

Errors in the Reporting of Activities on the American Time Use Survey

**Brian Meekins, Kathy Downey,
and Scott Fricker**

Office of Survey Methods Research

U.S. Bureau of Labor Statistics

6-14-2010

**Any opinions expressed in this paper are those of the authors and do not
constitute policy of the Bureau of Labor Statistic**



Purpose

- Examine consistency among measurement error indicators in ATUS, especially pattern of activity reports
- Attempt to loosely characterize these indicators by “cause” – recall or fatigue
- Supplement previous research with an examination of previous day’s activities at time of attempt

Background

- Krosnick (1999) – weak & strong satisficing – item nonresponse, rounding/heaping, omissions, etc.
- Also Dixon (2006) examined the propensity to respond and call history by type of activity

Background

- Fricker (2007) - nonresponse, level of effort, and measurement error in the American Time Use Survey (ATUS)
 - ▶ identifies possible patterns in the misreporting of activities by the time of day in which the activities occurred, as well as many other indicators including: DKs, errors, refusal, logical errors, rounding, lower amounts of volunteered information
 - ▶ possible explanations include both recall error and respondent fatigue
 - ▶ Also propensity model & external information

Background: ATUS

- Sample is drawn from CPS Wave 8 completions
- Telephone interview to collect activities from the previous day
 - ▶ From 4 AM previous day to 4 AM interview day
 - ▶ Interview begins with household roster and labor force items, then diary-style recall
 - ▶ Take activities as small as five minutes
 - ▶ Code primary activity (presence of “simultaneous” activity was not used)
- Modules after activities include childcare, volunteering, trips, labor force status, earnings and school enrollment
- Median interview time is 16 minutes

Data

- Data from ATUS 2006 & 2007 sample
- Number of cases in sample
 - ▶ From CPS = 50,145
- Number of cases in CATI call history
 - ▶ 48,319 (1,826 no phone number given in CPS)
- Number of completed interviews
 - ▶ 25,897
- Number discarded by ATUS for data quality concerns
 - ▶ 803
- ATUS oversamples HH with children

CPS and ATUS Differences

- Demographic variables from CPS (sample v. completed interviews)

| Variable Name | Category | CPS | ATUS |
|----------------|--------------------------|------|------|
| Housing Tenure | Owns | 67.8 | 74.7 |
| | Rents | 32.2 | 25.3 |
| Marital Status | Married | 47.1 | 50.8 |
| | Sep, Div, Wid | 25.0 | 25.5 |
| | Never Married | 27.9 | 23.7 |
| HH income | Lowest 25 th | 22.3 | 19.4 |
| | Middle 50 th | 52.9 | 52.6 |
| | Highest 25 th | 24.8 | 28.0 |

CPS and ATUS Differences

| Variable Name | Category | CPS | ATUS |
|---------------|----------|------|------|
| Age | Under 18 | 6.7 | 6.7 |
| | 19 to 30 | 18.7 | 14.1 |
| | 31 to 45 | 32.2 | 31.3 |
| | 46 to 65 | 27.9 | 31.1 |
| | 66 + | 14.4 | 16.8 |
| Race | White | 77.7 | 81.6 |
| | Black/AA | 16.5 | 13.2 |
| | Other | 5.8 | 5.3 |

- Some Error from nonresponse. See Dixon (2006) for detailed examination

ATUS Discards

- Hard to reach has no effect
- Reluctant

| | Reluctant | Not Reluctant |
|-----------|-----------|---------------|
| Discarded | 7.2% | 2.92% |

- CPS income missing

| | Missing | Not Missing |
|-----------|---------|-------------|
| Discarded | 4.9% | 2.8% |

- After discarding (3.1%) & cooperative sample can we identify measurement error?

Number of Activities

- Reluctant

| | Reluctant | Not Reluctant |
|-------------------|-----------|---------------|
| Mean # Activities | 18.5 | 20.0 |

- CPS income missing

| | Missing | Not Missing |
|-------------------|---------|-------------|
| Mean # Activities | 20.0 | 19.2 |

- Seldom have CPS as verifier
- Call history data relationship not well understood

A Different Measure

- It's always good to have more measures
- Little agreement among the current measures.
- Causes of measurement error? Recall, fatigue, something else?

