

Are lifestyle behaviors associated with excellent self-rated health among American adolescents? A cross-sectional study

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Abstract

Excellent self-rated health has been associated with decreased mortality and positive health outcomes in adults. However, less is known about youth populations. The FLASHE study, conducted by the National Cancer Institute, is a cross-sectional survey with publicly available self-reported data. The present study evaluated lifestyle behaviors and their relationship with excellent self-rated health in an adolescent population in the United States utilizing complete FLASHE data from 1250 adolescents (males N=626, mean age=14.5y, SD = 1.61y; and females N=624, mean age=14.4y, SD=1.57y). Logistic regression models were used to analyze associations between lifestyle behavior exposures and the outcome of excellent self-rated health. Lifestyle exposures included: free-time physical activity; sedentary behavior time; beneficial and detrimental food intake; perception of the importance of family meals; meeting sleep duration guidelines, having trouble sleeping, and having a regular bedtime. In addition, potential confounders included weight status, smoking, sex, age, socioeconomic status, and race/ethnicity in adjusted models. Approximately 47% of males (n=295) and 35% of females (n=217) reported having excellent self-rated health. In the fully adjusted model, the frequency of beneficial food intake (OR=1.06, 95%CI=1.02–1.11 for each additional exposure, $p=0.004$); perception of the importance of family meals (OR=1.88, 95%CI=1.35–2.63, strongly agree vs. not agree, $p<0.001$); frequency of physical activity in free-time (OR=2.17, 95%CI=1.20–3.92, very often vs. none, $p<0.001$); and had no trouble sleeping (OR=0.42, 95%CI=0.27–0.64, yes vs. no, $p<0.001$), were significantly associated with excellent self-rated health. These results support the importance of enhancing future efforts to implement salutogenic interventions that address health behaviors to improve health outcomes in adolescents, focusing on everyday living situations and actively promoting health.

Keywords: lifestyle behaviors, diet, physical activity, sleep, self-rated health

In the United States, adolescents comprise 12.8% of the population (Office of Disease Prevention and Health Promotion, 2021). As rapid physical and psychological changes occur during adolescence, this population is vulnerable to peer, school, mass media, family, neighborhood, and societal influences that could affect their lifestyle behaviors and well-being (Lachytova et al., 2017; Office of Disease Prevention and Health Promotion, 2021).

Behavior patterns that are developed during this period are key to establishing long-term health and risk for developing diseases in later stages of life (Office of Disease Prevention and Health Promotion, 2021). Over the past decade, there has been an increase in the prevalence of overweight, obesity, and non-communicable diseases among adolescents in the United States (Fryar et al., 2021). Certain modifiable lifestyle behaviors like healthier dietary

practices, high levels of physical activity, not smoking, low alcohol consumption, less time in sedentary behavior, and duration and quality of sleep, protect against the risk of developing non-communicable diseases (Haapasalo et al., 2018; Rosenkranz et al., 2013; Stenlund et al., 2021). Furthermore, detrimental lifestyle behaviors like smoking, alcohol consumption, and sedentary behavior, have also been shown to be related to depression, (McDowell et al., 2017; Wiles et al., 2011) psychological distress (Hamer et al., 2008), anxiety (McDowell et al., 2017), and increased risk of developing chronic diseases in adolescents (Kelder et al., 1994).

