Do Social Media affect how we spend our Time in Offline Social Relations?

Evidence of Demographic Differentials from Time Use Data

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ABSTRACT

The use of Internet, smart phones and social networking sites, represents the biggest social discontinuity in recent history. However, we still do not understand the consequences of this "digitalization of life" for people's time use and well-being. This study examines how digitalization affects the way individuals spend their time. Initial analyses based on the American Time Use Survey (2003 to 2018) indicate that Americans spend less time at someone else's place, now than they did in 2003. The decline is moderate when we consider all age groups combined, but is dramatic for the 15-19 year olds, for whom we observe a steep monotonically declining trend starting around 2008. We also observe that Americans spend more time at their own home, now than they did in 2003, and this change is again strongest for teenagers compared to other age groups. We use propensity score matching techniques to test if respondents who report more time using digital devices like computers, for leisure purposes, are also more likely to spend less time visiting others and more time at their own home. Analysis which allows us to test why we observe some of these changes in time-use patterns. As we extend our analysis to other activities and countries, we expect to be able to portray a comparative picture of time use change in the digital age and to uncover mechanisms that explain differential demographic impact of digitalization.

INTRODUCTION

One of the biggest social discontinuities of our times is the use of social media. Social networking platforms like Facebook, Instagram, dating apps, or Youtube are now used by over 3 billion people worldwide, or 42% of the world's population (Chaffey, 2019). When looking only at adult users, a recent report assessed that 53% of adults in developing countries and 60% of adults in developed countries are using social networking sites (SNS) (PEW 2018). Usage of SNS has been spreading like an infection, with over half of all adults –worldwide- using social media after a mere 20 years from their invention (Six Degrees, the first recognizable social media site was created in 1997), and less than 13 years since sites like Facebook and Twitter became available worldwide. Debate about what the effects that this new type of technology may have on individuals and societies have captivated policy makers, the scientific community and the general public alike. In this project, we aim to contribute to the scientific effort of understanding what the effects of the "digitalization of life" are, particularly for people's use of time, social relations and psychological well-being. There are two questions we aim to address in the first steps of this project: 1) how (if at all) has the use of social media affected the way people spend their time? 2) Has this led to a displacement of activities? Or has social media promoted interpersonal engagement and offline social connections?

We draw on data from the American Time Use Survey (2003-2018), a nationally representative time-diary survey, which provides rich information on how people spend their time (i.e., the type of activity), as well as with whom (e.g., alone or with friends) and where (e.g., at home) they were during the reported activity. The ATUS is conducted annually starting in 2003: its repeated cross-sectional design allows us to evaluate changes in time-use patterns over time, from 2003 to

the most recent survey wave in 2018. While the cross-sectional design of ATUS does not allow us to draw causal links between the increasing digitalization of life and changes in time-use, it is a unique data set because it provides a description of the entire day of respondent's life, thus enabling us to test how the use of time may have changed across survey years for a variety of contexts, including the type and duration of activities, the location where respondents spend time, and with whom. This survey provides the most authoritative description of how Americans have been spending their time over the last 15 years, a period marked by dramatic increases in smartphones and social media use. Specifically, ATUS allows us to assess trends in time use for different demographic groups and to address the following questions: 1) Where do individuals spend time? In 2018, do they spend more time alone, or at home, and less time at someone else's place, than they did in 2003? Are there differences by respondent's age group? Are these differences due to changes in the duration (e.g., the amount of time people spend visiting someone else's place) or because of changes in the incidence of certain activities (e.g., the fact that in 2018, people report visiting someone else's place less often, than they did in 2003); 2) Do families spend less time together in 2018 than in 2003? Do teenagers spend less time with siblings? Or with parents? And more time alone, while at home? 3) Do adults spend more time working from home in 2018 than in 2003?

Happiness and well-being are intimately connected with social relations. Understanding how the most important technological discontinuity of our times affects the way people spend time together is key to evaluate the consequences of the digitalization of our lives on well-being.