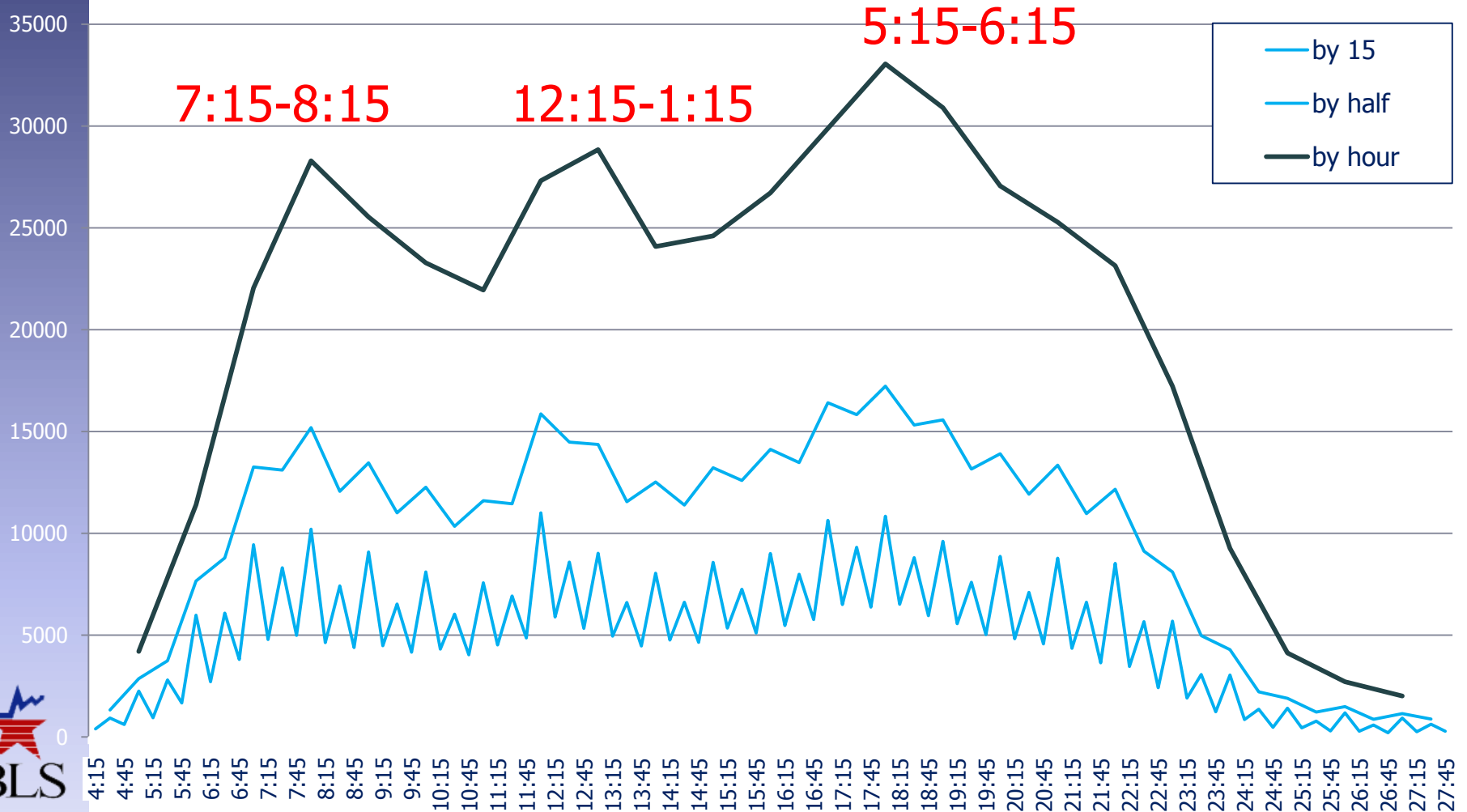
Other Indicators

- DK and Refusals
 - small amount < 1% for each
- Bad Activities: 14.1% (3,508) of R have at least one activity that could not be coded - usually due to refusal
- Disagreements with CPS
 - 23.9% have ref person with different age (expect 8.3%)
 - 11.6% have change in own child present
 - After 1 month, or so

Other Indicators

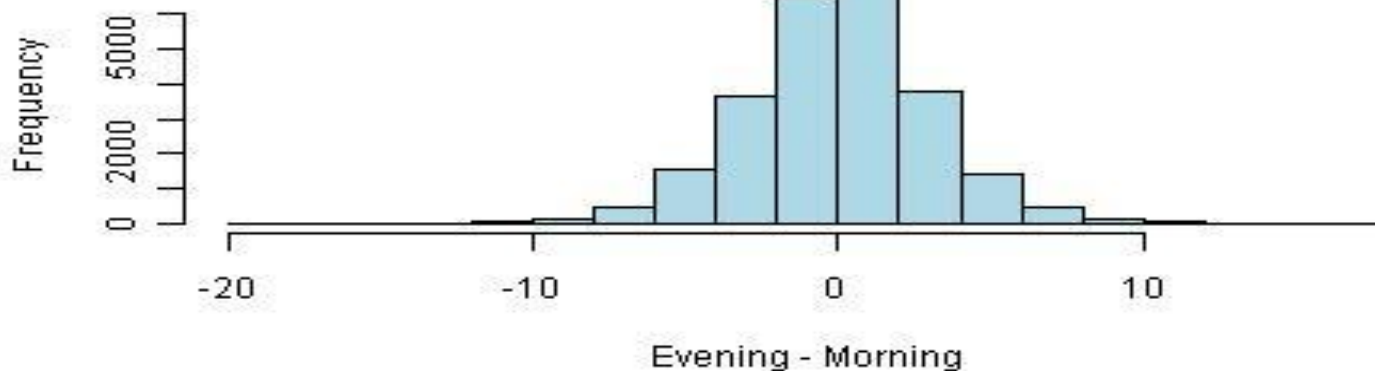
- Rounding of activity times
 - ▶ Mean number of activities rounded to hour = 5.1
 - ▶ Also considered half hour and quarter hour
- Earnings rounded: 21.3%
- Earnings allocated: 8.8%
- Common activities <6: 35.3%
 - ▶ Also number (8.4) and duration
- Child in HH under supervision but no activity: 4.9% but only 1,355 checked

