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Time to Work or Time to Play: The Effect of Student Employment on Homework, Sleep, and Screen Time

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Abstract: We use detailed time-diary information on high school students' daily activities from the 2003–2008 American Time Use Surveys (ATUS) to investigate the effects of employment on the time a student spends on homework and other major activities. Time-diary data are more detailed and accurate than data derived from responses to "usual activity" survey questions underlying other analyses and capture the immediate effects of working that may well accumulate over time to affect future outcomes. Our results suggest that employment decreases the time that high school students spend on homework, which is human-capital building, on all days, but also decreases screen time on non-school days, which may be considered unproductive time. Employed teens get more than the recommended amount of sleep on school days, and only slightly less on non-school days.

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I. Introduction

Many studies have investigated the effects of working while in school on students' outcomes. On the one hand, working while in high school may provide valuable work experience. Stephenson (1981), Michael and Tuma (1984), Ruhm (1995, 1997), Light (1999, 2001), and Neumark and Joyce (2001) have all found positive effects of student work on future labor market outcomes. Hotz et al. (2002), however, found no effect of high school employment on men's future wages when they controlled for individual-specific unobserved heterogeneity. On the other hand, some researchers have documented a small negative relationship between working while in high school and a student's academic achievement, which may negatively affect future earnings. For example, using the National Educational Longitudinal Study of 1988 (NELS:88), Tyler (2003) found that student employment has a negative effect on both the number of years of schooling that students complete and their 12th grade math achievement. Dustmann and Van Soest (2007) found that work while in school has a small negative effect on U.K. males' exam performance at age 16.

Some researchers have also found that the intensity of work matters for academic outcomes (Lillydahl 1990; Ruhm 1997; Oettinger 1999; DeSimone 2006; and Montmarquette et al., 2007).[1] For example, Lillydahl (1990) found that students' high school grade point averages (GPAs) increased up until weekly time worked exceed 13 ½ hours and declined thereafter. Ruhm (1997) found that females completed fewer years of school when they worked more than ten hours per week in their senior year. Oettinger (1999) found a substantial decline in the grades of minority students who worked longer than 20 hours per week. DeSimone (2006) found

[1] Schoenhals et al. (1998) provide an excellent review of research in sociology suggesting that work intensity affects academic achievement. However, using NELS:88, they found no effect of work intensity upon grades once they had included a more extensive set of controls.

that students' high school GPAs increased up about 15 hours worked per week, but declined as hours worked exceeded 15 hours. Montmarquette et al. (2007) found that working less than 15 hours per week does not necessarily have any deleterious effects on success in school while working 15 or more hours per week leads to an increased probability of dropping out of school. However, Warren et al. (2001) and Rothstein (2007) both found that employment has no effect on students' grades.

A limitation of most of these studies, with the exception of DeSimone (2006), is that they examine only the associations between work and broad outcomes such as high school completion, overall GPA, or future earnings. They do not examine the underlying mechanisms for these associations. One potential mechanism is that work reduces students' homework time (DeSimone 2006 and Kalenkoski and Pabilonia 2009) and thus negatively affects their grades and other measures of academic achievement (Betts 1997; Aksoy and Link 2000; and Eren and Henderson 2008). Using Monitoring the Future surveys of 12^{th} graders, DeSimone (2006) found that employment in the senior year has a small negative effect on usual weekly homework (an hour of work reduces homework by 3 minutes). Using the American Time Use Survey (ATUS) and a simpler model than that used in this paper, Kalenkoski and Pabilonia (2009) also found that an increase in daily minutes worked by teens aged 15–18 reduces daily homework (an hour of work reduces homework by 11 minutes). Using the Longitudinal Study of American Youth, Betts (1997) found that an extra half hour per night of assigned homework in grades 7 through 11 raises students' math scores by two full grade levels. Using NELS:88, Aksoy and Link

(2000) and Eren and Henderson (2008) found that additional homework (whether reported or assigned) increases tenth grade math test scores.[2]

Another potential mechanism by which employment can lower grades is through reductions in sleep time. DeSimone (2006) found evidence that employment has a small negative effect on sleep for 12th graders. Recent research by psychologists on first-year college students found that those who sleep less on school nights (41 minutes on average) have 0.3 lower grade point averages (GPA) (Peszka et al. 2009). A study by sociologists Brint and Cantwell (2008) found that an extra hour of sleep per week is associated with a 0.06 point increase in college students' GPA.

In addition to affecting homework and sleep, employment might also reduce students' screen time, which may be viewed to be academically unproductive time. Using NELS:88, Schoenhals et al. (1998) found that the more tenth graders worked, the less TV they watched. DeSimone (2006) found that that the time spent working was largely offset by a reduction in weekly TV watching. Brint and Cantwell (2008) found that an extra hour spent by college students on computers for fun is associated with a 0.05 decrease in GPA.

Although DeSimone (2006) investigated the mechanisms by which work time may affect student outcomes, as we do in this paper, he analyzed survey responses rather than time diary data. Time-diary data are more detailed and accurate than data derived from responses to "usual activity" survey questions underlying previous analyses (Juster 1995). Therefore, in this paper, we use detailed time-diary information on high school students' daily activities from the 2003–

[2] There also have been a couple of excellent studies on college students by Stinebrickner and Stinebrickner (2004, 2008), which examined the effects of study time collected from time diaries on overall grades. In their 2004 study, they found that an increase in first-year college students' study time from 1 to 2 hours per weekday was associated with a 0.397 increase in their GPAs. In their more recent work (2008), they found that an increase in study time of one hour per day increased students' GPAs by an amount equivalent to a 5.21 point increase in their ACT scores.

2008 American Time Use Surveys (ATUS) to investigate the effects of student employment on the time students aged 15–18 spend on homework and other major activities on their diary day.[3] [4] In addition, while DeSimone (2006) used two-stage modeling to analyze the effect of employment on only one alternative activity at a time, we estimate a more efficient model where we jointly estimate teens' employment decisions along with their other uses of time.

We measure work activity in two ways. First, we use a variable that indicates whether or not a teen was "employed during the previous week". This is a measure of whether a high school student has a job, and results using this variable are intended to capture the effects of having a job on a student's daily activities. Because some of the students who are classified by this variable as employed may not be working on the diary day, any effects found for this variable are averages across work and non-work days for employed students. Second, we use a variable indicating whether a teen "worked on the diary day". This variable is a better measure of how a student's working on a particular day constrains the amount of time remaining for other activities on the same day. Our results suggest that employment, by either measure, decreases the time high school students spend on homework, which is human-capital building, on both school days and non-school days but also decreases screen time, which generally is not thought to be academically productive, on non-school days. Both having a job and working on a

[3] We focus on high-school students rather than college students because the ATUS is not representative of the college student population. There are several reasons for this. First, the ATUS is drawn from the Current Population Survey (CPS), a household survey that follows individuals over time at the same household address. If a household member leaves a sampled household to move into a dorm between surveys, then she/he would not be sampled after the move. In addition, although the CPS does sample student dormitories, most students would be considered as having a "usual residence elsewhere" (i.e., their parents' households), and thus ATUS interviewers would unsuccessfully attempt to contact college students at their parents' residences when they are actually living in dorms.

