

**General Documentation for  
Linked ATUS-CPS Supplement Files**

**ATUS-X ([www.atusdata.org](http://www.atusdata.org))**

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## **Introduction**

Linked ATUS-CPS supplement data files are intended to facilitate analysis of time use data from the ATUS with CPS supplement data. The main benefits of the linked files are that the work required to identify ATUS cases for which CPS supplement responses are available has already been performed and weights suitable for analyses of the linked sample have been created. The linked files include all original CPS supplement file data along with ATUS identifiers appended to the CPS supplement records that can be used to merge the CPS supplement data with ATUS data extracted using the ATUS-X system. The files also include adjusted weights, based on original ATUS weights, which are suitable for analysis of the linked data. This document does the following:

- Describes the set of cases included on the linked ATUS-CPS supplement files we have prepared;
- Outlines the linking procedures we employed to create these files;
- Identifies different subsets of the cases on the linked files that may be relevant for different analytic purposes;
- Discusses the procedures used to create the weights we have added to the linked files and the replicate weights made available in a separate file;
- Explains briefly how the ATUS-CPS supplement files may be combined with extracts containing time use variables created using the ATUS-X system; and
- Provides a codebook for the identifier and weight variables we have added to all of the linked ATUS-CPS Supplement files.

## **Cases Included on Linked ATUS-CPS Supplement Files**

The Current Population Survey (CPS) provides the sampling frame for the American Time Use Survey (ATUS). Specifically, the ATUS sample is drawn from the members of households that have completed the 8<sup>th</sup> and final CPS interview for that household. The linked data files we have prepared include three types of people:

1. ATUS sample household members (ATUS respondents, ATUS non-respondents and all members of these individuals' households) who were linked to the CPS supplement;
2. ATUS sample household members for whom it should have been possible to link to the CPS supplement based on the month and year of their final CPS response, but for whom no match could be made, and;
3. CPS supplement respondents who were not in the ATUS sample.

In the CPS, the unit of observation is the physical housing unit. Those resident at an address are interviewed for 4 consecutive months, are out of the sample for the following 8 months, and then are interviewed for another 4 months. If people move in or out of a housing unit, the specific individuals who are interviewed at an address may vary across survey waves. The successive potential interview months are referred to as month-in-sample (MIS) 1, MIS-2, and so on up through MIS-8. Each month, the CPS sample consists of approximately equal numbers of households in MIS-1 through MIS-8. Supplements include households at each stage in the CPS rotation. Some supplement respondents may be just beginning their CPS participation while others may be in their

final month. Consider, for example, the October 2005 Education supplement. Those eligible to complete the October 2005 supplement could complete their MIS-8 interview in October, November, or December 2005 or January 2006 (MIS 8, 7, 6 or 5 in October 2005) or in October, November or December 2006 or January 2007 (MIS 4, 3, 2 or 1 in October 2005). Everyone in an ATUS sample household whose MIS-8 CPS interview was in one of these months is included on the linked files. Most ATUS sample household members with an MIS-8 CPS interview in an appropriate month can be linked to the CPS supplement, but there are always some who cannot be linked.

## **Rationale for Adjusting Analysis Weights**

The ATUS-X weight variable [WT06](#), based on a methodology introduced in 2006, is available for all years of ATUS data. For the sample of ATUS respondents, WT06 is designed to add up to the number of person-days on weekdays and on weekend days during each calendar quarter (i.e., January through March, April through June, July through September or October through December).

Because CPS supplement data are not available for all ATUS respondents, WT06 is not ideal for analyses of linked ATUS-CPS supplement data files. CPS supplement data may be missing for three reasons. First, anyone who moved into the housing unit selected for the CPS sample after the date of the supplement interview would not have had the opportunity to complete the supplement. Second, although the CPS response rate is very high, each month a small fraction of households in the CPS sample do not provide a usable basic CPS response. Households that do not respond to the basic CPS in MIS-8 are not eligible to be selected for the ATUS, but households that did not respond in any or all of MIS 1-7 may be selected if they provide an MIS-8 response. Third, in any month in which there is a CPS supplement, there are some people who respond to the basic CPS questionnaire but not to the supplement. For certain supplements, such as the Annual Social and Economic (ASEC) supplement conducted in March of each year and the Education supplement conducted in October of each year, missing supplement responses are fully imputed. For other supplements, this is not the case.