Compared to negative health outcomes, research focusing on the effects that lifestyle has on positive health outcomes like well-being is less common (Haapasalo et al., 2018; Rosenkranz et al., 2013). One study conducted in college students linked the benefits of sufficient physical activity levels, having lunch, and daily intake of fruits and vegetables, with higher happiness levels (Haapasalo et al., 2018). In addition, higher levels of physical activity, sleep duration, healthier diet habits, not smoking, and lower sitting time are also related to aspirational health outcomes, such as excellent self-rated health (Haapasalo et al., 2018). Furthermore, previous research findings have highlighted a significant association between frequent family meals and better nutritional health in children across various sociodemographic groups (Dallacker et al., 2018). One systematic review that evaluated the associations between family meal frequency and psychosocial outcomes showed that frequent family meals were associated with lower odds of developing eating disorders, alcohol and substance abuse, violent behavior, and depression (Harrison et al., 2015). Moreover, researchers found that frequent family meals were positively associated with higher ratings of increased self-esteem and more success in school success (Dallacker et al., 2018; Harrison et al., 2015). These positive psychological or “salutogenic” effects should be the focus to enhance health promotion instead of more traditional disease prevention and treatment approaches (Rosenkranz et al., 2013). In a salutogenic approach, it is important to emphasize the factors that lead to general well-being and the factors that create and maintain good health instead of looking for the cause of the diseases (Bhattacharya et al., 2020). Using a salutogenic approach can be helpful for detecting influences on aspirational levels of health (Rosenkranz et al., 2013). The salutogenic approach has been shown to actively promote health—as compared with a pathogenic approach that focuses on risk factors (Antonovsky, 1996). According to Antonovsky (1987), there are six main aspects in the salutogenic approach (Antonovsky, 1987). The first aspect is understanding health as a continuum, focusing on the changing interaction between health-promoting factors and stressors in people’s lives. The second aspect is to pay attention to a person’s story and not only consider them a diagnosis or a disease. The third aspect focuses on the salutary factors that contribute directly to health. The fourth aspect focuses on how stress can be viewed as salutogenic, neutral, or pathogenic. Because stress is everywhere, a salutogenic approach could improve the stressors in daily life. The fifth aspect is related to therapy and people’s

ability to actively adapt to different situations. The sixth and last aspect is focused on research to generate hypotheses to explain salutogenesis (Antonovsky, 1996; Vinje et al., 2022). In summary, a salutogenic approach considers all persons, at any moment and any time, focusing on salutary factors of daily living, and understanding health as being in constant change, not only as a separation of healthy and sick people (Antonovsky, 1996; Vinje et al., 2022). Additionally, prior evidence suggests that positively framed messages (such as gaining health benefits) can be more powerful than negatively framed messages for promoting enhancement of healthful behaviors in adult populations, (Rosenkranz et al., 2013) but there is a need for more research in adolescent populations.

Self-rated health is a simple, easy-to-administer health indicator that is frequently used in general population surveys and psychological and clinical research due to good reliability and predictive validity, as well as relevance for public health research (Bombak, 2013; Rosenkranz et al., 2013; Schnittker & Bacak, 2014). In many cases, self-rated health indicators provide a more accurate assessment of respondent views of their overall individual health status as compared with more specific health questions (Bombak, 2013; Breidablik et al., 2009). Inquiring about self-rated health allows for efficient assessment of multiple characteristics of health in combination. Therefore, the ability of self-rated health to efficiently capture various aspects of respondents’ health is optimized (Bombak, 2013; Breidablik et al., 2009). Previous research suggests that excellent self-rated health is associated with positive health outcomes and decreased mortality in adult populations (Keyes, 2007; Prendergast et al., 2016; Seligman, 2008). In addition, researchers have found that self-rated health was correlated with many indicators of well-being in older populations (Badri et al., 2021). However, more evidence is needed that focuses on well-being or aspirational health markers in younger people (Huppert & So, 2013), as there is a lack of evidence concerning adolescents specifically (Kelder et al., 1994; te Velde et al., 2007; Telama et al., 2005). Because many health behaviors are established in childhood and track into adulthood (Kelder et al., 1994; te Velde et al., 2007; Telama et al., 2005), prevention strategies (also known as upstream interventions that aim to prevent problems in a whole community) are needed to enhance the benefits of engaging in positive health-related behaviors that have been associated with both short- and longer-term beneficial health outcomes in youth populations (Gallagher & Updegraff, 2011; Rosenkranz et al., 2013). To contribute to filling this current gap in the literature, the present study aimed to examine whether lifestyle behavioral exposures in a United States adolescent population were associated with excellent self-rated health.

Methods

Design and Sample

The present study is a secondary analysis using data from The Family, Life, Activity, Sun, Health, and Eating (FLASHE) study. The FLASHE study is a cross-sectional

study conducted by the National Cancer Institute from April to October 2014. A detailed description of the FLASHE study has been published previously (Westat, 2015). The study examined behavioral measures like diet, physical activity and sedentary behavior, sun safety, sleep, and tobacco use in adolescents (Westat, 2015). A total of 5,088 adolescents met the inclusion criteria for FLASHE (National Cancer Institute, 2020). From those, only 1,250 completed all of the procedures and measures that were evaluated in the present study. This study aimed to assess lifestyle behaviors (i.e., beneficial and detrimental food intake; perception of the importance of family meals; free-time physical activity; sedentary behavior time; having no trouble sleeping and having a regular bedtime) in the United States adolescent population and their associations with the outcome of excellent self-rated health.