Number of Activities Reported by Time of Day

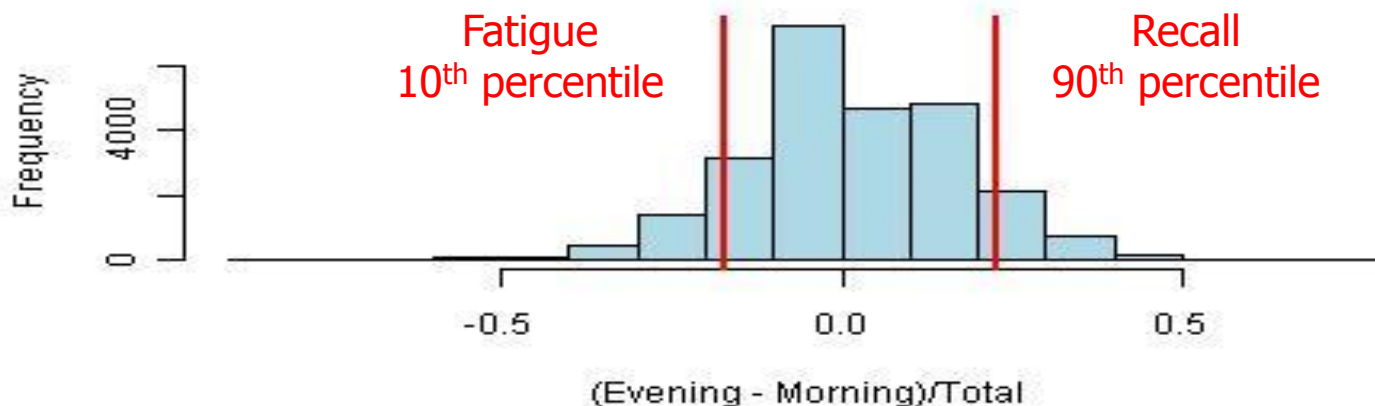


Differences between time of activity

Difference in Evening and Morning Activities

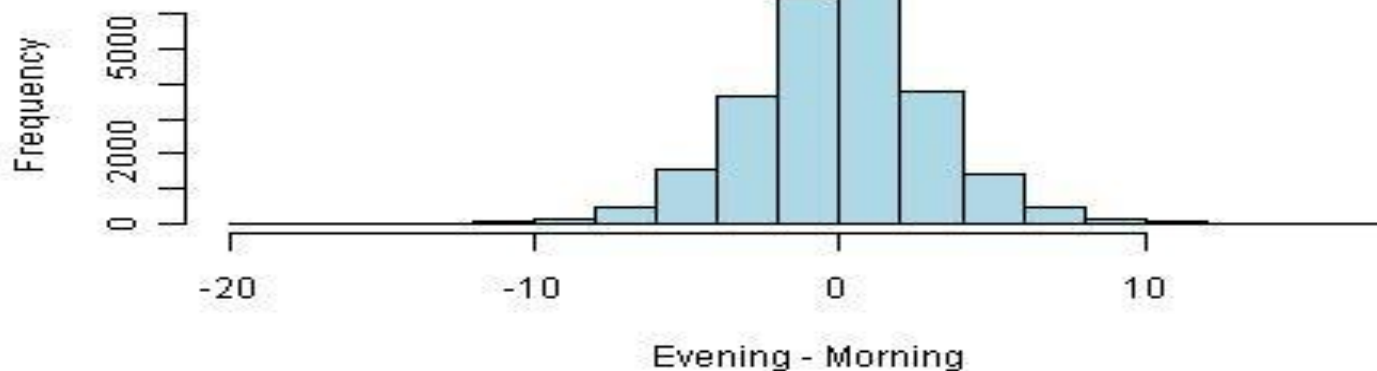


Difference in Proportion of Evening and Morning Activities

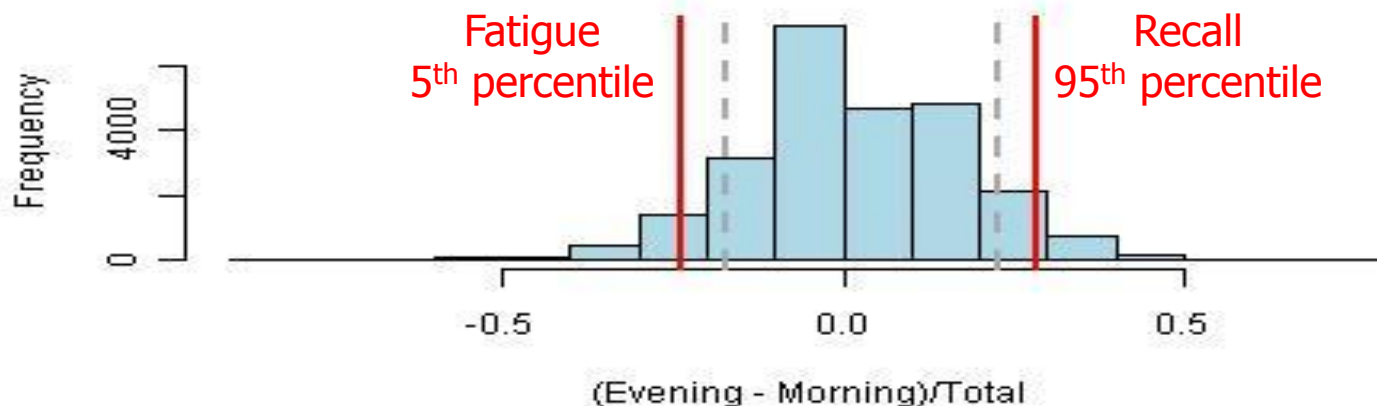


Differences between time of activity

Difference in Evening and Morning Activities



Difference in Proportion of Evening and Morning Activities



Findings – Recall Effect

- Those completing IV later in the day have fewer morning activities in prior day (recall or selection?)

| Activity Distribution | Time of Completion | | |
|--|--------------------|-----------|---------|
| | Morning | Afternoon | Evening |
| Percent in lowest decile Evening-Morning | 20.9 | 16.7 | 15.8 |
| Percent in lowest decile (Evening-Morning)/Total | 15.0 | 12.7 | 11.8 |

Findings – Recall Effect

- Those not working, weekend diary days

| Activity Distribution | Time of Completion | | |
|--|--------------------|-----------|---------|
| | Morning | Afternoon | Evening |
| Percent in lowest decile Evening-Morning | 17.2 | 13.2 | 11.5 |
| Percent in lowest decile (Evening-Morning)/Total | 11.5 | 9.5 | 8.4 |

Findings – Recall Effect

- Flag for low number of common acts
- R with few common activities more likely to be in either tail of distribution

| Activity Distribution | Common acts | |
|---|-------------|-------|
| | ≤ 6 | > 6 |
| Percent in lowest decile or highest decile: (Evening-Morning) | 31.5 | 18.0 |
| Percent in lowest decile or highest decile: (Evening-Morning)/Total | 22.2 | 8.5 |

Findings - Recall Effect

