

What is the impact of recoding travel activities in the American Time Use Survey?

According to data from the American Time Use Survey (ATUS), Americans spent an average of 1 hour and 11 minutes per day traveling in 2012–16. Because there is great interest in how much time people spend traveling for specific purposes—such as commuting—ATUS coders assign a travel purpose after data collection. This article examines how estimates of time spent by travel purpose vary when alternative coding methods are used.

The U.S. Bureau of Labor Statistics American Time Use Survey (ATUS) measures how people spend their time. It is the only federal survey to provide data about the full range of nonmarket activities, such as grocery shopping, socializing, and childcare. One of the many ways people spend time each day is getting from place to place.

ATUS data show that from 2012 to 2016, Americans ages 15 and over spent an average of 1 hour and 11 minutes per day traveling, with 85 percent of the population spending some time in transit. Although ATUS interviewers gather the amount of time spent traveling, they do not ask about the reasons for respondents' trips. Because there is a great deal of interest in the amount of time people spend traveling for different reasons—such as commuting—ATUS uses a rule to assign a purpose for the travel. However, it can be difficult to accurately identify the specific purpose of individual trips because of the complexities of travel behaviors.

This article will explore how the rules that coders use to assign travel purpose affect estimates of time spent in travel by purpose. The first section of this article describes ATUS and explains in detail the ATUS coding rule (subsequently referred to as the “current rule”) for assigning travel purpose. The second section describes shortcomings of the current rule and outlines two alternative methods. The final section presents estimates of travel time derived using the current rule and the alternative methods. There are many possible methods for classifying travel purpose; the intent of this article is not to identify a *correct* method, but merely to examine two potential alternatives to the current rule.



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Coding travel in ATUS

ATUS is a nationally representative, ongoing survey, with telephone interviews conducted nearly every day of the year.¹ One person age 15 or over is surveyed from each sampled household. First, interviewers collect information on a variety of demographic and labor force characteristics. Next, the core part of the ATUS interview, the time diary, begins. Here, respondents sequentially report the activities they completed over a 24-hour period the previous day (referred to as the “diary day”). For each activity, respondents provide a description, duration, location, and list of who they were with. For travel activities, respondents are asked to provide the mode of transportation instead of their location. Respondents are asked only about their main activity for the reported time. Respondents who voluntarily report doing multiple activities simultaneously are asked to identify the main activity. ATUS almost always classifies travel as the main activity, even when travel is done in conjunction with other activities, such as sleeping or reading.²

After the interview is complete, all activities are assigned a six-digit code from the ATUS coding lexicon. The first two digits indicate the major activity classification, such as consumer purchases, eating and drinking, and traveling. For travel activities, the last four digits of the activity code identify the travel purpose. The middle two digits of the activity code identify the broad purpose of the trip, such as travel related to consumer purchases or travel related to eating and drinking. The final two digits of the activity code identify the travel purpose at a more detailed level, such as travel related to grocery shopping. In this article, all estimates and examples show travel purpose at the broad, rather than the detailed, level.³

Identifying travel activities

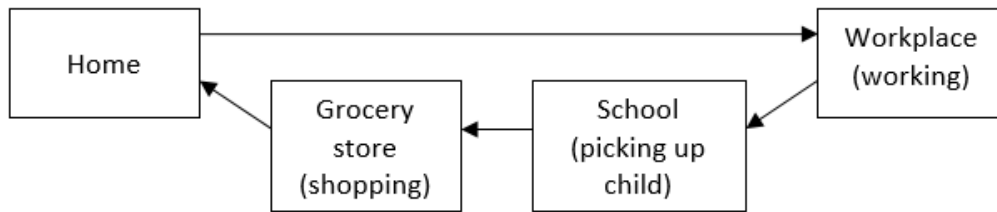
Identifying an activity as travel is fairly straightforward for coders. In ATUS, a travel activity is roughly defined as one in which an individual moves from one address or location to another. Travel to destinations that lack a mailing address, such as a park or a bus stop, may still be considered travel because they take the respondent to a destination for a specific purpose (such as to have a picnic or to wait for the bus). ATUS codes waiting associated with travel, such as waiting for the bus, as a travel activity.

