically (Haas 2008; Hayward and Gorman 2004) and theoretically through cumulative dis/advantage theory (DiPrete and Eirich 2006) and cumulative inequality theory (Ferraro and Shippee 2009) which identify the additive and multiplicative effects of social conditions over time. Further, a strong sociological tradition asserts the significance of background SES on experiences and opportunities throughout the life course, which serve to maintain the status quo across generations. For example, Bourdieu and Passeron (1990) described how schools treat children who exhibit different social class signals differently, with important consequences for the educational outcomes of children. Parenting is also an important way that children are prepared to exhibit the same social class as their parents.

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Parents of higher social status encourage their children to develop a sense of entitlement and teach them how to get what they need from institutions, whereas parents of lower status defer to authority, and these parenting styles continue to be influential through the transition to adulthood (Lareau 2011; Lareau 2015). These key institutions of school and family serve to reinforce the expression of SES across the early life course, and SES shapes the transition to adulthood (Furstenberg 2008). In support of this view, health behaviors and health lifestyles show associations with SES of origin across the life course, with the health lifestyles of preschoolers being patterned by parent socioeconomic status (Mollborn et al. 2014).

Developmental specificity

The transition to adulthood is a life stage that offers many potential turning points, allowing individuals the opportunity for changes. It is a time of "firsts" (Staff et al. 2015) and has been described as demographically dense, in reference to the high potential for marriage, childbearing and migration (Rindfuss 1991). Thus, this developmental stage offers individuals the opportunity to continue or change their trajectories in terms of health lifestyle, SES, and identity.

Jeffrey Arnett (2000) argues that there is a developmental stage between adolescence and young adulthood called "emerging adulthood." This stage, usually exhibited around ages 18 to 25, is characterized by "relative independence from social roles and normative expectations" (Arnett 2000: 469). Whether or not emerging adulthood is a distinct phase has been challenged theoretically and empirically, with a strong critique that this stage may be more applicable to privileged individuals (Hendry and Kloep 2010). We do not enter this debate, but the emerging adulthood concept highlights the potential for turning points during the transition to adulthood.

In support of developmental specificity, prior research suggests that some health behaviors demonstrate inverse relationships with SES during the early years of young adulthood (Pampel et al. 2014; Patrick et al. 2012). For example, socioeconomically privileged college-goers may engage in unhealthy substance use in these early years, desisting as they transition out of college (Nichter 2015). At the same time, socioeconomically disadvantaged individuals may be busy working and may increase their substance use later as they age across young adulthood. Perhaps corroborating this view, Mize (2017) reports that intensive obligatory roles and voluntary roles are associated with different health lifestyles.

The present study

We extend our previous study that described predominant health lifestyles among a U.S. cohort that recently reached young adulthood, articulating and testing how these health lifestyles are patterned across this developmental stage and their relationships to SES and adult roles. To adjudicate between path dependency and developmental specificity perspectives, we examine if and how: (1) health lifestyle groupings are similar or different across adolescence, early young adulthood, and late adulthood; (2) individuals change health lifestyles; (3) background and achieved SES is associated with health lifestyles in each stage; and (4) adult roles are related to health lifestyles. Through interpreting these results, we can conclude whether health lifestyle development can best be characterized by early influences and relative stability or if concurrent factors and volatility better describe this process.

We use a longitudinal, nationally representative dataset of a cohort that has recently reached adulthood, which offers information on a variety of the same individuals' health behaviors in adolescence (ages 15-17), early young adulthood (ages 20-24), and late young

adulthood (ages 26-31). We broadly operationalize health lifestyles using a wide variety of

health behaviors, including indicators in the domains of diet, exercise, substance use, sleep,

sexual risk, and safety. This study therefore examines how well the developmental specificity

and the path dependence frameworks characterize both changes in health lifestyles, and changes

in the relationship between SES and health lifestyles, across the transition to adulthood.

Methods

Data

We used the National Longitudinal Study of Adolescent to Adult Health (Add Health), a

longitudinal, nationally representative survey (Harris 2010). Add Health first surveyed 20,745

adolescents in grades 7-12 in 1994-1995 (Wave I). The first follow-up was conducted on a

subsample one year later (Wave II). Wave III was administered in 2001 and Wave IV in 2007-

08. This study uses respondent interviews at Waves I, III, and IV. This dataset is ideal for this

study because it offers detail on a wide range of health behaviors and social factors across the

transition to adulthood. We adjust for sampling weights and clustering to account for clustering

and unequal probability of selection, and ensure our sample is nationally representative.

Measures

Health lifestyle indicators. We used a wide range of measures to capture health-related behaviors

at Waves I, III, IV. We define health-related as shaping the risk of injury, illness, infection, or

chronic disease, and limit the scope to behaviors, omitting any environmental or contextual

features. We note that all of these behaviors are likely related to structural constraints and

opportunities shaped by families, schools, neighborhoods, policies, and other contexts but do not

use such influences as inclusion criteria. Measures differed slightly across survey waves because of data constraints, but also because of developmental differences in life stages (author citation). We included measures for: physical (in)activity, substance use, diet, safety, health care, sleep, and sexual risk behaviors. Similar studies (e.g., Burdette et al. 2017; Daw et al. 2017; Olsen et al. 2017; Saint Onge and Krueger 2017) have incorporated subsets of these domains, but to our knowledge, have not used all of them, excepting our previous study. We created categorical measures, creating thresholds based on the observed distributions of data, substantive meaning of the cut-offs, and recommended guidelines. We combined categories or measures for parsimony. For example, smoking and chewing tobacco were combined to create one categorical variable for tobacco use. We explored numerous alternative operationalizations for variables, and results had similar substantive patterns; results presented here indicate the best fitting and most substantively interpretable (author citation). Table 1 presents the measures used in our analysis.

Table 1 here

Independent variables included controls, SES, and adult roles. Controls included the respondent's gender, race/ethnicity, nativity, adolescent GPA, and religiosity in adolescence, all of which have been shown to be influential on health behaviors and status attainment (Bradley and Greene 2013; Fletcher and Kumar 2014; Jackson et al. 2010; Kao and Thompson 2003; Lopez-Gonzalez et al. 2005; Kimbro et al. 2008; Lehrer 2004). We also included age at Wave I, though we have restricted the age range as described below. Gender classified individuals as male or female. Race/ethnicity was captured in the mutually exclusive categories of non-Hispanic White (referred to as White hereafter), non-Hispanic Black (referred to as Black), Hispanic, and other race/ethnicity. Other race/ethnicity included those of Asian/Pacific Islander or Native American/American Indian descent, or individuals who reported "other" on the

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questions about race or ethnicity. Nativity was dichotomized to compare those who report being born in the United States to those born elsewhere. Religiosity was coded into mutually exclusive categories based on frequency of attendance at religious services. Categories included having no religion or never attending services, attending less than once per month, attending at least once per month but less than weekly, and attending weekly or more. Finally, we included a control for grade point average at Wave I, which was constructed using self-reported grades (A, B, C, D or lower) during the most recent grading period in English or language arts, mathematics, history or social studies, and science.

SES was represented with income and education to allow for comparison over time. SES of origin was measured at Wave I. Parents completing a survey reported their educational attainment, and we filled in respondent reports of mother's education for those who did not have information from the parent survey. We used the highest education of either parent; categories included less than high school, high school diploma or equivalent, some college, and 4-year college graduate. Income-to-needs was calculated as the ratio of the household income relative to the U.S. Census-defined poverty threshold for 1995 or 1996, specific to household size. In late young adulthood, the respondent's Wave IV reported years of education, household income-to-needs, and occupational status captured attained SES. Educational attainment was a categorical measure with categories for less than high school, high school diploma or equivalent, some college, 4-year college graduate, and graduate or professional degree. Income-to-needs was calculated the same as described for Wave I, but used thresholds from the year of the Wave IV interview. Occupational status included categories for unemployed or working less than 10 hours per week, professional/managerial occupation, non-professional/managerial occupation, and military employment.

Adult role transitions, taken from Waves III and IV, included family structure (unmarried without children, married without children, unmarried with children, and married with children) and a dichotomous measure comparing those who living independently to those still living with parents. At Wave III, we also included a measure of current school enrollment (none, part-time, and full-time).