[4] Kalenkoski and Pabilonia (2009) also used the ATUS, but performed a limited analysis, examining the effect of diary work time on homework time only.

particular day increase the time students spend sleeping on school days but decrease it on non-school days. Indeed, predictions from our model suggest that employed teens get more than the recommended amount of sleep on school days and only slightly less than the recommended amount on non-school days.

II. **Data**

Our primary data source is the pooled 2003–2008 ATUS. The ATUS is a nationally representative survey of the U.S. civilian non-institutionalized population aged 15 years and over. Each person selected for the ATUS is randomly drawn from a sample of households in the Current Population Survey (CPS) that have finished their final CPS interview. The key feature of the ATUS is its 24-hour time diary in which the respondent describes how he or she spends his or her time from 4 A.M. on the day before the interview to 4 A.M. on the day of the interview. Although in reality teens may be engaging simultaneously in multiple activities, the ATUS records only time spent in the primary activity for most activities.[5] The survey also collects household roster and demographic information and is matched to the CPS household data. One of the advantages of using time diary data compared to other survey data, such as the NLSY97, is that time-diary data are less sensitive to the recall and aggregation bias that is associated with broader survey questions capturing average time spent (Bianchi et al. 2006). They are less susceptible to recall bias because respondents only have to recall the previous day's activities, not the activities of the previous week. They are less susceptible to aggregation bias because respondents report all activities sequentially and thus account for the full 1440 minutes in the day. The NLSY97 does not require the respondent to ensure a time constraint.

[5] The exceptions are secondary child care and, in 2006 and 2007, time spent eating and drinking.

We examine a subsample of the ATUS respondents, those who were aged 15–18 on their diary day, were attending high school, were interviewed during the typical school year (September through May),[6] were not married or living with a partner, and did not have children of their own living in their households. From this subsample we excluded low quality diaries (those missing more than 60 minutes of time) and diaries that captured atypical days (those where teens reported either sleeping more than 20 hours or being sick for more than four hours on their diary day) (Juster 1985). These latter restrictions excluded less than half a percent of school-year diaries, leaving us with a sample of 3,027 teenagers.

Our main variables of interest measure whether or not the teen was employed during the week ending with the diary day, whether the individual worked on his/her diary day, and minutes spent on homework, sleeping, and in front of a screen (watching TV or using the computer for leisure except for video games) on the diary day.[7] We also perform sensitivity analyses where we add time spent on other potentially human-capital building activities, such as schooling-related extracurricular activities and sports, to homework time because previous researchers (Barron et al. 2000; Persico et al. 2004; and Kuhn and Weinberger 2005) have shown that those who participate in extracurricular activities and/or high school sports later earn higher wages. For example, Barron et al. (2000) found that athletic participation increases wages over and above participation in other extracurricular activities, suggesting that the positive association between sports and wages may arise because athletic participation builds teamwork and discipline, skills that are rewarded in the labor market. In addition, Lipscomb (2007) found that participation in extracurricular activities and sports increases students' math and science scores,

[6] Other studies (Ruhm 1997; Oettinger 1999) have found that summer employment does not affect educational outcomes.

[7] The ATUS coded video games with all games including board games. See the Data Appendix for additional details on the specific ATUS codes included in each of our activity categories.

independent of unobserved individual ability. Our measure of sports participation includes team sport participation, but we are unable to separate this type of participation from other exercise.

We also examine an alternative sleep category that includes all sleep occurring after 4 P.M. on the diary day until the student awakes the following morning.[8] We do this because of the way sleep time is collected in the time diary. Because the 24-hour diary covers activities starting at 4 A.M. on the diary day until 4 A.M. on the next day, the primary daily sleep measure we use includes portions of each of two calendar days' sleep episodes. However, the ATUS also collects the end time of the activity that was being performed at 4 A.M. on the second day and we are able to use this information to construct a nighttime sleep measure that includes sleep that occurs after the majority of the diary day's other activities.[9]

Finally, we add game time to our screen time definition. The ATUS game category groups board games and computer and video games together. Therefore it is not possible to distinguish between them. Therefore, we add all time spent in this category to our screen time measure as we suspect that most gaming by teens is done electronically. Note that our homework, sleep, and screen time variables (including alternative definitions) do not account for all of a teen's uses of time but that they do examine the major leisure and human-capital-building activities that account for a substantial portion of their out-of-classroom time. We do not analyze in-classroom time because such time is not discretionary.

For each of our main time use variables, Table 1 reports the percentage of respondents who participated in these activities and their average daily minutes by employment status for

[8] We also examined sleep occurring after noon on the diary day until the following morning to include naps, and the results were similar.
[9] We exclude six diaries where the sleep episode was recorded as ending at 4 A.M. because it was likely due to interviewer error in ending the diary recall early.

school days and non-school days. We define school days as weekdays that are not major holidays. In addition, school days do not include the day after Thanksgiving, Good Friday, or the weekdays between Christmas and New Year's Day, because these days are typically school holidays. None of the students in our sample attended class on these days. We separate analyses by school day and non-school day, because school homework assignments and extracurricular activity offerings, as well as state regulations regarding student employment, differ for school days and non-school days.[10]

Only 14% of students worked on their diary day. Those who worked on their diary day worked, on average, 235 minutes on school days and 354 minutes on non-school days. Slightly more than half of all students reported doing homework (51%) on a school day, although only 29% did homework on a non-school day. On average, students spent 52 minutes doing homework on a school day and 41 minutes doing homework on a non-school day. This is equal to 5.7 hours of homework per week.[11] Although employed students spent slightly less time, on average, on homework than students who were not employed, this difference is not statistically significant.

All students reported sleeping. Employed students spent less time sleeping, on average, than non-employed students by almost half an hour on school days and almost 50 minutes on non-school days. Students who worked on the diary day spent over half an hour less time sleeping than students who did not work on school days and over an hour less time sleeping on non-school days.

[10] See www.dol.gov/whd/state/nonfarm.htm#footc for a chart describing some of the federal and state restrictions on student employment.
[11] We calculate weekly hours as the sum of 5 times the school day minutes and 2 times the non-school day minutes, divided by 60.