Another way to understand the ATUS travel definition is to observe what is *not* counted as a travel activity. Although walking is considered a legitimate mode of transportation, walking within a home or building is not considered travel because the respondent is not moving from one address to another. Thus, “I walked from my house to the bank” would be coded as a travel activity, but “I walked from my apartment to the basement to do laundry” would not. Likewise, “taking a stroll” and “walking the dog” are not considered travel in the ATUS.

Coding travel purpose

Because of the complexity of travel behaviors, coming up with a way to ensure coders consistently and accurately assign a purpose to each travel activity was particularly challenging for the ATUS development team. Figure 1 shows a sample of a person’s travel during a day. The reason for the trip to work is straightforward because the person went directly from home to work and immediately began working, leaving little doubt as to the purpose of the travel. But the trip from work to home is more complicated; instead of going directly home, the person makes two stops, one to pick up a child and another to shop for groceries. It is far less clear how best to assign a purpose to these travel activities.

Figure 1. Example of an individual's travel activities



Initially, the ATUS development team considered asking respondents directly about the purpose of their travel. However, cognitive testing revealed that respondents often instead reported the purpose of their next *activity*. For example, a question about the purpose of travel to the gym might result in a response of “because I want to lose weight.” The ATUS development team then proposed a rule that required travel purpose be inferred from the *destination*. Thus, “driving to church” could be assumed to be travel related to religious activities. However, the coding lexicon associated travel with *activities* rather than destinations, so coders found it difficult to follow. Specifically, the rule was found inadequate for situations in which the activity performed at the destination did not align with the reasonable inference, such as when a person drove to church to pick up a child.

The rule was modified to address the shortcomings of the earlier proposals. Under the modified approach, travel activities were coded according to the activity performed at the next destination, and a “dwell-time” rule was introduced to address multiple-destination trips. Under the dwell-time rule, coders were instructed to disregard intervening stops of less than 10 minutes. For example, if a person drove to a coffee shop, stopped for 5 minutes to purchase a beverage, and then drove to the office and began working, both the drive to the coffee shop and the drive to the office would be coded as travel related to work because the person stopped at the coffee shop for less than 10 minutes. If, however, the person stopped at the coffee shop for 15 minutes, the first travel activity would be coded as travel related to consumer purchases and the second as travel related to work. This dwell-time rule was tested multiple times and eventually rejected because it was too confusing for coders.⁴

After taking all testing results into account, the ATUS development team finalized the ATUS travel-coding rule. In the final rule, travel activities are coded according to the activity performed at the next destination, regardless of the dwell time at each stop. Thus, if the first reported activity was “driving my car” and the next activity was “working,” the travel activity would be coded as travel related to work. There is one major exception to this general rule: when the travel ends at home, the purpose is coded according to the last activity performed at the previous location. For example, if someone reported “purchasing groceries” and then “driving home,” the travel home would be coded as travel related to consumer purchases. This approach is simple enough for coders to apply consistently and accurately and provides researchers with the flexibility to redefine the trip purpose according to their own definitions.⁵

Possible shortcomings of the ATUS travel-coding rule

The current rule has two major weaknesses: (1) travel purpose codes for some travel activities in multiple-destination trips may appear inaccurate, and (2) the varying amount of activity detail provided by different respondents may lead to coding inconsistencies.

Multiple-destination trips

An example of how the current rule can lead to travel purpose codes that appear inaccurate in multiple-destination trips is illustrated in table 1. This example shows a commute that includes a 1-hour drive, followed by a 10-minute stop for coffee, and then a 5-minute walk to work. Under the current rule, the hour of driving is coded to the next activity, shopping, even though the likely purpose of the drive was travel to the workplace. Under the current rule, just the 5-minute walk is coded to working. While coding travel according to the activity at the next destination eliminates the need for coders to try to guess the primary travel purpose, the assigned reasons for travel may not always be the true purpose of the travel.