Analytic Approach

We used latent class analysis (LCA) to separately estimate health lifestyles for three waves of data (adolescence, early young adulthood, and late young adulthood). LCA uses a structural equation modeling approach to identify a categorical latent variable that is represented with observed indicators (for more information, see Collins and Lanza 2013). In this case, the categorical latent variable is health lifestyles, and the observed indicators are different health behaviors. LCA's focus on a categorical latent variable makes this approach appropriate for identifying health lifestyles (Abel 1991). We used LCA at each life stage because this approach allowed us to include different health behavior indicators at each wave, which is important given the developmental differences for the three life stages as well as differences in survey questions. We used the SAS package PROC LCA (Lanza et al. 2007; PROC LCA 2015). Analyses adjusted for sampling weights and clustering to ensure national representation. We choose the number of classes in line with the previous study (author citation) and considered fit statistics (see Appendix Table A and Appendix Figure B) and theoretical and substantive coherence.

We assigned each individual to the health lifestyle with the highest probability for each stage. We then estimated multinomial logistic regression models for the health lifestyles at each wave. We estimated models with the controls and each set of variables (earlier health lifestyle

membership and transition to adulthood/SES) and present here results from models including all variables.[2]

For the LCA at each wave, we included all respondents with a valid weight for that wave and who were 15 to 17 years old at Wave I (Wave I N=10,647; Wave III [ages 20-24] N= 8,025; Wave IV [ages 26-31] N=8,312). We restricted the sample by age because health behaviors and health lifestyles are age dependent, and we wanted to examine similarly aged respondents. For Wave I, we tested measurement invariance to assess whether health behaviors clustered differently across age, and the results indicated that indeed, models separated by age better fit the data. We maintained the full sample at each wave using full information maximum likelihood to account for item missingness. For the regression analyses, our analytic sample comprised respondents who were aged 15-17 at Wave I and who were interviewed at Waves III and IV (N= 6,863). To retain this sample for further descriptive statistics and regression analyses, we used multiple imputation. We imputed using a chained equations approach (White et al. 2011). We created 30 datasets using all independent and dependent variables. All analyses adjusted for complex sampling design.

Results

Our LCA analyses yielded 6, 5, and 4 health lifestyle classes for adolescence (Wave I), early young adulthood (Wave III), and late young adulthood (Wave IV). Appendix Tables B-D present the class-conditional probabilities for all indicators. Because a description of the predominant health lifestyles among U.S. young adults is available elsewhere (author citation), we do not detail these results. Notably, these results demonstrated a discordant or mixed pattern of behaviors in terms of their health implications, defying simple categorization according to a

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unidimensional continuum of healthfulness. Each life stage had more and less positive clusters, with substance use, diet, and physical activity levels generally being the most defining characteristics. We named each group according to the substantive criteria that distinguished the group from the population average and the other groupings. Additionally, the health lifestyles demonstrate important social patterns (see Appendix Table E for descriptive statistics).

We overview here the lifestyles for each wave, which are listed in Table 2 (see Appendix Tables B-D for details on the classes). For adolescence (ages 15-17), there is a positive group (31%) that exhibited generally healthful behaviors, and a mostly positive but substance/sleep group (13%) that displayed healthful behaviors, but also engaged in substance use and had sleep problems. This wave also included a passive group (13%) that appeared to refrain from both healthful and harmful behaviors, and a mixed group (12%) that demonstrated favorable activity, sleep, drug use, and sex behaviors, but also unfavorable screentime, tobacco use, diet, safety and health care. There were two negative groups that demonstrated generally insalubrious behaviors, but one group engaged in substance use (11%), and the other did not (20%).

Table 2 here

For early young adulthood (ages 20-24), there was no group that was consistently positive on all indicators, but the mostly positive group (25%) had mostly healthful behaviors but also displayed low rates of physical activity. Another mostly positive group (21%) had multiple salubrious indicators, but also had high rates of problem drinking and risky sex. A mixed group also emerged (10%), with healthful activity but also poor sleep and safety. Similar to adolescence, two negative groups were differentiated by substance use (18%) or abstention (26%).

For late young adulthood (ages 26-31), there was a positive group (24%) that displayed a consistently healthy profile, alongside a negative group (21%) that was consistently unhealthy. There was also a group that was mostly positive (38%) but had poor activity and diet, as well as a mixed with problem drinking group (17%) that showed a complex pattern, but also remarkably high rate of problem drinking. Notably, it appears that health lifestyles are overall less healthy in early young adulthood, compared to either adolescence or later young adulthood. In early young adulthood, all of the health lifestyles included some compromised behaviors, and a large proportion of individuals (45%) were in the generally negative groups (either with or without substance use).

The results indicate that many individuals remained in a similar health lifestyle from one life stage to the next, but there was perhaps more movement than one might expect. For example, nearly two thirds (64%) of adolescents in the *positive* health lifestyle later belonged to one of the two *mostly positive* early young adult classes. Yet, a sizeable proportion of *positive* adolescents were distributed across other health lifestyles in early young adulthood. In the middle panel, among those in the *passive* group in adolescence, 60% were in the *mostly positive, sedentary/poor diet* group in late young adulthood, which is similar in its inactivity and substance use abstention. Only 8% and 11% of the *passive* adolescents went on to belong to the *mixed, with problem drinking* and *negative* groups, respectively. The large percentage in similar health lifestyles and the small percentage in dissimilar lifestyles suggests congruence over time. Patterns for early to late young adult health lifestyles can be interpreted in the same way: Individuals are likely to be in health lifestyles with similar behaviors over time. For example, the large majority (88%) of those in the early adult *mostly positive* group went on to belong to the *positive* or *mostly positive, sedentary/poor diet* lifestyles.

Figure 1 illustrates the proportions of health lifestyle classes and their relationships to one another. Each of the ribbon sizes correspond to the percentage from the lifestyle on the left that are in the lifestyle on the right. For example, among those in the Wave I *positive* group, 35% go on to adopt the Wave III *mostly positive* lifestyle, 29% to the *mostly positive with drinking/sex*, and smaller proportions to the other three Wave III lifestyles.

Figure 1 here

A given individual shifting across the spectrum from a lifestyle composed of consistently unhealthy habits to a consistently healthy lifestyle appears unlikely, but smaller shifts are common. For example, those in the adolescent *negative with substance* group were distributed across the late young adult groups, with about one third in *mostly positive, sedentary/poor diet*, one fifth in *mixed with problem drinking*, nearly two fifths in the *negative* group, and a small number in the *positive* group (8%). Adolescents engaging in this negative lifestyle may be experimenting with different behaviors, of which some unhealthy habits are likely to persist. Together, these results suggest that continuity in health lifestyles over time partly supports path dependency but also displays developmental specificity.

We then assessed multivariate relationships between social factors, earlier health lifestyles, adult roles, SES, and early and late young adult health lifestyles. Table 3 presents results from a multinomial logistic regression predicting adolescent health lifestyles. The results demonstrated strong social patterns even in this early life course stage. Having a parent with a college degree was associated with approximately halved odds of being in the *passive*, *mixed*, and *negative, no substance* groups compared to the *positive* class, with fairly strong effect sizes (odds ratios ranging from .41 to .55). Greater household income-to-needs was associated with reduced odds of being in the *passive* and *mixed* groups. Interestingly, neither parental education

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nor household income was related to membership in the groups with substance use compared to the referent.

<div align="center">Table 3 here</div>

Table 4 presents results from a multinomial logistic regression predicting early young adult health lifestyles, with *mostly positive* as the reference group. Interestingly, greater parent education was associated with increased odds of the less healthy *mostly positive with drinking/sex, negative no substance*, and *negative with substance* early young adult groups compared to *mostly positive* (and higher adolescent family income was associated with the former group). These relationships were similar but with some higher coefficient magnitudes in a base model that did not include adolescent health lifestyles, Wave III adult roles, or Wave III achieved SES (see Appendix Table F for results from a base model). These results indicate that higher SES of origin is, perhaps surprisingly, associated with *increased* health lifestyle risk during this life stage of early young adulthood (ages 20-24).

