
Longitudinal Physical Activity and Sedentary Behavior Trends

Adolescence to Adulthood

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Background: There is little national research on longitudinal patterns of physical activity and sedentary behavior in ethnically diverse teens as they transition to adulthood.

Methods: Longitudinal questionnaire data from U.S. adolescents enrolled in Wave I (1994–1995) and Wave III (2001) of the National Longitudinal Study of Adolescent Health ($n = 13,030$) were analyzed in January 2004. Incidence, reversal, and maintenance of achieving five or more weekly bouts of moderate to vigorous physical activity (MVPA) and ≤ 14 hours of weekly TV and video viewing, computer/video game use (screen time) were assessed. Multinomial logistic regression models examined the likelihood of achieving five or more weekly sessions of MVPA week and ≤ 14 hours screen time per week as an adolescent and/or young adult, controlling for household income, parental education, age of adolescent, and seasonality.

Results: Of those achieving five or more weekly sessions of MVPA and ≤ 14 hours of weekly screen time as adolescents, few continued to achieve these favorable amounts of activity (4.4%) and screen time (37.0%) as adults. More failed to maintain these favorable amounts of activity (31.1%) and screen time (17.3%) into adulthood. Black versus white females were more likely to maintain favorable amounts of activity from adolescence to adulthood (odds ratio [OR]=3.09; 95% confidence interval [CI]=1.49–6.42), while black males (OR=1.50; CI=1.05–2.14) and females (OR=2.00; CI=1.40–2.87) were more likely than whites to maintain less (versus more) favorable screen time hours.

Conclusions: The vast majority of adolescents do not achieve five or more bouts of moderate physical activity per week, and continue to fail to achieve this amount of activity into adulthood. (Am J Prev Med 2004;27(4):277–283) © 2004 American Journal of Preventive Medicine

Introduction

Physical activity is low and inactivity high among U.S. adolescents¹ and adults.^{2,3} Inactivity and poor diet are responsible for roughly 400,000 annual deaths and may soon become the leading causes of death in the United States.⁴ The Centers for Disease Control (CDC) and Prevention and the American College of Sports Medicine (ACSM)⁵ recommend engaging in 30 minutes of moderate physical activity on most, if not all, days of the week. In addition, the American Academy of Pediatrics (AAP) Committee on Public Education^{6,7} recommend engaging in ≤ 2 hours per day of TV and video viewing and computer/video game use.

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Research on the topic of physical activity, particularly as it relates to tracking patterns over time among the major ethnic groups in the United States, is scarce. In particular, there is a dearth of such longitudinal data in ethnically diverse, nationally representative U.S. cohorts spanning the adolescent and young adult years. It is clear from a range of studies that physical activity declines with age^{8,9} and varies by race/ethnicity.^{1,10,11} One of the major transition periods for a vast array of behaviors is the period from adolescence to young adulthood, characterized by major life event changes associated with the move from the parental home to full residential independence.^{12–15} This life-cycle transition is also characterized by high obesity incidence and maintenance.¹⁶ Understanding behavioral changes during this transition is particularly important with the current emphasis on promoting child and adolescent physical activity as part of a major strategy for achieving optimal adult health.^{17,18}

This study examines trends in achieving five or more sessions of moderate to vigorous physical activity (MVPA) per week and ≤ 14 hours of TV and video viewing,

computer/video game use (≤ 14 hours screen time per week) across the critical and understudied period of transition from adolescence to young adulthood based on data from the National Longitudinal Study of Adolescent Health (Add Health). Of particular interest is the variation in incidence, maintenance, and reversal of achieving five or fewer weekly sessions of MVPA and ≤ 14 hours screen time per week in adolescence and young adulthood and the ethnic variation in these trends across time.

Subjects and Methods

Survey Design

The study population consisted of $>20,000$ adolescents enrolled in Add Health, a longitudinal, nationally representative, school-based study of U.S. adolescents in grades 7 through 12, supplemented with minority special samples and collected under protocols approved by the Institutional Review Board of the University of North Carolina. The survey design and sampling frame have been described elsewhere.^{1,19} The primary sampling frame included a sample of 80 U.S. high schools and 52 middle schools with unequal probability of selection. Study design included systematic sampling methods and implicit stratification to ensure representation of U.S. schools with respect to region of country, urbanicity, school size, school type, and ethnicity.