Seventy-nine percent of students reported screen time on a school day and 84% reported screen time on a non-school day. On average, students spent 122 minutes in front of a screen on school days and 178 minutes in front of a screen on non-school days. This is equal to just over 16 hours of screen time per week for the typical teenager.[12] Employed students spent significantly less time in front of a screen than non-employed students, approximately 24 minutes less on school days and almost an hour less on non-school days. This effect is, of course, magnified for students who worked on the diary day. They spent almost an hour less on school days and over an hour and twenty minutes on non-school days. Table 1 also shows that there is considerable variability in time use among teens, even in sleep, where all participate (see standard deviations in parentheses). For example, a one standard deviation in sleep is just under 2 ½ hours on school days and almost 3 hours on non-school days.

In our analyses of students' time allocation, we control for several measures of individual and household characteristics. To control for socio-economic disadvantage, we include indicators for race and ethnicity, whether or not a teen lives with a single parent, and whether or not a teen lives with at least one parent who has earned a bachelor's degree. Non-Hispanic black students and Hispanic students may face reduced economic opportunities because of discrimination or lack of job opportunities in their communities. The single-parent household variable is likely negatively correlated with the degree of parental supervision and thus may affect teenagers' time allocation (Wight et al. 2009; Kalenkoski et al. 2010). Porterfield and Winkler (2007) suggest that parents' education levels may affect their child's access to jobs. The variable measuring the parents' education level may also capture parents' preferences toward education that are passed on to their children and thus affect the amount of time a student

[12] We calculate weekly hours as the sum of 5 times the school day minutes and 2 times the non-school day minutes, divided by 60.

chooses to spend doing homework. In addition, parental education may affect how much TV and computer time a student is allowed. Parents are currently encouraged by the American Academy of Pediatrics (2007) to limit the time their children devote to watching TV and playing video games to no more than two hours per day. One might expect more-educated parents to be better informed about and pay more attention to this advice. Finally, both the single parent variable and the parent education level variable are correlated with parental income and thus may affect whether or not a student works to earn spending money.

We also control for the number of co-resident siblings under age 15. We expect that this variable will affect homework time because, the greater the number of siblings, especially younger siblings who are more likely to need their parents' help with homework, the less time a parent has available to help with the teen's homework and perhaps the less parental supervision of his/her homework that occurs. In addition, younger siblings may limit the teen's ability to work outside the home if they cause a parent to be unable to transport the teen to work or if the parent requires the teen to babysit his/her siblings. However, having a greater number of younger siblings may increase the likelihood that a teen works if the larger family size leads to a decreased share of family resources for the teen. It is also likely that a teen may spend more time watching TV or using a computer to communicate with friends if there are no siblings to play with in the home.

We also include indicator variables for whether or not the teen respondent is female; indicators for ages 16, 17, and 18 (with age 15 being the omitted category because 15-year-olds are quite limited in the work they are legally able to do); and an indicator for SMSA status.

Finally, we include the state monthly unemployment rate from the U.S. Bureau of Labor Statistics' Local Area Unemployment Statistics (LAUS) program and the state minimum driving

age for a full license (i.e. unsupervised driving), which ranged from 14 to 17 over the period. These are matched to the ATUS data using the state identifier and, for the unemployment rate, the survey month. As a measure of labor market conditions, the unemployment rate is likely to affect whether a student has a job. Having a driver's license can also increase the job opportunities available to teens (Pabilonia 2001b). See the appendix, Table A2, for the means and standard deviations of all of our control variables.

We examine the intensity of employment by select demographic characteristics in Table 2. Overall, 31 percent of students aged 15–18 held a job in the previous school week, with only a minority of all teens (8%) holding a job where they usually worked more than 20 hours per week. On school days, we find that all teens who work are about equally likely to work more or less than 4 hours per day. However, on non-school days, the majority of teens with a job worked more than 4 hours per day.

Non-Hispanic blacks and Hispanics were less likely to work at all (although the difference is not significant at conventional levels) or to work 1-20 hours per week than non-Hispanic, non-blacks. Hispanics were less likely to work on the diary day and were less likely to work more than 4 hours on the diary day than non-Hispanic non-blacks. Non-Hispanic black teens were less likely to work on non-school days than non-Hispanic, non-black teens. Among those non-Hispanic blacks and Hispanics who worked on a non-school day, almost all worked over 4 hours per day.

Students who lived with a single parent were slightly less likely to be employed, although the difference is not statistically significant. Those students who lived in a single-parent household were statistically significantly less likely to work 1-20 hours than those students living in two-parent households. Students whose parents had not earned a bachelor's degree were

about as likely to work as those with at least one parent who had earned a bachelor's degree. However, they were more likely to work at a job where the usual hours exceeded 20 hours per week. These differences by race, ethnicity, presence of one or two parents, and parental education among teens in employment status motivate controlling for these characteristics in our multivariate models.

Econometric Model

Because screen time (C) and time spent on homework (H) are recorded as zero for a substantial number of respondents, we model time spent in each of these activities as a censored regression (Tobit).[13] Sleep (S) is modeled as a non-censored regression because all students report some sleep. In addition, whether or not a student engages in paid work (E) is potentially endogenously chosen with the time s/he spends in other activities. Therefore, we estimate the

[13]Some researchers assume that all observed zeros are the result of random measurement error. Their assumption is that all respondents participate in an activity over the period of interest in which individuals make decisions, but that we don't happen to catch everyone doing it on the diary day. If there is only measurement error, but no true non-participation, then the OLS estimator is appropriate. However, if some of these zeros represent true non-participation, then the OLS estimator is biased and inconsistent (Amemiya 1973). We believe that there is true non-participation in homework and screen time over the short period of interest in which fairly short-sighted teens make decisions because we also find evidence of non-participation in other, longer-term measures. For example, in a typical week during the school year in the National Longitudinal Survey of Youth 1997 (NLYS97) Round 1, 11 percent of enrolled students aged 12-16 did not spend any time doing homework (authors' own calculation). In the Panel Study of Income Dynamics Child Development Supplement (PSID-CDS II), 41 percent of students aged 14-16 did not do any homework during a synthetic school-year week which was created using one weekday diary and one weekend day diary (authors' own calculation). Further justification for using Tobit models rather than OLS models comes from work done by Kalenkoski, Ribar, and Stratton (2010). In their paper, they also use the ATUS to study a very similar sample of teens and show that Tobit models predict the actual distribution of teens' time use better than OLS models. Therefore, we estimate censored (Tobit) models for our measures of time spent in activities that contain a substantial number of zero values.

