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contents

Timo Toivonen: Spousal influence in time use – On book reading, highbrow culture attendance and computer use	1
Tamar Khitarishvili and Kijong Kim: The great recession and unpaid work time in the United States – Does poverty matter?	19
Marit Rebane: Double advantage or disadvantage? – Parental education and children's developmental stages in Italy	49
Satu Ojala and Pasi Pyöriä: Working around the clock? – The time and location of paid work in Finland 1979-2010	73
Jens Bonke: Love and retirement – Older couples' leisure time before and after retirement	97
Martin Brosnan and David M. Levinson: Automobile accessibility and the allocation of time 1990-2010	115
John P. Robinson, Elena Tracy and Yoonjoo Lee: Cruising through the millennium – 2003-13 changes in American daily life	133
time-pieces	153
▪ New developments in time-technology – Projects, data, computing, services	153
▪ Spending time on media– Results of using 'Multitasking Frequency Questionnaire' in Poland	153
▪ Harmonising time use microdata for the 2010 wave of European time use surveys	157

▪ German time use survey	157
▪ Innovations and lessons from the UK 2014-2015 Every Day Life Survey	163
▪ Introducing the American Heritage Time Use Study Data Extract Builder (AHTUS-X)	169
▪ A mixed-mode approach to measuring young peoples' time use in the UK Millennium Cohort Study	173
▪ Reflections on measuring time alone	180
▪ Book notes by Kimberly Fisher	186





Spousal influence in time use – On book reading, highbrow culture attendance and computer use

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Abstract

Spousal influence on time use has been studied quite intensively in the context of domestic work. Spousal influence means how the properties or behavior of a spouse affect the other spouse's behavior. However, spousal influence studies on time use in leisure time are very rare. This research focuses on just that. The general hypothesis was that the power of spousal influence is dependent on the type of leisure activity in question. Three different types of leisure activities were investigated. They were: book reading, visiting more or less high culture places, or attendance at high culture events, and computer use. Data came from two recent Finnish time use surveys from the years 1999-2000 and 2009-2010. General univariate linear models were used as the method. It was found that spousal influence was very strong in high culture attendance, remarkable in book reading, and non-existent in computer use. It was also evident that a person's age and education increased spousal effect in time devoted to highbrow culture.

JEL- Codes: D00, Z1, Z13

Keywords: Changes in time use, computer use, highbrow culture, reading, spousal influence

1 Introduction

On the basis of observations from everyday life, we know that the leisure time use of spouses is very often similar. However, little research has been done on this issue. What has been studied intensively is the division of domestic work - child care, cooking, cleaning etc. (e.g. Balzan & alii 2014, van Klaveren & al 2013, Oinas 2010, Sullivan 2010), but in time use studies the spousal influence (spousal effect, cohabitant partner effect) on leisure time activities has been investigated only to a very limited extent (however, see e.g. Niemi 2009, Wollscheid 2014). The general result of these studies has been that spousal influence on time use is remarkable. In this article we cannot naturally study time devoted to all the different leisure activities but the focus is on some central cultural activities.

2 Theoretical backgrounds

In the US, DiMaggio and Mukhtar (2004) report large declines in attendance rates between 1982 and 2002 for most high-culture activities (as theaters, concerts, museums, art exhibitions, and libraries). According to the authors, this decline is even stronger for younger age groups, which is consistent with Peterson and Rossman's (2008, p. 308) finding that the median age of art attendees has significantly increased for all high-culture activities. Similar observations, although, not so evident, can be made on the basis of Finnish time use studies (Pääkkönen and Hanifi 2011, Toivonen 2014).

A universal decrease in book reading has also been reported (see e.g. Griswold & al 2005), but in Finland this trend has not been so striking at least no longer between 1999/2000 and 2009/2010 (Pääkkönen and Hanifi 2011).

If the studies on shared time use of couples in leisure activities have been rare, there are other types of studies than time use studies ("how often", "how many times during the last 12 months" etc.), where spouse or partner effect, for instance, on cultural activities has been studied quite extensively. Significant spouse effects have been found with status or education of spouse being the mediating factor of spouse effect. It has been found already in the "classical" studies on cultural capital that the level of education is as such one of the most important variables in consumption of highbrow culture (e.g. Bourdieu 1984, p. 32-34).

For instance, Upright studied attendance at galleries, musical events, classical music events, theater, dance, and opera. He found that men's attendance is more strongly influenced by spousal characteristics than is women's attendance (Upright 2004, p. 129). For men, each increase in the level of a wife's education is associated with "a dramatic and

statistically significant higher level of participation for nearly each type of event” (Upright, p. 140). These results are strongest when both partners attended an event, and the coefficients suggest that a wife’s educational level is as important in this case as is that of the respondent himself. Surprisingly, for every event, excepting opera, these results are clear even when a wife did not attend.

For women, the coefficients suggest that the educational level of the husband is also a strong if not a stronger predictor of participation than the wife’s own educational attainment. The education of the husband appears to have little effect, however, on the odds of his wife attending alone. In any case, among married couples, women characteristically play a disproportionate role in driving households’ arts participation, with husbands being guided by the preferences of wives (Upright, p. 141). Thus, attendance at high culture events is very much a status symbol or status-seeking process.

Also, in another study that included analysis of partnered individuals it has been found, similarly, that among ‘elite’ couples, women tend to take charge of the cultural engagements of their husbands, or husbands tend to be led (“pleasantly and gratefully”) by the tastes and choices of their wives (Warde and Bennett, p. 2008). An interesting observation is, that a more fluid gender style has greater currency among women and men from the professional-executive class (Bennett & al 2009, p. 233). Another study also indicates this type of dynamics. Individuals who are in couple relationships and belong to the working class show disparate profiles of being feminine and masculine (Silva & Le Roux 2011, p. 558).