Table 1. Example of a multiple-destination trip

Verbatim report	Location	Duration	Activity coded in the ATUS as . . .
Talking with my mother	Respondent's home or yard	1 hour	Socializing and communicating
Driving car	Car, truck, or motorcycle (driver)	1 hour	Travel related to consumer purchases
Buying coffee	Other store/mall	10 minutes	Shopping (store, telephone, Internet)
Walking to work	Walking	5 minutes	Travel related to work
Working	Respondent's workplace	4 hours	Working

Source: U.S. Bureau of Labor Statistics.

Table 2 shows another example of how the current rule can result in travel purpose codes that seem inaccurate. In this example, the respondent stopped to buy gas between two lengthy travel activities. The first travel activity is coded to the next activity—shopping. Because the second trip ended at the respondent's home, it is coded to the previous activity—again, shopping. Thus, the 4 hours of travel time are attributed to consumer purchases, even though socializing and communicating appears to be the likely purpose of the trip. Illogical travel purposes are more likely to be assigned when respondents offer a more detailed account of their day's activities.

Table 2. Example of travel purpose codes that may seem illogical

Verbatim report	Location	Duration	Activity coded in the ATUS as . . .
Visiting sister	Someone else's home	1 hour	Socializing and communicating
Driving car	Car, truck, or motorcycle (driver)	2 hours	Travel related to consumer purchases
Buying gas	Other store/mall	10 minutes	Shopping (store, telephone, Internet)
Driving car	Car, truck, or motorcycle (driver)	2 hours	Travel related to consumer purchases
Preparing dinner	Respondent's home or yard	20 minutes	Food and drink preparation, presentation, and cleanup

Source: U.S. Bureau of Labor Statistics.

Varying level of activity detail provided by respondents

Although interviewers are trained to guide respondents through the time diary, some respondents still offer more detail than others. Respondents' travel may be coded differently depending on how much detail they provide in their interviews, as illustrated in table 3. Respondents A and B both traveled primarily to ski, but their travel purposes are coded differently because respondent B provided a more detailed time diary than respondent A. Respondent A reported skiing immediately after arriving at the ski resort, so the travel activity is coded as travel

related to sports, exercise, and recreation. Respondent B, however, reported purchasing a lift ticket after arriving at the ski resort. Therefore, the travel activity is coded as travel related to consumer purchases.

Table 3. Example of respondents providing varying activity detail in the time diary

Respondent	Verbatim report	Location	Duration	Activity coded in the ATUS as . . .
A	Riding bus to ski resort	Bus	1 hour	Travel related to sports, exercise, and recreation
	Skiing	Outdoors away from home	2.5 hours	Participating in sports, exercise, and recreation
B	Riding bus to ski resort	Bus	1 hour	Travel related to consumer purchases
	Buying ski lift ticket	Outdoors away from home	15 minutes	Shopping (store, telephone, Internet)
	Waiting in line for ski lift	Outdoors away from home	15 minutes	Waiting associated with sports, exercise, and recreation
	Skiing	Outdoors away from home	2 hours	Participating in sports, exercise, and recreation

Source: U.S. Bureau of Labor Statistics.

Alternative methods for coding ATUS travel

When the ATUS development team created the current rule, one of their goals was to provide researchers the flexibility to redefine travel purpose using their own definitions. This section presents two possible alternative methods that researchers might use, detailing advantages and disadvantages of both.

Alternative method 1: dwell time

As mentioned earlier, dwell-time rules require coders to disregard stops of less than a specific duration when assigning travel purpose. There are many ways in which this rule could be implemented. The method described in this article is adapted from the current rule, but with two important differences. First, instead of simply coding travel to the activity done immediately after reaching the destination, the purpose is assigned to the activity that took the *longest* amount of time at each destination. This can result in more consistent coding across individuals who provide varying levels of detail in their time diaries. For example, when this rule is applied to the two respondents in table 3, travel activities for both respondents are coded as travel related to sports, exercise, and recreation. Respondent A did only one activity at the ski resort, so the travel purpose is unambiguously sports-related. Respondent B, however, did three activities at the ski resort—buying a lift ticket, waiting in line, and skiing. Because skiing is the activity with the longest duration, respondent B’s travel is also coded as travel related to sports, exercise, and recreation.

