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Supplemental Table 1: Time use item definitions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Variable name** | **How was the item assessed or developed?** | **Response Options** | **Category of Item** |
| Dating | date | On average, how often (if ever) do you go out with a date? | 1="Never" 2="Once a month or less" 3="2 or 3 times a month" 4="Once a week" 5="2 or 3 times a week" 6="Over 3 times a week" | Social/Unsupervised Time |
| Parties | party | How often do you do each of the following?  Go to parties or other social affairs | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Social/Unsupervised Time |
| Time out without a parent | outwoparent | During a typical week, on how many evenings do you go out for fun and recreation? (Don't count things you do with your parents or other adult relatives.) | 1="Less than one evening per week" 2="One evening" 3="Two evenings" 4="Three evenings" 5="Four or five evenings"  6="Six or seven evenings per week" | Social/Unsupervised Time |
| Riding for fun | rideforfun | How often do you do each of the following?  Ride around in a car (or motorcycle) just for fun | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Social/Unsupervised Time |
| Social media | socialmedia | How often do you do each of the following?  Visit social networking websites (like Facebook) | 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Social/Unsupervised Time |
| Visiting friends | friendvisit | How often do you do each of the following?  Get together with friends informally (in your free time) | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Social/Unsupervised Time |
| Sports | sports | How often do you do each of the following?  Actively participate in sports, athletics or exercising | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Recreation |
| Movies | movie | The next questions ask about the kinds of things you might do. How often do you do each of the following? Go to movies | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Recreation |
| Concerts | concert | How often do you do each of the following? Go to music concerts | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Recreation |
| Periodicals | periodicals | Maximum of two questions: How often do you do each of the following? Read magazines; How often do you do each of the following? Read newspapers | 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Recreation |
| Religious attendance | relattend | How often do you attend religious services? | 1="Never" 2="Rarely" 3="Once or twice a month" 4="About once a week or more" | Community |
| Community service | community | How often do you do each of the following?  Participate in community affairs or volunteer work | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Community |
| Time spent working | workhours | On the average over the school year, how many hours per week do you work in a paid job? | 1="None" 2="5 or less hours per week" 3="6 to 10 hours per week" 4="11 to 15 hours per week"  5="16 to 20 hours per week" 6="21 to 25 hours per week" 7="26 to 30 hours per week" 8="More than 30 hours per week" | Work |
| Shopping | shopping | How often do you do each of the following?  Go to a shopping mall | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Recreation |
| Leisure time spent alone | aloneleisure | How often do you do each of the following?  Spend at least an hour of leisure time (free time) alone | 6=”Every day” 5="Almost every day" 4="At least once a week" 3="Once or twice a month" 2="A few times a year" 1="Never" | Social/Unsupervised Time |
| Academic performance | gpa | The next questions are about your experiences in school. Which one of the following best describes your average grade in this school year? | 9="A (93-100)" 8="A- (90-92) 7="B+ (87-89)" 6="B (83-86)" 5="B- (80-82)" 4="C+ (77-79)" 3="C (73-76)"  2="C- (70-72)" 1="D (69 or below)" | Academic |
| Homework | homeworkhours | About how many hours do you spend in an average week on all of your homework including both in school and out of school? | 1="0 hours" 2="1-4 hours" 3="5-9 hours" 4="10-14 hours" 5="15-19 hours" 6="20-24 hours" 7="25 or more hours" | Academic |

Supplemental Table 2: Time use and engagement profiles of US adolescents from 1991 to 2019

|  |  |  |
| --- | --- | --- |
| **Group Number** | **Group Name** | **Group Description** |
| 1 | Low Social / Disengaged | Lower levels of social activities (e.g., social media, parties, visiting friends) and lower engagement in activities like sports, community activities, and other behaviors |
| 2 | Low Social/ Engaged | Lower levels of social activities and higher engagement in activities like sports, community activities, and other behaviors |
| 3 | Workers | Substantial amount of time spent at a paid job |
| 4 | High Social / Disengaged | Higher levels of social activities and lower engagement in activities like sports, community activities, and other behaviors |
| 5 | High Social/  Engaged – More Supervised | Higher levels of social activities and higher engagement in activities like sports, community activities, and other behaviors, but with lower levels of unsupervised social activities (dates, parties, and going out without a parent) |
| 6 | High Social/  Engaged – Less Supervised | High levels of social activities and high engagement in activities like sports, community activities, and other behaviors, but with higher levels of unsupervised social activities (dates, parties, and going out without a parent) |

Supplemental Table 3: Mplus metrics for various k’s

|  |  |  |  |
| --- | --- | --- | --- |
| **Number of Time Use Groups** | **BIC** | **LRT p-value (k vs k-1 groups)** | **Entropy** |
| 2 | 26590083 | - | 0.723 |
| 3 | 26389196 | <.0001 | 0.771 |
| 4 | 26108976 | <.0001 | 0.86 |
| 5 | 26045032 | <.0001 | 0.755 |
| 6 | 25956375 | <.0001 | 0.796 |
| 7 | 25912732 | <.0001 | 0.809 |
| 8 | 25871176 | 1.000 | 0.769 |

