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Adolescents' Time Use: Effects on Substance Use, Delinquency and Sexual Activity

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Abstract Using an integration of social control theory and the routine activity perspective, adolescent time use was examined for effects on problem behaviors. We examined a wide variety of time use categories, including homework, extracurricular activities, sports time, alone time, paid work, housework, television watching, as well as indices of family time and peer time, for their effects on heavy alcohol use, cigarette smoking, illicit drug use, delinquency and sexual activity. The study employed a representative household sample of adolescents ($n = 606$) and took into account important sociodemographic factors – gender, age, race (Black and White), and socioeconomic status. The most important predictors of adolescent problem behaviors were family time and peer time. Family time serves as a protective factor

against all five problem behaviors while peer time is a highly significant risk factor for all five problem behaviors.

Keywords Adolescent · Alcohol · Substance use · Delinquency · Time use

Introduction

Adolescents' use of time is an issue of importance to youth, families and society as a whole because the amount of time spent in various activities has been linked to the development of adolescent problem behaviors. Occupying time in constructive ways by participating in extracurricular activities and doing homework, for example, is often viewed by parents and community leaders as a means of preventing

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risky behaviors such as substance use and delinquency. Adolescent time use in shared family and peer experiences may also have profound influences on the development of problem behaviors. A large literature shows that higher levels of family support and cohesion are associated with lower levels of adolescent substance use, delinquency and other negative outcomes (Barnes and Farrell, 1992; Farrell and Barnes, 2000). On the other hand, large exclusive amounts of time spent in unsupervised peer contexts may reinforce or exacerbate adolescent substance use and delinquency. Some theorists see parents and peers as occupying separate domains in the lives of adolescents, with separate impacts on alcohol and other substance misuse (see discussions by Bogenschneider *et al.*, 1998; Farrell and Barnes, 2000; Hawkins *et al.*, 1992). Thus, large amounts of unsupervised time spent with peers at parties, “hanging out” at malls, dating and talking on the phone may contribute to a variety of risky behaviors in adolescents (Osgood and Anderson, 2004).

Although there are popular notions and findings about the relationships between selected aspects of adolescent time use and behavioral outcomes, there is relatively little empirical research documenting the actual amount of time adolescents spend on a wide variety of specific activities and how time allocations considered together are related to multiple problem behaviors in adolescence. Furthermore, there is a lack of empirical research examining whether or not the relationships between time use categories and problem behaviors vary for special population groups, that is males versus females, younger versus older adolescents, Blacks versus Whites, as well as for those of differing socioeconomic statuses. If certain categories of time use have stronger effects on problem behaviors in certain population subgroups, then prevention effects can be more effectively targeted. Using a general population sample of adolescents living in households, the present study is an examination of the relative effects of various categories of time use on heavy drinking, cigarette smoking, illicit substance use, delinquent behaviors and sexual activity while taking into account important sociodemographic factors, namely gender, age, race and socioeconomic status.

Theoretical framework

The organizing theoretical framework for the present study is a synthesis of Hirschi's (1969/2002) social control theory of delinquency and the more recent routine activity perspective for crime and deviant behavior (Cohen and Felson, 1979; Felson and Gottfredson, 1984; Hawdon, 1999; Osgood *et al.*, 1996). Hirschi's social control theory is based on the assumption that deviant behavior occurs when the bond of the individual to conventional society (e.g., school-education, parents) is weak or broken. One of the key elements for de-

veloping the bond to society is *involvement in conventional activities*. According to Hirschi, “a person may be simply too busy doing conventional things to find time to engage in deviant behavior” (1969/2002, p. 22). This is the “idle hands are the devil's workshop” philosophy of the occurrence of deviant behavior. Thus, in Hirschi's theory, conventional activities, such as homework and family activities, today could be labeled *protective factors* that *prevent* problem behaviors in adolescence. Hirschi acknowledges, however, that involvement in many conventional activities may be unrelated to the commission of delinquent acts. These activities include, according to Hirschi, television, sports (basketball, football), hobbies and work around the house. He maintains that these activities are not related to the development of conventional “success goals” (p. 191). Furthermore, what Hirschi calls “leisure time” activities, such as time talking with friends, riding around in an automobile, are positively related to delinquency in his theoretical schema—or in today's nomenclature, these activities are *risk factors* for problem behaviors.

Routine activity theorists (Cohen and Felson, 1979; Felson and Gottfredson, 1984) extended social control theory by arguing that the trends in increased crime rates are related to a greater dispersion of activities away from families and increasing time spent with peers, particularly in unsupervised activities. Crime is viewed as a byproduct of freedom as manifested in routine activities of everyday life. The observed secular decline in time adolescents spent in families and households settings and the increased time spent in adolescent settings is viewed as evidence of a secular decline in social control of youth exerted by parents (Felson and Gottfredson, 1984). Thus, routine social interaction in the family tends to constrain violation of social norms whereas any social processes increasing the proportion of time spent with peers would increase the opportunity for delinquency. This situational approach to delinquency is consistent with Hirschi in that it does not focus on motivations for delinquency but rather focuses on opportunities (i.e., time use) for delinquency provided in everyday life.

Hawdon (1999) further refined the integration of the theory of social control of crime within daily routines by proposing that routine activity patterns (RAPs) be substituted for Hirschi's involvement concept. Hawdon proposed that the social control in a RAP is a function of the visibility (the degree to which the activity is likely to occur in the presence of authority figures) and the instrumentality of the routine (the extent to which activities are directed toward a traditionally acceptable goal). Based on a synthesis of social control and routine activity theories, the following summary of empirical findings is organized into time use indicators which should be protective, neutral, and risk factors for problem behaviors.