The weight adjustments we have developed are designed to account for possible differences in the characteristics of those in the linked data set for whom supplement data are available versus those for whom no usable supplement data were obtained. For this purpose, we treat imputed supplement responses as usable responses. A researcher who does not want to include imputed supplement data in his or her analysis may wish to create his or her own weight adjustment factors.

## **Technical Documentation**

### **Linking Procedures**

Links between the ATUS and the CPS supplement records are based both on a set of linking keys and on a comparison of demographic characteristics.

## **Creating Links**

The first step in the record matching process was to use the linking keys available on the files to match ATUS records to CPS supplement records. This procedure is described in detail in the [American Time Use Survey User's Guide](#). Note that the details of the linking keys to be employed differ slightly depending on whether the CPS supplement was conducted prior to May 2004 or during May 2004 or later.

## **Evaluating Links**

Having identified matches based on the linking keys, we compared sex, race and age as recorded in the final month of the CPS (AGE\_CPS8) to that recorded in the CPS supplement month to verify the validity of the match. Cases identified as matches based on the linking keys for which sex, race or age did not match were deemed to be questionable matches. We did not require an exact match for age, both because a person may have had one or two birthdays between the time of the CPS supplement interview and the time of the final CPS interview and because age may be reported with some noise. We therefore required only that age at the time of the final CPS interview agree with what we expected it should be based on the CPS age within plus or minus 2 years. Specifically, someone who was in MIS 5-7 at the time of the supplement interview could have had a birthday between then and the time of the final CPS interview. For these cases, we considered a final CPS interview age between 3 years older and 2 years younger than age reported at the time of the CPS supplement to be a match. Someone who was in MIS 1-4 at the time of the supplement interview would have had at least one birthday and could have had two birthdays between then and the time of the final CPS interview. For these cases, we considered a final CPS interview age between 4 years older and 1 year younger than age reported at the time of the CPS supplement interview to be a good match.

## **Summarizing Links**

The variable PER\_STAT contains information about the quality of any match between the ATUS records and the CPS supplement records. As noted above, cases for which both the linking keys and the demographic variables agree are considered good matches. Cases for which the linking keys agree but one or more of the demographic variables do not are considered questionable matches.

## **Choosing a Sample**

The variable PER\_STAT on the linked data file categorizes individuals according to their sample and response status. As shown in the codebook at the end of this document, there are 19 possible values for PER\_STAT.

## **ATUS and CPS Supplement Respondents**

Most analysts will be interested primarily in linked records for individuals who responded both to the ATUS and to the CPS supplement. PER\_STAT distinguishes among ATUS respondent records that are a good match to a supplement record (both the linking keys and the individual's demographic characteristics match), that are a questionable match to a supplement record (the linking keys correspond but the demographic characteristics do not match) and that do not match any supplement record (no corresponding record based on linking keys).

ATUS interviews generally occur about 3 months after a person's MIS-8 CPS interview. This means that, for individuals in CPS MIS 5-8 at the time of the CPS supplement, the large majority of ATUS responses occur 3 to 6 months following the supplement date. Supplement respondents who were in CPS MIS 1-4 at the time of the supplement and later become an ATUS respondent generally respond to the ATUS 15 to 18 months after the time of the supplement. Only a small fraction of CPS supplement respondents provide ATUS responses in other months. PER\_STAT allows the data user to select records for ATUS respondents that are a good match to CPS supplement responses broken out according to the month of the ATUS response – those in ATUS 3 to 6 months after completing the supplement (PER\_STAT=1, a group that includes most individuals in CPS MIS 5-8 at the time of the supplement interview), those in ATUS 15 to 18 months after completing the supplement (PER\_STAT = 2, a group that includes most individuals in CPS MIS 1-4 at the time of the supplement interview), and those in ATUS in some other month (PER\_STAT=3).