Wave III included 15,197 eligible original Wave I (1994–1995) respondents, measured between August 2001 and April 2002, including 218 pretested in April 2001. The final analysis sample includes 13,030 adolescents (53% males, 47% females; 69% white, 15% black, 12% Hispanic, 4% Asian) present at both Waves I and III with complete physical activity and inactivity data. In Wave I, ages ranged from 11 to 21 years ($M=16.0$; 95% CI=15.8–16.2), with a total of 1.96% aged >18 at Wave I, representative of the school-based U.S. population in 1994–1995. Ages range from 18 to 26 years ($M=22.6$; 95% CI=22.3–22.9) at Wave III. Exclusions include seriously disabled respondents (used a walking aid), females who were currently pregnant during either of the survey periods, and Native Americans.

Using longitudinal poststratification sampling weights (calculated to account for persons who could not be located or refused to participate), the school as the primary sampling unit and U.S. region as a stratification variable, the Add Health cohort provided a representative sample at both time points. In Wave III, 6% of the original Wave I study population refused participation and an additional 19% could not be located or were unable to participate for other reasons. Detailed work on nonresponse bias shows that bias remaining after adjustment for final sampling weights is $<1\%$ for the physical activity questions, which is small relative to the 20% to 80% prevalence rates for these measures.²⁰

Physical activity, TV and video viewing, computer/video game use. Add Health questionnaires included a standard physical activity behavior recall that is similar to other self-report questionnaires that have been used and validated in other large scale epidemiologic studies.^{10,21–24} Information was elicited on participation in MVPA (five to eight metabolic equivalents [METs]; skating, cycling, exercise, and active sports) in the previous week. One MET is defined as the energy expenditure associated with quiet sitting. The Add Health physical activity

questions were worded as such, “During the past week, how many times did you,” followed by activities, such as walking, basketball, softball, and so forth, allowing calculation of frequency (sessions) of specified activities per week by MET value. The Add Health physical activity data have been used in several published research papers.^{25,26}

In Wave III, participants reported the frequency of the activities from the Wave I questionnaire, plus additional questions applicable to young adults. To avoid reporting of erroneously inflated physical activity levels in young adults resulting from the additional items, a scaled sum of MVPA sessions was created.²⁷ The total sum of moderate to vigorous bouts of physical activity reported in Wave III was scaled to be equivalent to that of Wave I (by dividing by the total number of activities in Wave III [34] and then multiplying by the total number of activities in Wave I [14]).

TV viewing, video viewing, and computer/video game use were recorded as hours over the past week. This method has been described in detail elsewhere.¹ Quantifying sedentary behaviors has received far less attention than physical activity,²⁸ and little is published in the literature regarding the reliability and validity of sedentary behavior data.

Study Variables

Initial status: physical activity, and TV and video viewing and computer/video game use. Adolescents were classified as achieving or not achieving five or more weekly sessions of MVPA. Next, respondents were classified as achieving ≤ 14 hours or >14 hours of weekly screen time.

Incidence, maintenance, and reversal of achieving five or more sessions of MVPA and ≤ 14 hours screen time per week. Across both the adolescent and young adult periods, the following were assessed: (1) achieving five or more sessions of MVPA and ≤ 14 hours screen time per week in both adolescence and adulthood, (2) in neither period, (3) in adolescence but not adulthood, and (4) in adulthood but not adolescence.

Covariates. A combination of in-home surveys of parents and adolescents provided race/ethnicity data, categorized as Hispanic, non-Hispanic white (referent), non-Hispanic black (referred to as black hereafter), or Asian American. Age is the reported age at last birthday. Baseline (Wave I) parental education was defined as the highest level of education achieved for either parent (less than high school [referent], high school/GED, some college, and college degree and/or graduate or professional degrees). Income was reported in \$1000 increments and was imputed using data on parental occupation, family structure, and school community where income was missing ($n=1895$; 14.5%). This method is similar to that used in other national surveys, such as the National Health and Nutrition Examination Surveys (NHANES) to deal with missing data.^{29,30} Seasonality was defined as the month of Wave I and Wave III interviews using dummy variables.