Protective time use factors

According to Hirschi's social control theory, school work and school activities serve to strengthen the bond to society and therefore, should be related to less delinquency. In a longitudinal study of school children followed for over ten years, Mahoney (2000) found that participation in school extracurricular activities was related to lower school dropout rates in high school and lower subsequent arrest rates. Zill *et al.* (1995) conducted secondary analyses of several U.S. databases to address the issue as to how teenagers spend free time at their disposal and to test whether or not participation in extracurricular activities reduced the chances that young people would engage in risky behaviors. The study showed that U.S. teenagers had a considerable amount of discretionary time which, for the most part, was not being filled with skill-building activities. For example, 10th graders spent on average only a half hour a day on homework and only a fifth of the students participated in youth groups or organized recreational activities. Students who spent no time in school-sponsored activities were 49% more likely than those who did participate in activities to have used drugs; 35% more likely to have smoked cigarettes and 27% more likely to have been arrested. One notable exception to the rule that extracurricular activities reduced risky behavior in the Zill *et al.* (1995) study was binge drinking. Time in extracurricular activities did not show a significant relationship with alcohol use, although participation in varsity sports was positively related to binge drinking. Similarly, a more recent study in six California schools showed that adolescents who participated in extracurricular activities reported lower levels of smoking and marijuana use but did not report lower levels of alcohol use (Darling, 2005). The positive association between extracurricular activities and alcohol use, which is counter to the theory, needs further investigation in the context of other time use factors and sociodemographic factors.

According to both social control and routine activity theories, positive shared family time should result in less adolescent problem behaviors. Defining family time as time shared by two parents and two target adolescent siblings in activities across seven days, Crouter *et al.* (2004) found that although family time was rare, averaging only about four hours in a seven-day period, parent-child relationships were viewed as warmer and more loving in families with higher levels of family time. The more time families shared at time 1, the less involvement in risky behavior, including drinking and delinquency, two years later. This relationship held for males and females and regardless of social class. The authors note that this study may be one of the only quantitative studies to focus on "family time," that is, time spent by parents and adolescents as a group. In spite of the strengths of the longitudinal design and detailed measures of time use, time use was assessed for only a seven-day period which may or may not

be typical of average time use, and the sample was relatively small (192 families) and ethnically homogenous with all but four families being European American of higher than average socioeconomic status. African American children, for example, are more likely to live in female-headed, single parent families of lower socioeconomic means as compared with White children (e.g., Taylor *et al.*, 1997); yet the question remains whether the relationships between family time and adolescent problem behaviors are different for Black and White adolescents.

In one of the only studies of time use by urban African American youth, Larson *et al.* (2001) reported that 5th–8th grade African American students in a Chicago sample spent significantly more time with their families (including extended families) than a comparison group of European American suburban youth; yet the amount of time spent with friends was about the same in both samples. The authors conclude that these activities with the family may provide opportunities for positive interactions. However, it was noted that the African American sample spent greater time watching television in the context of the family which may have negative effects on reading skills, aggressive behavior and desensitization to violence. Substance use and delinquency were not assessed in this study and thus, it is not known how family socialization experiences were related to these problem behaviors.

Neutral time use factors

Based on social control and routine activity theories, there are no a priori propositions that certain activities such as hobbies, sports time, alone time, paid work, housework or television watching should be predictive of substance use, delinquency and sexual activity. For most of these activities, there is no systematic body of literature related to problem outcomes. There is some evidence that athletes are less likely to use tobacco and marijuana (Miller *et al.*, 2000) yet adolescents who report a strong jock identity are more likely to engage in problem drinking than their non-jock counterparts (Miller *et al.*, 2003). In a U.S. sample of 18–26 year olds, Osgood *et al.* (1996) found no relationship between being active in sports and criminal behavior, heavy alcohol use or other drug use. This same study showed a tendency for time spent relaxing alone to be related to higher levels of deviance although the reason for this finding was not evident.

One activity in this category which has received considerable public debate is television watching among youth. Excessive television watching by adolescents generally has been viewed as developmentally unconstructive resulting in negative impacts, such as lower school performance, changes in perceptions of sexual norms, and increased aggression (Larson, 2001). In a recent Kaiser Family Foundation Study of media among 2,032 youth in the U.S., it was reported that

youth aged 8–18 years average about 3 h per day of watching television and young people aged 15–18 years old spend approximately 2.6 h per day watching television. Although substance use and delinquency were not assessed in this study, the amount of time spent watching television did not vary for youth with high, moderate or low grades in school (Rideout *et al.*, 2005). In a study of time use by adolescents conducted in 12 European countries as well as the United States, Flammer *et al.* (1999) found that television viewing occupied a high proportion (39%) of adolescents' leisure time in all countries. Although there were no measures of delinquency or substance use in this study, the authors found that watching television was not related to their measures of well-being (positive attitudes toward life and self-esteem). Thus, television watching may be a non-productive use of time, yet consistent with Hirschi's theory, there is no clear evidence that it is related to problem outcomes.

Another single time use factor which has received a substantial amount of research and policy attention is paid part-time work among young people. Consequences of paid work among adolescents are often debated. Some argue that part-time work is a good transition to learning responsible adult work roles especially among older adolescents while others show evidence that adolescents who work long hours are prone to substance use, delinquency and a generally unhealthy lifestyle (see reviews by Frone, 1999; Mortimer and Finch, 1996). During later adolescence, a significant portion of young people spend time outside of the family in paid, part-time employment. In fact, in a representative U.S. sample of high school students, about two-thirds of 12th graders worked for pay during the school year and over one-third of the seniors who did work reported working more than 20 h per week (Safron *et al.*, 2001).

In a comprehensive review of empirical studies related to the developmental consequences of youth employment, Frone (1999) reported that employment status per se (that is, working versus not working) was not appreciably related to various developmental outcomes, including academic performance, educational attainment, family and behavioral outcomes. There was consistent evidence, however, that working many hours per week increases the likelihood of substance use and delinquency (Frone, 1999). A large longitudinal study of school students in Minnesota showed that students who worked at high intensity levels engaged in more alcohol use even when demographic controls and earlier alcohol use were controlled (Mortimer *et al.*, 1996). The alcohol use findings were robust; yet work intensity did not show significant effects on mental health, academic achievement, smoking or school problem behaviors.