Measures

American adolescents ($n = 1,250$) aged 12–17 years, who matched the U.S. population as closely as possible, according to gender, census division, household size and income, and race/ethnicity (Westat, 2015), completed several survey instruments, covering dietary practices, physical activity, sleep, and other health-related behaviors. Adolescents completed a 49-question survey addressing dietary habits in the FLASHE study. The three variables analyzed from this survey, as included in the FLASHE data set, were total daily beneficial food intake, total daily detrimental food intake, and perception of the importance of family meals (National Cancer Institute, 2017). Food frequencies were reported from zero to three times per day and then converted to a daily frequency value (National Cancer Institute, 2017). The beneficial food intake variable included 100% fruit juice, water, fruit, green salads, other non-fried vegetables, cooked beans, whole grain bread, cooked whole grains, non-sugary cereal, and other potatoes. The food items included in the beneficial category are consistent with the recommendations of the Dietary Guidelines for Americans, the World Cancer Research Fund International, and the American Cancer Society. In contrast, the detrimental food variable included pizza, heat and ready-to-serve food, tacos, fried chicken, burgers, processed meat, fried potatoes, candy/chocolate, cookies/cake, potato chips, frozen desserts, sugary cereals, sweetened fruit drinks, soda, energy drinks, and sports drinks (National Cancer Institute, 2017). The detrimental food items are not consistent with the recommendations from Dietary Guidelines for Americans, the World Cancer Research Fund International, or the American Cancer Society. The FLASHE study committee assigned the relative healthfulness of foods according to a literature review of obesity and cancer-related outcomes (National Cancer Institute, 2017). The importance of family meals (agreement that: “In my family, it is important that we eat at least one meal a day together.”) was also included in the analysis. Adolescents detailed their responses using a five-point Likert scale (National Cancer Institute, 2017).

Adolescent physical activity was measured in FLASHE using a 78-question survey from The Youth Activity Profile (Welk et al., 2021). The two variables used in the present

analysis were typical weekly physical activity in free time, and typical weekly sedentary behavior. Total physical activity was measured with the participant reports of the frequency they engaged in physical activity in their free time during the last week: I did not do physical activity in my free time, I sometimes (1–2 times last week) did physical activity in my free time, I often (3–4 times last week) did physical activity in my free time, I quite often (5–6 times last week) did physical activity in my free time, and I very often (7 or more times last week) did physical activity in my free time (National Cancer Institute, 2017b). Adolescent sedentary behavior (SB) was assessed through a question regarding typical sedentary habits at home (I spent almost none of my free time sitting, I spent little time sitting during my free time, I spent a moderate amount of time sitting during my free time, I spent a lot of time sitting during my free time, and I spent almost all of my free time sitting) (National Cancer Institute, 2017b). Sleep was also included in the physical activity survey. Having trouble staying asleep (yes/no) and having a regular bedtime (yes/no) were included in the present study (National Cancer Institute, 2017b). In addition, adolescents were asked how many hours of sleep they usually get to evaluate whether they meet the sleep guidelines for adolescents (8–10 hours per 24 hours regularly to promote optimal health) (Paruthi et al., 2016).

Health status was part of the demographic questionnaire. Adolescents classified their health as excellent, very good, good, fair, or poor by answering the question “In general, would you say your health is...” (National Cancer Institute, 2017a). Race and ethnicity were also self-reported using the following categories: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White, Hispanic, Non-Hispanic Black or African American Only, Non-Hispanic White only, and Non-Hispanic Other (National Cancer Institute, 2017a). Additionally, proxy variables for economic status included adolescent responses to crime as a barrier to performing physical activity in their neighborhood when walking at night, and type of school (attending private or public school, or homeschooling) (National Cancer Institute, 2017a, 2017b) due to the limited information of other socioeconomic status in the survey. Furthermore, tobacco use was evaluated using adolescents’ responses to smoking at least 100 cigarettes in their lifetimes (Haapasalo et al., 2018; Rosenkranz et al., 2013; National Cancer Institute, 2017b). “Lastly, participants self-reported their weights and heights, which were used to calculate their body mass index (BMI) percentiles and to determine appropriate weight status classifications. Adolescents who had a BMI percentile between 5th and <85th were classified as having a healthy weight status. Adolescents who had a BMI between 85th and <95th were classified as having overweight, and adolescents who had a BMI percentile at or greater than 95th were classified as having obesity.”