THEORETICAL FRAMEWORK

[to be included]

DATA AND METHODS

Data

The American Time Use Survey is a nationally representative time-use survey, conducted annually starting in 2003 by the US Census and sponsored by the Bureau of Labor Statistics (BLS, 2019; Hofferth, Flood, Sobek 2018). We use all 16 available survey rounds: 2003 to 2018. Interviews are conducted with one randomly selected household member aged 15 or older, via computer assisted telephone interviewing (CATI). The respondents are asked about what they did the previous 24 hours, from yesterday at 4 am until today at 4am, how long each activity took, who was present in the room/accompanied the respondent during the activity, and where the activity took place. Interviewers record the activities verbatim and each time-diary is cross coded by two trained staff coders to ensure reliability across different respondents. ATUS provides an unparalleled level of detail – among nationally representative time-diaries – with over 400 activity types.

The analytic sample for our study was formed by pooling the data across the 16 survey waves conducted annually between 2003 and 2018 (N=191,558 respondents). We do not make restrictions based on respondent's age because we are interested in time-use patterns, across different stages of the life-course, for the youngest and oldest respondents captured by ATUS.

Key Measures

Dependent Variables

To answer our research questions we created measures of time-use capturing several contexts, including where people spend time and with whom they spend time.

To measure where people spend time we create two sets of variables capturing the *incidence* (measured *continuously*; e.g., the number of times a respondent reported that s/he was visiting someone else's place) and the *duration* (measured continuously in minutes/day; e.g., the total number of minutes/day a respondent reported that s/he was visiting someone else's place; or that s/he spent at home) of time spent in several key contexts: at home, at someone else's home, in a bar/restaurant. We used the "where" information included in the activity reports (see Table 1 of Supplementary information for further detail) to identify where an activity took place. *Incidence* measures capture the number of times an activity took place at a given location for each respondent, with 0 meaning that the respondent did not report any activities in that location (e.g., did not visit someone else's home, the day when ATUS was recorded). *Duration* measures were coded by calculating the total minutes/day spend – in any activity – at a given location, for each respondent, with 0 meaning that the respondent did not report any time, at that location. These two measures will allow us to disentangle if any changes in time-use patterns across survey years (from 2003 to 2018) are due to the fact that respondents spend less/more time in those activities, or because they do not do those activities at all.

Independent Variables

In order to evaluate trends over time and demographic differentials in outcomes, we considered, as independent variables, the year of the survey (from 2003 to 2018, each survey year was dummy coded), the respondent's age group (coded into 14 separate age categories, each

measuring 5 year intervals beginning at age 15 and ending at age 85) and the respondent's sex (dummy coded) which is based on respondent self-identification as male (=0) or female (=1).

Analysis Plan

The analysis is conducted at the person level, with information about activities being summed up for each respondent. We opted for this approach, as opposed to conducting the analysis at the activity level, because it is the more parsimonious approach and activity level details were not necessary to test our research questions. For multivariate analyses we used ordinary least square (OLS) regression to predict total minutes (duration of activities) in selected activities in which the unit of analysis was the survey year. Doing this allowed us to examine if there are changes in time-use patterns over the time period covered by ATUS (2003-2018). As a second step, we included an interaction term between survey year and respondent's age group to test if observed patterns varied by age or were valid for the entire population. We graphed this interaction by calculating "average marginal effects" for each cell, to better and more directly observe what the patterns are (Esarey and Sumner 2015). To predict if an activity took place more or fewer times (incidence of activities) in selected activities, in 2003 compared to 2018 we repeated these two steps described earlier, only this time using logistic regression to account for the binary structure of the outcome variable (1=activity took place at home; 0=not at home). We use OLS instead of Tobit models because recent research aimed at clarifying which statistical method to use when dealing with high volumes of zeros recommends using OLS: "OLS estimates are unbiased and robust to a number of assumptions about the relationship between the variables in the model and the probability of doing an activity" (Stewart, 2009, p. 12)." All models were estimated in Stata 15 and included the respondent sample weight (wt06) to account for the complex survey design.