Using a U.S. representative national data, Safron *et al.* (2001) showed that work intensity was positively related to all of the drug use measures, including cigarette smoking, alcohol use, binge drinking and marijuana use. However, they

further elucidated these relationships by examining possible mediating factors, especially time in unstructured social activities (i.e., fun/recreation, dates, parties, rides for fun). Unstructured social time use mediated the relationship between work intensity and all of the drug measures, especially for alcohol use and binge drinking. Thus, it is important to examine work time in the context of other time use variables including peer and family time. It is also important to determine if the relationships between work time and problem behaviors applies to all adolescent subgroups or if adoption of early work roles by younger adolescents, for example, may have more negative effects on substance use, delinquency and sexual activity.

Risky time use factors

There is a substantial amount of research documenting the relationship between peer delinquency and problem behavior of adolescents. For example, in two separate samples, Barnes *et al.* (2005) showed that earlier involvement with delinquent peers predicted later alcohol misuse, other drug use and delinquency even after controlling for a number of demographic, individual and parental socialization factors. Nevertheless, there are few studies examining the amount of time spent in various routine peer activities for its effect on problem behaviors regardless of whether or not the peers were involved with problem behaviors. Osgood *et al.* (1996) applied a routine activity perspective to the study of deviant behavior among a U.S. sample of over 1,700 young adults aged 18–26 years old. They hypothesized that opportunities for deviance would be especially prevalent during informal, unsupervised socializing with peers. They further argued that such situations with peers are more conducive to deviance given that no authority figure is present to exert social control in response to deviance. Their measure of unstructured socializing with peers included riding around in a car for fun, getting together with friends informally, going to parties and spending an evening out for fun. Their deviant behaviors included criminal behaviors, heavy alcohol use, marijuana use, use of other illicit drugs and dangerous driving. They found consistent positive associations between the four unstructured activities and the five deviant behaviors. This study, however, did not measure potential protective effects of family time on adolescent problem behaviors. Also given that peer influences may increase during adolescence, it is important to examine the relative effects of peer time on problem behaviors for younger as well as older adolescents.

Research questions

To augment findings from past research on time use and adolescent outcomes, the present study examines the amount of time spent in various activities for their relative effects

on heavy drinking, cigarette smoking, illicit drug use, delinquency and sexual activity. This study includes diverse time use domains including homework, extracurricular activities/hobbies, sports time, alone time, paid work, housework, television, as well as family and peer activities. Furthermore, because the relationships between time use categories and problem behaviors may vary by age, gender, racial and socioeconomic groups, these factors are taken into account. More specifically, the research questions for the present study are:

1. How many hours per week do adolescents spend in various activities, including homework, extracurricular activities/hobbies, sports time, alone time, paid work, housework, television watching, family time and peer time; and how do these time allocations vary according to gender and race?
2. Which time use allocations predict problem behaviors after accounting for gender, age, race and socioeconomic status? More specifically, based on the synthesis of control and routine activity theories, it is hypothesized that homework and family time will be negatively related to heavy drinking, cigarette smoking, illicit drug use, delinquency and sexual activity; it is hypothesized that extracurricular activities/hobbies, sports time, alone time, paid work, housework/sibling care and television watching will have no significant relationships to the five problem behaviors; and it is hypothesized that peer time will be positively related to all five problem behaviors.
3. Do the relationships between specific time use categories and problem behaviors vary across gender, age, racial (Black and White) and socioeconomic groups? No specific interaction effects are hypothesized between sociodemographic factors and time use based on the theory. It is hypothesized, however, that family time will buffer the negative effects of peer time, such that the influence of peer time on problem behaviors will be reduced at higher levels of family time compared to lower levels of family time.

Method

Sample

This study is based on data from 606 adolescents interviewed in Wave 3 of a six-wave longitudinal study of the development of alcohol of alcohol misuse and related problem behaviors. Wave 3 data were used because this was the first occasion for which measures of adolescent time use were available. This sample included 332 females (55%) and 274 males (45%), ranging in age from 15 to 18 years old (mean age 16.5 years). The unweighted racial distribution was 181

Blacks (30%) and 425 Whites (70%). Small numbers from other racial groups (1 Native American and 5 Asians) were eliminated from the analysis. Parents' education was an average of 13.4 years and 13.5 years, for mothers and fathers, respectively.

At Wave 1 a sample of 699 13 to 16 year-old adolescents living in Western New York State households with at least one parent was obtained by means of random-digit-dialing telephone procedures. After determining eligibility, face-to-face interviews were carried out with adolescents and parents at approximate yearly intervals between 1989 and 1996. Families were paid \$50 at Wave 1 and \$75 at Waves 2 and 3. Careful followup procedures resulted in a Wave 1 completion rate of 71% of all eligible families. Among Black families, there was a 77% completion rate. The weighted demographic characteristics of the sample closely matched the census characteristics of the population. Over 90% of adolescents were retained in the sample from each wave to the subsequent wave (Barnes *et al.*, 2000).

Measures

Dependent measures

Frequency of drinking 5 or more drinks at a time. Adolescents were asked three separate questions regarding how often they had 5 or more drinks of beer, wine or liquor at a time during the past year. Drinks were defined as a 12 ounce can or bottle of beer; a four ounce glass of wine or a 12 ounce wine cooler; and a 1–1/2 ounce shot of liquor by itself or in a mixed drink. Response choices ranged from 1 (*every day*) to 7 (*never drank 5 drinks of the specific beverage at a time*), with 0 for *do not drink that beverage at all*. For each beverage, these responses were recoded to the midpoints of the frequency intervals; for example, the value 2 (*one or two days a week*) was recoded to 78 times a year. The measure for the beverage having the highest frequency of the three beverages was used as the measure of frequency of drinking 5 or more drinks at a time. A log transformation was also applied to reduce the skewness of the distribution.