- Those with big mornings are less likely to exhibit differences in CPS and ATUS
 - ▶ Those with big evenings are more likely
- Those with big evenings were more likely to have some logic errors
 - ▶ e.g. no activities for child (when child present)
- Small effects

Findings - Fatigue

- A slightly larger % of those missing CPS income have big mornings – a very slightly smaller % have big evenings

| Activity Distribution | CPS Income | |
|---|-------------|---------|
| | Not Missing | Missing |
| Percent in lowest: (Evening-Morning) | 17.1 | 19.3 |
| Percent in lowest decile: (Evening-Morning)/Total | 12.6 | 15.3 |

- Slightly smaller % of those reporting bad activities have big evenings
 - ▶ Most of these are refusals

Findings - Fatigue

- Hard to reach (contact) is slightly neg related to big morning
- Reluctance (CB and Ref) is somewhat pos related to big morning
 - ▶ Both finding reversed for big evenings

| Activity Distribution | Hard to Reach | | Reluctant | |
|--|---------------|------|-----------|------|
| | No | Yes | No | Yes |
| Percent in lowest: (Evening-Morning) | 18.3 | 15.7 | 15.1 | 21.0 |
| Percent in lowest decile: (Evening-Morning)/Total | 13.3 | 12.0 | 11.9 | 14.6 |

Findings - Fatigue

- Interview time has small positive relationship with big morning
- HH that speak only Spanish are more likely to have big mornings
 - ▶ Cultural? big evening - diff in afternoon

| Activity Distribution | Only Spanish | |
|---|--------------|------|
| | No | Yes |
| Percent in lowest: (Evening-Morning) | 17.4 | 19.4 |
| Percent in lowest decile: (Evening-Morning)/Total | 12.8 | 19.5 |