Statistical analysis. This is a descriptive study investigating dynamic patterns of change in prevalent, incident, reversal, and maintenance cases of achieving five or more bouts MVPA and ≤ 14 hours screen time per week among white, black, Hispanic, and Asian teens as they transition to young adulthood. Statistical

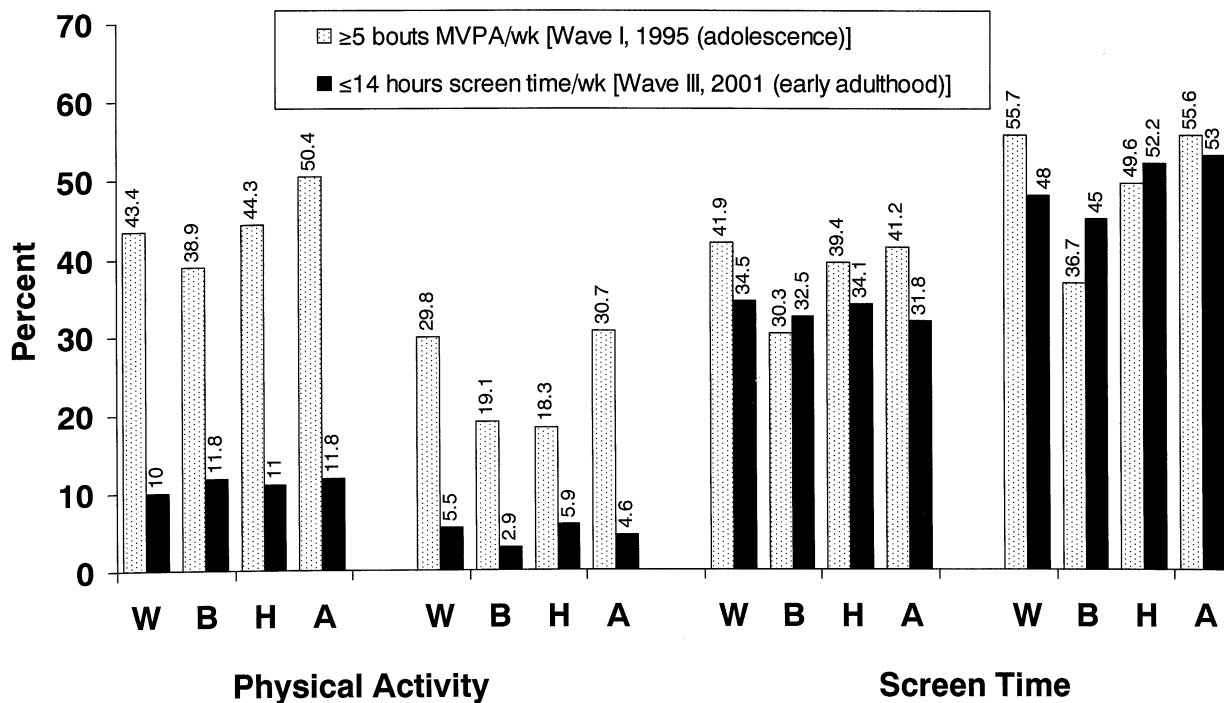


Figure 1. Patterns of achieving five or more sessions of MVPA per week and ≤ 14 hours of screen time per week during adolescence (wave I) and early adulthood (wave III). All results are weighted for national representation. A, Asian; B, black; H, Hispanic; MVPA, moderate to vigorous physical activity; W, white.

analyses were carried out using STATA, version 8.0 (StataCorp, College Station TX, 2003). The widely accepted series of STATA survey (SVY) procedures was used to correct for multiple stages of cluster sample design and unequal probability of selection to ensure that results were nationally representative with unbiased estimates and standard errors. A *t*-statistic was used to test the statistical significance of differences in group means for incidence, maintenance, and reversal of achieving five or more sessions of MVPA and ≤ 14 hours screen time per week between the 1994–1995 and 2001 waves. For racial/ethnic differences within gender, the Bonferroni correction for multiple comparisons was applied.

A series of four multinomial logistic regression models was used to assess the likelihood of: (1) achieving five or more sessions of MVPA per week and ≤ 14 hours of screen time per week at both adolescence and adulthood (referent); (2) achieving both at neither period; (3) achieving both at adolescence but not adulthood; or (4) achieving both at adulthood but not adolescence (e.g., models compare the probability of falling into the following categories: 1 vs 2, 1 vs 3, and 1 vs 4). All models were stratified by gender, controlling for: household income, parental education, age of adolescent, and seasonality of interview.