Cigarette smoking in the past 30 days. Adolescents were asked if they had ever smoked cigarettes, and if so, how often they had smoked in the past 30 days. The responses to these two questions were combined and recoded on an 8-point scale, ranging from 0 (*never smoked*) to 7 (*2 or more packs per day*).

Illicit drug use. This measure was created by summing the number of times adolescents used any of seven types of illicit drugs (marijuana, hallucinogens, cocaine or crack, glue or inhalants, tranquilizers, “ups” such as speed and pep pills, and “downs” such as barbiturates and sleeping pills) in the past year. Frequency of past year use was assessed using a 7-point scale: 0 (*never used*), 1 (*one time*),

2 (2–3 times), 3 (4–9 times), 4 (10–19 times), 5 (20–39 times) and 6 (40 or more times). These responses were recoded to midpoints of the intervals (for example, the value 3, representing 4–9 times, was recoded to 6.5 times, and the value 6, representing 40 or more times, was recoded to 50 times), and the resulting items were totaled making an index of total illicit drug use in the past year. A log transformation was also applied to reduce the skewness of the distribution.

Delinquency. The measure of delinquency was based on the respondent's self-reports of the frequency of 17 delinquent acts during the past year. The delinquency items were developed in part from the National Youth Survey (Elliott *et al.*, 1989). Items for using alcohol or illicit drugs or having sex were omitted to avoid overlap with the separate outcome measures for alcohol misuse, illicit drug use, and sexual activity. Items included some relatively minor deviance, such as stayed out later than parents said, argued or fought with mother, skipped a day of school without a real excuse, argued or fought with father, to more serious deviance such as ran away from home, taken something of value which did not belong to you, beaten up someone on purpose, used a credit card or check without the owner's permission, and broken into a house, business or car. Response choices ranged across a 6-point scale: 0 (*never*), 1 (*once*), 2 (2–3 times), 3 (4–5 times), 4 (6–9 times) and 5 (10 or more times). The responses were recoded to midpoint values, e.g., the value 4, representing 6–9 times, was recoded to 7.5 times, and the resulting items were totaled together to make an index of delinquency in the past year.

Sexual activity. Adolescents were asked “about how many times have you had sexual intercourse in the last 12 months?” The response was open-ended, i.e., the adolescents stated actual number of times in the last 12 months. To limit the influence of extremely high values, a small percentage of responses greater than 50 were truncated, i.e., recoded to 50. Adolescents were also asked “how many different people have you had sexual intercourse with in your life?” with an open-ended response that ranged from 0 to 45. The measure of sexual activity was then defined as the sum of the two recoded measures.

Predictor measures

Sociodemographic factors. Gender was coded 0 for males and 1 for females. Age at Wave 3 ranged from 15 to 18 years old. Race was a dichotomous variable, with 1 representing Blacks and 0 equal to Whites (as described above). A composite measure of family socioeconomic status (SES) at Wave 3 was constructed as an equal weighted average of family income, mother's education, and father's education, based on parents' reports.

Time use variables. Respondents were asked a series of questions about the frequency and usual number of hours spent per occasion on numerous activities in the past year. The response choices for frequency ranged from 0 (*never*) to 5 (3 or more times a week). Total time spent on each activity was calculated by multiplying frequency by usual number of hours per occasion, and was then converted to number of hours per week to facilitate comparisons (see ranges in Table 1). The activities were: *homework* (including number of hours on weeknights and weekends); *extracurricular activities and individual hobbies* (total hours per week of playing a musical instrument or singing; doing crafts, artwork or sewing; reading books, magazines, or newspapers for pleasure; listening to music; participating in clubs, scouts or other organized activities); *sports time* (total of participation in sports outside of school hours and attendance at sporting events); *relaxing alone*; *paid work* outside the home; *housework or taking care of younger children in the family*; *television watching*; *family time* [total hours per week of going out to dinner with family, doing things or going places with your parent(s) for fun; going to church and church-related programs, family celebrations (calculated at an average of 5 hours per celebration); overnight trips or vacations taken with parents (calculated at 12 h per day of vacation); and number of days eating dinner with the family per week (calculated at 1 h per day)]; and *peer time* (total hours per week of going to movies, getting together with friends informally, going out on dates, going to parties or other social events with friends their age, going to the mall with friends and talking on the telephone with friends). The distributions and ranges of all calculated time use variables were examined for implausibly high values. Such values occurred in only about 1 percent of cases and were recoded to plausible maximum values for each activity as shown in Table 1 listing the ranges for each variable.

Data analysis

Means of all study variables were computed for the entire sample, and were also compared across gender and race groups using ANOVA. Correlations among all study variables were also computed. In order to assess the potential predictive effect of adolescent time use on behavioral outcomes, separate regression analyses were performed for each of the five dependent variables. In the first step, sociodemographic controls (gender, age, race, and SES) were entered. In the second step, all adolescent time use measures for the nine categories of time use were entered simultaneously. Finally, in the third step, product terms between each of the time use measures and gender, age, race, and SES were entered to test for interactions. The interaction between family time and peer time was also tested in this step. Continuous measures were centered before forming the product terms to

Table 1 Means of sociodemographic, adolescent time use, and adolescent behavior measures by gender and by race ($N = 606$)