Some researchers may wish to include in their analyses some or all of the individuals responding 3-6 months and/or 15-18 months after their CPS interview whose ATUS linking key variables correspond to those on the CPS supplement file, even though there are discrepancies in the demographic characteristics associated with the two records. If so, they should select cases with PER\_STAT= 4 and/or PER\_STAT=5. Because we have deemed these cases to be questionable matches, no analytic weights are provided for them.

Similarly, some researchers may wish to include cases for which the ATUS response occurred with a lag other than 3-6 or 15-18 months (PER\_STAT=3 or possibly PER\_STAT=6). No analytic weights are provided for these cases. The analytic weights we have constructed for use with the linked data are based on the ATUS estimation weights, which are designed to make the sample of ATUS observations representative of the days during a particular time period. In months for which the linked file includes a significant fraction of ATUS responses, we can adjust the ATUS estimation weights to account for missing CPS supplement records. But for months in which a supplement response was available for only a small fraction of ATUS respondents, it was not feasible to reweight the matched observations to represent the period of interest. Only a small fraction of ATUS respondents for whom a good match can be made between the supplement and the ATUS response fall into this category.

Researchers should note that including ATUS respondents for whom we have not provided analytic weights requires that new analytic weights be created to accurately represent linked file data.

## **ATUS Respondent Household Members and CPS Supplement Respondents**

Some analysts using the linked files may be interested in data on members of ATUS respondents' households. Only one person per household can be an ATUS respondent, but data for other household members may be useful for constructing measures of household characteristics. The variable CASEID identifies the household to which an individual belongs. A second variable, PERNUM, identifies individuals within the household. The ATUS respondent always has PERNUM=1; other household members have higher values for PERNUM. PER\_STAT indicates the quality of any match between these other members of the ATUS household and the CPS supplement records.

## **CPS Supplement Respondents Who Were Not Part of the ATUS**

In addition to records for ATUS sample members and members of their households, the linked files include records for CPS supplement respondents who were not selected for the ATUS sample. These records might be useful, for example, if a researcher wished to determine whether the responses of ATUS sample members to the supplement questions were similar to those given by other supplement respondents.

## **Constructing Your Own Weights**

Researchers who wish to construct their own analytic weights taking the ATUS weights as a starting point rather than using those we have created will want to select the full sample of ATUS respondents for the relevant time period. A sample suitable for constructing alternate weight adjustments for the set of individuals responding to the ATUS 3-6 months after completing a given CPS supplement, for example, would include everyone with PER\_STAT=1, 4 or 7. In addition, if the model used to create these adjustment factors will include measures of household characteristics, the researcher also may wish to select the records for other members of these ATUS respondents' households. Information on the date of the MIS-8 CPS interview would be used for this purpose.

It is possible that, rather than starting with the ATUS estimation weights, a researcher might wish to create his or her own independent analytic weights for use with the linked sample. In this case, records for ATUS non-respondents and perhaps also records for members of ATUS non-respondent households would be required. While we do not expect this to be common, we have included records for ATUS non-respondents and members of their households on the linked data file.

## **Creating Weight Adjustments for the Linked Data File**

WT06, the ATUS estimation weight, is the starting point for the weights we have developed for the linked files. WT06 is controlled separately to the number of weekdays and the number of weekend days in a calendar quarter, both for the general population and for selected subpopulations. Because the WT06 values are controlled to the total number of days in a quarter rather than the number of days in each individual month of the quarter, it is not necessarily the case that they will add up exactly to the number of person-days in any 4-month period, such as the 4-month period that falls 3 to 6 months after the date of a particular CPS supplement. Given the way in which they are constructed, however, they should add approximately to that total. To create weight adjustments for the linked data file, we began by defining four separate groups of people among those for whom we found a good match between the ATUS and the CPS supplement file:

- ATUS respondents who completed a weekday diary 3 to 6 months after the CPS supplement of interest
- ATUS respondents who completed a weekend diary 3 to 6 months after the CPS supplement of interest
- ATUS respondents who completed a weekday diary 15 to 18 months after the CPS supplement of interest
- ATUS respondents who completed a weekend diary 15 to 18 months after the CPS supplement of interest

Separate weight adjustment factors were created using propensity score methods for each of these four groups of people. No weight adjustment factors were created for the small number of ATUS respondents whose ATUS interview occurred in other months (e.g., in the 2<sup>nd</sup> month following the date of the CPS supplement or the 7<sup>th</sup> or 8<sup>th</sup> month following the date of the CPS supplement).