<div align="center">Table 4 about here</div>

Adolescent health lifestyle membership appears to be influential for early young adulthood health lifestyles in this multivariate context. Compared to being in the adolescent *positive* group, belonging to any of the other groups was associated with either increased or decreased odds of membership in early adult health lifestyles, compared to the referent. Substance use in adolescence appears particularly salient, as the two groups with substance use (*mostly positive but substance/sleep* and *negative, with substance*) were related to much greater odds of belonging to any other early adult group besides *mostly positive*, and particularly for the early adult *negative, with substance*. These relationships were very similar in a model that did not include Wave III achieved SES or adult roles.

<div align="center">20</div>

Achieved SES in early young adulthood, a life phase in which adult socioeconomic attainment may still be emerging, demonstrated a somewhat complicated pattern with early adult health lifestyle membership. Greater education was associated with increased odds of belonging to the *mostly positive with drinking/sex* and decreased odds of belonging to the *negative, no substance*. Income-to-needs was not significantly related to early adult health lifestyle membership. For occupation, having a nonprofessional job increased the odds of belonging to the *mostly positive with drinking/sex* and *negative, no substance* groups. Together, these findings suggest that higher SES in early adulthood does not confer much advantage for health lifestyle, in line with research arguing that the experimentation of "emerging adulthood" is concentrated among those more privileged (Hendry and Kloep 2010).

Adult role measures in early young adulthood, a life phase in which many people have not yet assumed these roles, are inconsistently related to health lifestyles in early adulthood. Being married or having children generally reduced the odds of being in the *mostly positive with drinking/sex*, *mixed but active*, or *negative with substance use* groups compared to the referent but did not relate to *negative, no substance*. But living away from parents in this life stage was associated with increased membership in three of the four less healthy groups compared to the reference group.

Turning to late young adulthood, Table 5 presents results from a multinomial logistic regression predicting health lifestyle membership in Wave IV. SES of origin was not related to health lifestyle membership in this full model. However, in a base model only including controls (see Appendix Table G), having a college-educated parent was associated with reduced odds of belonging to the *mostly positive, sedentary/poor diet* (OR=.48) and the *negative* (OR=.55) groups compared to *positive*, and those two groups also demonstrated reduced odds for income-

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to-needs (OR=.95). These relationships were no longer significant once Wave IV achieved SES and adult roles were added to the model, suggesting that these background factors may operate through other important social factors.

Table 5 about here

Earlier health lifestyles demonstrated multiple significant relationships with late young adult health lifestyles. Each of the adolescent and early young adult health lifestyles was associated with increased odds of belonging to late young adult lifestyles other than the reference group of *positive*. Echoing results presented previously, substance use demonstrates a particularly strong relationship over time, as those lifestyles have particularly large coefficient magnitudes.

Unlike SES effects in early young adulthood, achieved SES demonstrated a generally protective effect for late young adult health lifestyles. Greater educational attainment was associated with lower odds of belonging to the *negative* group, and greater household income was related to reduced odds of being in the *mostly positive, sedentary/poor diet* and *negative* groups compared to *positive*. Occupational status did not conform to the pattern, with those employed either in professional or nonprofessional jobs compared to those not employed being more likely to belong to the *mostly positive, sedentary/poor diet* and *negative* classes than the *positive* referent, net of the covariates. Models that did not consider earlier health lifestyles or Wave III SES and adult roles were substantively similar to the results presented here, but with stronger magnitudes and with more significant results demonstrating an inverse relationship between education and health lifestyle membership in the three less healthy groups compared to the referent group (see Appendix Table H). For example, advanced degree holders had greatly reduced odds of being in the *mostly positive, sedentary/poor diet* (OR=.24), mixed with problem

drinking (OR=.29), and negative (OR=.06) groups compared to the referent. These findings contrast to those in early young adulthood, in which SES demonstrated mixed effects.

Adult roles in Wave IV had similar findings as those for Wave III, with marriage or parenthood generally reducing the odds of belonging to health lifestyles other than the *positive* class. Unlike early young adulthood, however, living separately from one's parents did not relate to health lifestyles in late young adulthood. These results were similar in models that did not include earlier health lifestyles or Wave III achieved SES and adult roles. These findings are in line with previous research suggesting that marriage and parenthood are generally protective for health behaviors (Umberson et al. 2010).

Discussion

In this study, we aimed to describe the development of health lifestyles over the transition to adulthood and how they relate to SES and adult roles. We presented two theoretical frameworks: (1) path dependency, which expects consistency across the transition to adulthood in health lifestyles and their relationship to SES, and (2) developmental specificity, which expects changes in health lifestyle trajectories and their associations with SES. We then analyzed the composition of health lifestyle groupings, patterns of health lifestyles over life stages, and associations between health lifestyles and SES and adult roles. Our results indicate that health lifestyles in adulthood are rooted in earlier social experiences and health lifestyle memberships, but individuals also display fairly high rates of change. Associations with SES were different at each health lifestyle stage, with higher SES predicting *less* healthy lifestyles in early young adulthood. Healthier lifestyles were most consistently associated with higher SES in late young adulthood. We conclude that health lifestyles across the transition to adulthood are characterized

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by both developmental specificity and path dependency, but with an emphasis on developmental specificity. We explain this conclusion further.

Health lifestyles cannot be conceptualized as spontaneously arising in adulthood but instead have origins in early life social experiences and health behaviors. Adolescent health lifestyles were strongly patterned by socioeconomic characteristics, suggesting that early experiences shape health lifestyles. In turn, adolescent health lifestyles were related to early and late young adult health lifestyles. Although there were clear early origins for later health lifestyles, individuals exhibited more movement over time than the path dependency model would expect, suggesting that health lifestyles depend importantly on developmental stage.

As further evidence of developmental specificity, risky health behavior appears to be most common in early young adulthood, with all predominant health lifestyles including some compromised behaviors and with higher socioeconomic status sometimes predicting less healthful lifestyles. These results complicate notions of life course cumulative advantage and disadvantage based on childhood health lifestyles. In contrast, they support research that has been conducted on specific health behaviors that suggests emerging adulthood is a unique and risky life phase for many individuals (Arnett 2000; Frech 2012). However, our findings also imply that rather than being an anomaly with no consequences, emerging adult health lifestyles have considerable influence on health lifestyles several years later, when many respondents have settled into their adult lives. Additionally, these early young adult health lifestyles have important implications for health (author citation). Thus, it would be a mistake for policy makers to downplay the consequences of emerging adult health behaviors, even if they are somewhat transitory. Instead, this life phase may be a catalyst for the development of socially patterned risky health behaviors that persist into the future.

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Additionally, the differences in associations between health lifestyles and SES across life stages suggest that in the transition to adulthood, individuals settle into their SES-based identities, in part *through* their health lifestyles. Early young adulthood demonstrated an inverse association between background SES and health lifestyles and did not evidence a consistent pattern for achieved SES. In late young adulthood, background SES was not associated with health lifestyles net of achieved SES, but achieved SES was negatively associated with belonging to some less healthy health lifestyles compared to the reference group. Associations with SES thus appear to be developmentally specific, and socioeconomically based identities may become more salient in adulthood than in earlier life stages.

In contrast, adult roles such as family structure demonstrated generally similar patterns in early and late young adulthood. In early young adulthood, the implications of being married or having children diverged from those of SES. It may be that those starting families during these earlier ages are settling into more durable health lifestyles, whereas higher-SES individuals demonstrate more transitional lifestyles during this same life stage. By late young adulthood, higher-SES individuals are also settling into their adult roles and the health lifestyles that in part may arise from them.

This study has several limitations. First, because our data were observational, we focused on associations and could not identify causal relationships. Second, we investigated the transition to adulthood, but there are important processes that occur before and after this life stage that other research should examine. Third, we sought to maximize our understanding of health lifestyles in the three stages; other approaches may better identify trajectories of specific behaviors or socioeconomic status, but omit a fuller picture of health lifestyles. Fourth, in our

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effort to describe the development of health lifestyles, we neglected many details that will likely be fruitful for future research.