Conclusions

- Multivariate analysis:
 - ▶ Morning completion, only Spanish, interview time still pos related to bigger mornings
 - ▶ Lack of common acts still pos rel with either tail
 - ▶ The effect of logic errors and differences in CPS & ATUS are somewhat diminished
 - ▶ Reluctant still neg related to big evenings, although for younger the effect is reversed
 - ▶ Refusals on activities still neg related to big evenings
 - ▶ Age, interaction of age and time of day, weekend diary day, education, and sex also related

Conclusions

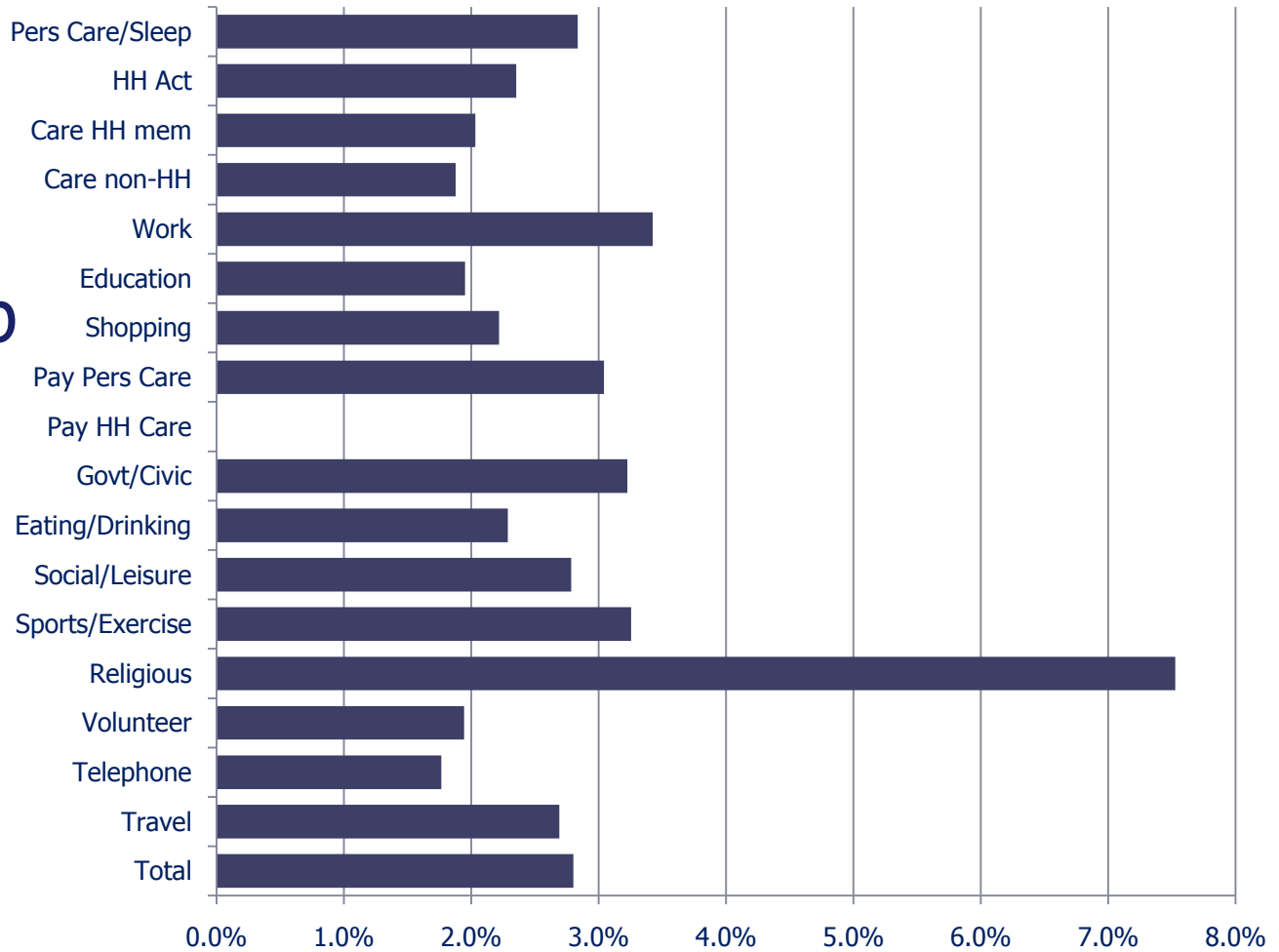
- Pattern of diary reports does seem to indicate measurement error – consistent with some other indicators
- Weak relationships but consistent
- Somewhat stronger evidence for recall effect than fatigue
 - ▶ Fatigue may be difficult to observe in this sample