Results

Cross-section Changes

The prevalence patterns of engaging in five or more sessions of MVPA per week and ≤ 14 hours of screen time per week for adolescents (Wave I) and young adults (Wave III) are presented to show the magnitude of the decline in patterns of favorable physical activity,

and TV and video viewing and computer/video game use during the transition to adulthood (Figure 1). There was a dramatic drop in the percentage of adolescents who achieved five or more sessions of MVPA per week and continued to achieve this amount as young adults. Conversely, the decline in the number of individuals who achieved ≤ 14 hours of screen time per week from adolescence to young adulthood is less extreme and in some subgroups the proportion increases.

Incidence, Maintenance, and Reversal of Physical Activity and TV and Video Viewing and Computer/Video Game Use Patterns

Physical activity. Longitudinal shifts in achieving five or more sessions of MVPA per week from adolescence to young adulthood (Table 1) indicate that the majority of males, and particularly females, did not achieve this amount of physical activity (PA) in either period. Among those who achieved this amount as adolescents, one third failed to achieve five or more sessions of MVPA per week as adults.

Over half of the male respondents failed to achieve five or more sessions of MVPA per week across both time periods, with little ethnic variation across the longitudinal groupings. Ethnic variation was greater among females. Significantly more white females this level of PA as adolescents compared to Hispanic and black females. Asian-American females were similar to white females. However, significantly greater percent-

Table 1. Longitudinal shifts in physical activity^a in adolescence and early adulthood^b

Sample	Adolescence (+) Early adulthood (+) % (95% CI)	Adolescence (-) Early adulthood (-) % (95% CI)	Adolescence (+) Early adulthood (-) % (95% CI)	Adolescence (-) Early adulthood (+) % (95% CI)
TOTAL (N=13,030)	4.4 (3.9–4.9)	61.0 (59.0–63.0)	31.1 (29.3–32.9)	3.6 (3.0–4.1)
Males (n=6396)	5.9* (5.1–6.6)	52.3* (49.8–54.8)	37.2* (35.0–39.4)	4.6* (3.8–5.4)
White (n=3516)	5.6 (4.6–6.6)	52.3 (49.2–55.4)	37.7 (34.9–40.6)	4.4 (3.4–5.4)
Black (n=1246)	6.3 (4.5–8.1)	55.6 (50.5–60.7)	32.6 (29.0–36.2)	5.5 (3.7–7.3)
Hispanic (n=1104)	6.4 (4.2–8.6)	51.1 (45.6–56.6)	37.9 (32.4–43.4)	4.6 (2.6–6.5)
Asians (n=530)	6.3 (3.2–9.3)	44.1 (37.1–51.0)	44.2 (35.8–52.5)	5.5 (2.2–8.8)
Females (n=6634)	2.7 (2.2–3.3)	70.7 (68.5–72.9)	24.4 (22.2–26.2)	2.4 (1.8–3.0)
White (n=3694)	3.1 (2.4–3.8)	67.8 (65.2–70.5)	26.7 (24.2–29.1)	2.4 (1.6–3.1)
Black (n=1437)	1.1** (0.5–1.7)	79.1** (75.0–83.3)	18.0** (13.9–22.1)	1.8 (0.7–2.8)
Hispanic (n=1038)	2.4 (1.2–3.6)	78.2** (74.3–82.1)	15.9** (12.8–19.0)	3.5 (2.1–4.9)
Asian (n=465)	2.7 (0.2–5.3)	67.4 (60.1–74.6)	28.0 (21.3–34.7)	1.9 (0.5–3.2)

^aProportion to achieve five or more weekly bouts of moderate to vigorous physical activity.

^bData from Waves I (1995) and III (2001), National Longitudinal Survey of Adolescent Health. Results are weighted for national representation, and standard errors are corrected for multiple stages of cluster sample design and unequal probability of selection.

*Males significantly different from females at $p \leq 0.01$ (with Bonferroni adjustment) using t -statistic (bolded).

**Significantly different from same-sex, non-Hispanic whites at $p \leq 0.01$ (with Bonferroni adjustment) using t -statistic (bolded).

CI, confidence interval; (+), achieve five or more weekly bouts of moderate to vigorous physical activity; (-), fail to achieve five or more weekly bouts of moderate to vigorous physical activity.

ages of Hispanic (78.2%) and black (79.1%) females failed to achieve five or more bouts per week across both periods, compared to whites (67.8%). More white females showed unhealthy shifts (i.e., from achieving the recommended amount of PA as adolescents to not achieving this amount as young adults) compared to black and Hispanic females.