Widening disparities in health and health behavior across SES should stimulate more research into the meaning of SES for routinized, everyday patterns of behavior such as health lifestyles. Our results suggest that early experiences, while important, are not the sole source of adult inequalities in health lifestyles. Rather, they develop and change across the transition to adulthood, as individuals progress towards their own achieved SES and settle into an identity that conforms to that status.

These results support calls for an integrated theory that joins the path dependency and development specificity perspectives (Pampel et al. 2014). Our results suggest the importance of recognizing that adolescence sets the stage for later behavior but does not determine it – life course changes in adulthood have the potential to redirect disparities in healthy lifestyles. Norms of adolescence and young adulthood leave room for experimentation that affect youth from all status backgrounds. SES differences in health lifestyles are modest in adolescence and early adulthood. However, role transitions that steadily emerge through late young adulthood are increasingly differentiated by achieved SES. Role transitions may reinforce path dependency among lower-SES groups, who tend to continue less healthy behaviors into adulthood. In contrast, role transitions may redirect health lifestyles for high-SES groups. Despite much experimentation at younger ages, these groups come to reject risky health lifestyles as they complete advanced education, establish long-term relationships, and enter into occupational careers. Achieved SES and adult roles thus have both overlapping and independent influences. Considering the combined influences of family SES, achieved SES, the stage-setting influence of early health lifestyles, and the potential redirecting influence of later role transitions for

advantaged SES groups can help to make sense of the complexity of life course changes in health

lifestyles and is consistent with rising social inequalities in health.

Endnotes

[1] The meaning of the transition to adulthood and young adulthood has changed over time, with today's young adults displaying more protracted and individualized transitions (Shanahan 2000). These historical changes are not the focus of this study.

[2] We present results from multinomial models which compare each group to the referent of the healthiest lifestyle. This approach provides only one point of comparison for each lifestyle but is a substantively meaningful comparison. Average marginal effects, on the other hand, compare each group to all other groups, which is more comprehensive but less substantively precise.

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Table 1. Measures used in LCA analyses to generate health lifestyles, by wave and domain

	Adolescence Wave I	Early young adulthood Wave III	Late young adulthood Wave IV
Physical (in)activity	Activity count past 7 days: 0, 1-2, 3+ Screentime hours in past 7 days: 0-13, 14-27, 28+	Activity count past 7 days: 0, 1-2, 3+ Screentime hours in past 7 days: 0-13, 14-27, 28+	Activity count past 7 days: 0, 1-2, 3+ Screentime hours in past 7 days: 0-13, 14-27, 28+
Substance use	Tobacco use in last 30 days: none, some, daily Marijuana use in last 30 days Illegal drug use in last 30 days Alcohol in last year: none, some, problem drinking	Tobacco use in last 30 days: none, some, daily Marijuana use in last 30 days Illegal drug use in last 30 days Alcohol in last year: none, some, problem drinking	Tobacco use in last 30 days: none, some, daily Marijuana use in last 30 days Illegal drug use in last 30 days Alcohol in last year: none, some, problem drinking
Diet	Ate 2 vegetables and 2 fruits yesterday Usually eats breakfast	Ate 2 vegetables and 2 fruits yesterday Usually eats breakfast Fast food in last week: 0-1 or 2+	Fast food in last week: 0-1 or 2+ Sugary beverages in last week: 0-6 or 7+
Safety	Physical fight in last year Seatbelt use: always or never/rarely/sometimes/most of the time	Injured in fight in last year	Serious physical fight in last year
Health	Doctor checkup in last year Dental visit in last year	Doctor checkup in last year Dental visit in last year	Doctor checkup in last year Dental visit in last year
Sleep	Usual number of hours: 0-8 or 9+	Usual number of hours: 0-6 or 7+	Usual number of hours: 0-6 or 7+
Sexual risk	Last sex: never, used condom, contraception but no condom, no contraception	Last sex: never, used condom, contraception but no condom, no contraception Sex partners in last year: 0-1 or 2+ Paid for sex in last year	Sex partners in last year: 0-1 or 2+ Paid for sex in last year

Notes: Categories compare yes (or any) to no (or none) unless categories are indicated.

Table 2. Means of health lifestyle classes across health lifestyles of different stages

	Early young adult health lifestyles				
	Mostly positive (25%)	*Mostly positive with drinking/sex (21%)*	*Mixed but active (10%)*	*Negative, no substance (26%)*	*Negative, with substance (18%)*
Adolescent health lifestyles					
Positive	0.35	0.29	0.07	0.19	0.11
Passive	0.45	0.14	0.08	0.26	0.08
Mostly positive but substance/sleep	0.10	0.32	0.08	0.25	0.26
Mixed	0.27	0.11	0.09	0.32	0.20
Negative, no substance	0.17	0.19	0.08	0.36	0.20
Negative with substance	0.06	0.14	0.08	0.27	0.45

	Late young adult health lifestyles			
	Positive (24%)	*Mostly positive, sedentary/poor diet (38%)*	*Mixed, with problem drinking (17%)*	*Negative (21%)*
Adolescent health lifestyles				
Positive	0.36	0.41	0.13	0.10
Passive	0.22	0.60	0.08	0.11
Mostly positive but substance/sleep	0.22	0.31	0.26	0.20
Mixed	0.11	0.51	0.10	0.28
Negative, no substance	0.19	0.41	0.14	0.26
Negative with substance	0.08	0.32	0.20	0.39

	Late young adult health lifestyles			
	Positive (24%)	*Mostly positive, sedentary/poor diet (38%)*	*Mixed, with problem drinking (17%)*	*Negative (21%)*
Early young adult health lifestyles				
Mostly positive	0.31	0.57	0.06	0.06
Mostly positive with drinking/sex	0.40	0.28	0.22	0.10
Mixed but active	0.16	0.47	0.13	0.23
Negative, no substance	0.15	0.51	0.11	0.22
Negative, with substance	0.09	0.21	0.25	0.45

Source: Add Health.
Notes: Rows sum to 1. Shading indicates mean greater than class proportion. Adjusted for complex sampling design. N=6,863.

Table 3. Coefficients and significance from multinomial logistic regression for adolescent (Wave I; ages 15-17) health lifestyle (referent: positive)

	Passive	Mostly positive but substance/ sleep	Mixed	Negative, no substance	Negative with substance
SES of origin					
Parent's Education [<HS]					
HS graduate	-0.19	0.00	0.16	0.30	0.00
Some College	-0.64**	-0.10	-0.11	-0.19	-0.20
College Graduate	-0.90***	-0.11	-0.86***	-0.59**	-0.44
Household income-to-needs	-0.08*	0.02	-0.12**	-0.01	-0.03
Controls					
Female	0.28*	0.02	-0.83***	0.01	-0.08
W1 Age in Years	0.29***	0.21**	-0.11	0.66***	0.49***
Race/Ethnicity [NH White]					
NH Black	0.29	-1.06***	0.62**	0.55**	-0.13
Hispanic	0.040	-0.19	0.01	-0.14	-0.23
Other	0.34	-0.11	-0.16	-0.24	-0.52
US Born	-0.24	0.93**	0.37	0.75**	1.65***
Adolescent factors (Wave I)					
Religious Attendance [Never/No Religion]					
<1/month	-0.30	-0.25	-0.21	-0.77***	-1.49***
Monthly	-0.07	-0.08	0.09	-0.18	-0.56**
Weekly	-0.28	0.31	0.14	-0.09	0.09
High school GPA	-0.35***	-0.73***	-0.96***	-0.79***	-1.16***
Constant	-3.98**	-3.14**	3.66*	-9.43***	-6.74***

Notes: Adjusted for complex sampling design. Standard errors in parentheses. N=6,863
Source: Add Health.
*** p<0.001, ** p<0.01, * p<0.05 ; two-tailed

Table 4. Coefficients and significance from multinomial logistic regression for early young adult (Wave III; ages 20-24) health lifestyle (referent: mostly positive)