We began by defining a dependent variable equal to 1 if CPS supplement data were available for the individual respondent and otherwise equal to 0. We also defined a number of variables that might be related to the probability of obtaining a supplement response – sex (dummy variable for female), race and ethnicity (dummy variables for Hispanic and Black, non-Hispanic), education (dummy variable for less than high school), household composition (dummy variable for whether children present in the home), and age (dummy variables for age 20-24, 25-34, 35-44, 45-54, 55-64 and 65 plus). These are essentially the same explanatory variables used by BLS to develop the original ATUS estimation weights. We then verified that, for each of the categorical explanatory variables, each group we had defined included both people for whom we had supplement data and people for whom we did not. Categories were collapsed if necessary, but this was seldom required.

Our next step was to fit an OLS regression model with the dummy variable for whether we had CPS supplement data for the respondent on the left hand side and the explanatory variables for sex, race and ethnicity, education, household composition and age on the right hand side. Because the dependent variable is categorical, an OLS model is not

strictly appropriate, but the OLS coefficients are simpler to work with and we have verified that our results are not altered in any material way by fitting a probit or a logistic regression.

For each individual, based on their characteristics and the estimated OLS regression coefficients, we then computed the estimated probability,  $P_{hat}$ , that supplement data were available for that person. Our weight adjustment factor equals  $1/P_{hat}$  and the estimation weight included on the linked data file (ADJ\_WGT) equals  $1/P_{hat}$  times WT06, where WT06 is the original ATUS estimation weight.

Researchers who plan to use statistical software procedures designed for use with complex survey data such as the ATUS data also will require replicate weights. In addition to constructing analytic weights as just described, we also have produced a set of replicate weights. These were created by multiplying each of the original ATUS replicate weights by the adjustment factor just described.

### **Combining Supplement Data with Time Use Variables**

The identifier variables CASEID and PERNUM are included on the linked ATUS-CPS supplement data files so that these files can be merged with data files created using the ATUS-X system. CASEID identifies households and PERNUM identifies individuals within households. To link ATUS non-respondents or respondent/non-respondent household members these sample members must be selected for inclusion in your ATUS-X extract.

Suppose, for example, that a researcher was interested in learning about how time spent watching television was related to having been displaced from a job in the recent past. A data file suitable for addressing this question could be created by combining data from the ATUS on time use on the diary day with a linked ATUS-CPS supplement file for one of the CPS worker displacement supplements. A file containing this information could be created as follows:

- Select and download the linked ATUS-CPS supplement file for the displaced worker supplement of interest (for example, the January 2004 supplement). In addition to the supplement data, this file will include CASEID, PERNUM and a few additional variables described below. Drop all cases for which CASEID is missing.
- In the ATUS-X system, select data for the calendar years during which respondents to this supplement could have responded to the ATUS (in this case, 2004 and 2005). Use the ATUS-X system to create a variable equal to time spent watching television on the ATUS diary day. Select CASEID and PERNUM from the list of ATUS-X demographic variables. Create an extract containing the time use variable plus CASEID and PERNUM.
- Sort both the linked ATUS-CPS supplement file and the ATUS-X extract by CASEID and PERNUM, then use a statistical software package to merge them together.

- Assuming that only the records for individuals who responded to the ATUS 3-6 months or 15-18 months after completion of the January 2004 supplement will be used in the analysis, select cases from the merged file for which PERNUM = 1 and (PER\_STAT = 1 or PER\_STAT = 2).

Replicate weight variables are provided in a separate data file. A similar procedure may be followed to link the replicate weight file with the other data needed for the analysis.