following mixed-process recursive model that includes a Tobit for homework time, a Tobit for screen time, a non-censored regression for sleep time, and a probit for employment:

$$H_i^* = \gamma_h E_i + \beta_h X_i + h_i$$

$$H_i = H_i^* \text{ if } H_i^* > 0$$

$$H_i = 0 \text{ if } H_i^* \leq 0$$

$$C_i^* = \gamma_c E_i + \beta_c X_i + c_i$$

$$C_i = C_i^* \text{ if } C_i^* > 0$$

$$C_i = 0 \text{ if } C_i^* \leq 0$$

$$S = \gamma_s E_i + \beta_s X_i + s_i$$

$$E_i^* = \alpha Z_i + e_i$$

$$E_i = 1 \text{ if } E_i^* > 0$$

$$E_i = 0 \text{ if } E_i^* \leq 0$$

H_i^*, C_i^*, and E_i^* are the latent variables behind the observed variables H_i, C_i, and E_i, where i refers to the individual respondent. X_i is the vector of the respondent's personal and household characteristics. Z_i includes X_i plus two additional variables to help identify employment status in the other equations.[14] β_h, β_c, and β_s are the vectors of coefficients on X_i in the latent homework, latent screen time, and observed sleep equations, respectively, and α is the vector of coefficients on Z_i in the employment equation. The key coefficients of interest are γ_h, γ_c, and γ_s, the effects of employment on latent homework, latent screen time, and observed sleep time, respectively. h_i,

[14] Note, however, that because of non-linearities in this model (i.e. probit model in first stage), these additional variables are not necessary for identification as they would be in a 2SLS model, although identification might be more robust if exclusion restrictions are imposed (Roodman 2009, p. 27-28).

c_i, s_i, and e_i are the error terms in each of these equations and are jointly normally distributed.[15] One can think of the homework, sleep, and screen time equations as "structural" equations and the employment equation as a "reduced form" equation where only exogenous factors enter the equation. The equations are estimated jointly via simulated limited-information maximum likelihood using the "cmp" command in STATA (Roodman 2009).[16]

III. **Results**

Recall that we measure employment, E_i, in two different ways, first as working at any point during the previous week, and second, as working on the diary day. Therefore, we provide separate estimates for each of these alternative measures. The explanatory variables in X_i include the exogenous regressors identifying students' personal and household characteristics, as described in the data section. [17] The additional variables in Z_i that are not in X_i are the state unemployment rate and the minimum driving age.[18] These variables help to identify the

[15] Single-equation estimates that do not allow for correlated errors or control for the endogeneity of employment are available from the authors upon request.

[16] The cmp command was created by David Roodman (2009) as a seemingly unrelated regression estimator for mixed-process models. Using cmp, one can jointly estimate Tobit, probit, ordered probit, continuous, and other models. Note, however, that one can use cmp to consistently estimate only recursive (not fully simultaneous) models. That is, endogenous variables may appear on the right-hand side of any of the models only in their observed, not in their latent, form.

[17] In one school-day specification (not reported here), we also included an indicator for Fridays because students may behave differently when they do not have to go to school the following day. Results were similar in magnitude. However, we do not include this specification throughout because some of our sensitivity analyses would not converge with this additional variable.

[18] We also explored models with a host of other variables that could possibly affect employment but not other uses of time. These included the following variables, all defined at the state level, which is the finest level of geography available for our entire sample: the annual unemployment rate (as opposed to the monthly rate, which we use here); indicators for child labor laws, compulsory schooling laws, and car license rules; effective minimum wage laws (the maximum of state and federal minimums); the relative wages of teens aged 16-19 to adults aged 25-64; the

employment variable in the other equations, although, as noted earlier, they are not technically required.[19]

In Table 3A we report coefficients, standard errors (in parentheses), and marginal effects (in brackets) for our "employed during the previous week" variable and the variables excluded from the homework, sleep, and screen time models. Marginal effects are calculated for the unconditional expected value for each observation and averaged over all observations. We also report the correlation coefficients among the error terms. Being employed reduces a student's daily homework time on a school day by 45 minutes, a rather substantial amount given that the average daily minutes spent on homework on school days is 52 minutes. Surprisingly, given the differences we saw in the simple means (Table 1), employed students sleep 148 minutes more than non-employed students on school days. This could be due to fatigue, resulting from a combination of in-class time and work time on such days. The results also indicate that screen time is lower for employed students by 20 minutes, but this result is not statistically significant. The probability of employment decreases the higher the unemployment rate.[20]

On non-school days, students who are employed spend 34 fewer minutes on homework than students who are not employed, a smaller effect than on school days, as expected. The

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yearly share of teens aged 16-19 out of the working-aged population aged 16-64; the average annual earnings per worker, the average annual earnings per worker for those employed in manufacturing jobs, the average annual earnings per worker for those employed in service-sector jobs, the annual percentage rate of growth in employment, the employment-share-weighted annual percentage growth rate of manufacturing sector employment, and the employment-share weighted annual percentage growth rate of the service sector employment. Many of these variables, but defined at the county level instead of the state level, were used by Hotz et al. (2002) to identify the effect of employment in high school on men's future wages.

[19] Unemployment rates have been used by other researchers to identify hours worked by students (e.g., Rothstein 2007; Kalenkoski and Pabilonia 2010).

[20] Only the state unemployment rate was included in the employed probit for the school day sample because the model would not converge with the minimum driving age variable.

reduction in screen time, however, is quite large at 165 minutes (more than 2 ¾ hours), and is also statistically significant, unlike on school days. The magnitude of the effect of employment on sleep on non-school days is about the same as that for school days, but the sign is in the opposite direction. On non-school days, employed students sleep almost 2 ½ hours less than non-employed students. The probability of employment decreases the higher the unemployment rate. Although the minimum driving age is not individually statistically significant, the state unemployment rate and minimum driving age are jointly significant at less than the 1% level. In addition, employment is also identified in the homework, sleep, and screen time regressions by functional form.

For both our school day and non-school day specifications, we rejected the null hypothesis of no correlation among the error terms using a Wald test.[21] [22] In addition, most of the correlation coefficients in these specifications are individually statistically significant.[23] The correlation coefficients between the unobserved determinants of employment and homework on both day types are statistically significant and positive, suggesting that an unobserved variable, such as student motivation or ability, affects both employment and homework in the same way. On school days, the correlation coefficient between the unobserved determinants of employment

[21] It is not possible to use a likelihood-ratio test for our joint significance tests because we are estimating robust standard errors with the "cmp" command. In this case, the likelihood function does not reflect the non-sphericity of the errors (Roodman 2009).