PRELIMINARY FINDINGS

Bivariate Description of Time-use data in the U.S. between 2003 and 2018

Initial descriptive analyses based on the American Time Use Survey (2003 to 2018) indicate that Americans spend less time at someone else's home now than they did in 2003. Figure 1 shows that the average number of daily minutes spent at someone else's place for the whole population decreased from about 45 minutes to 35 minutes between 2003 and 2017. This decline is mainly driven by the age group 15-19 years old: for this group of teenagers we observed a steep monotonically declining trend starting around 2008 when, on average, they spent 80 minutes per day at someone else's place, to a value of less than 50 minutes in 2017. For the elderly, 70-85 years old, the trend over time has been relatively flat.

Note: these preliminary results do not include the most recent wave, 2018 because this data has been made available recently. This wave will be added to the full dataset used for this project shortly, and we expect to see similar trends as for 2017.

Figure 2 indicates that the decline over time is not related to shorter visits. Instead, the number of visits that teenagers made to someone else's place has been declining. The decreasing trend for teenagers started approximately during the period when social media platforms became popular and, given the strong linear relationship, we may expect that the trend will continue in coming years. This observation points to a potential displacement effect of social media: as social media create new 'online spaces' that make it easier for people to maintain social relationships, teenagers may spend less time in offline relationships, including time at someone else's place.

In Figure 3 we present average time spent at home across survey years. We find that between 2003 and 2017 there is an increase of about 20 minutes/day in total time spent at home for the whole population (see line labeled as "all ages"). As expected respondents who are older reported spending at home almost twice (an average of 10.8 hours/day) the time compared to respondents who are younger (an average of 5.3 hours/day). Please remember that this does not include time spent sleeping and other personal activities like grooming and self-care, for which ATUS did not ask where the activity took place. This is a reasonable decision given that the location where someone is sleeping is sensitive in nature. Returning to the interpretation of our results, over time, there seems to be an increase in time spent at home, not for every age group, but particularly for teenagers (ages 15 to 19) who, on average, report spending about 50 minutes more at home in 2017 (a total of 360 minutes/day) compared to 2003 (a total of 310 minutes/day). Although we cannot be completely sure, it seems that some of the time teenagers no longer spend visiting/at someone else's home, is now being spent at their own home.

In the next analysis steps we aim to test why we see some of these patterns. Specifically, we plan on focusing the analysis on three age groups: teenagers (15-19), adults (20-69) and older adults (70 to 85), and use propensity score matching techniques to test if – within each age group - respondents who report spending more "time using computers for leisure purposes" are also reporting less time at someone-else's-place, and more time at home. This would be a test of whether increased use of digital devices (e.g., computers) is linked to changes in the way people use time, and more broadly, to changes in the way people live their lives.

DISCUSSION

What we observed is striking in terms of magnitude of change during a short period of time. Based on the data that we have analyzed so far, we cannot jump to the conclusion that social media is the driving factor. However, as we extend our analysis to time spent in other activities and across a number of countries for which time use surveys exist, and with different levels of social media penetration rates, we expect to be able to portray a comparative picture of time use change in the digital age, and to uncover mechanisms that explain the differential demographic impact of digitalization.