In addition, the dwell-time method used here involves identifying “trip chains,” or travel that is uninterrupted by a stop that exceeds the dwell time. After identifying trip chains, the purpose for travel embedded in a trip chain can be assigned according to the relatively simple rules shown in table 4. A location is identified as a starting or ending point of a trip chain if the individual remained there longer than the allotted dwell time.

Table 4. Rules for recoding trip purpose for trip chains

Starting point	Ending point	
	Home	Not home
Home	Code to the nontravel activity of longest duration on the trip chain	Code to the nontravel activity of longest duration at the ending point
Not home	Code to the nontravel activity of longest duration at the starting point	If starting and ending points are different, code to the nontravel activity of longest duration at the ending point
		If starting and ending points are the same, code to the nontravel activity of longest duration on the trip chain

Source: U.S. Bureau of Labor Statistics.

To better understand how different dwell times can affect coding of travel activities, it is helpful to look at a hypothetical case. Table 5 shows a section of an ATUS time diary that has been recoded using two different dwell times—15 minutes and 30 minutes. In the case of the 15-minute dwell-time rule, there are two trip chains: the first has a starting point of home and an ending point of a restaurant, and the second has a starting point of a restaurant and an ending point of the workplace. The respondent spent more than 15 minutes at each of the three locations—home, restaurant, and workplace—so each is identified as the starting or ending point of a trip chain. All travel in the first trip chain is coded to the activity at the chain's ending point and, therefore, is travel related to eating and drinking. The second chain is a direct trip and is coded as travel related to work.

Recoding activities with a 30-minute dwell-time rule yields a different result. Under this rule, there is only one trip chain—from home to the workplace—because the respondent stayed at the intervening locations for less than 30 minutes. Thus, all travel in the trip chain is coded as travel related to work.

Table 5. Example of ATUS diary recoded using dwell time rules

Verbatim report	Location	Duration	Activity coded as . . .		
			ATUS coding rule	15-minute dwell-time rule	30-minute dwell-time rule
Watching TV	Respondent's home or yard	2 hours	Relaxing and leisure	Relaxing and leisure	Relaxing and leisure
Driving car	Car, truck, or motorcycle (driver)	20 minutes	Travel related to consumer purchases	Travel related to eating and drinking	Travel related to work
Buying bread	Grocery store	10 minutes	Shopping (store, telephone, Internet)	Shopping (store, telephone, Internet)	Shopping (store, telephone, Internet)
Driving car	Car, truck, or motorcycle (driver)	30 minutes	Travel related to eating and drinking	Travel related to eating and drinking	Travel related to work
Eating lunch	Restaurant or bar	25 minutes	Eating and drinking	Eating and drinking	Eating and drinking
Driving car	Car, truck, or motorcycle (driver)	10 minutes	Travel related to work	Travel related to work	Travel related to work
Working	Respondent's workplace	2 hours	Working	Working	Working

Source: U.S. Bureau of Labor Statistics.

The dwell-time rule can yield higher or lower estimates of time spent in travel for any specific purpose relative to those based on the current rule. Estimates may be sensitive to the dwell time selected.

Alternative method 2: anchor method

Another way to recode travel purpose is to define “anchors” and code all travel between certain anchors to a specific purpose. This method can be particularly useful for researchers examining commuting. The anchor method discussed below uses the two anchors generally associated with commuting—home and the workplace.

For direct trips between the home and workplace, both the current rule and the anchor method assign the same codes to travel activities. However, for multiple-destination trips, the anchor method generally codes more travel activities as travel related to work. An example of this is shown in table 6. Here, the respondent spends 1 hour in four separate travel activities. Under the current rule, only one of the four activities is counted as travel related to work. The first three activities are coded to the next activity and are travel related to consumer purchases, travel related to work, and travel related to caring and helping household members, respectively. Because the fourth travel activity ends at home, it is coded to the previous activity and is travel related to caring for and helping household members. By contrast, under the anchor method, all four travel activities are coded as travel related to work.