	Mostly positive with drinking/sex	Mixed but active	Negative, no substance	Negative, with substance
SES of origin				
Parent's Education [<HS]				
HS graduate	0.45*	0.28	0.48**	0.69**
Some College	0.42*	0.20	0.39*	0.82***
College Graduate	0.55*	-0.16	0.44*	0.96***
Household income-to-needs	0.04*	0.04	-0.03	0.02
Earlier health lifestyles				
Adolescent Health Lifestyle [Positive]				
Passive	-0.62***	-0.10	0.02	-0.32
Mostly positive but substance/sleep	1.38***	1.41***	1.31***	2.03***
Mixed	-0.09	0.19	0.57**	0.84***
Negative, no substance	0.78***	0.90***	1.18***	1.57***
Negative, with substance	1.26***	1.79***	1.68***	3.06***
Achieved SES (Wave III)				
Educational Attainment [<HS]				
HS grad	0.65*	-0.18	-0.36*	0.08
Some college/currently enrolled	1.00**	-0.33	-0.59**	-0.07
College Graduate	1.32***	-0.32	-1.02***	-0.52
Income-needs ratio	0.04	-0.01	0.04	0.04
Occupation [None/<10 hr]				
Professional/Managerial	0.03	-0.09	0.19	-0.18
Non-Professional	0.29*	0.30	0.53***	0.23
Adult roles (Wave III)				
Family Structure [Unmarried/No Kids]				
Married/No Kids	-0.73***	-1.03**	-0.35	-1.27***
Unmarried/Kids	-0.36	-0.85**	0.09	-0.38
Married/Kids	-1.22***	-1.78***	-0.26	-1.66***
Living Away from parents	0.36*	0.09	0.41**	0.56***
Controls				
Female	-0.03	-1.13***	-0.24*	-0.86***
W1 Age in Years	-0.12	-0.04	-0.04	-0.19*
Race/Ethnicity [NH White]				
NH Black	-0.90***	0.40*	-0.73***	-0.88***
Hispanic	0.08	0.51*	-0.24	-0.17
Other	-0.49*	0.05	0.06	-0.01
US Born	0.52*	0.10	0.43	0.49
Adolescent factors (Wave I)				
Religious Attendance [Never/No Religion]				
<1/month	-0.55**	-0.43*	-0.55***	-0.85***
Monthly	-0.11	-0.20	-0.04	-0.03
Weekly	-0.15	-0.32	-0.07	-0.23
High school GPA	0.10	0.03	-0.08	-0.14
Constant	-0.43	-0.32	0.17	1.86

Notes: Adjusted for complex sampling design. Standard errors in parentheses. N=6,863
Source: Add Health. *** p<0.001, ** p<0.01, * p<0.05 ; two-tailed

Table 5. Coefficients and significance from multinomial logistic regression for late young adult (Wave IV; ages 26-31) health lifestyles (referent: positive)

	Mostly positive, sedentary/poor diet	*Mixed, with problem drinking*	*Negative*
SES of origin			
Parent's Education [<HS]			
HS Graduate	-0.01	-0.22	-0.18
Some College	-0.16	0.04	0.02
College Graduate	-0.13	0.31	-0.06
Household income-to-needs	0.00	0.00	-0.01
Earlier health lifestyles			
Adolescent health lifestyles (positive)			
Passive	0.54***	0.05	0.45*
Mostly positive but substance/sleep	0.14	0.90***	0.70***
Mixed	0.50**	0.61**	1.05***
Negative, no substance	0.07	0.42*	0.83***
Negative, with substance	0.63**	1.16***	1.49***
Early young adult Health Lifestyle [Mostly positive]			
Mostly positive with drinking/sex	-0.59***	0.96***	0.47
Mixed but active	0.17	0.88**	1.25***
Negative, no substance	0.43**	1.12***	1.55***
Negative, with substance	-0.01	1.97***	2.43***
Achieved SES (Wave IV)			
Degree Earned [<HS]			
HS Graduate	-0.20	-0.38	-0.85*
Some College	-0.18	-0.48	-0.78*
College graduate	-0.29	-0.73	-1.71***
Advanced Degree	-0.49	-1.05	-2.04***
Income-to-needs ratio	-0.13***	-0.05	-0.12**
Occupation [None/<10 hr]			
Professional/Managerial	1.08***	1.14	2.20**
Non-Professional	1.19***	1.28	2.41***
Adult roles (Wave IV)			
Family Structure [Unmarried/No Kids]			
Married/No Kids	-0.32*	-1.36***	-1.03***
Unmarried/Kids	0.22	-0.49*	-0.41
Married/Kids	-0.19	-1.58***	-1.59***
Living Away from parents	-0.19	0.16	-0.06
Controls			
Female	-0.63***	-0.86***	-1.25***
W1 Age in Years	0.12*	0.14	0.02
Race/Ethnicity [NH White]			
NH Black	0.73***	0.16	0.02
Hispanic	0.01	0.11	-0.36
Other	0.20	-0.09	0.16
US Born	0.33	0.39	0.75*
Adolescent factors (Wave I)			
Religious Attendance [Never/No Religion]			
<1/month	-0.12	-0.39*	-0.20

Monthly	-0.17	-0.11	0.05
Weekly	-0.09	-0.35*	-0.08
High school GPA	-0.09	-0.08	-0.10
Early young adult factors (Wave III)			
Educational attainment [<HS]			
HS Grad	-0.34	0.08	0.48
Some college/currently enrolled	-0.71*	0.21	-0.04
College Graduate	-1.01**	0.05	-0.11
Occupation [None/<10 hr]			
Professional/Managerial	-0.10	0.18	-0.14
Non-Professional	-0.05	0.08	0.01
Family Structure [Unmarried/No Kids]			
Married/No Kids	0.01	-0.12	-0.36
Unmarried/Kids	-0.19	0.12	0.38
Married/Kids	0.11	0.39	0.40
Living Away from parents	-0.09	0.38**	0.17
Income-needs	-0.01	0.04	0.01
Constant	-0.54	-4.00*	-2.15

Notes: Adjusted for complex sampling design. Standard errors in parentheses. N=6,863.
Source: Add Health.
*** p<0.001, ** p<0.01, * p<0.05 ; two-tailed

Figure 1. Health lifestyles at Waves I, III, and IV.
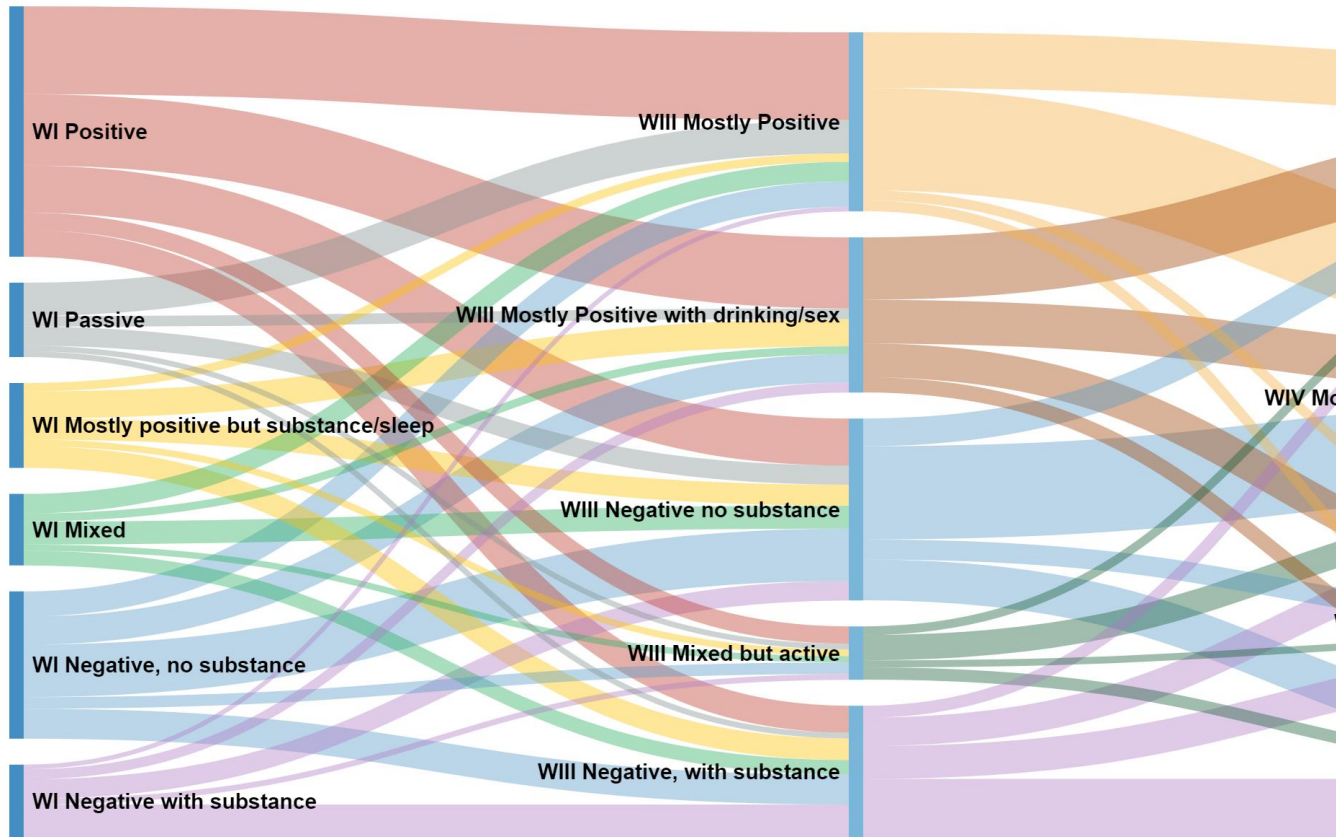
Notes: Adjusted for complex sampling design. Standard errors in parentheses. N=6,863. Diagram created using SankeyMATIC (Bogart 2018).
Source: Add Health.