Measure	Range	Overall mean	Gender		Race	
			Male (<i>n</i> = 274)	Female (<i>n</i> = 332)	Black (<i>n</i> = 181)	White (<i>n</i> = 425)
Sociodemographic measures						
Adolescent age (years)	15–18	16.5	16.5	16.6	16.5	16.6
Mother’s education (years)	6–22	13.4	13.4	13.4	12.9	13.6**
Family income (thousands of \$)	3.5–100	37.6	37.0	38.0	22.8	43.9***
SES composite	1–4	2.6	2.5	2.6	2.2	2.7***
Adolescent time use measures (hours/week)						
Homework	0–48	8.4	7.6	9.1**	8.5	8.4
Extracurricular activities/hobbies	0–60.5	11.7	10.9	12.4	11.5	11.8
Sports time	0–45	5.6	7.9	3.7***	5.7	5.6
Relax alone	0–24	3.2	3.5	2.9*	3.8	2.9**
Paid work	0–70	8.4	9.0	7.9	5.3	9.7***
Housework/sibling care	0–57	6.7	5.2	8.0***	10.9	5.0***
TV	0–84	20.0	19.7	20.2	31.8	15.0***
Family time composite	0.4–50.8	10.2	10.2	10.2	10.9	9.9
Go out to dinner with family	0–12	0.7	0.7	0.7	0.8	0.7
Do things with parents	0–30	1.4	1.3	1.4	1.9	1.1**
Go to church	0–36	1.4	1.2	1.5	2.8	0.8***
Family celebrations	0–2.1	1.4	1.4	1.4	1.4	1.4
Eat dinner with family	0–7	3.3	3.5	3.2	2.8	3.6***
Overnight trips with parents	0–9.7	2.0	2.1	1.9	1.2	2.4***
Peer time composite	0–96	23.3	22.8	23.7	25.6	22.3**
Go to movies	0–12	1.3	1.3	1.3	1.8	1.1***
Get together with friends	0–72	9.1	9.7	8.5*	9.1	9.0
Go out on dates	0–27	3.6	3.1	4.1**	2.7	4.0***
Go to parties with friends	0–18	2.9	3.0	2.8	2.5	3.1
Go to mall with friends	0–18	1.9	1.6	2.1**	2.8	1.4***
Talk on phone with friends	0–36	4.4	4.0	4.8*	6.7	3.5***
Adolescent behavioral measures						
No. days drank 5 + drinks of alcohol past year	0–360	13.9	20.4	8.6***	9.0	16.0*
Cigarette smoking level past month	0–7	1.2	1.2	1.3	0.5	1.5***
Times used illicit drugs past year	0–350	5.0	6.0	4.1	2.4	6.0*
No. of delinquent acts past year	0–553	97.0	104.2	91.0*	70.8	108.2***
Sexual activity score past year	0–95	11.9	13.2	10.8	13.0	11.4
No. times sexual intercourse past year	0–50	9.2	9.3	9.1	9.2	9.2
No. of people had sexual intercourse with in life	0–45	2.7	3.8	1.7***	3.8	2.2***

* $p \leq .05$; ** $p < .01$; *** $p < .001$.

avoid problems with multicollinearity and to make the coefficients more interpretable (Aiken and West, 1991; Jaccard and Turrisi, 2003).

In light of the many product terms tested simultaneously, some control for experimentwise error was desirable. To minimize the probability of Type I errors, i.e., declaring too many spurious results significant, we adopted a conservative strategy in interpreting interactions by interpreting only those interactions that were significant at $p < .01$. We also re-tested these interactions that were significant at $p < .01$ in the models with all product terms simultaneously by re-running regressions to test them individually, and only those product

terms that remained significant at $p < .01$ when tested individually were plotted. Simple slopes for plotting the interactions were then calculated by computer.

Results

Descriptive analyses

Descriptive statistics for all study variables, including the variable ranges, overall means, and means for gender and race are presented in Table 1 to address the first research

question. (The overall sociodemographic characteristics of the sample are summarized above under the sample description.)

Time use – gender and race differences

Of the single time use activities, television watching occupies the greatest proportion of time in the week for 15 to 18 year olds in this sample, with an average time of 20 h per week. Black adolescents watch television twice as much (31.8 h) as White adolescents (15 h). Extracurricular activities and hobbies take the second highest amount of time for a single category of time use with an average of 11.7 h per week. No differences were observed according to gender or race for extracurricular activities and hobbies. Adolescents spend equal time per week on homework (8.4 h) and paid work (8.4 h). Females spend significantly more time on homework than males (9.1 vs. 7.6 h per week) and White adolescents spend more time working at paid jobs than Black adolescents (9.7 vs. 5.3 h per week). Housework and sibling care occupy 6.7 h a week for adolescents with females reporting higher levels than males (8.0 vs. 5.2 h) and Blacks reporting twice the amount of hours per week as Whites (10.9 vs. 5.0 h). Sports time averages another 5.6 hours per week and it shows higher levels for males than for females (7.9 vs. 3.7 h). Time spent relaxing alone averages 3.2 h per week, and is somewhat greater for males than for females (3.5 vs. 2.9 h) and is higher for Blacks than for Whites (3.8 vs. 2.9 h).

After combining six categories of time use in the family, the family composite score shows only about 10 h per week spent in family time. This figure is consistent across gender and race categories. On the other hand, after combining six single peer time use indicators, the data show that adolescents, in an average week, spend twice as much time in peer activities as in family activities (23.3 vs. 10.2 h per week). There are no differences in peer time according to gender, but Blacks spend significantly more time with peers than do Whites (25.6 vs. 22.3 h per week).

Problem behaviors – sociodemographic differences and correlations

For the measure of heavy drinking, adolescents report having five or more drinks at a time on an average of nearly 14 days in the past year (Table 1). Males have significantly higher levels of heavier drinking than females (20.4 vs. 8.6 days) and Whites have more heavy drinking days than Blacks (16.0 vs. 9.0 days). The two other substance use measures, cigarette smoking and illicit drug use, show far lower endorsement than heavy drinking with no observed differences for gender and with Whites showing higher levels of cigarette and illicit drug use than Blacks. Delinquent acts are more frequent

among males than females and more frequent among Whites than Blacks. There are no differences in the overall sexual activity scores for males and females or for Whites and Blacks. The item related to the number of sexual partners, however, does show significantly higher means for males than females and higher levels for Blacks than Whites.