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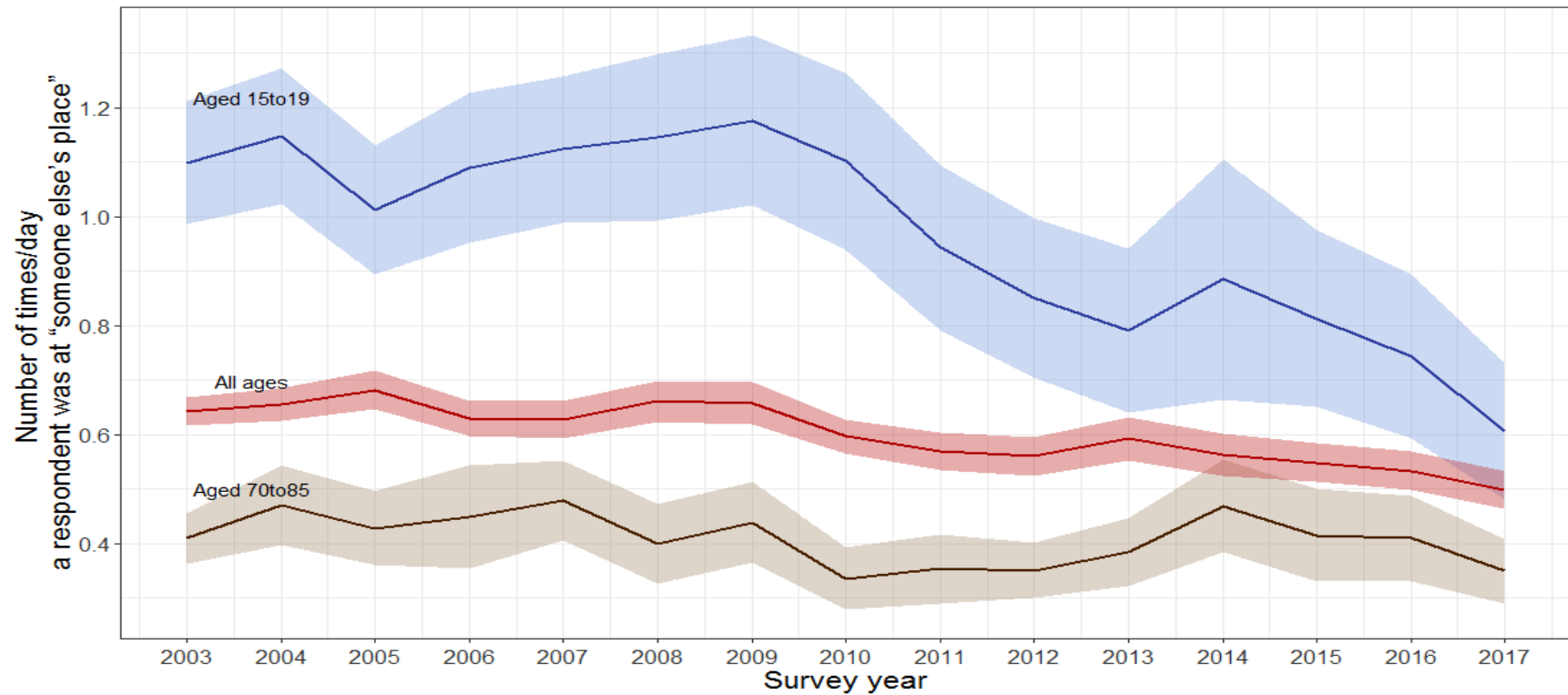
Figure 1. Average Time Spent at "Someone Else's Place" by Respondent's Age Group and Survey Year. ATUS 2003-2017