TV and video viewing and computer/video game use. Relative to PA, the screen time results show greater percentages of adolescents achieving favorable amounts of screen time (Table 2). Significantly more males achieved ≤ 14 hours of screen time per week at both periods. Significantly more black males and fe-

males achieved ≤ 14 hours screen time per week across both time periods compared to their white counterparts. A significantly greater proportion of black compared to white females shifted from a more favorable screen time profile during adolescence to a less favorable pattern in early adulthood, whereas more white than black males and females shifted from a less favorable pattern in adolescence to a more favorable pattern as young adults.

Likelihood of achieving five or more sessions of MVPA and < 14 hours of screen time per week from adolescence to adulthood. The multinomial logistic regression models estimate the likelihood of achieving five or

Table 2. Longitudinal shifts in screen time^a in adolescence and early adulthood^b

Sample	Adolescence (+) Early adulthood (+) % (95% CI)	Adolescence (-) Early adulthood (-) % (95% CI)	Adolescence (+) Early adulthood (-) % (95% CI)	Adolescence (-) Early adulthood (+) % (95% CI)
TOTAL (N=13,030)	37.0 (35.2–38.9)	23.4 (21.7–25.1)	17.3 (16.2–18.5)	22.2 (20.9–23.5)
Males (n = 6396)	43.9* (41.6–46.2)	17.7* (15.8–19.6)	16.4 (15.1–17.6)	22.1 (20.4–23.7)
White (n=3516)	42.9 (39.9–46.0)	19.3 (16.8–21.8)	15.2 (13.7–16.7)	22.6 (20.6–24.5)
Black (n=1246)	49.8*** (46.0–53.6)	12.7** (10.2–15.1)	19.8 (16.2–23.5)	17.7*** (14.4–20.9)
Hispanic (n=1104)	42.7 (38.3–47.0)	16.2 (13.1–19.2)	17.9 (14.5–21.4)	23.2 (19.4–27.1)
Asians (n=530)	41.6 (33.1–50.0)	14.5 (10.0–18.9)	17.3 (11.6–23.0)	26.7 (20.2–33.2)
Females (n=6634)	29.4 (27.4–31.4)	29.8 (27.5–32.0)	18.4 (16.8–20.1)	22.4 (20.9–23.9)
White (n=3694)	28.2 (25.7–30.6)	31.9 (29.2–34.5)	16.1 (14.4–17.9)	23.8 (22.0–25.6)
Black (n=1437)	36.8** (33.2–40.4)	18.5** (15.5–21.6)	26.5** (22.8–30.1)	18.2*** (14.7–21.7)
Hispanic (n=1038)	28.5 (22.9–34.2)	30.3 (23.8–36.8)	21.9*** (17.6–26.1)	19.3 (15.5–23.1)
Asian (n=465)	25.5 (19.4–31.5)	34.1 (27.6–40.6)	19.0 (14.8–23.1)	21.5 (15.5–27.5)

^aProportion to achieve ≤ 14 hours of weekly TV and video viewing and computer/video game use.

^bData from Waves I (1995) and III (2001), National Longitudinal Survey of Adolescent Health. Results are weighted for national representation, and standard errors are corrected for multiple stages of cluster sample design and unequal probability of selection.

*Males significantly different from females at $p \leq 0.01$ (with Bonferroni adjustment) using t -statistic (bolded).

**Significantly different from same-sex, non-Hispanic whites at $p \leq 0.01$ (with Bonferroni adjustment) using t -statistic or ≤ 2 hours of screen time per week (bolded).

***Significantly different from same-sex, non-Hispanic whites at $p \leq 0.05$ (with Bonferroni adjustment) using t -statistic (bolded).

CI, confidence interval; (+), achieve ≤ 14 hours of weekly TV and video viewing and computer/video game use; (-) fail to achieve ≤ 14 hours of weekly TV and video viewing and computer/video game use.