All of the bivariate correlations between the five problem behaviors show highly significant moderate to high correlations with each other (Table 2). The correlations between the five problem behaviors and gender and race reflect the same relationships as shown earlier in the mean differences reported in Table 1. Age is positively related to all problem behaviors except delinquency reflecting the established pattern that delinquency peaks earlier in adolescence (e.g., Windle, 2000) than substance use and sexual activity.

Main effects analyses – prediction of problem behaviors

To address the second research question as to which time use variables predict problem behaviors, Table 3 shows the results of separate multiple regression analyses for each of the five problem behaviors. After taking into account the sociodemographic effects of gender, age, race, and socioeconomic status as well as other time use factors, only a few of the individual time use variables predict problem outcomes. As hypothesized based on Hirschi's theory, time spent on homework is a significant negative predictor of cigarette smoking, illicit drug use, and delinquency. Thus, the more time spent doing homework, the less problem behaviors, except for heavy/binge drinking and sexual activity. Similarly, as hypothesized, the more time spent in family activities, the less occurrence of all five problem behaviors.

Based on the theory, it was further hypothesized that extracurricular activities/hobbies, sport time, alone time, paid work, housework/sibling care and television watching would have no significant relationships to the five problem behaviors. As hypothesized, time spent in paid work, housework and sibling care, and television watching have no significant main effects on any of the five problem behaviors. There are some isolated significant main effects for some of the other time use variables. Involvement in extracurricular activities and hobbies has a modest protective influence on sexual activity. Sports involvement is associated with less cigarette smoking and less illicit drug use. Time spent relaxing alone is a significant ($p < .05$) risk factor for illicit drug use and sexual activity.

Consistent with social control theory and routine activity theory, time spent with peers has a highly significant positive relationship to heavy drinking, cigarette smoking, illicit drug use, delinquency and sexual activity as hypothesized.

Table 2 Correlations among measures of adolescent problem behaviors, demographics, and time use ($N = 606$)

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Log freq. 5 + drinks past year	–																	
2. Cigarette smoking level past month	.45***	–																
3. Log freq. illicit drug use past year	.52***	.48***	–															
4. No. of delinquent acts past year	.30***	.24***	.36***	–														
5. Sexual activity past year	.21***	.22***	.22***	.22***	–													
6. Gender (0 = Male, 1 = Female)	–.15***	.04	–.05	–.08*	–.08	–												
7. Age	.16***	.14***	.08*	–.00	.28***	.04	–											
8. Race/ethnicity (0 = White, 1 = Black)	–.32***	–.28***	–.16***	–.21***	.04	.02	–.04	–										
9. Socioeconomic status (SES)	.05	–.04	–.05	.08	–.09*	.03	.03	–.33***	–									
10. Homework hours/week	–.10*	–.15***	–.16***	–.12**	–.05	.11**	.07	.01	.23***	–								
11. Extracurricular activities/hobbies hours/week	–.04	.06	–.01	–.01	–.04	.07	.08	–.02	.03	.07	–							
12. Sports time hours/week	.01	–.15***	–.12**	.03	–.01	–.34***	–.11**	.01	.01	.01	.05	–						
13. Relax alone hours/week	.00	.02	.09*	.06	.09*	–.09*	–.02	.12**	–.03	–.04	.18***	.02	–					
14. Paid work hours/week	.17***	.16***	.14***	.05	.16***	–.05	.40***	–.17***	.02	–.09*	.02	–.05	–.05	–				
15. Housework/sibling care hours/week	–.16***	–.06	–.09*	–.05	.05	.15***	.05	.29***	–.27***	–.03	.13**	–.11**	–.02	–.08*	–			
16. TV hours/week	–.17***	–.08	–.08*	–.12**	.02	.01	–.09*	.49***	–.31***	–.07	–.00	–.05	.08	–.22***	.34***	–		
17. Family time hours/week	–.21***	–.20***	–.18***	–.17***	–.18***	.00	–.20***	.06	.10*	.10*	.07	.24***	–.03	–.14**	.03	.03	–	
18. Peer time hours/week	.23***	.14*	.20***	.19***	.18***	.03	.06	.11**	–.14**	–.10*	.19***	.17***	.12**	.03	.09*	.12**	.00	–

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3 Results of regression analyses for effects of adolescent time use variables on five problem behaviors using hierarchical (sequential) model building ($N = 606$)

Predictor variables	Freq. of 5 + drinks		Cigarette smoking		Illicit drug use		Delinquency		Sexual activity	
	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.146***		.119***		.048***		.051***		.094***	
Gender (0 = M, 1 = F)		-.15***		.04		-.05		-.08		-.08*
Age		.15***		.13**		.08*		-.01		.29***
Race (0 = W, 1 = B)		-.33***		-.33***		-.20***		-.21***		.03
SES		-.06		-.16***		-.12**		.01		-.08*
Step 2	.107***		.074***		.112***		.092***		.054***	
Homework		-.04		-.10**		-.09*		-.09*		-.00
Extracurricular activities/hobbies		-.07		.04		-.04		-.05		-.10*
Sports		-.05		-.13**		-.16***		.01		.00
Relaxing Alone		.01		.03		.08*		.06		.08*
Paid work		.03		.05		.06		-.01		.06
Housework/sib care		-.07		-.04		-.06		.05		.04
TV		-.03		.06		-.03		-.05		-.01
Family time		-.14***		-.11**		-.10*		-.16***		-.11**
Peer time		.29***		.15***		.24***		.22***		.17***
Main Effects R^2	.253***		.194***		.160***		.143***		.148***	
Step 3										
All interactions	.080**		.069		.054		.069		.090**	
Peer time $\times$ gender										-.16**
Homework $\times$ age										.13**
Work time $\times$ age		-.16**								
Peer time $\times$ race		-.23***		-.21***		-.18**				
Total R^2	.328***		.263***		.214***		.212***		.237***	