Health Lifestyles, Socioeconomic Status, and the Transition to Adulthood

ONLINE SUPPLEMENT

Appendix Table A. Fit statistics for latent class analysis (LCA) Waves I, III, and IV

	Classes	G2	AIC	BIC		Classes	G2	AIC	BIC
Wave I Ages 15-17	2	34208	34294	34607	Wave IV (ages 26-31)	2	16447	16521	16781
	3	32804	32934	33406		3	15569	15681	16074
	4	31737	31911	32544		4	15315	15465	15992
	5	31116	31334	32127		5	15147	15335	15996
	6	30784	31046	31999		6	14976	15202	15996
	7	30481	30787	31899		7	14842	15106	16033
	8	30244	30594	31867		8	14718	15020	16081
	9	29991	30385	31818		9	14614	14954	16148
	10	29814	30252	31844		10	14517	14895	16223

	Classes	G2	AIC	BIC
Wave III (ages 20-24)	2	25029	25115	25415
	3	24255	24385	24839
	4	23794	23968	24576
	5	23418	23636	24398
	6	23203	23465	24381
	7	23023	23329	24398
	8	22855	23205	24428
	9	22697	23091	24468
	10	22560	22998	24529

Source: Add Health

Notes: Analyses adjust for complex sampling design. Shaded rows indicate selected class solution for each wave.

Appendix Table B. Class-Conditional Response Probabilities from Latent Class Analyses (LCA) for **Adolescent** Health Lifestyles (Wave I, ages 15-17)

	Positive	Passive	Mostly positive but substance/ sleep	Mixed	Negative, no substance	Negative with substance	Overall Mean
	0.31	0.13	0.13	0.12	0.20	0.11	
Physical activity							
Weekly activity count							
0	**0.03**	*0.13*	0.05	0.04	0.08	0.09	0.06
1-2	0.15	0.45	0.19	0.20	0.24	0.28	0.22
3+	**0.81**	*0.42*	0.75	0.76	0.68	0.63	0.72
Weekly screentime hours							
0-14	0.54	0.43	**0.55**	*0.27*	0.47	0.47	0.45
14.001-28	0.28	0.30	0.30	0.24	0.27	0.23	0.28
28.001+	0.18	0.27	**0.15**	*0.50*	0.26	0.30	0.27
Substance use							
Tobacco use							
None	**0.95**	0.94	0.26	0.66	0.52	*0.13*	0.68
Some	0.05	0.06	0.59	0.24	0.25	0.35	0.20
Daily	0.00	**0.00**	0.15	0.11	0.22	*0.52*	0.11
Marijuana use last 30 days	**0.00**	0.00	0.36	0.06	0.12	*0.87*	0.17
Other drug use last 30 days	0.00	0.01	0.12	**0.00**	0.01	*0.41*	0.06
Alcohol use last 12 months							
Nondrinker	0.71	**0.78**	0.08	0.57	0.27	*0.06*	0.48
Drinker	0.16	0.15	0.12	0.10	0.13	0.00	0.13
Problem drinking	0.13	**0.07**	0.80	0.33	0.60	*0.94*	0.39
Diet							
2 fruits and 2 vegetables	**0.25**	0.09	0.17	*0.08*	0.13	0.12	0.16
Does not eat breakfast	**0.14**	0.26	0.21	0.22	0.27	*0.37*	0.22
Safety							
Got in fight last year	0.18	**0.05**	0.29	0.60	0.42	*0.60*	0.33
Always wears seatbelt	**0.73**	0.61	0.50	*0.23*	0.44	0.29	0.54
Health care in last year							
Dental exam	**0.84**	0.46	0.81	*0.45*	0.63	0.62	0.66
Physical examination	**0.80**	*0.37*	0.70	0.55	0.73	0.62	0.67
Sleep							
9+ hours sleep	0.23	0.19	*0.17*	**0.28**	0.19	0.21	0.20
Sex							
Two or more partners	0.02	**0.00**	0.08	0.03	*0.82*	0.71	0.22
Last sex							
Never had sex	**0.86**	0.84	0.70	0.62	*0.00*	0.09	0.55
Condom	0.10	0.08	0.14	0.22	0.60	0.44	0.26
Birth control/no condom	0.01	0.02	0.03	0.01	0.08	0.09	0.03
No contraception	**0.02**	0.07	0.13	0.15	0.32	*0.38*	0.16

Source: Add Health. Notes: LCA adjust for clustering and weighting. N=10,647. Underlining indicates that the probability is better for health compared to the overall mean (greater or less than the 95% confidence interval around the overall mean); shading indicates that the probability is significantly worse for health. Bold (better for health) or italics (worse for health) represent greatest difference from mean.

Appendix Table C. Class-Conditional Response Probabilities from Latent Class Analyses (LCA) for **Early Young Adult** Health Lifestyles (Wave III, ages 20-24)

	Mostly positive	Mostly positive with drinking/sex	Mixed but active	Negative, no substance	Negative, with substance	Overall Mean
	0.25	0.21	0.10	0.26	0.18	
Physical activity						
Weekly activity count						
0	0.24	**0.07**	0.08	*0.32*	0.21	0.2
1-2	0.16	0.14	0.11	0.23	0.15	0.17
3+	0.60	0.80	**0.81**	*0.45*	0.64	0.63
Weekly screentime hours						
0-14	0.50	**0.50**	0.35	*0.30*	0.34	0.41
14.001-28	0.32	0.37	0.30	0.33	0.32	0.32
28.001+	0.18	**0.13**	0.36	*0.37*	0.34	0.27
Substance use						
Tobacco use						
None	**0.96**	0.71	0.57	0.47	*0.25*	0.65
Some	0.02	0.14	0.29	0.10	0.19	0.13
Daily	**0.02**	0.14	0.15	0.43	*0.55*	0.23
Marijuana use last 30 days	**0.00**	0.24	0.21	0.09	*0.93*	0.25
Other drug use last 30 days	**0.00**	0.03	0.08	0.00	*0.34*	0.07
Alcohol use in last 12 months						
Nondrinker	**0.53**	*0.01*	0.28	0.27	0.03	0.25
Drinker	0.30	0.09	0.04	0.14	0.02	0.15
Problem drinking	**0.18**	0.90	0.68	0.59	*0.95*	0.6
Diet						
Fast food (2+/week)	0.57	**0.42**	*0.71*	0.68	0.64	0.61
Breakfast (any vs. none)	0.23	**0.13**	0.27	*0.42*	0.35	0.29
Health care in last year						
Dental exam	0.57	0.83	0.45	*0.39*	0.48	0.55
Physical examination	0.63	**0.74**	0.47	0.54	*0.45*	0.6
Safety						
Injured from fight	0.01	**0.00**	*0.17*	0.02	0.06	0.04
Sleep						
7+ hours sleep	**0.80**	0.72	*0.60*	0.72	0.71	0.72
Sex						
Two or more partners	**0.09**	0.34	*0.68*	0.22	0.50	0.32
Paid for sex	**0.00**	0.16	*0.57*	0.02	0.17	0.22
Last sex						
Never had sex	**0.29**	0.07	0.19	*0.02*	0.02	0.12
Condom	0.28	0.39	0.58	0.27	0.36	0.37
Birth control, no condom	0.25	0.46	0.01	0.32	0.34	0.28
No contraception	0.19	**0.08**	0.22	*0.39*	0.28	0.23

Source: Add Health

Notes: LCA adjust for clustering and weighting. N=8,025. Underlining indicates that the probability is better for health compared to the overall mean (greater or less than the 95% confidence interval around the overall mean); shading indicates that the probability is significantly worse for health. Bold (better for health) or italics (worse for health) represent greatest difference from mean.