Table 6. Example of ATUS diary recoded using the anchor method

Verbatim report	Location	Duration	Activity coded as . . .	
			ATUS coding rule	Anchor method
Eating breakfast	Respondent's home or yard	2 hours	Eating and drinking	Eating and drinking
Driving to gas station	Car, truck, or motorcycle (driver)	15 minutes	Travel related to consumer purchases	Travel related to work
Buying gas	Other store/mall	10 minutes	Shopping (store, telephone, Internet)	Shopping (store, telephone, Internet)
Driving to workplace	Car, truck, or motorcycle (driver)	15 minutes	Travel related to work	Travel related to work
Working	Respondent's workplace	8 hours	Working	Working
Driving to child's school	Car, truck, or motorcycle (driver)	15 minutes	Travel related to caring for and helping household members	Travel related to work
Picking up child	School	10 minutes	Caring for and helping household children	Caring for and helping household children
Driving home	Car, truck, or motorcycle (driver)	15 minutes	Travel related to caring for and helping household members	Travel related to work
Eating supper	Respondent's home or yard	1 hour	Eating and drinking	Eating and drinking

Source: U.S. Bureau of Labor Statistics

As with all coding rules, the anchor method has its shortcomings. One danger is that too many travel activities may be coded as travel related to work. For example, if a respondent drove from home to a mall, spent 5 hours shopping, and then stopped by the workplace to pick up a forgotten item before returning home, all travel activities would be coded as travel related to work, even though it is more likely that the travel purpose was largely related to

consumer purchases. Because of situations like this, researchers using anchor methods often incorporate dwell-time and other rules.

With home and workplace as the only two anchors and with no dwell-time rule, the anchor method will always lead to higher estimates of time spent in travel related to work and lower estimates of time spent in other travel purpose categories when compared with the current rule. The estimates of time spent in travel related to work are approximate upper bounds.

Methods

This study relies on data from over 56,000 ATUS interviews over the 2012–16 period. Because many activities did not have location information, some preparation of the files was necessary before travel purpose could be recoded. As mentioned earlier, interviewers asked respondents for the location of each activity, information that is critical in order to implement alternative coding methods. However, location information was not collected for activities in which the question was considered sensitive—specifically, it was not collected for sleeping, grooming, and personal activities. Because almost all respondents reported sleeping on their diary day and because most also reported grooming, about one-fifth of all activities in the 2012–16 data do not have location information.

Missing location information can often be inferred. If a person reported grooming between two activities that occurred at home (without intervening travel), it can be inferred that the grooming also occurred at home. Almost 20 percent of all activities lacking location information occurred between 2 activities with the same location code. Location information is also frequently missing for the first and last activities of the day, when many respondents report sleeping. First and last activity events account for nearly 70 percent of all activities with missing location information, though an activity's location can often be inferred from that of the previous or following activity. However, there are situations in which it is much more difficult to infer location. For example, if a person were sleeping between two travel activities, it is impossible to tell where the activity occurred. The appendix describes the assumptions used when imputing missing location information for this article. The vast majority of missing locations were imputed as the respondent's home.

After missing locations were assigned, travel purpose was recoded under dwell-time rules and the anchor method. Four dwell-time rules were applied, with durations of 15, 30, 45, and 60 minutes.⁶ Under the anchor method, “home” and “workplace” were the only two anchors used.⁷

Results

Table 7 shows travel estimates under the current rule, the four dwell-time rules, and the anchor method. For each of the four dwell-time rules, the estimate of time spent in travel related to work increased relative to that produced under the current rule. The change was most prominent at the 60-minute dwell time—22 minutes, 6 minutes more than the estimate under the current rule. By contrast, the estimate of time spent in travel related to consumer purchases decreased under the dwell-time rules, with the 60-minute dwell time producing an estimate 5 minutes lower than that found under the current rule. Dwell-time rule estimates for time spent in other travel purposes were generally similar to those under the current rule, differing by no more than 2 minutes.

Under the anchor rule, the estimate of time spent in travel related to work was 25 minutes, 9 minutes longer than the estimate based on the current rule. Estimates for time spent in all other travel categories decreased relative to those based on the current rule, though only by 2 minutes or less. This decrease is not surprising because, as mentioned earlier, estimates of time spent in travel related to work are the only travel purpose estimates that can increase under this method.