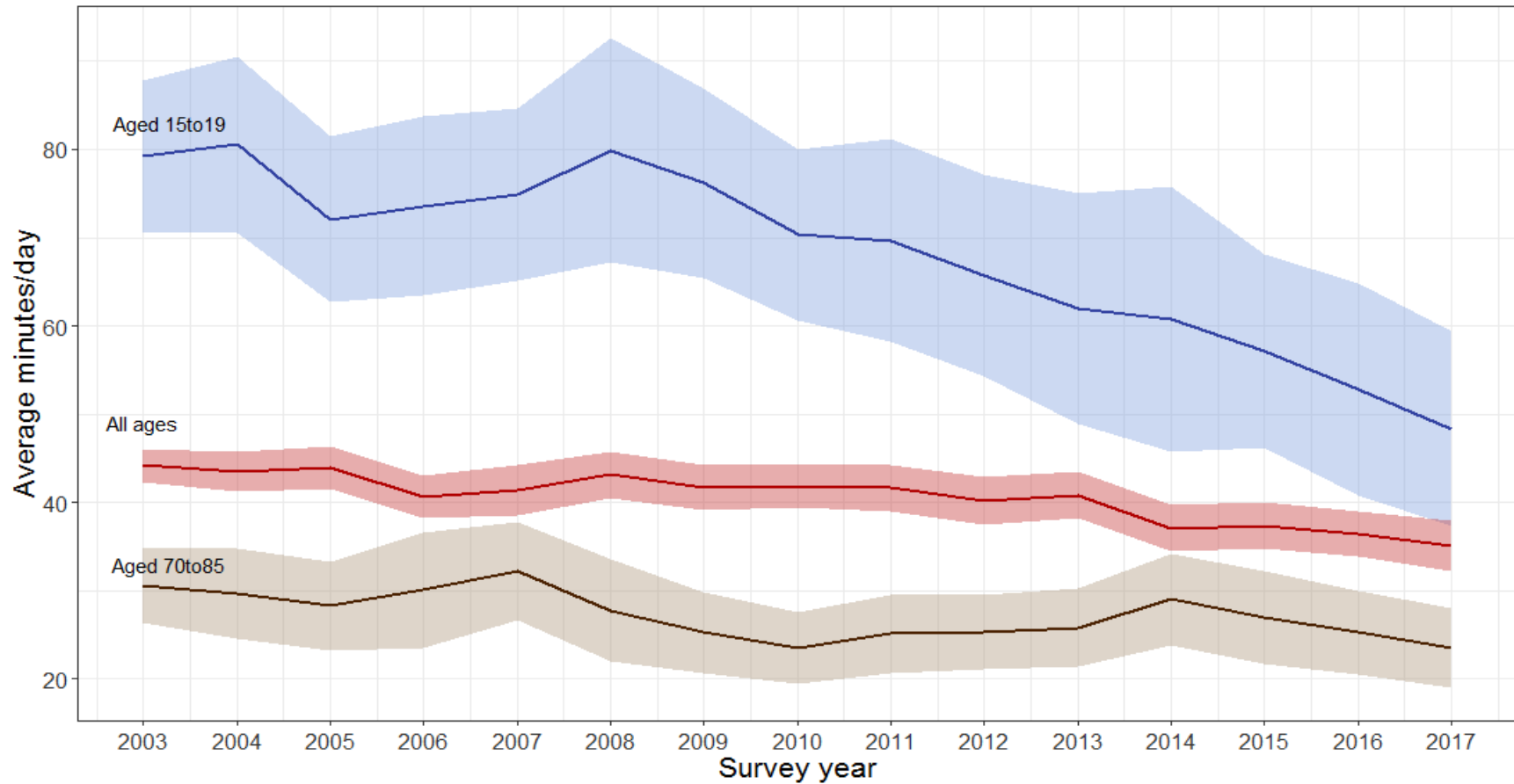
Note: Data from ATUS 2003-2017. OLS regression predicting average time spent at someone else's home by age group and survey year; includes weights.