[22] When we do not allow for errors to be correlated, there is no significant effect of employment on non-school day homework, unlike our correlated model. Also, when we restrict the correlations to zero, the effect of employment on school day homework is muted. The effects of employment on sleep are all statistically significant as in the model with correlated errors, but are smaller in magnitude and all negative, not the case in our correlated model. The effects of employment on screen time when the errors are restricted to be zero are all significant and negative, although the school day results are not significant in the correlated model. The non-school-day effects are much smaller negative effects when the errors are not allowed to be correlated. Complete estimates are available from the authors upon request.

[23] The exceptions are the coefficients between employed and screen time and sleep and screen time on school days and the correlation between homework and screen time on non-school days.

and sleep is negative while this correlation coefficient is positive on non-school days. One possible explanation for the difference is that the amount of time dedicated to in-class schooling makes the (discretionary) time constraint bind on school days, indicating that a tradeoff must be made between employment and sleep on such days, whereas this time constraint is not binding on non-school days. In other words, on non-school days students may simply have more time for both employment and sleep. A similar explanation may be in order for the positive correlation found between the unobserved determinants of employment and screen time on non-school days. Again, students simply may have more time to spend on both employment and in front of the screen on such days. The correlation coefficient for homework and sleep is negative on school days and positive on non-school days, again suggesting that the unobserved factor may be a binding time constraint on school days but not on non-school days. Finally, the positive correlation coefficient between sleep and screen time on non-school days only also seems to suggest that the unobserved factor is a greater amount of time available for leisure when school is not in session.

Table 3B shows the effects of working on the diary day. The estimated effects of working on the diary day have the same signs, but are generally larger in magnitude, than the effects of being employed in the previous week. This is to be expected, as the effect of being employed the previous week averages the effects for students who are working with those who are not working on the diary day. On school days, students who worked on their diary day spent 50 fewer minutes on homework than did students who did not work. Those who worked slept 166 minutes more than those who did not work. Screen time is lower by 33 minutes for students who worked but, as with the results for "employed in the previous week," this estimate is statistically insignificant. On non-school days, students who worked spent 43 fewer minutes on

homework, slept 202 fewer minutes (almost 3 ½ hours), and engaged in 162 fewer minutes (almost 2 ¾ hours) of screen time than those who did not.

Similar to the results for the previous week employment measure, the majority of the estimated correlation coefficients on the errors in the worked on the diary day specifications, for both school days and non-school days, are individually statistically significant and a Wald test confirms their joint significance. Because the signs and magnitudes of these correlation coefficients are similar to those in Table 3A, we do not interpret them again in detail here. However, it appears that motivation or ability may be the unobserved factor behind employment status and homework and that a binding discretionary time constraint on school days versus non-school days may be the unobserved factor behind the other correlation coefficients.

Results for the control variables for the specifications presented in Tables 3A and 3B are not presented in order to conserve space but are available from the authors upon request. However, we highlight a few results here. The probability of employment or working on the diary day is greater for older students. On non-school days, having a parent with a bachelor's degree reduces the probability of employment or working on the diary day (although this effect is only statistically significant for working on the diary day), and reduces both sleep and screen time. On both school days and non-school days, having a parent who has earned a bachelor's degree increases daily homework time. Being non-Hispanic black or Hispanic generally decreases the probability of employment or working on the diary day, but not all effects are statistically significant. Female students do more homework and engage in less screen time than do male students. On school days, older students sleep less than younger students, while non-Hispanic black and Hispanic students sleep more than non-black, non-Hispanic students.

Finally, students living in a single-parent household do less homework than do students in two-parent families, although effects are only significant using the school day sample.

IV. **Sensitivity Analyses**

The results that we have just presented were based on a sample that included 15- to 18-year-old students. However, 15-year-olds face many more legal restrictions on the types of jobs that they may hold and the hours that they are allowed to work than do 16- to 18-year-olds (Pabilonia 2001a).[24] While the age dummies used in the previous models do control somewhat for student age, they do not allow employment effects to differ between 15-year-olds and 16- to 18-year-olds. Therefore, we re-estimate all of the models using the smaller 16- to 18-year-old sample.[25] Table 4 presents the estimated effects of being employed the previous week and working on the diary day on homework, sleep, and screen time.[26] The results are very similar to those from the larger sample, although all of the effects are slightly larger in magnitude.

We also estimated several specifications using alternative time use categories. The key results are shown in Table 5. First, we expanded the homework category to include non-sport extracurricular activities. Next, we included both non-sport extracurricular activities and sports. Third, we report results for the effect of employment on night sleep, as opposed to total diary day sleep. Finally, we expanded the screen time category to include games. The results for the two broader homework categories are similar to those for the narrower category. Adding additional activities, however, does increase the magnitude of the estimated effects. This suggests that the

[24] See also www.dol.gov/whd/state/nonfarm.htm#footc.
[25] Eighteen-year-olds face fewer restrictions than 16- and 17-year olds, but the samples of 18-year-olds only and 16- and 17-year olds are too small to obtain separate estimates.
[26] We present only abbreviated results for the sensitivity analyses. Full results are available upon request from the authors.

additional activities that we have included in these sensitivity analyses are affected in ways similar to the original set of activities. On non-school days, the effects of working on the broader screen categories are also larger in magnitude. With respect to screen time, the effect of being employed becomes positive and highly significant on school days when we broaden the category to include games. This suggests that employed students spend more time playing video games (perhaps because they can afford to buy them without parental assistance) on school days than do non-employed students. The results using nighttime sleep also differ from our results using diary day sleep presented in Tables 3A and 3B, as they are negative and statistically insignificant on school days. However, our results for non-school days are of the same sign regardless of whether we consider diary-day or nighttime sleep.[27]

As another sensitivity analysis, we examined the effect of work intensity on teens' daily activities. In Table 6, we report results for the effects of working 1-20 hours and 20+ hours relative to not working, as other studies have shown large declines in GPA after a certain threshold level (Oettinger 1999; DeSimone 2006). [28] Unfortunately, we could not estimate the full model because it would not converge when we replaced the simple probit with the ordered probit. Because the troublesome portion of the full model was the homework Tobit, we first estimated a specification that did not include homework. This specification involved joint estimation of an ordered probit for employment/work intensity, a continuous regression for sleep, and a Tobit for screen time. We then estimated a separate specification that included only the homework Tobit and the work intensity ordered probit. The results of the first specification

[27] We also estimated a specification in which we dropped Friday diary days from the sample because night sleep on a Friday would include Saturday morning sleep and thus may be different from night sleep on other school days. However, this made no substantive difference in the results.