Statistical Analyses

Data from the FLASHE study were analyzed using IBM SPSS Statistics V25 (IBM, Armonk, NY, USA). First,

crude odds ratios and adjusted odds ratios were calculated to assess relationships between exposures to the health behaviors of interest, and the outcome variable of excellent self-rated health. Then, logistic regression analyses ($\alpha=0.05$; 95% confidence intervals) were used to examine the associations between lifestyle behavioral exposures and the outcome variable of excellent self-rated health. Univariate, unadjusted relationships between each behavior and excellent self-rated health were evaluated. The initial model included all three nutrition-related variables, adjusting for weight status. The second model was adjusted for nutrition, weight status, and other lifestyle factors. The final fully adjusted model was adjusted for nutrition, weight status, and other lifestyle factors and also was adjusted for the demographic variables. A total of 1,250 adolescents who had complete data for all variables were included in the analyses.

Results

Participant Characteristics

Table 1 summarizes the adolescents' characteristics by sex. The mean age for males was 14.5y ($SD=1.61y$) and 14.4y ($SD=1.57y$) for females. Approximately 62.9% of

males and 65.5% of females were non-Hispanic White. In addition, a high percentage of both sexes (77.8% of males and 75.3% of females) reported that crime was not a barrier to performing physical activity. The majority of adolescents (92.7% of males, 96.4% of females) attended public schools. Only 1.4% of males and 2.1% of females reported having smoked at least 100 cigarettes in their lifetime. Furthermore, 89.6% of males and 83.2% of females reported having no trouble sleeping, and 62.6% of males and 59% of females reported having a regular bedtime. Additionally, 74.1% of males and 73.6% of females met the daily sleeping duration guidelines.

The majority of males (71.2%) and females (74%) were classified as having normal weight. In addition, 13.9% of males had obesity compared to 11.9% of females. Nearly half of males (44.6%) and females (49.8%) strongly agreed that family meals are important. Finally, 47.1% of males and 34.8% of females reported excellent health status, while only 0.5% of males and 0.3% of females reported having poor health status. Additionally, in the partially adjusted and adjusted models, having overweight or obesity was significantly inversely associated with excellent self-rated health (Overweight $OR=0.55$, 95% $CI=0.38-0.80$ $p<0.002$; Obesity $OR=0.29$, 95% $CI=0.19-0.45$ $p<0.001$).

Table 1. Adolescents Characteristics According to Sex (N=1,250)

Variable	Males Mean (SD)	Females Mean (SD)
Age (years)	14.5 (1.61)	14.4 (1.57)
Height (cm)	169.6 (11.40)	161.5 (8.68)
Weight (kg)	64.5 (17.40)	57.9 (14.80)
BMI Percentile	61.8 (30.35)	60.2 (28.84)
Beneficial food intake (daily frequency)	5.5 (2.96)	5.7 (3.24)
Detrimental food intake (daily frequency)	5.1 (2.80)	4.6 (2.81)
Agree that family meals are important (5-point scale) ^a	4.1 (1.08)	4.1 (1.13)
Typical PA in free time (days)	3.1 (1.16)	2.8 (1.14)
Typical SB in free time (hours per day)	2.9 (0.95)	3.1 (1.00)
Sleep (hours)	8.7 (1.40)	8.8 (1.28)
	Male %(n)	Female %(n)
Family meals important		
Strongly agree	44.6 (279)	49.8 (311)
Agree	31.5 (197)	26.3 (164)
Not Agree	24 (150)	23.9 (149)
Have no trouble sleeping	89.6 (561)	83.2 (519)
Have regular bedtime	62.6 (392)	59 (368)
Meeting sleep guidelines	74.1 (464)	73.6 (459)
Weight Status		

Healthy weight	71.2 (446)	74 (462)
Overweight	14.9 (93)	14.1 (88)
Obese	13.9 (87)	11.9 (74)
Smoked 100 cigarettes	1.4 (9)	2.1 (13)
Not white	37.1 (232)	34.5 (215)
Non-Hispanic white	62.9 (394)	65.5 (409)
Public school	92.7 (580)	93.4 (583)
Crime barrier to PA		
Agree	22.2 (139)	24.7 (154)
Not Agree	77.8 (487)	75.3 (470)
Health Status ^b		
Excellent	47.1 (295)	34.8 (217)
Very good	35.8 (224)	42.8 (267)
Good	12.6 (79)	15.7 (98)
Fair	3.7 (23)	6.1 (38)
Poor	0.5 (3)	0.3 (2)

Note: BMI: body mass index, PA: physical activity, SB: sedentary behavior, NH white: non-Hispanic white

^a on a five-point Likert Scale 1-Strongly disagree that is important to eat at least one family meal together and 5-Strongly agree that is important to eat at least one family meal together.