Table 3. Odds of achieving favorable activity^a and screen time^b levels across adolescence and adulthood^{c,d}

Sample	Physical activity ^e			Screen time ^f		
	Adolescence (-)	Adolescence (+)	Adolescence (-)	Adolescence (-)	Adolescence (+)	Adolescence (-)
	Early adulthood (-)	Early adulthood (-)	Early adulthood (+)	Early adulthood (-)	Early adulthood (-)	Early adulthood (+)
Male^g						
Black	0.76 (0.50–1.17)	0.65 (0.46–0.94)	1.08 (0.64–1.84)	1.50 (1.05–2.14)	1.42 (1.03–1.95)	0.81 (0.59–1.11)
Hispanic	0.74 (0.47–1.17)	0.85 (0.55–1.31)	1.13 (0.53–2.40)	1.07 (0.74–1.56)	0.93 (0.65–1.32)	0.84 (0.57–1.25)
Asian	0.72 (0.39–1.33)	0.86 (0.46–1.62)	1.16 (0.43–3.09)	1.03 (0.61–1.71)	0.89 (0.55–1.42)	0.69 (0.41–1.16)
Females^g						
Black	3.09 (1.49–6.42)	2.11 (0.98–4.54)	1.84 (0.68–5.00)	2.00 (1.40–2.87)	1.52 (1.09–2.13)	0.71 (0.51–0.98)
Hispanic	1.49 (0.76–2.91)	0.84 (0.44–1.63)	1.12 (0.42–2.97)	1.64 (1.08–2.48)	1.18 (0.83–1.69)	1.25 (0.86–1.82)
Asian	0.79 (0.61–2.04)	1.02 (0.37–2.76)	0.67 (0.18–2.54)	1.45 (0.88–2.38)	0.97 (0.59–1.61)	1.23 (0.69–2.21)

^aFavorable physical activity was defined as likelihood of achieving five or more weekly bouts of moderate to vigorous physical activity.

^bFavorable screen time was defined as likelihood of achieving ≤ 14 hours of weekly TV and video viewing and computer/video game use.

^cData from Waves I (1995) and III (2001) of the National Longitudinal Survey of Adolescent Health. Values are expressed as odds ratio (95% confidence interval). All results were weighted for national representation, and standard errors are corrected for multiple stages of cluster sample design and unequal probability of selection.

^dMultinomial logistic regression, sex-stratified models controlled for household income, parental education, age of adolescent, and seasonality of interview. Models assessed the odds of achieving favorable physical activity or screen in adolescence *and* early adulthood relative to achieving these levels at neither period; in adolescence, but not early adulthood; or in early adulthood but not adolescence.

^eThe reference group for physical activity is achieving favorable activity in adolescence (Wave I, 1995) *and* young adulthood (Wave III, 2001).

^fThe reference group for screen time is achieving level in adolescence (Wave I, 1995) *and* young adulthood (Wave III, 2001).

^gThe reference group is non-Hispanic whites.

(+), achieve favorable weekly MVPA sessions or screen time hours; (-), fail to achieve favorable MVPA sessions or screen time hours.

more sessions of MVPA and ≤ 14 hours of screen time per week at both adolescence and adulthood (referent) versus at neither period, at adolescence but not adulthood, or at adulthood but not adolescence (Table 3). Black females (OR=3.09; CI=1.49–6.42) were more likely than their white counterparts to remain inactive (vs active) during adolescence **and** early adulthood. Black males were more likely than white males to have high (versus low) screen time hours during both adolescence and early adulthood (OR=1.50; CI=1.05–2.14). They were also significantly more likely than whites to have low (versus high) screen time during adolescence **only** (OR=1.42; CI=1.03–1.95) rather than at **both** adolescence and early adulthood. Black females were more likely than white females to have high (vs low) screen time (OR=2.00; CI=1.40–2.87) during adolescence **and** early adulthood as well as during adolescence **only** (OR=1.52; CI=1.09–2.13). Conversely, black females were less likely than their white counterparts to have low (versus high) screen time during early adulthood **only** (OR=0.71; CI=0.51–0.98).

Discussion

These nationally representative data indicate that the vast majority of adolescents do not achieve five or more bouts of moderate physical activity per week, and that they continue to fail to achieve this amount of activity as they become adults. Greater proportions of females, particularly Hispanic and black females, failed to achieve favorable activity patterns at adolescence and into adulthood. Among all respondents who were active

during adolescence, there is a substantial age-related decline in activity. Similar differences, although of less magnitude, are seen for TV and video viewing and computer and video game use. Just under one quarter of the adolescents failed to achieve favorable sedentary behavior patterns, e.g., they engaged in >14 hours of screen time per week and continued to engage in this amount of sedentary behavior as adults. Of the adolescents who engaged in ≤ 14 hours of screen time per week, 17% increased their screen time into adulthood.