Note: In step 3, product terms between each of the time use variables in step 2 and gender, age, race, and SES, and a product term of family time and peer time, were entered into the model. Only those product terms that were significant at $p < .01$, and that also remained significant at $p < .01$ when tested individually, are shown. Main effects are taken into account.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Interaction analyses

The third research question asks whether or not the relationships between specific time use categories and problem behaviors vary across gender, age, race, and socioeconomic categories. In Step 3 of the regression analyses, only six interactions are significant ($p < .01$). There is a gender difference for peer time, such that the positive relationship between time spent with peers and sexual activity is stronger for males than for females. There is a significant interaction between homework time and age, such that more time spent on homework is associated with less sexual activity for younger adolescents, but not for older adolescents. The observed significant interaction between work time and age for heavy drinking shows that there is a strong positive relationship (i.e., a steeper slope) between paid work and frequency of consuming five or more drinks for *younger* aged adolescents whereas there is no effect of work on drinking for older adolescents. The last three significant interactions are between peer time and race. For all three substance use variables, the relationships between peer time and race are similar. The effect of time spent with peers has a much stronger influence

on the substance use behaviors for White adolescents than for Black adolescents. None of the interactions between the time use variables and socioeconomic status were significant.

We also hypothesized that family time would interact with peer time to buffer the associations of peer time with each of the problem behaviors. However, the interactions between family time and peer time were not significant in any of the regressions for the five problem behaviors.

In summary, the results of this study support the hypothesis that family time and peer time represent opposite aspects of the social control process. Family time is a protective factor against problem behaviors whereas time spent with peers is a risk factor for problem behaviors. The main effects of family time show no variations with regard to gender, age, race, and socioeconomic status. However, the negative effects of peer time are stronger for males than females with regard to sexual activity and peer influences have a stronger effect on substance use for White adolescents as compared with Black adolescents. No evidence was found for a buffering effect of family time on the associations between peer time and problem behaviors.

Discussion

To extend previous research on time use among adolescents, we examined a wide variety of time use categories, including homework, extracurricular activities/hobbies, sports time, alone time, paid work, housework, television watching, as well as indices of family time and peer time. The contributions of the present study are that an understanding of the effects of adolescent time use on problem behaviors is guided by theory, namely, social control and routine activity theories; the study employs a representative household sample of adolescents with an oversample of Black adolescents; and it simultaneously takes into account a wide variety of time use variables for their effects on five important problem behaviors in adolescence, namely, heavy alcohol use, cigarette smoking, illicit drug use, delinquency and sexual activity. To our knowledge, this is the only study to consider the unique contributions of this range of time use factors, including individual time tasks as well as peer and family time, on a number of related problem behaviors while taking into account important sociodemographic factors and examining potential variations (i.e., interactions) in the effects of time use on problem behaviors according to gender, age, race and socioeconomic status.

The findings show that while single time use variables predict selected problem behaviors, family time and peer time are the most consistent predictors of all five problem behaviors. Family time and peer time represent important aspects of adolescent socialization such that time spent in the family is a protective factor against the development of problem behaviors; whereas the more time adolescents spend in unsupervised peer contexts, the more likely they are to develop substance use and other problem behaviors.

Based on the synthesis of social control and routine activity theories, one of the single task time use variables, i.e., homework, was hypothesized to predict less of all five problem behaviors. While time spent on homework averages only slightly more than an hour per day (or 8 h per week), it is associated with less cigarette smoking, less illicit drug use, and less delinquency as predicted by the theory. Homework does not protect against heavy drinking and it has a protective effect on sexual activity only for younger adolescents. Perhaps heavy drinking is not considered to be as deviant as the other behaviors measured and sexual activity is clearly more deviant among younger than older adolescents. Thus, it can be argued that homework, as theorized by Hirschi, is a conventional activity which apparently does strengthen the bond of the adolescent to society and prevent problem behavior in adolescents.

The remaining single task time use variables were hypothesized to have no relationship to problem behaviors and with only some exceptions, this was largely the case. Television is the single time task with the highest average time

spent per week (20 h). Despite the fact that the present study is several years older than the newest media time use study sponsored by the Kaiser Family Foundation (Rideout *et al.*, 2005), the findings for the highest single time use measure, television watching, is basically the same in the two studies. The Kaiser Foundation scientists, in their study of media use among a nationally representative sample of young people, found that 15–18 year-olds spend an average of 2.6 h a day watching TV while the comparable figure in our study is 2.9 h per day. The authors of the Kaiser study indicate that the total amount of time young people spend using media in general has remained the same over the five year period since their earlier study (perhaps indicating a ceiling effect); however, the way young people use media has changed and now includes multi-tasking, i.e., instant messaging while doing homework and watching TV. Our study did not examine multi-tasking. However, television viewing appears to be a universal time use phenomenon among adolescents in the United States as well as in Europe and East Asia (Flammer *et al.*, 1999; Larson, 2001). While television watching may be considered an unproductive use of time by adolescents or as an influence on precocious alcohol use and sexual activity, television viewing does not predict any of the five problem behaviors in the present study; and although Black adolescents spend twice as much time watching television as White adolescents, there are no significant race by television interactions in regard to predicting the problem behaviors considered in this study.