Supplemental Table 4: Classification probabilities for the most likely latent class membership by latent class

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Most Likely Latent Class Membership | | | | | |
| Latent  Class | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 0.869 | 0 | 0.052 | 0.072 | 0.003 | 0.002 |
| 2 | 0 | 0.767 | 0.002 | 0.015 | 0.019 | 0.197 |
| 3 | 0.017 | 0.002 | 0.794 | 0.008 | 0.004 | 0.175 |
| 4 | 0.045 | 0.013 | 0.012 | 0.869 | 0.01 | 0.05 |
| 5 | 0.002 | 0.016 | 0.005 | 0.008 | 0.94 | 0.029 |
| 6 | 0 | 0.048 | 0.067 | 0.016 | 0.009 | 0.86 |

Supplemental Table 5: Substance use item definitions

|  |  |  |  |
| --- | --- | --- | --- |
| Item | How was the item assessed or developed? | Response Options | Category of Item |
| Smoking Cigarettes | How frequently have you smoked cigarettes during the past 30 days? | 1="Not at all" 2="Less than one cigarette per day"  3="One to five cigarettes per day" 4="About one-half pack per day" 5="About one pack per day" 6="About one and one-half packs per day" 7="Two packs or more per day" | Cigarette Use |
| Drinking Alcohol | On how many occasions (if any) have you had alcoholic beverages to drink -- more than just a few sips . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Alcohol Use |
| Binge Drinking | Think back over the LAST TWO WEEKS. How many times have you had five or more drinks in a row? (A "drink" is a glass of wine, a bottle of beer, a wine cooler, a shot glass of liquor, a mixed drink, etc.) | 1="None" [includes respondents who reported nonuse] 2="Once" 3="Twice" 4="3 to 5 times" 5="6 to 9 times" 6="10 or more times" | Binge Drinking |
| Smoking Cannabis | On how many occasions (if any) have you used marijuana (weed, pot) or hashish (hash, hash oil) . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Cannabis Use |
| LSD | On how many occasions (if any) have you used LSD ("acid") . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Other Hallucinogens | On how many occasions (if any) have you used hallucinogens other than LSD (like PCP, mescaline, peyote, "shrooms" or psilocybin) . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Crack | On how many occasions (if any) have you used "crack" (cocaine in chunk or rock form) during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Other Cocaine | On how many occasions (if any) have you used cocaine in any other form (like cocaine powder) . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Amphetamines | On how many occasions (if any) have you taken amphetamines on your own -- that is, without a doctor telling you to take them . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Tranquilizers | On how many occasions (if any) have you taken tranquilizers on your own -- that is, without a doctor telling you to take them . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Narcotics | On how many occasions (if any) have you taken narcotics other than heroin on your own -- that is, without a doctor telling you to take them . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Inhalants | On how many occasions (if any) have you sniffed glue, or breathed the contents of aerosol spray cans, or inhaled any other gases or sprays in order to get high . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Steroids | Anabolic steroids are prescription drugs sometimes prescribed by doctors to treat certain conditions. Some athletes, and others, have used them to try to increase muscle development. On how many occasions (if any) have you taken steroids on your own -- that is, without a doctor telling you to take them . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Heroin with needle | On how many occasions (if any) have you taken heroin using a needle . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Heroin without needle | On how many occasions (if any) have you taken heroin WITHOUT using a needle . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Other Injected Substances | On how many occasions (if any) have you taken any drugs other than heroin by injection with a needle (like cocaine, amphetamines, or steroids) . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Other Substances |
| Vaping Nicotine (2017/2018) | On how many occasions (if any) have you vaped NICOTINE . . .  . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions"  5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Vaping Nicotine |
| Vaping Cannabis (2017/2018) | On how many occasions (if any) have you vaped MARIJUANA . . . during the last 30 days? | 1="0 Occasions" 2="1-2 Occasions" 3="3-5 Occasions" 4="6-9 Occasions"  5="10-19 Occasions" 6="20-39 Occasions" 7="40 or More" | Vaping Cannabis |
| Vaping Nicotine (2019) | On how many DAYS (if any) have you vaped NICOTINE . . . during the last 30 days? | 1="0 Days" 2="1-2 Days" 3="3-5 Days" 4="6-9 Days" 5="10-19 Days" 6="20 or More" | Vaping Nicotine |
| Vaping Cannabis (2019) | On how many DAYS (if any) have you vaped MARIJUANA . . . during the last 30 days? | 1="0 Days" 2="1-2 Days" 3="3-5 Days" 4="6-9 Days" 5="10-19 Days" 6="20 or More" | Vaping Cannabis |

Supplemental Figure 1: Variable means by time use group, 1991-2019



\*See Supplemental Table 1 for full time use item descriptions and response options.

Supplemental Figure 2: Variable means by decade, 1991-2019



\*See Supplemental Table 1 for full time use item descriptions and response options.