^b on a five-point Likert Scale 1-Poor health status and 5-Excellent health status.

Diet

Daily beneficial food intake was associated with excellent self-rated health in all three models (OR=1.06, 95%CI=1.02–1.11 for each additional beneficial food exposure, $p=0.004$). In contrast, detrimental food intake showed no significant association with excellent self-rated health, even after adjusting for demographic and lifestyle variables (Table 2). In the fully adjusted model, participants reporting strong agreement with the importance of family meals were 88% (OR=1.88, 95%CI=1.35–2.63, $p<0.001$) more likely to report excellent self-rated health as compared to those who did not agree (Table 2).

Physical Activity, Sedentary Behavior, and Sleep Behaviors

Adolescents reporting the highest level of physical activity were consistently more likely to report excellent

self-rated health across all models. Adolescents who reported performing physical activity very often (7+ times per week) were 2.2 times more likely (OR=2.17, 95%CI=1.20–3.92, $p<0.001$) to report excellent health, after adjusting for all variables as compared with adolescents who reported not doing physical activity. In the unadjusted and adjusted models, having trouble sleeping was significantly inversely associated with excellent self-rated health (OR=0.42, 95%CI=0.27–0.64 $p<0.001$). In contrast, sedentary behavior in free time ($p=0.162$), having a regular bedtime ($p=0.910$), and meeting sleep guidelines ($p=0.974$) were not significantly associated with excellent self-rated health in any of the three models. Other demographic variables like smoking at least 100 cigarettes in their lifetime, ethnicity, attending private school, or crime as a barrier to performing physical activity, showed no significant associations with excellent self-rated health.

Table 2. Associations between Lifestyle Variables and Excellent Self-Rated Health (N=1,250)

Variable	Unadjusted	Partially Adjusted	Fully Adjusted
	OR (95% CI)	OR (95% CI) ^a	OR (95% CI) ^b
Beneficial food intake (daily)*	1.12 (1.08–1.16)	1.05 (1.01–1.10)	1.06 (1.02–1.11)
Detrimental food intake (daily)*	0.99 (0.96–1.04)	1.00 (0.96–1.05)	0.99 (0.95–1.05)
Family meals are important			
Do not agree †	1.00	1.00	1.00
Somewhat agree	1.40 (1.01–1.95)	1.09 (0.77–1.55)	1.05 (0.73–1.50)
Strongly agree	2.40 (1.79–3.24)	1.87 (1.34–2.591)	1.88 (1.35–2.63)
Typical weekly PA in free time			
None†	1.00	1.00	1.00
Sometimes (1–2 times)	1.19 (0.76–1.19)	1.14 (0.71–1.85)	1.04 (0.64–1.68)
Often (3–4 times)	1.83 (1.17–2.85)	1.40 (0.86–2.29)	1.29 (0.79–2.13)
Quite often (5–6 times)	3.30 (2.11–5.17)	2.31 (1.41–3.80)	2.02 (1.22–3.36)
Very often (7+ times)	3.89 (2.30–6.58)	2.63 (1.47–4.69)	2.17 (1.20–3.92)
Typical weekly SB in free time			
Almost none †	1.00	1.00	1.00
Little time	1.15 (0.67–1.99)	1.11 (0.60–2.03)	1.09 (0.59–2.02)
Moderate time	0.62 (0.37–1.06)	0.76 (0.42–1.37)	0.79 (0.43–1.43)
Lot of time	0.36 (0.21–0.64)	0.65 (0.34–1.22)	0.69 (0.36–1.30)
Trouble Sleeping			
Regular bedtime	1.41 (1.23–1.79)	1.09 (0.85–1.42)	0.98 (0.75–1.29)
Meet sleep guidelines	1.21 (0.93–1.57)	1.00 (0.75–1.33)	1.00 (0.75–1.34)
Weight Status			
Not overweight or obese†	1.00	1.00	1.00
Overweight	0.54 (0.38–0.75)	0.58 (0.41–0.84)	0.55 (0.38–0.80)
Obese	0.26 (0.17–0.40)	0.31 (0.20–0.48)	0.29 (0.19–0.45)
Smoked at least 100 cigarettes	0.53 (0.21–1.38)	0.77 (0.26–2.31)	0.92 (0.30–2.85)
Age*	0.87 (0.81–0.94)		0.89 (0.82–0.97)
Sex of adolescent	0.60 (0.48–0.75)		0.58 (0.45–0.75)
NH white	1.16 (0.91–1.47)		1.05 (0.81–1.37)
In private school	1.25 (0.80–1.93)		0.94 (0.58–1.52)
Crime barrier to PA			
Not Agree†	1.00		1.00
Agree	0.73 (0.55–0.95)		0.82 (0.60–1.12)