Figure 2. Average Number of Times Per Day a Respondent Reported Being at Someone Else's Home, by Age Group and Survey Year. ATUS 2003-2017

Note: Data from ATUS 2003-2017. OLS regression predicting average number of times a respondent reported being at someone else's home by age group and survey year; includes weights.

Figure 3. Average Time Spent at Home by Respondent's Age Group and Survey Year. ATUS 2003-2017
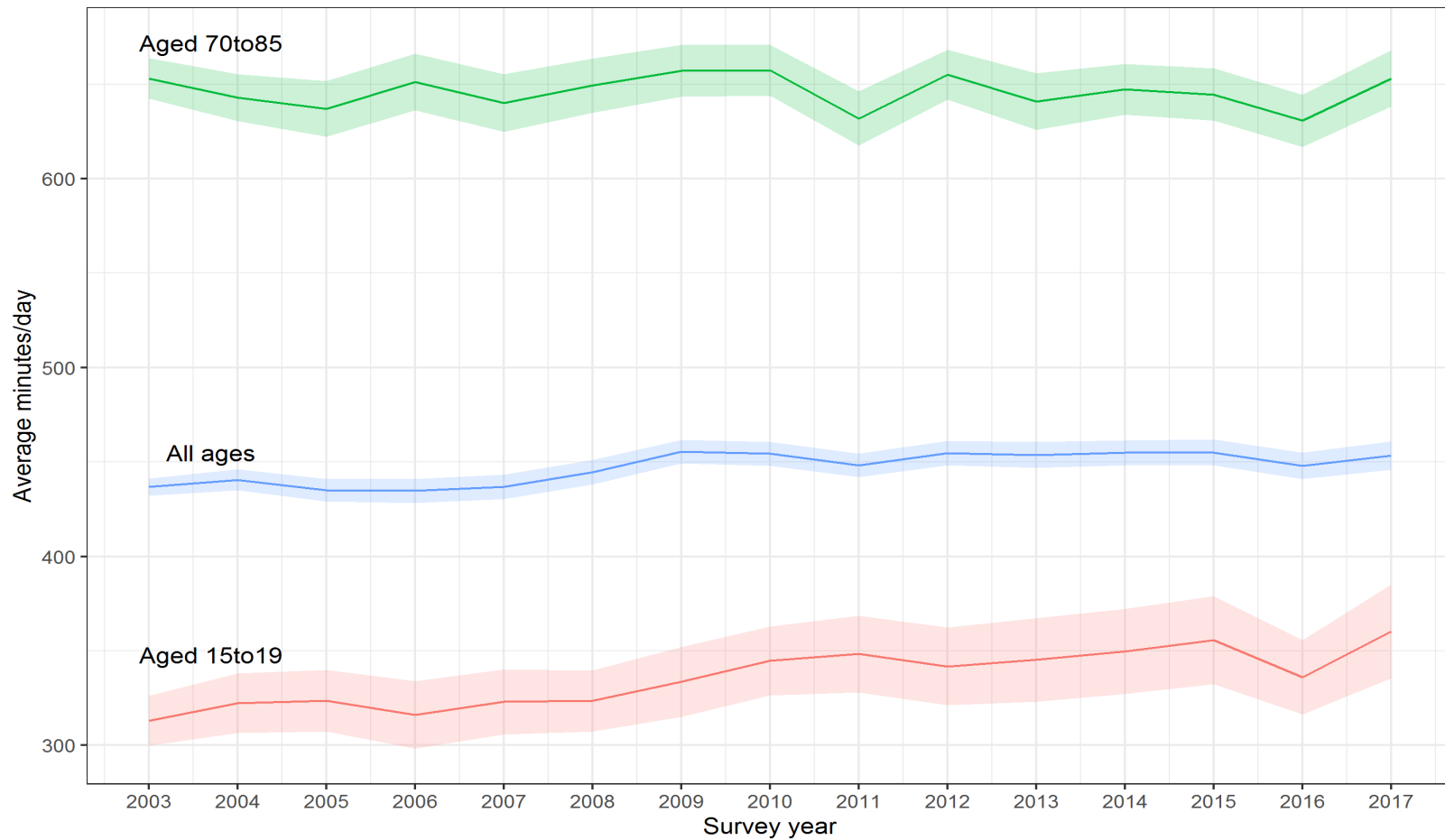
Note: Data from ATUS 2003-2017. OLS regression predicting average time spent at home by age group and survey year; includes weights.

SUPPLEMENTARY INFORMATION

Table 1. ATUS 2003-2017. Activity level. Location of Activity

ATUS code	Description	Frequency	Percent	Cumulative
101	R's home or year	1,564,724	41.68	41.68
102	R's workplace	186,534	4.97	46.65
103	Someone else's place	130,636	3.48	50.13
104	Restaurant or bar	72,401	1.93	52.06
105	Place of worship	37,067	0.99	53.04
106	Grocery store	33,355	0.89	53.93
107	Other store/mall	80,349	2.14	56.07
108	School	38,495	1.03	57.1
109	Outdoors - not at home	46,566	1.24	58.34
110	Library	2,319	0.06	58.4
111	Bank	3,622	0.1	58.5
112	Gym/health club	7,755	0.21	58.7
113	Post office	2,370	0.06	58.77
114	Other place	113,152	3.01	61.78
115	Unspecified place	11,257	0.3	62.08
230	Driver of car, truck or motorcycle	535,935	14.28	76.36
231	Passenger of car, truck or motorcycle	125,151	3.33	79.69
232	Walking	53,848	1.43	81.12
233	Bus	8,840	0.24	81.36
234	Subway/train	4,483	0.12	81.48
235	Bicycle	2,681	0.07	81.55
236	Boat/ferry	553	0.01	81.56
237	Taxi/limousine service	1,240	0.03	81.6
238	Airplane	1,148	0.03	81.63
239	Other mode of transportation	1,401	0.04	81.67
240	Unspecified mode of transportation	9	0	81.67
.d_dkn	Don't know	3	0	81.67
.r_refuse	Refuse	4	0	81.67
.u_niu	Not in universe	688,191	18.33	100
Total		3,754,089	100	