### **Variables Included on the Linked File**

Each linked CPS supplement file contains all of the variables collected as part of the basic CPS questionnaire in the supplement month together with all of the responses to the supplement questionnaire. Documentation for the CPS supplement files is produced by the Census Bureau; we provide the original documentation on [our site](#). These files may also be downloaded from the [Census website](#) or from the [National Bureau of Economic Research](#).

The linked files we have created contain several additional variables that we have appended to the end of the CPS supplement file records:

- CASEID** CASEID is an identifying number unique to each ATUS household. CASEID is the same as TUCASEID which is on the public use ATUS files. For user convenience CASEID has been converted to a numeric variable. CASEID is defined only for ATUS sample households.
- LINENO** LINENO is a person line number unique to each person in the ATUS respondent household at the time of the ATUS. LINENO is the same as TULINENO which is on the public use ATUS files.
- PERNUM** PERNUM is constructed to identify uniquely each person within a given ATUS household. It is available for all household members whether they were present in the household at the time of the ATUS, the MIS-8 CPS interview, or both. This is the only line number variable available for each person in every ATUS sample household. The ATUS sample member always has PERNUM = 1. PERNUM is defined only for members of ATUS sample households.
- SET**
- 1 Individual present in both ATUS sample and CPS supplement interview file
  - 2 Individual present in ATUS sample but not CPS supplement interview file
  - 3 Individual present in CPS supplement interview file but not ATUS sample

## **PER\_STAT**

- ATUS respondent with good match to CPS supplement
  - 1 Interviewed for ATUS 3-6 months after supplement date
  - 2 Interviewed for ATUS 15-18 months after supplement date
  - 3 Interviewed for ATUS in some other month
- ATUS respondent with questionable match to CPS supplement
  - 4 Interviewed for ATUS 3-6 months after supplement date
  - 5 Interviewed for ATUS 15-18 months after supplement date
  - 6 Interviewed for ATUS in some other month
- ATUS respondent with no match to CPS supplement
  - 7 Interviewed for ATUS 3-6 months after supplement date
  - 8 Interviewed for ATUS 15-18 months after supplement date
  - 9 Interviewed for ATUS in some other month
- ATUS respondent household member
  - 10 Good match to CPS supplement
  - 11 Questionable match to CPS supplement
  - 12 No match to CPS supplement
- ATUS nonrespondent
  - 13 Good match to CPS supplement
  - 14 Questionable match to CPS supplement
  - 15 No match to CPS supplement
- ATUS nonrespondent household member
  - 16 Good match to CPS supplement
  - 17 Questionable match to CPS supplement
  - 18 No match to CPS supplement
- CPS supplement respondents not in ATUS sample
  - 19 CPS supplement respondent with no ATUS record

**ADJ\_WGT** ADJ\_WGT is a weight intended for analyses of linked ATUS-CPS supplement data created using the methodology described elsewhere in this document. ADJ\_WGT is defined only for individuals with PER\_STAT = 1 or PER\_STAT = 2.

In addition to the linked ATUS-CPS supplement data files, we also have prepared files that contain replicate weights designed for use with the linked ATUS-CPS supplement data. The replicate weights are provided separately rather than as part of the basic linked ATUS-CPS supplement file because files containing them are very large. We created ADJ\_WGT only for records with PER\_STAT = 1 or PER\_STAT = 2, and the replicate weight files include records only for these cases. The variables on the replicate weight files are:

**CASEID** See above.

**LINENO** See above.

**ADJ\_RWT06** The basic ATUS data include 160 replicate weights (RWT06\_1 through RWT06\_160) intended for use in computing appropriate standard errors for estimates based on the ATUS data. A similar set of replicate weights have been created for use with the linked ATUS-CPS supplement data. These 160 variables are named ADJ\_RWT06\_1 through ADJ\_RWT06\_160. Each of these 160 replicate weights is calculated as the product of the corresponding ATUS replicate weight (RWT06\_1 through RWT06\_160) times the same individual-specific adjustment factor used to create ADJ\_WGT.