Population-wide declines in physical activity and stability of inactivity patterns during a period of such change are remarkable. Young adults in their early 20s (Wave III) have not completed the full social transition to adulthood, and are in a period termed the “demographically dense years,” in which major changes regarding family formation, labor force participation, and childbearing occur.¹⁵ As noted, there is a large literature on the enormous shifts in the lives of adolescents as they transition to young adults. Hogan¹² has shown that the patterns attained during this period are more important than family background for ordering key events in the life cycle.

The public health impact of these findings is substantial. This Add Health analysis sample represents over 20 million school-aged youth. An average of >12 million adolescents did not achieve five or more sessions of MVPA per week and continued to fail to achieve this amount as young adults. This number approaches an average of 16 million in Hispanic and black females. An additional average of 6 million adolescents who achieved five or more bouts of MVPA per week as

Physical activity declines with age.

There are limited longitudinal data on change in physical activity over time, particularly in national, ethnically diverse samples.

This study shows considerable population-wide declines in physical activity and stability of sedentary behavior between adolescence and young adulthood.

The vast majority of U.S. adolescents do not achieve five or more sessions of moderate to vigorous physical activity per week, and an even smaller proportion continue to achieve this amount of activity as adults.

adolescents failed to do so as young adults. Conversely, an average of <1 million adolescents achieved five or more bouts of MVPA per week as adolescents and again as young adults.

The data can be compared to the CDC/ACSM guideline of participation in moderate activity for at least 30 minutes on >5 days per week. However, it is important to note that while the recommendation is specified in terms of frequency and minutes of moderate activity, the Add Health data are characterized by frequency alone. Thus, these data are suggestive of the CDC/ACSM guideline, but not identical. The present data represent a conservative estimate of the magnitude of the failure to meet the CDC/ACSM guideline over the transition from adolescence to adulthood. The data can be directly compared to the AAP recommendation of engaging in ≤ 2 hours per day of TV and video viewing and computer/video game use.

By the time individuals reach adolescence, most adolescents are already not engaging in enough physical activity and engaging in too much inactivity to meet national recommendations. Thus, intervention efforts aimed at engaging in healthful amounts of activity and TV and video viewing, and computer/video game use must begin prior to the adolescent period. This is particularly true for Hispanic and black females, who are far from meeting the recommendations while adolescents. Whites are more likely to have unhealthful shifts in activity and screen time during this period; however, it must be kept in mind that greater proportion of white adolescents engage in favorable amounts of activity and screen time at baseline than blacks and Hispanics. Blacks who are active in adolescence are more likely to remain active into young adulthood.

While there is a literature on tracking of physical activity, the bulk of this research is focused in European samples and represents small, typically limited samples with few ethnic groups represented. In general, this literature suggests low to moderate tracking of physical activity from adolescence to adulthood.³¹ Research in the United States shows higher tracking in young adults³² and young adolescents,³³ and moderate tracking in early childhood³⁴ and into adolescence.³⁵ Studies show better tracking of inactivity than activity,^{36,37} and better tracking of activity in females versus males.³⁸ A dramatic decline in physical activity has been shown for black compared to white girls.³⁹

As reviewed by Sallis et al.,⁸ physical activity is known to decline with age, with a considerable decline in physical activity shown to occur between adolescence and young adulthood.^{9,33,40} Overweight and obesity increase with age; a recent study shows that the transition from adolescence to young adulthood is a period characterized by substantial increase in obesity incidence.¹⁶ Although this is an age period believed to be one of peak health, young adulthood is characterized by changes in work and marital status, and other life

events that have been shown to be associated with decreased physical activity.⁴¹ Furthermore, the recent trend toward diabetes and chronic degenerative diseases emerging at younger ages⁴²⁻⁴⁴ is also of utmost concern.

The transition from adolescence to young adulthood is an important time to promote physical activity, reduce TV and video viewing and computer and video game use, and encourage those who are already active to maintain adequate amounts of physical activity. Among adolescents, a very small portion of the population is active and maintains an active lifestyle into adulthood, and a larger group maintains healthful amounts of screen time. Thus, while preventive efforts are needed throughout the life cycle, they are critically needed before adolescence, particularly in Hispanic and black females with low and declining physical activity and high frequency of TV and video viewing and computer/video game use.

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