Participation in extracurricular activities and hobbies, the next largest single time use category, is associated with less sexual activity but has no relationship to the other substance use and delinquency behaviors. Unlike these findings, other investigators have found those adolescents who participated in school-based extracurricular activities to have less criminal offending (Mahoney, 2000) and lower levels of smoking and marijuana use (Darling, 2005). Our category of extracurricular activities and hobbies was not limited to school-based activities and we are controlling for other factors. However, we do find sports involvement, as a separate category of activity, to be associated with less cigarette smoking and less illicit drug use. This finding is consistent with findings from a national study of U.S. high school students showing athletes to be less likely than non-athletes to smoke cigarettes and to use illicit drugs (Miller *et al.*, 2000). The present findings regarding sports involvement are also consistent with those of Miller and associates who did not find frequency of sports involvement per se to predict binge drinking; yet identification of oneself as a “jock” did significantly predict binge drinking and alcohol-related social problems (Miller *et al.*, 2003). Miller *et al.* (2003) show that identification as a “jock” may be linked to sports-related social networks which include alcohol-related partying. This distinction between athlete and jock may explain, in part, discrepancies in

the literature regarding the effects of sports involvement on problem behaviors.

While the value of paid work by adolescents has been debated, in this study, work hours does not have a main effect on any of the five problem behavior measures. There is, however, an interesting interaction between paid work and age such that the more time spent in paid work, the more heavy drinking among younger adolescents. These findings fit within the context of some previous research on the consequences of adolescent employment. For instance, Mortimer *et al.* (1996) using a sample of 1,000 9th graders aged 14–15 years old (similarly aged to the younger group in our sample), found that work intensity did not have significant effects on smoking or school problem behaviors with stringent controls, but work intensity did have a robust effect on alcohol use. One of their explanations for this finding was that students who were more invested in work may develop friendships with older fellow workers who initiate them into more adult patterns of recreation.

In a recent rigorous study on links among work intensity, social activities and substance use, Safron *et al.* (2001) found support for both the “time trade-off” theoretical perspective as well as the “precocious development” perspective. The observed relationships between work intensity and drug use (cigarette smoking, binge drinking and marijuana use) was mediated by time spent on unstructured social activities such as dating and hanging out with friends as opposed to time spent on homework and health-related behaviors (e.g., sleeping, exercising). In addition to this evidence supporting the “time trade-off” perspective, there was also support for the precocious development perspective in that the linkages were generally stronger for 8th graders than for the 10th and 12th graders in the sample. In our study, although the bivariate correlations between paid work hours and all three substance use measures are significant, the main effects of work on the substance use variables are not significant when the sociodemographic and other time use factors are taken into account. The significant relationship between work and binge drinking for younger adolescents lends support to the precocious development perspective set forth by Safron *et al.* (2001).

Osgood *et al.* (1996) found that one routine activity which was associated with higher levels of deviance was time relaxing alone. In the present study, relaxing alone is also related to higher levels of illicit drug use and sexual activity. This is consistent with Hirschi’s notion that leisure time of adolescents produces a set of values leading to delinquency; yet this activity does not fit with the routine activity perspective where deviance is associated with unsupervised peer activities. This issue warrants further research to understand the contexts of *alone time*.

Based on social control theory and the routine activity perspective, we hypothesized that family time and peer time

may represent dimensions of the adolescent socialization whereby family time serves as a protective factor against adolescent problem behaviors and peer time serves as a risk factor for increased levels of substance use and delinquency. The findings strongly support this hypothesis. To our knowledge this is the only study which examines the amount of family and peer time jointly while taking into account other time use dimensions and sociodemographic characteristics in a general population sample. Even with stringent controls, family time is negatively associated with all five problem dimensions and peer time is positively related to all five problem dimensions.

The theory presented does not address potential subgroup differences in the relationships between time use and problem behaviors, yet it is important to examine possible differences in population subgroups to guide the development of prevention and intervention strategies. It is noteworthy that there are no variations in the relationships of family time to problem outcomes according to gender, age, race, or socioeconomic status. The implication of this finding is that increasing positive family time may be a strategy to prevent problem behavior in older adolescents across all sociodemographic groupings.

The interaction analyses, however, show that the relationships between peer time and all three substance use measures are stronger for Whites than for Blacks. This finding is not based on a priori hypotheses and warrants more detailed research into the differences in the nature of peer networks for White and Black adolescents. Increased peer time also has a stronger effect on sexual activity of males than for females. For males, time spent in peer settings may disproportionately focus on sexual themes than is the case for female adolescents. This issue also requires further research to develop a better understanding of gendered sexual risks.

Positive time spent with the family may be a means of building family cohesion and supportive relationships between parents and adolescents. Our family time composite included only those variables which were specifically linked to the family such as going out to dinner with the family, doing things with parents for fun and eating dinner with the family. Activities which may or may not be done in a family context, such as television watching or doing chores, were retained as separate items. Interestingly, neither of these two latter activities were related to any of the five outcomes. These findings are generally consistent with those of Crouter *et al.* (2004) who showed that family time is protective against adolescent risky behaviors when it is chosen by family members, but not when it represents a default use of time. Like the Crouter *et al.* study, our finding regarding the effect of family time on problem behaviors holds regardless of gender and socioeconomic status.

Wong (2005), in a recent study of 7th–12th graders in a Western Canadian city, found that family-related activities strengthened the social bond and reduced delinquency while spending time with friends and dating had the opposite effects. Other investigators have likewise shown that time spent in unstructured socializing with peers explained a significant share of variation in rates of delinquency (Osgood and Anderson, 2004) and substance use (Osgood *et al.*, 1996). Our study shows that both family time and peer time, each controlling for the other, are important for predicting substance use, delinquency and sexual activity regardless of time spent on homework, in extracurricular activities, sports or paid work. Although adolescents spend considerably more time with peers than with parents, family time still plays an important role in preventing problem behaviors. No evidence was found, however, for a buffering effect of family time on the positive associations between unsupervised peer time and problem behaviors. Peer influences during adolescence are strong predictors of problem behaviors regardless of family influences. Social policies which encourage parents and adolescents to spend positive social time together and encourage peer socialization within adult-supervised settings may facilitate the prevention of substance use, delinquency and risky sexual behavior in older adolescents.

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