PRELIMINARY FINDINGS:

**ACTIVITIES FROM SAME
TIME (PREVIOUS DAY) AS
THE TIME OF COMPLETED
INTERVIEW**

Percent of Attempts That Are Refusals By Previous Day Activity

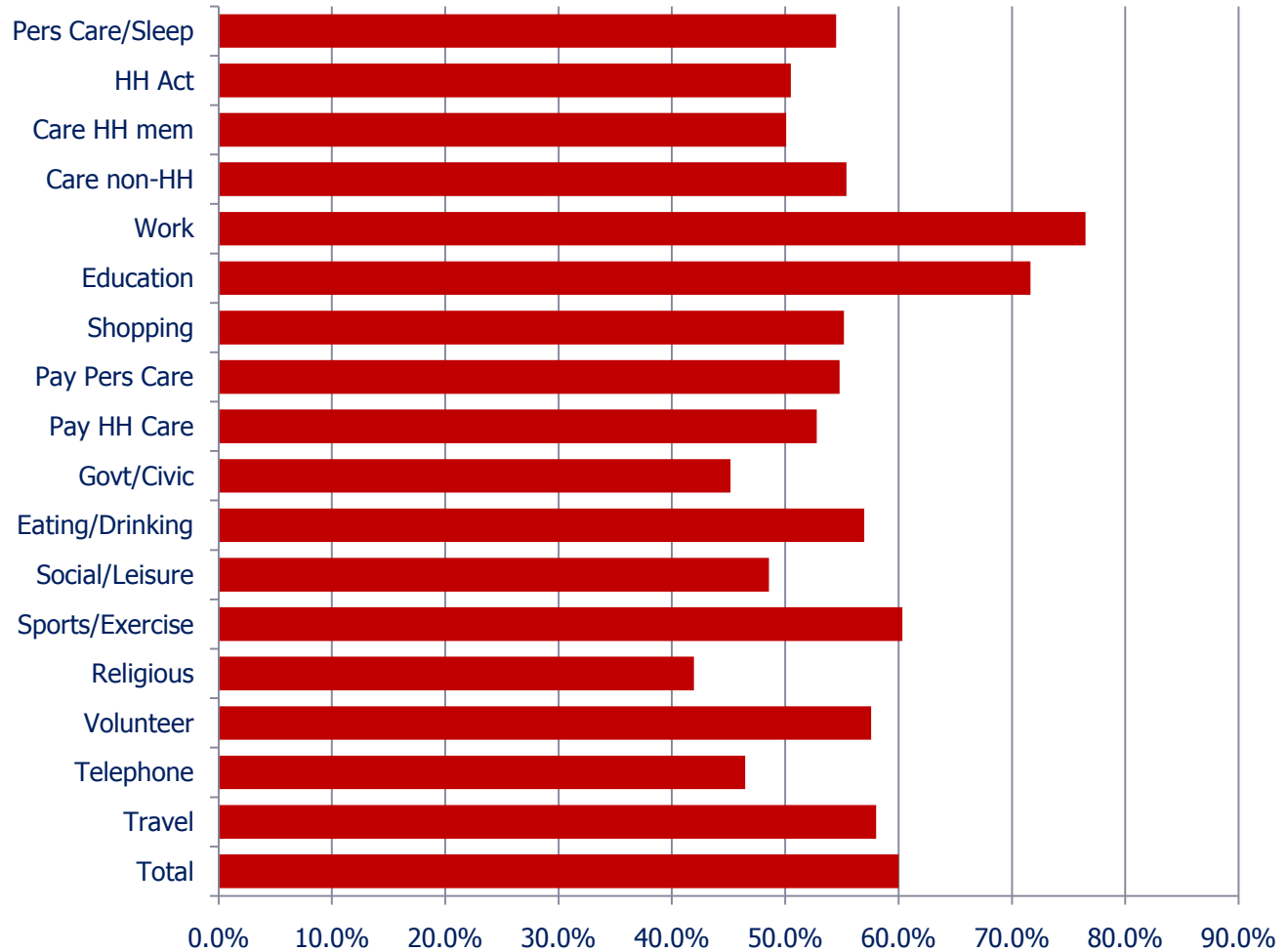
- Religious
- Work
- Personal care/ sleep