Appendix Table D. Class-Conditional Response Probabilities from Latent Class Analyses (LCA) for **Late Young Adult** Health Lifestyles (Wave IV, ages 26-31)

	Positive	Mostly positive, sedentary/poor diet	Mixed, with problem drinking	Negative	Overall Mean
	0.24	0.38	0.17	0.21	
Physical activity					
Weekly activity count					
0	0.06	*0.25*	**0.05**	0.16	0.16
1-2	0.12	0.20	0.09	0.19	0.16
3+	0.82	*0.55*	**0.86**	0.64	0.68
Weekly screentime hours					
0-14	**0.54**	0.44	0.41	*0.37*	0.44
14.001-28	0.31	0.30	0.37	0.24	0.31
28.001+	**0.15**	0.26	0.22	*0.39*	0.26
Substance use					
Tobacco use					
None	**0.88**	0.72	0.54	*0.23*	0.66
Some	0.06	0.07	0.28	0.15	0.11
Daily	**0.06**	0.21	0.18	*0.62*	0.23
Marijuana use last 30 days	**0.01**	0.01	0.34	*0.48*	0.15
Other drug use last 30 days	0.01	**0.00**	0.14	*0.25*	0.05
Alcohol use in last 12 months					
Nondrinker	0.25	**0.43**	*0.04*	0.17	0.28
Light drinker	0.34	0.30	0.09	0.13	0.25
Problem drinking	0.41	**0.27**	*0.87*	0.70	0.47
Diet					
Fast food (2+/week)	**0.24**	*0.68*	0.34	0.66	0.53
Sugary beverages (7+/week)	**0.30**	0.69	0.41	*0.84*	0.58
Safety					
Fight in last year	**0.00**	0.02	0.06	*0.14*	0.05
Health care in last year					
Dental exam	**0.79**	0.52	0.61	*0.40*	0.58
Physical examination	**0.75**	0.61	0.57	*0.42*	0.62
Sleep					
7+ hours sleep	**0.83**	0.68	0.79	*0.65*	0.73
Sex					
Two or more partners	**0.08**	0.16	0.39	*0.47*	0.26
Pay for sex	**0.00**	0.01	0.03	*0.05*	0.02

Source: Add Health

Notes: LCA adjust for clustering and weighting. N=8,312. Underlining indicates that the probability is better for health compared to the overall mean (greater or less than the 95% confidence interval around the overall mean); shading indicates that the probability is significantly worse for health. Bold (better for health) or italics (worse for health) represent greatest difference from mean.

Table 1. Means for adolescent, early young adult, and late young adult health lifestyles across control variables

	Age	Female	Race/ethnicity				US Born	Parent education				W1 Inc-needs	High school GPA	Religious attendance			
			White	Black	Hisp	Other		< HS	HS	Some college	College			Never/none	< 1/mo	Monthly	Weekly+
Adolescent health lifestyles																	
Positive (36%)	16.3	0.54	0.70	0.12	0.11	0.07	0.93	0.09	0.20	0.28	0.43	3.44	3.05	0.19	0.48	0.18	0.15
Passive (11%)	16.5	0.60	0.57	0.18	0.16	0.09	0.88	0.20	0.30	0.25	0.25	2.31	2.81	0.24	0.42	0.20	0.14
Mostly positive but substance/sleep (12%)	16.4	0.52	0.52	0.05	0.11	0.05	0.97	0.10	0.23	0.29	0.39	3.81	2.68	0.23	0.36	0.18	0.24
Mixed (10%)	16.2	0.32	0.32	0.26	0.14	0.04	0.95	0.17	0.35	0.32	0.16	2.04	2.40	0.24	0.37	0.21	0.18
Negative, no substance (21%)	16.8	0.51	0.51	0.22	0.10	0.03	0.97	0.13	0.35	0.28	0.24	2.86	2.57	0.29	0.29	0.22	0.20
Negative with substance (10%)	16.6	0.47	0.47	0.12	0.10	0.03	0.99	0.14	0.29	0.30	0.26	2.89	2.36	0.37	0.16	0.17	0.30
Early young adult health lifestyles																	
Mostly positive (26%)	16.5	0.61	0.57	0.22	0.14	0.07	0.90	0.17	0.25	0.27	0.31	2.64	2.84	0.17	0.51	0.17	0.15
Mostly positive with drinking/sex (22%)	16.5	0.58	0.77	0.09	0.10	0.04	0.96	0.07	0.22	0.27	0.44	4.07	2.99	0.22	0.38	0.20	0.20
Mixed but active (8%)	16.5	0.28	0.50	0.28	0.17	0.05	0.93	0.18	0.29	0.29	0.24	2.99	2.67	0.27	0.39	0.18	0.16
Negative, no substance (26%)	16.5	0.53	0.71	0.14	0.11	0.05	0.95	0.14	0.33	0.29	0.25	2.50	2.59	0.28	0.32	0.20	0.21
Negative, with substance (19%)	16.4	0.35	0.74	0.12	0.10	0.05	0.97	0.09	0.26	0.31	0.34	3.16	2.55	0.32	0.25	0.22	0.22
Late young adult health lifestyles																	
Positive (24%)	16.4	0.68	0.74	0.09	0.12	0.06	0.92	0.08	0.22	0.28	0.42	3.62	3.06	0.18	0.45	0.19	0.18
Mostly positive, sedentary/poor diet (42%)	16.5	0.53	0.60	0.22	0.13	0.05	0.93	0.16	0.31	0.27	0.26	2.61	2.67	0.24	0.40	0.18	0.18
Mixed with problem drinking (15%)	16.5	0.42	0.74	0.10	0.11	0.05	0.96	0.08	0.19	0.28	0.45	3.77	2.80	0.29	0.30	0.22	0.19
Negative (33%)	16.4	0.33	0.72	0.14	0.09	0.05	0.97	0.13	0.30	0.33	0.24	2.72	2.47	0.31	0.27	0.21	0.21

Notes: Adjusted for complex sampling design. N=6,863. Parenthetical percentages indicate the distribution of individuals in health lifestyle categories.

Source: Add Health.