Table 7 includes estimates for the employed population.⁸ On average, employed people spent slightly more time per day traveling than the overall population—79 minutes versus 71 minutes. Under the current rule, employed people spent an average of 26 minutes per day in travel related to work. This estimate is lower than those found under both alternative methods—35 minutes with a 60-minute dwell time and 39 minutes with the anchor method. By contrast, the current-rule estimate of time spent in travel related to consumer purchases is higher than those found under the alternative methods.

Table 7. Minutes per day spent traveling, ATUS coding rule and alternative coding methods, average for the combined years 2012–16

Activity	ATUS coding rule	Using imputed location codes					Change from ATUS coding rule				
		Dwell-time rule (minutes)				Anchor method	Dwell-time rule (minutes)				Anchor method
		15	30	45	60		15	30	45	60	
Total population											
Travel, total	71	71	71	71	71	71	0	0	0	0	0
Travel related to work	16	19	20	21	22	25	3	4	5	6	9
Travel related to caring for and helping household members	5	3	3	3	3	4	-2	-2	-2	-2	-1
Travel related to consumer purchases	14	12	10	10	9	12	-2	-4	-4	-5	-2
Travel related to eating and drinking	7	7	8	7	6	6	0	1	0	-1	-1
Travel related to socializing, relaxing, and leisure	10	11	11	11	12	9	1	1	1	2	-1
Travel related to sports, exercise, and recreation	3	4	4	4	4	2	1	1	1	1	-1
Other travel	16	15	15	15	16	14	-1	-1	-1	0	-2
Total employed											
Travel, total	79	79	79	79	79	79	0	0	0	0	0
Travel related to work	26	31	32	33	35	39	5	6	7	9	13
Travel related to caring for and helping household members	5	3	3	3	3	3	-2	-2	-2	-2	-2
Travel related to consumer purchases	14	11	9	8	8	10	-3	-5	-6	-6	-4
Travel related to eating and drinking	7	8	8	8	7	6	1	1	1	0	-1
Travel related to socializing, relaxing, and leisure	10	10	10	11	11	8	0	0	1	1	-2
Travel related to sports, exercise, and recreation	3	4	4	4	4	2	1	1	1	1	-1
Other travel	14	13	13	13	13	11	-1	-1	-1	-1	-3

Source: U.S. Bureau of Labor Statistics.

Conclusion

Estimates of time spent in travel-purpose categories change when alternative coding methods are used. However, the new estimates are not dramatically different from those found under the current rule. The travel-purpose estimate with the largest difference, for both the overall population and the employed population, was travel related to work.

While it is possible that the alternative methods produce estimates that more nearly represent reality than the current rule, it is important to keep in mind that ATUS does not ask travel purpose directly. Any coding method merely yields an inference. If asked, respondents would doubtless report very different travel purposes for some travel activities than those inferred by coders. Coding travel purpose is further complicated because people often have more than one reason for traveling, especially for multiple-destination trips. For some situations, it may be an oversimplification to assign a single travel purpose.

The alternative methods examined in this article are by no means the only rules that could be implemented. Other, more sophisticated, coding rules could be applied. However, the results here suggest that, although alternative methods affect the estimates, the overall differences are likely to be relatively small. This article only evaluates differences between the overall and total-employed populations. Examining how the use of different methods affects the estimates for other subpopulations could possibly yield different results.

Appendix. Recoding missing location information

In ATUS, most activities are assigned a location code. If the activity is not a travel activity, a place code is assigned. If the activity is travel, a mode of transportation code is assigned. (See appendix table 1.) However, location is not collected for activities that could be considered sensitive—sleeping, grooming, and personal activities. These account for a considerable share of total activities, leading to a data gap for analyses that rely on location information.

Appendix table 1. ATUS location codes

Place		Mode of Transportation	
1	Respondent's home or yard	12	Car, truck, or motorcycle (driver)
2	Respondent's workplace	13	Car, truck, or motorcycle (passenger)
3	Someone else's home	14	Walking
4	Restaurant or bar	15	Bus
5	Place of worship	16	Subway/train
6	Grocery store	17	Bicycle
7	Other store/mall	18	Boat/ferry
8	School	19	Taxi/limousine service
9	Outdoors away from home	20	Airplane
10	Library	21	Other mode of transportation
11	Other place		
30	Bank		
31	Gym/health club		
32	Post Office		
89	Unspecified place	99	Unspecified mode of transportation

See footnotes at end of table.