[28] We also estimated a specification with 15 hours as the cutoff, but we could not get all of the specifications to converge with this cutoff. Effects were similar for those that did converge.

suggest, as before, that there are positive effects of employment and work on the diary day on sleep for school days and negative effects on sleep for non-school days. We also find that the effects are greater when more than 20 hours a week or more than 4 hours a day are worked. On non-school days, the negative effects of working on screen time are larger for those students who work more than 20 hours a week or 4 hours a day. The results of the specifications including only the homework tobit and work ordered probit indicate that there are no significant effects of work on homework when we analyze work intensity rather than a simple indicator for having a job or working on the diary day. However, our estimators are inefficient compared to the estimator for the full model, if we could estimate it, and the estimated effects of being employed and working on the diary day are all negative as expected.

Finally, in an attempt to distinguish the effects of simply having a job from actually working on the diary day, we estimated a model that included both an indicator variable for being employed in the previous week and an interaction of this variable with an indicator variable for working on the diary day. Thus, in this model, the base/comparison category was not employed. Unfortunately, the model did not converge separately for school days and non-school days, so we estimated it over the combined sample of school days and non-school days (Table 7). For this combined sample, neither being employed but not working on the diary day nor being employed and working on the diary day has a statistically significant effect on homework, a result that differs from our main analyses. Having a job but not working on the diary day also does not affect sleep time, but having a job and working on the diary day reduces sleep time. Both having a job but not working on the diary day and working on the diary day reduce screen time. Having a job but not working on the diary day leads to a reduction in screen time of 42 minutes compared to not-employed students while working on the diary day reduces it

by an additional 95 minutes. However, because this model asks a lot of the data, and because we cannot examine how the effects vary by whether or not the diary day is a school day, the results from this specification should be interpreted with caution.

V. **Discussion and Conclusions**

Using time-diary data from the ATUS, this paper examines the effects of high school students' employment on the time that they spend in their other major discretionary activities. Our results suggest that employment decreases the time high school students spend on human-capital-building activities, such as homework and extracurricular activities, but also decreases screen time, which may be considered academically unproductive time. We also find that, the more students work, the more they decrease this unproductive time. This is not surprising given the disparity in the average time that students spend on homework (about 49 minutes) versus screen time (about 138 minutes) per diary day.[29] However, given that Betts (1997) finds that an increase in homework time by a half hour per night increases math scores by two full grade levels, our finding that work on the diary day reduces homework by 49 minutes suggests that employment does indeed reduce academic outcomes.

Our results also suggest that employment increases diary day sleep on school days, but decreases it on non-school days. These school-day results were unexpected, given both the popular notion that working causes students to sleep less and the simple comparisons of means in Table 1. Perhaps the positive effect of working on school days on sleep is caused by student fatigue due to a heavy schedule of in-class time and work on such days. However, our sensitivity analysis that investigates nighttime sleep rather than diary day sleep finds no

[29] The daily average is calculated by multiplying the school day time by 5/7 and the non-school day time by 2/7 and summing the two products.

statistically significant effect of work on sleep on school days, suggesting that how sleep is measured is important. Predictions from our models for diary day sleep and screen/game time can be compared to recommendations from the National Sleep Foundation and the American Academy of Pediatrics. In Table 8, we show the average predictions for different groups based on whether or not a student worked during the previous week, whether a student worked on the diary day, and whether or not the diary day was a school day. The National Sleep Foundation (2010) recommends that teenagers get 8.5–9.25 hours of sleep per night. On school days, employed students and students working on the diary day sleep more than the recommended amount, on average. However, other students sleep less than the recommended amount. On non-school days, only those students who worked on those days sleep less than the recommended amount.

With respect to screen time, the American Academy of Pediatrics (Elsevier Health Sciences 2008) recommends no more than two hours of TV and video games per day. On school days, the average time spent on these activities is about the recommended two hour limit for those who are not employed, but higher for those who are employed. However, on non-school days, those students who are not employed and those who are employed but are not working on their diary day spend considerably more than the recommended time on these activities while students who work on non-school days spend much less time on these activities. These predictions suggest that student work, at least work done on the non-school days, may have the beneficial effect of reducing time spent on these unproductive activities.

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Table 1. Incidence and Intensity of Activities by Teens

Activities	Percent Participating	Average Daily Minutes	Average Daily Minutes by Employment Status			
			Employed Previous Week	Not Employed Previous Week	Worked on Diary Day	Did Not Work on Diary Day
School Day Sample (N = 1,420)						
Work	14%	32.33	97.20		235.07	
		(105.40)	(271.50)		(340.77)	
Homework	51%	52.24	42.20	57.25	29.21	55.92
		(80.80)	(135.73)	(99.97)	(157.36)	(89.64)
Sleep	100%	514.51	497.11**	523.18**	486.58**	518.96**
		(144.39)	(232.24)	(181.46)	(339.93)	(157.80)
Screen Time	79%	121.60	105.57**	129.59**	75.14**	129.01**
		(139.97)	(219.31)	(177.91)	(292.27)	(153.73)
Non-School Day Sample (N = 1,607)						
Work	14%	48.74	149.56		353.85	
		(162.59)	(426.54)		(507.52)	
Homework	29%	40.79	39.70	41.32	32.81	42.07
		(94.41)	(145.44)	(121.14)	(185.92)	(105.39)
Sleep	100%	629.93	598.09**	645.33**	575.66**	638.60**
		(170.07)	(280.98)	(207.00)	(395.87)	(183.10)
Screen Time	84%	177.67	139.19**	196.27**	106.38**	189.06**
		(172.53)	(281.52)	(213.07)	(350.80)	(187.59)

Notes: Standard deviations are in parentheses. Averages are weighted. ** = Means significantly different at the 5% level for each employment status definition.

Table 2. Incidence and Intensity of Employment by Teen Demographic Characteristics

	All Teens	Non-Hispanic, Non-Black	Non-Hispanic, Black	Hispanic	Two Parent Household	Single Parent Household	Parent Has Bachelor's Degree	Parent Does Not Have Bachelor's Degree
Panel A. *All Days (N =2,954)*								
Not Employed	68%	63%	80%	80%	67%	72%	69%	68%
Employed 1-20 Hours/Week	23%	**28%**	**12%**	**14%**	**25%**	**19%**	25%	22%
Employed >20 Hours/Week	8%	9%	8%	6%	8%	9%	**6%**	**10%**
Panel B. School Days (N = 1,420)								
Did Not Work on Diary Day	86%	**84%**	88%	**92%**	86%	87%	87%	86%
Work <= 4 Hours/Day	7%	**9%**	5%	**5%**	8%	7%	7%	8%
Work > 4 Hours/Day	6%	**7%**	7%	**3%**	7%	6%	6%	7%
Panel C. Non-School Days (N = 1,607)								
Did Not Work on Diary Day	86%	**84%**	**93%**	**91%**	86%	86%	87%	85%
Work <= 4 Hours/Day	3%	**4%**	**1%**	**0%**	3%	3%	3%	3%
Work > 4 Hours/Day	10%	**12%**	**6%**	8%	10%	11%	9%	11%

Notes: Reported usual weekly hours are used for Panel A. Some teens did not report usual hours so the sample used for Panel A is slightly smaller than the sum of the observations for school days and non-school days combined. Daily time use data are used for Panels B and C. Survey weights are used. Percentages in bold are statistically significantly different at the 5% level for each demographic characteristic. For race/ethnicity, the comparison is to non-Hispanic, non-black.