N=762

Percent of Attempts That Are Noncontacts By Previous Day Activity

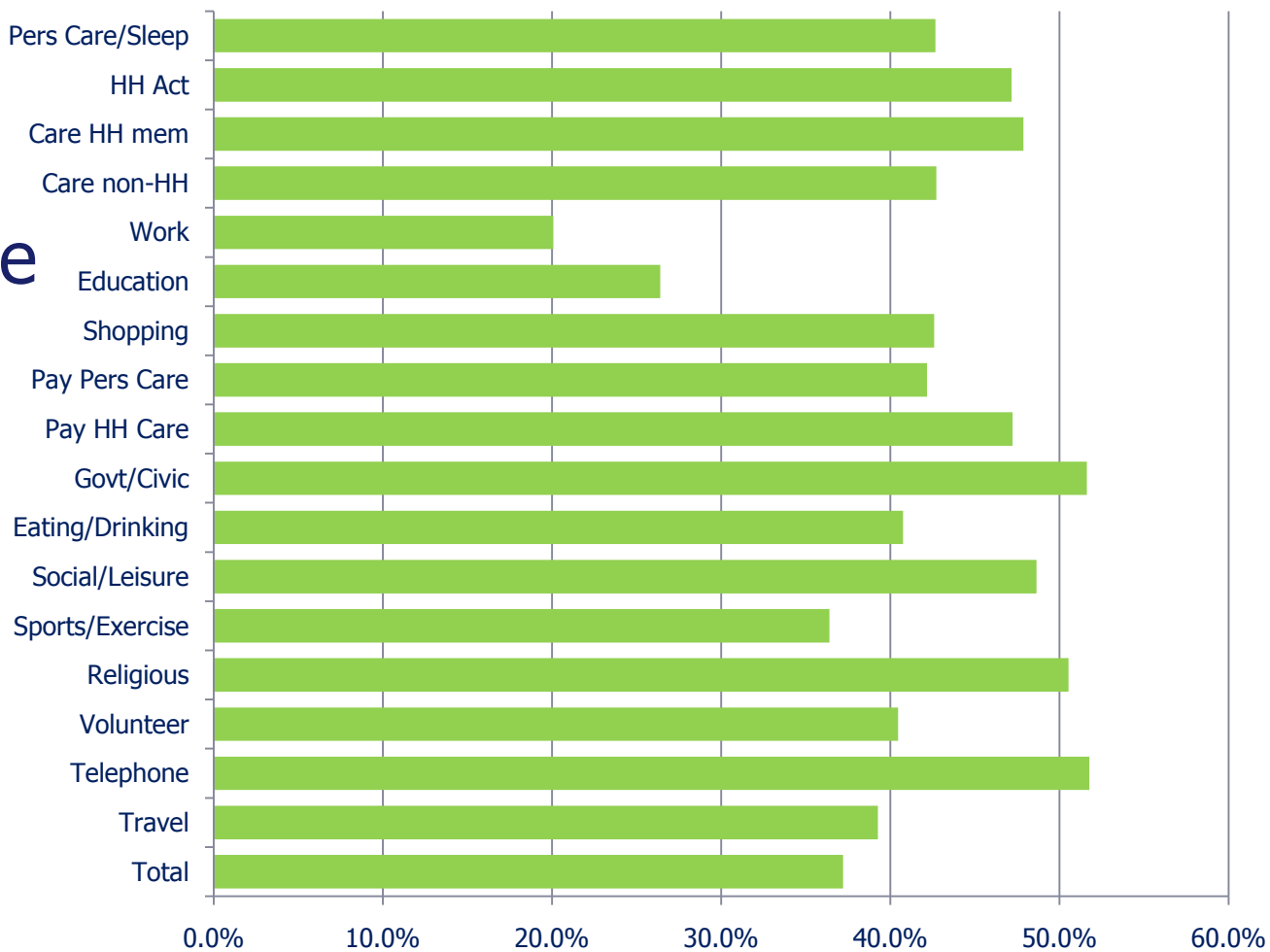
- Work
- Education
- Sports / exercise



N=16,317

Percent of Attempts That Are Completions By Previous Day Activity

- Gov't/
Civic
- Telephone
- Religious



N=10,119

Conclusions

- Coded completions according to their activities (high refusal acts)
- Did not find a relationship between interviews that were possibly conducted during high refusal activity and other measurement error indicators

Future Research

- Would like to examine pattern of diary reporting in other data – CE diary
 - ▶ Look for increased rounding
 - ▶ Longer time between purchases
- If stronger results are found, we may be able combine indicators
- Model this with noncontact

Contact Information

Brian Meekins

Office of Survey Methods Research
U.S. Bureau of Labor Statistics

[*www.bls.gov/osmr*](http://www.bls.gov/osmr)

202-691-7594

meekins.brian@bls.gov



[**www.bls.gov**](http://www.bls.gov)

Percent of Attempts That Are Certain Call Statuses By Previous Day Activity

| Refusal | Non-Contact | Completion |
|-----------------------------------|--------------------------------|------------------------|
| Religious (7.1%) | Work (72.9%) | Gov't/Civic (52.6%) |
| Work (3.4%) | Education (68.6%) | Telephone (49.8%) |
| Personal Care/ Sleep (3.1%) | Sports/ Exercise (59.8%) | Religious (49.1%) |