Appendix Table F. Coefficients, significance, and standard errors from multinomial logistic regression for early young adult (Wave III) health lifestyle classes (referent class: mostly positive)

	Mostly positive with drinking/sex	Mixed but active	Negative, no substance	Negative, with substance
SES of origin				
Parent's Education [<HS]				
HS graduate	0.61**	0.26	0.44**	0.69**
Some College	0.63**	0.14	0.24	0.76***
College Graduate	0.89***	-0.20	0.14	0.86***
Household income-to-needs	0.08***	0.07*	-0.04	0.03
Controls				
Female	-0.13	-1.37***	-0.27*	-0.98***
W1 Age in Years	-0.03	-0.05	0.01	-0.11
Race/Ethnicity [NH White]				
NH Black	-0.93***	0.47**	-0.77***	-0.79***
Hispanic	-0.04	0.45*	-0.38	-0.27
Other	-0.51*	0.09	-0.10	-0.14
US Born	0.68**	0.31	0.62*	0.90**
Adolescent factors (Wave I)				
Religious Attendance [Never/No Religion]				
<1/month	-0.58***	-0.57**	-0.75***	-1.18***
Monthly	-0.09	-0.31	-0.13	-0.25
Weekly	-0.06	-0.30	-0.11	-0.21
High school GPA	0.19*	-0.12	-0.37***	-0.46***
Constant	-1.13	0.15	0.79	2.35*

Notes: Adjusted for complex sampling design. Standard errors in parentheses. N=6,863
Source: Add Health.
*** p<0.001, ** p<0.01, * p<0.05 ; two-tailed

Appendix Table G. Coefficients, significance, and standard errors from multinomial logistic regression for late young adult (Wave IV) health lifestyle classes (referent class: positive)

	Mostly positive, sedentary/poor diet	Mixed, with problem drinking	Negative
SES of origin			
Parent's Education [<HS]			
HS Graduate	-0.20	-0.06	-0.12
Some College	-0.48**	0.12	-0.16
College Graduate	-0.73***	0.32	-0.59**
Household income-to-needs	-0.05*	0.00	-0.05*
Controls			
Female	-0.59***	-1.01***	-1.35***
W1 Age in Years	0.03	0.06	-0.04
Race/Ethnicity [NH White]			
NH Black	0.91***	0.22	0.31
Hispanic	0.04	0.09	-0.33
Other	0.28	0.01	0.28
US Born	0.32	0.69*	1.10***
Adolescent factors (Wave I)			
Religious Attendance [Never/No Religion]			
<1/month	-0.28**	-0.83***	-0.80***
Monthly	-0.27	-0.29	-0.26
Weekly	-0.20	-0.39*	-0.27
High school GPA	-0.53***	-0.41***	-0.85***
Constant	2.23**	-0.18	3.30**

Notes: Adjusted for complex sampling design. Standard errors in parentheses. N=6,863.
Source: Add Health.
*** p<0.001, ** p<0.01, * p<0.05 ; two-tailed

Appendix Table H. Coefficients, significance, and standard errors from multinomial logistic regression for late young adult (Wave IV) health lifestyle classes (referent class: positive)
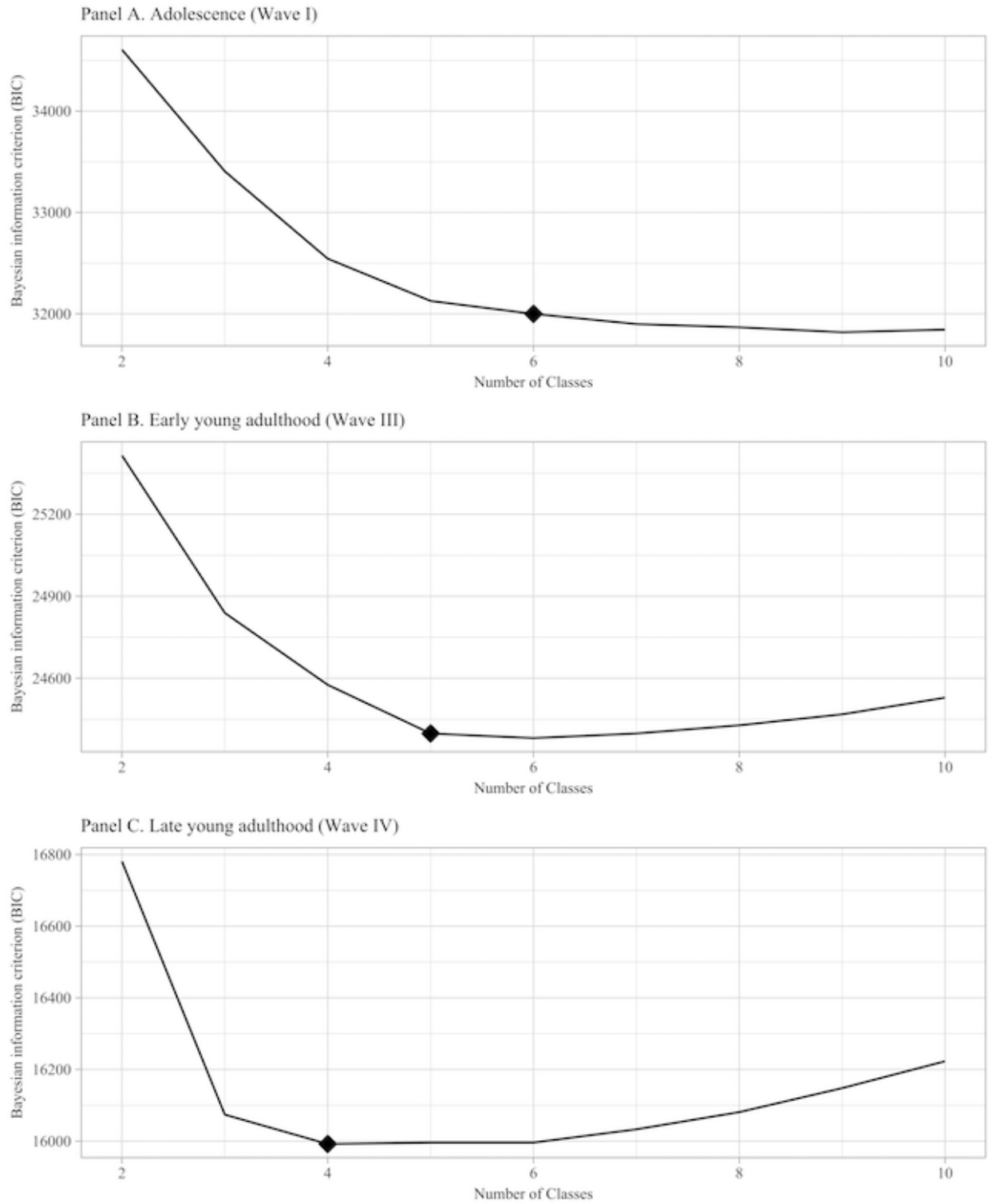
	Mostly positive, sedentary/poor diet	Mixed, with problem drinking	Negative
SES of origin			
Parent's Education [<HS]			
HS Graduate	-0.04	-0.06	0.04
Some College	-0.21	0.17	0.19
College Graduate	-0.22	0.48	0.09
Household income-to-needs	-0.01	0.01	-0.01
Achieved SES (Wave IV)			
Degree Earned [<HS]			
HS Graduate	-0.55	-0.46	-0.86**
Some College	-0.76**	-0.47	-1.06***
College graduate	-1.08***	-0.80*	-2.24***
Advanced Degree	-1.43***	-1.25**	-2.84***
Income-to-needs ratio	-0.15***	-0.04	-0.14***
Occupation [None/<10 hr]			
Professional/Managerial	0.90**	1.44*	2.35**
Non-Professional	1.09***	1.63*	2.68***
Adult roles (Wave IV)			
Family Structure [Unmarried/No Kids]			
Married/No Kids	-0.23	-1.38***	-1.03***
Unmarried/Kids	0.27	-0.26	-0.00
Married/Kids	-0.14	-1.48***	-1.42***
Living Away from parents	-0.24	0.27	-0.01
Controls			
Female	-0.68***	-0.92***	-1.35***
W1 Age in Years	0.08	0.16*	0.07
Race/Ethnicity [NH White]			
NH Black	0.75***	-0.09	-0.078
Hispanic	0.00	-0.02	-0.43*
Other	0.29	-0.19	0.13
US Born	0.27	0.65*	1.00**
Adolescent factors (Wave I)			
Religious Attendance [Never/No Religion]			
<1/month	-0.16	-0.65***	-0.53***
Monthly	-0.19	-0.18	-0.05
Weekly	-0.08	-0.33*	-0.07
High school GPA	-0.18*	-0.22*	-0.32***
Constant	0.75	-2.61	-0.51

Notes: Adjusted for complex sampling design. Standard errors in parentheses. N=6,863.
Source: Add Health.
*** p<0.001, ** p<0.01, * p<0.05 ; two-tailed

Appendix Figure A. BIC for latent class analysis (LCA)

Panel A. Adolescence (Wave I)

Panel B. Early young adulthood (Wave III)

Panel C. Late young adulthood (Wave IV)

Source: Add Health
Notes: Adjusted for complex sampling design. Star illustrates the chosen number of classes.