Table 3A. Effects of Employment during Previous Week on Daily Time Use

	School day sample				Non-school day sample			
	Probit[1] Employed	Tobit Homework	Non-censored Sleep	Tobit Screen	Probit Employed	Tobit Homework	Non-censored Sleep	Tobit Screen
Employed previous week		-96.06***	148.07***	-26.09		-120.29**	-148.22***	-225.24***
		(34.11)	(21.60)	(63.46)		(53.91)	(40.14)	(38.53)
		[-45.12]		[-20.30]		[-33.91]		[-164.98]
State unemployment rate	-0.05*				-0.09***			
	(0.03)				(0.03)			
	[-0.02]				[-0.03]			
Minimum driving age					-0.13			
					(0.11)			
					[-0.04]			
σ		125.24***	148.57***	147.44**		214.68***	151.05***	190.67***
		(5.37)	(7.22)	(4.63)		(11.21)	(6.79)	(8.35)
Correlation coefficients:								
ρ(Employed, Homework)	0.34**				0.34**			
	(0.16)				(0.14)			
ρ(Employed, Sleep)	-0.70***				0.45***			
	(0.06)				(0.14)			
ρ(Employed, Screen)	0.01				0.51***			
	(0.26)				(0.10)			
ρ(Homework, Sleep)	-0.24***				0.17**			
	(0.07)				(0.06)			
ρ(Homework, Screen)	-0.26***				-0.03			
	(0.06)				(0.07)			
ρ(Sleep, Screen)	0.05				0.14***			
	(0.11)				(0.07)			
P-value for joint significance of excluded variables	0.086				0.005			
Observations	1,420	1,420	1,420	1,420	1,607	1,607	1,607	1,607

Note: Robust standard errors are in parentheses and average marginal effects, calculated for the unconditional expected value, are in brackets. Marginal effects for indicator variables are calculated for a change in value from 0 to 1. Regressions also include an intercept and controls for the number of siblings under age 15, living in a single-parent household, gender, age, race/ethnicity, region, season, lives in SMSA, and a parent has a bachelor's degree. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

[1]The state minimum driving age was not included in the employed probit for the school day sample because the model would not converge with it.

Table 3B. Effects of Worked on the Diary Day on Daily Time Use

	School day sample				Non-school day sample			
	Probit Worked	Tobit Homework	Non-censored Sleep	Tobit Screen	Probit Worked	Tobit Homework	Non-censored Sleep	Tobit Screen
Worked on diary day		-136.59***	165.76***	-46.38		-191.95***	-202.15***	-253.33***
		(22.79)	(15.29)	(41.76)		(53.58)	(28.86)	(26.05)
		[-50.19]		[-33.24]		[-42.49]		[-162.16]
State unemployment rate	-0.06*				-0.08**			
	(0.03)				(0.03)			
	[-0.01]				[-0.02]			
Minimum driving age	-0.09				-0.05			
	(0.11)				(0.12)			
	[-0.02]				[-0.01]			
σ		125.36***	143.41***	146.43***		218.89***	151.66***	184.27***
		(4.50)	(4.87)	(4.63)		(12.31)	(4.73)	(5.43)
Correlation coefficients:								
ρ(Worked, Homework)	0.42***				0.49***			
	(0.09)				(0.12)			
ρ(Worked, Sleep)	-0.77***				0.55***			
	(0.04)				(0.09)			
ρ(Worked, Screen)	-0.08				0.47***			
	(0.15)				(0.06)			
ρ(Homework, Sleep)	-0.24***				0.19***			
	(0.04)				(0.05)			
ρ(Homework, Screen)	-0.29***				-0.03			
	(0.04)				(0.05)			
ρ(Sleep, Screen)	0.07				0.12***			
	(0.06)				(0.04)			
P-value for joint significance of excluded variables	0.087				0.037			
Observations	1,420	1,420	1,420	1,420	1,607	1,607	1,607	1,607

Note: Robust standard errors are in parentheses and average marginal effects, calculated for the unconditional expected value, are in brackets. Marginal effects for indicator variables are calculated for a change in value from 0 to 1. Regressions also include an intercept and controls for the number of siblings under age 15, living in a single-parent household, gender, age, race/ethnicity, region, season, lives in SMSA, and a parent has a bachelor's degree. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 4. The Effects of Employment/Working on Time Use for 16- to 18-year-olds

	School day sample			Non-school day sample		
	Tobit Homework	Non-censored Sleep	Tobit Screen	Tobit Homework	Non-censored Sleep	Tobit Screen
Employed previous week	-100.98***	160.65***	-60.89	-133.65**	-191.04***	-253.09***
	(37.912)	(22.44)	(61.94)	(54.55)	(34.089)	(34.10)
	[-47.10]		[-44.57]	[-39.94]		[-182.71]
P-value for joint significance of excluded variables	0.013			0.011		
Worked on diary day	-139.21***	170.08***	-53.73	-237.50***	-233.81***	-266.23***
	(25.53)	(17.39)	(56.73)	(58.79)	(23.84)	(28.85)
	[-50.85]		[-38.13]	[-54.63]		[-166.73]
P-value for joint significance of excluded variables	0.064			0.030		
Observations	1,041	1,041	1,041	1,193	1,193	1,193

Note: Robust standard errors are in parentheses and average marginal effects, calculated for the unconditional expected value, are in brackets. Marginal effects for indicator variables are calculated for a change in value from 0 to 1. Regressions also include an intercept and controls for the number of siblings under age 15, living in a single-parent household, gender, age, race/ethnicity, region, season, lives in SMSA, and a parent has a bachelor's degree. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 5. The Effects of Employment/Working: Alternative Time Use Definitions