Note: *Refers to non-categorical variables and the odds associated with a one-unit change in the variable level. CI: Confidence interval, PA: physical activity, SB: sedentary behavior, NH white: non-Hispanic white

^a Adjusted for nutrition, weight status, and other lifestyle factors

^b Includes additional adjustments for demographic variables

†Reference category.

Discussion

Following a salutogenic approach, the current study examined associations between health behaviors (diet, physical activity, sleep behaviors, and other health behaviors) and excellent self-rated health in American adolescents. The main finding of the study was that after adjusting for covariates, daily beneficial food intake, perception that family meals are important, frequent levels of physical activity in free time, and not having trouble sleeping, were significantly positively associated with excellent self-rated health. Although these positive associations were attenuated after controlling for demographic variables, they remained statistically

significant, and are likely to be of public health significance within the adolescent population. The results showed that a daily beneficial food intake in adolescents was associated with a 6% increase in the odds of reporting excellent self-rated health. In addition, the perception that family meals are important is associated with an 88% increase in reporting excellent self-rated health in adolescent populations. Performing physical activity seven or more times a week was associated with reporting 2.17 times higher odds of excellent self-rated health. Furthermore, having no trouble sleeping was associated with a 58% increase in reporting excellent self-rated health. Even though the FLASHE study was conducted several years ago, there is little evidence to date that shows how healthier lifestyles are associated to excellent self-rated health in adolescents.

The current study outcomes align with the previous research that is available, which also indicated that physical activity was positively associated with excellent self-rated health in youth populations (Choudhury & M., 2011; Zullig & White, 2010). Previous research findings from a cross-sectional study with Australian adults showed that diet, higher levels of physical activity, sleep quality, and duration were also positively associated with excellent self-rated health with a similar magnitude to the results of the present study (Haapasalo et al., 2018). However, to our knowledge there are no current studies that evaluate all of these variables in adolescent populations.

The current results are also similar to previous research indicating positive relationships between beneficial lifestyle behaviors and positive health outcomes and life-satisfaction among adolescents (Marques et al., 2017). A cross-sectional study conducted in adults supported these findings and suggested that higher engagement with risky health behaviors such as risky alcohol consumption, physical inactivity, and poor diet, is more likely to be associated with poorer health outcomes (Duncan et al., 2014). A cohort study conducted in Norway with 8,828 adolescents (10–19 years) explored the predictive value of adolescents' self-rated health with "multi-illness" in early adulthood. After adjusting for baseline variables including chronic diseases, frequency of health care attendance, sex, and age, the results showed that adolescents who had reported "very good" or "good" self-rated health were classified as "healthy" in their early adulthood. The findings showed a clear association between adolescents' poorer self-rated health and the risk of having "multi-illness" in early adulthood, suggesting the poor self-rated health may serve as a proxy for later multimorbidity (Hetlevik et al., 2020). This evidence supports the importance of implementing interventions in the early stages of life, given the uniquely vulnerable period of adolescence (Gootman et al., 2009).

In addition, the current results were similar to a systematic review that evaluated the salutogenic approach and its relationship with eating behavior (Veiga et al., 2022). Among the 15 articles reviewed, 11 showed that implementing a salutogenic approach had a positive relationship with several healthy eating behaviors, including a higher intake of beneficial foods like fresh fruits and vegetables (Veiga et al., 2022). Another systematic review that included 21 articles highlighted the positive relationship between a salutogenic orientation and eight health-related behaviors, including eating habits. This evidence indicates that the salutogenic approach may be associated with fewer risk behaviors, more healthful eating habits, and other healthy behaviors like higher levels of physical activity, less smoking and alcohol consumption, and more frequent tooth brushing (da-Silva-Domingues et al., 2022).