N=32,942; uncodeables excluded

Data Used: Process Variables

- Hard to reach
 - ▶ 4+ consecutive NC or 8+ total NC
 - ▶ # attempts to first contact ≥ 8
 - ▶ Number of interview days (weeks) ≥ 4
- One+ refusals/callbacks
- Number of attempts
- Number of NCs
- Number of interview days

Data Used:

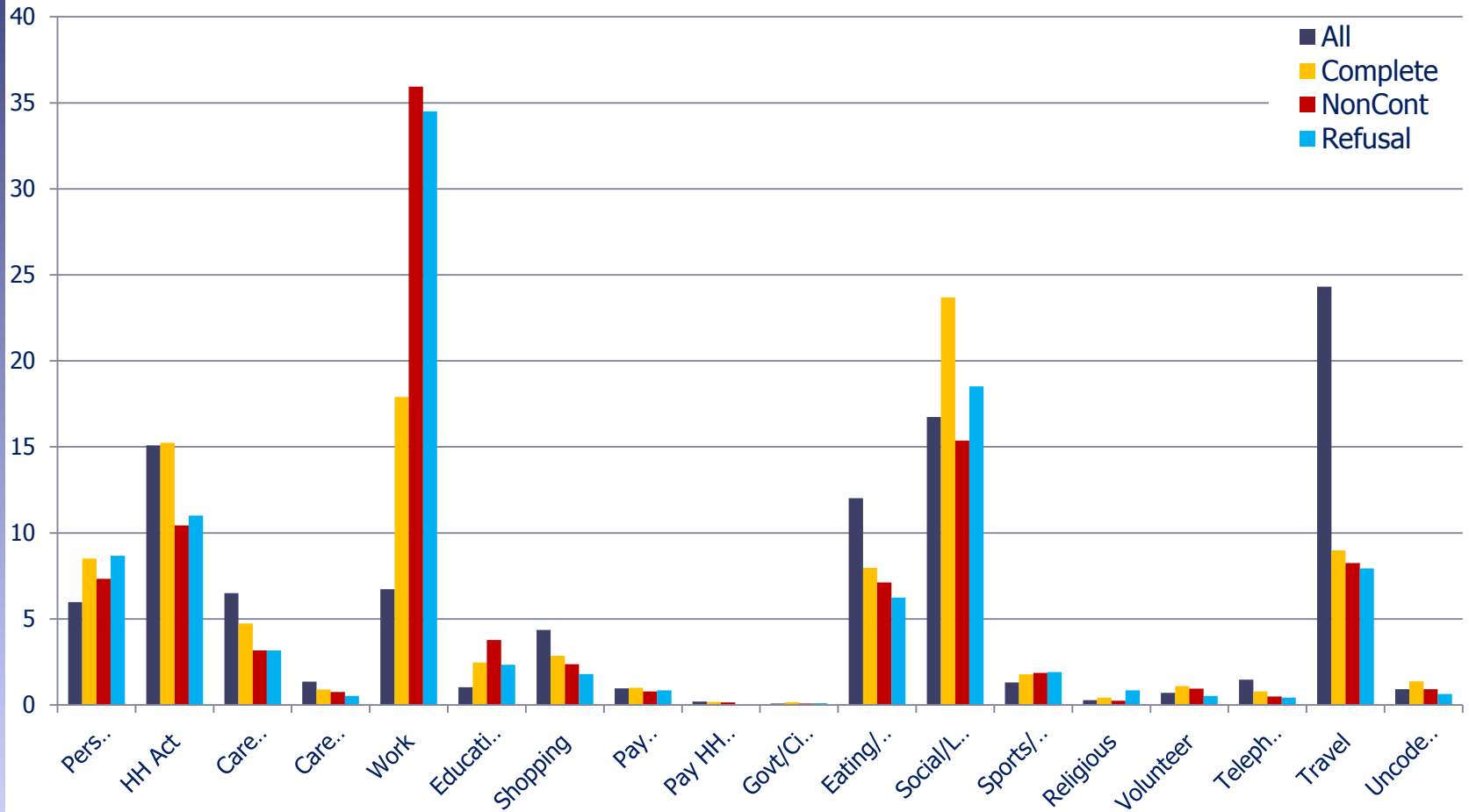
Other Process Variables

- Time of day of interview (hour; morning/afternoon/evening)
- Telephone use activities/duration
- Length of time spent at home
- Day of week for time diary
- ATUS same R as CPS
- CATI or telephone interview on CPS
- Only Spanish spoken in household on CPS

Data Used: Demographics from CPS

- Young child, own child present
- Spouse present, marital status
- Rents/own
- Household size/type
- Family income
- Respondent education, sex, employment status, student, age
- Parental and respondent nativity, race, Hispanic origin
- Census region

Activity by Contact Code



Activity by Contact Code Differences