	School day sample				Non-school day sample			
	Homework / Extracurricular	Homework/ Extra/Sports	Night sleep	Screen/ games	Homework / Extracurricular	Homework/ Extra/Sports	Night sleep	Screen/ games
Employed previous week	-161.44***	-162.17***	-45.51	178.84***	-123.46**	-166.09*	-183.44***	-242.71***
	(43.13)	(63.17)	(61.28)	(18.04)	(50.16)	(94.86)	(121.57)	(32.99)
	[-75.25]	[-98.20]		[148.50]	[-37.52]	[-81.62]		[-196.19]
P-value for joint significance of excluded variables	0.024	0.027	0.299	0.041	0.004	0.003	0.012	0.018
Worked on diary day	-143.39***	-215.29***	-52.78	19.21	-215.20***	-270.29***	-142.26*	-308.23***
	(24.58)	(23.32)	(34.15)	(83.80)	(62.21)	(49.07)	(81.13)	(25.84)
	[-56.70]	[-103.59]		[15.15]	[-50.63]	[-102.17]		[-204.82]
P-value for joint significance of excluded variables	0.007	0.029	0.018	0.119	0.014	0.143	0.088	0.086
Observations	1,420	1,420	1,417	1,420	1,607	1,607	1,604	1,607

Note: Robust standard errors are in parentheses and average marginal effects, calculated for the unconditional expected value, are in brackets. Marginal effects for indicator variables are calculated for a change in value from 0 to 1. Regressions also include an intercept and controls for the number of siblings under age 15, living in a single-parent household, gender, age, race/ethnicity, region, season, lives in SMSA, and a parent has a bachelor's degree. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.The state driving age was not included in the employed equation for the night sleep specification for the school day sample and in the worked on the diary day equation for the homework/extracurricular specification for the non-school day sample in order to get these specifications to converge.

Table 6. The Effects of Work Intensity on Teens' Time Use

	School days			Non-school days		
	3 equation model		2 equation model	3 equation model		2 equation model
	Non-censored Sleep	Tobit Screen	Tobit Homework	Non-censored Sleep	Tobit Screen	Tobit Homework
Employed <=20 hours per week	114.56***	-11.61	-33.99	-89.49*	-139.54**	-66.35
	(26.80)	(38.25)	(47.76)	(45.81)	(58.85)	(66.85)
		[-8.78]	[-17.25]		[-109.20]	[-19.36]
Employed >20 hours per week	191.72***	-54.68	-68.35	-142.57*	-262.58***	-114.50
	(50.37)	(65.29)	(81.20)	(80.53)	(102.37)	(116.77)
		[-38.73]	[-31.03]		[-174.94]	[-29.59]
P-value for joint significance of the work intensity variables	0.000	0.186	0.635	0.130	0.032	0.608
P-value for joint significance of excluded variables	0.127		0.063	0.000		0.000
Number of observations	1,387		1,387	1567		1567
Worked <=4 hours on diary day	144.51***	-31.85	-84.80	-122.19***	-118.56***	-63.48
	(15. 94)	(39.67)	(63.32)	(39.21)	(37.77)	(88.38)
		[-23.25]	[-36.29]		[-90.89]	[-16.67]
Worked >4 hours on diary day	172.77***	-55.00	-139.05	-180.76***	-261.58***	-33.56
	(24.36)	(55.60)	(90.78)	(44.31)	(40.52)	(124.39)
		[-38.68]	[-49.01]		[-163.71]	[-9.53]
P-value for joint significance of the work intensity variables	0.000	0.594	0.261	0.000	0.000	0.537
P-value for joint significance of excluded variables	0.081		0.013	0.022		0.222
Number of observations	1,420		1,420	1607		1607

Note: Robust standard errors are in parentheses and average marginal effects, calculated for the unconditional expected value, are in brackets. Marginal effects for indicator variables are calculated for a change in value from 0 to 1. Regressions also include controls for the number of siblings under age 15, living in a single-parent household, gender, age, race/ethnicity, region, season, lives in SMSA, and a parent has a bachelor's degree. In addition, all regressions, except for the ordered probits, include an intercept term. The ordered probits also include the state unemployment rate and the minimum driving age. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Model Including Both Employment Measures

	Tobit Homework	Non-censored Sleep	Tobit Screen
Employed previous week	-10.05	-11.87	-55.13***
	(34.57)	(24.65)	(21.09)
	[-8.76]		[-41.81]
Employed previous week*worked on diary day	-9.88	-44.13**	-140.54***
	(53.57)	(22.40)	(30.59)
	[-8.63]		[-95.49]
P-value for joint significance of employment measures	0.942	0.100	0.000
P-value for joint significance of excluded variables in employed equation		0.000	
P-value for joint significance of excluded variables in worked on diary day equation		0.002	
Number of observations	3,027	3,027	3,027

Note: Robust standard errors are in parentheses and average marginal effects, calculated for the unconditional expected value, are in brackets. Marginal effects for indicator variables are calculated for a change in value from 0 to 1. Regressions also include an intercept and controls for the number of siblings under age 15, living in a single-parent household, gender, age, race/ethnicity, region, season, lives in SMSA, and a parent has a bachelor's degree. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 8. Predicted hours of diary day sleep and screen time based upon employment status, by school day status

	Sleep on diary day		Screen and games	
	School days	Non-school days	School days	Non-school days
Employed	10.16	8.82	**4.44**	1.83
Not Employed	**7.7**	11.29	1.97	**5.10**
Working	10.92	**7.56**	**2.69**	0.93
Not Working	**8.15**	10.93	**2.43**	**4.34**

Note: Hours in bold are less than the amount recommended by the National Sleep Foundation (2010) for sleep (8.5–9.25) and greater than the two hours recommended limit by the American Academy of Pediatrics (Elsevier Health Sciences 2008) for screen time.

DATA APPENDIX

Table A1. Time Use Variables and ATUS codes

Time Variable	Activities	Codes
Paid Work	Working at main or other job	0501xx
Homework	Research/homework for a class for degree	060301
Extracurricular	Classes for personal interest, extracurricular school activities (except sports), taking other not classified classes, homework for a class taken for personal interest	060102,060199,0602,060302
Sports	Participating in sports, exercise or recreation	1301
Screen	Watching television and movies, using the computer for leisure (except games), surfing the web, participating in a chat room	1230303,120308
Games	Playing computer and board games and cards	120307
Sleep	sleeping	0101xx

Note: The codes correspond to the variables TUTIER1CODE, TUTIER2CODE, and TUTIER3Code in the ATUS activity file.

Table A2. Selected Descriptive Statistics for Covariates

Variable	Mean	Standard Deviation
Number of siblings under age 15	0.74	1.20
State monthly unemployment rate	5.26	1.43
State minimum driver's license age	16.06	0.38
Female	0.49	
Age 15	0.25	
Age 16	0.33	
Age 17	0.31	
Age 18	0.12	
School day	0.70	
Non-black, non-Hispanic	0.68	
Non-Hispanic black	0.14	
Hispanic	0.18	
Single-parent household	0.25	
Parent has bachelor's degree	0.38	
Resides in SMSA	0.83	
Number of Observations	3,027	

Note: Survey weights were used.