Stronger agreement with family meal importance consistently resulted in a higher likelihood of reporting excellent self-rated health as compared to a lower agreement. These results are consistent with several previous studies. For example, a cross-sectional study by

Videon and Manning (2003) showed that parental presence at the evening meal was positively related to a higher intake of fruits and vegetables (Videon & Manning, 2003). In another study of 2,516 adolescents conducted by Neumark-Sztainer and colleagues, family meals were associated with benefits for dietary intake, disordered eating behaviors, substance use, and psychosocial health (Neumark-Sztainer et al., 2010). Adolescents who reported performing physical activity in their free time seven or more times per week, had higher odds of reporting excellent health compared to adolescents who did not do physical activity in their free time. Additionally, a dose-response relationship between physical activity and self-rated health has been observed in several studies, with higher levels of physical activity positively associated with self-rated health among adolescents. For example, results of a systematic review showed that out of 62 publications evaluating relationships between physical activity and self-rated health in adolescents, 58 studies reported statistically significant positive associations (Zhang et al., 2020). In the current study, an imperfect dose-response association was observed in the unadjusted analyses among adolescents reporting spending a little, moderate, or a lot of time in sedentary behaviors, but statistical adjustment for confounders attenuated the observed associations to the point of non-significance. Health promotion through decreased sedentary behavior time has been previously reported, both alone and in combination with other health behavior changes in other studies (Rezende et al., 2016; Vandelanotte et al., 2013).

One strength of the present study is that evaluates several health behaviors simultaneously, compared to previous studies that are only focused on evaluating physical activity or dietary patterns separately. Several potential confounding variables relevant to health and key demographics were included in the adjusted analysis and results were robust in showing that healthier lifestyle behaviors were associated with the aspirational outcome of excellent self-rated health. In addition, promoting and implementing salutogenic approaches in adolescent populations, that encourage adolescents to actively participate in their own well-being, enhances the process of developing personal skills to strengthen societies and improve overall quality of life. These salutary factors should be researched in longitudinal studies to investigate strategies to help adolescents optimize their health and quality of life. The FLASHE study is inherently limited due to its cross-sectional nature. Consequently, conclusions cannot imply causation. Additionally, while the FLASHE participants were representative of the United States adolescent population in 2014, the availability of specific measures of socioeconomic status was limited. Socioeconomic status is an important determinant of health, so the absence of a valid assessment to apply in adjusted models may potentially confound results. Because of the dichotomization of some lifestyle behaviors, the ability to evaluate dose-response associations between lifestyle variables and self-rated health was limited. Future research should include stronger study designs to address temporality and to better determine causal and dose-response relationships. In addition, a valid measure of

socioeconomic status is needed to properly determine its influence and ensure a representative population sample. Lastly, the self-reported nature of the measures may allow various types of bias like self-report bias, recall bias, or social desirability bias. Also, the measure of excellent self-rated health was self-reported and therefore subjective. However, evidence has shown that patient-reported health status is an independent predictor of mortality, hospitalization, and cost of care (Rosenkranz et al., 2013). For that reason, these measures are highly relevant in public health. Furthermore, we acknowledge that circumstances could be different and that there is a likelihood that following the 2020 pandemic, adolescents may have additional barriers to healthful lifestyle behaviors and optimal wellbeing. Though limited, the current study is valuable because it includes a large, generally representative sample, uses validated and appropriate measures of multiple health behaviors, and is novel due to the salutogenic orientation. To our knowledge, this study is the first to report on adolescent health behaviors and excellent self-rated health. The present study indicated that adolescents engaging in healthy lifestyle behaviors were more likely to report excellent self-rated health. Specifically, engaging in positive lifestyle behaviors like beneficial food consumption, having at least one family meal a day, higher levels of physical activity and limited sedentary behavior time, and not having trouble staying asleep were positively associated with excellent self-rated health in this adolescent population. These results support the potential for future efforts to implement salutogenic interventions that address health behaviors to improve health outcomes in adolescents.

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Declaration of conflicting interests

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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