Source: U.S. Bureau of Labor Statistics, American Time Use Survey.

For the analysis in this article, missing location codes for nontravel activities (designated as T2) were imputed by evaluating the location codes of the previous activity (T1) and the following activity (T3). Note that in some cases, T1 does not exist—this generally happens when T2 is the first activity of the day. Likewise, T3 does not exist in some cases, generally when T2 is the last activity of the day. In addition, in some cases, multiple sequential activities are missing location codes; in these situations, T1 refers to the most recent nonmissing location code among previous activities and T3 refers to the first nonmissing location code among following activities. Location codes were assigned according to the following rules:

1. T2 was assigned the place code in T1 in the following situations:
 - a. T1 = T3
 - b. T3 does not exist
 - c. T3 is a mode of travel rather than a place code
2. T2 was assigned the place code in T3 in the following situations:
 - a. T1 does not exist
 - b. T1 is a mode of travel rather than a place code
3. T2 was assigned a value of 1 (respondent's home or yard) in the following situations:
 - a. T1 = 1 (respondent's home or yard), T3 = any place code other than home, and T2's activity code = sleeping, grooming, or personal activities
 - b. T1 = any place code other than home, T3 = 1 (respondent's home or yard), and T2's activity code = sleeping, grooming, or personal activities
 - c. T1 does not exist and T3 = mode of travel
 - d. T3 does not exist and T1 = mode of travel
4. T2 was assigned a value of 89 (unspecified place) in the following situations:
 - a. T1 = 1 (respondent's home or yard), T3 = 9 (outdoors away from home), and T2's activity code ≠ sleeping, grooming, or personal activities
 - b. T1 = 9 (outdoors away from home), T3 = 1 (respondent's home or yard), and T2's activity code ≠ sleeping, grooming, or personal activities
 - c. T1 = mode of travel and T3 = mode of travel
 - d. If T2 is still missing following all previous assignments
 - e. If missing T2 was assigned as 9 (outdoors away from home) but T2's activity code = sleeping, grooming, or personal activities

It is important to note that while the imputed location codes under these assumptions are plausible, they may be incorrect. Also, many different imputation rules could have been implemented.

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NOTES

¹ For detailed information about the American Time Use Survey (ATUS), see the ATUS user's guide, at <https://www.bls.gov/tus/atususersguide.pdf>.

² The one exception is for travel that is part of a job, such as a taxi driver transporting customers or a salesperson traveling to meet a potential client. Such travel is coded as working.

³ For information on the ATUS coding lexicons, see <https://www.bls.gov/tus/lexicons.htm>.

[4](#) For more information on the development of the ATUS lexicon and coding rules, see Kristina J. Shelley, “Developing the American Time Use Survey activity classification system,” *Monthly Labor Review*, June 2005, pp. 3–15, <https://www.bls.gov/opub/mlr/2005/06/art1full.pdf>.

[5](#) For more details about how to code specific situations, see ATUS coding rules, 2016, at <https://www.bls.gov/tus/tu2016coderules.pdf>.

[6](#) For this article, some trip chain purposes were not recoded, including certain travel activities that began and ended at the same place. For cases in which the trip chain purpose could not be recoded under the dwell-time rules, the original ATUS travel purpose was retained.

[7](#) For this article, trips in diaries that do not contain the home and workplace anchors were not recoded. Likewise, trips that did not occur between work and home, including those that were coded as travel related to work under the current rule, were not recoded. For example, work-related travel to nonworkplace venues, such as conferences and offsite meetings, may be coded as travel related to work under the current rule. Likewise, trips to the workplace that do not originate at home, such as trips from a relative’s or friend’s home, could be coded as travel related to work under the current rule. Additionally, time spent in midday trips that begin and end at the workplace (for example, going out to lunch) could also be coded as travel related to work.

[8](#) The estimates of average number of minutes per day are computed using data from all ATUS respondents who were employed, including those who did not work on their diary day.

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