We can also approach the highbrow culture and spousal influence from the concepts presented by Granovetter (1973) as Lizardo (2006) did. These concepts are *strong ties* and *weak ties* used in the context of social capital. The total number of ties was operationalized in Lizardo’s study as the total number of connections of people with other people with whom they kept in contact at least once a year (Lizardo, p. 788).

After being asked for an estimate of their total number of connections, the respondents were then prompted to name how many of those people are really close friends: “Of these friends and relatives [that are contacted at least once a year], about how many would you say you feel really close to, that is, close enough to discuss personal or important problems with?” (Lizardo, p. 789). These kinds of contacts were operationalized as strong ties.

As cultural taste indicators Lizardo used, among others, such activities as attended a life performance of a nonmusical stage play, watched a live ballet or dance performance, visited an art museum or gallery etc. during the past year (p. 787). It was found that highbrow taste is more likely to be converted into a denser network of strong ties, while popular taste leads to an increasing number of weak ties. This is, according Lizardo, because the highbrow culture taste is more restricted: it has an “assetspecific” nature. This is thus “infused with the classical Kantian aesthetic in which cultural products are seen as a conduit for

intellectual and emotional impressions that reflect “higher” moral and aesthetic values” (Lizardo, p. 799).

Christin (2012) in her study on gender and highbrow cultural participation in the United States also touched on spousal influence and presented a hypothesis according to which if the male spouse has high levels of arts socialization (impacts in childhood and youth) and high educational attainment, the female is more likely to attend arts events than otherwise. However, the hypothesis was not supported by the data. It has also been found that spousal influence is not only remarkable in activities which are more or less status symbols, but also in those that are social by nature such as entertaining visitors (Niemi 2009, p. 304).

Highbrow culture attendance is connected with social status, and perhaps therefore this type of consumption is a visible consumption. But even in a less visible cultural consumption the role of partner status has been found to be substantial. For instance, Kraaykamp & al (2007) found that also in book reading and selection of TV programs, status is an important factor. This is because preferences for certain books and TV programs are regular conversation topics, and their popularity differs between social strata. Indeed, they find positive effects of respondent’s and partner’s status on literary book reading and negative effects of respondent’s status on the amount of time spent watching TV for both men and women (p. 132).

In an additional analysis, Kraaykamp & al investigated the interaction of gender with the partner’s status measures to determine whether partner status effects differ for men and women. For women, partner’s status proved to be significantly more important than for men: hence, women are inclined to read more elitist reading materials when their husbands hold a high-status job (p. 142).

It is not only spouses who have an impact on each other’s behavior, but also children have impacts on their parents’ behavior. For instance, in tourism studies, dealing with tourist destination selection, not only partner effect but also the effect of children has been studied extensively, and it has been found that the influence of children is remarkable in destination selection in tourism (e.g. Kozak and Karadag 2012).

Sullivan’s study on division of domestic work was mentioned above. She found that men with higher levels of education contribute substantially more to childcare than men with lower education (Sullivan 2010, p. 727). Thus, spousal effect was strong among more highly educated men. Therefore, although there are only few time use studies on spousal influence on leisure time use, one might think, by analogy, that, among men, the spousal effect is strong also on time used on leisure activities, if the education of the man is high.

However, education or status of partner is not the only factor which controls the spousal influence. The age of a partner and the shared time of spouses have been observed to increase the similarity in time use, because the likelihood of the length of the marriage also increases (Ruuskanen 2004).

On the basis of the above discussion time devoted to book reading and time devoted to highbrow culture attendance were two of the leisure activities studied here. Both of them have high status value - perhaps highbrow culture attendance higher - and they are social and visible, especially highbrow cultural attendance. However, it is reasonable to suppose that there are also other leisure activities which are neither high status symbols nor are visible and social.

From earlier studies we know that time devoted to computer use has increased dramatically (e.g. Toivonen 2013). In several studies, age and education have been found to be central variables in adopting computer use or, in general, new information and communication techniques (e.g. Näsi 2013). It is, however, very difficult to assume how powerful, if any, the spouse effect is on time devoted to the computer, because there are in abundance studies on impacts of computers and information technologies on family life (e.g. Chesley 2005, Lanigan 2009) but evidently not strictly on spousal influence and computer use. Computer use is not a traditional high status activity, and it is not a social activity in the sense that the persons involved have a physical presence in a situation. Therefore, time devoted to computer use was chosen as the third leisure activity studied here.

3 Research questions and hypotheses

On the basis of the above, the research questions and hypotheses of this study are as follows:

1. What is the influence of the spouse's time use on a person's own time used on a known leisure activity? It can be expected that the effect is different depending on the activity. Thus, it is hypothesized (1) that spousal influence is strongest in activities where the traditional status value (upper class) of the activity is high and visible the activity as in highbrow cultural attendance activities (see above e.g. Upright, Warde & Bennet). It also quite strong in activities where the traditional status value is not so high also in those that are social by nature such as reading (see above Niemi, Kraaykamp & alii). On the contrary, spousal influence is lower in the activities where status value in the traditional sense is lower (technical skill), and/or which are by nature less visible and more individual such as computer use.
2. Previous studies on spousal influence indicate that the influence is mediated by the partner's status, but spousal influence studies on leisure activities have not been based on time use data. Therefore, we ask whether these time use data support findings. However, it is hypothesized (2) that the power of spousal influence is mediated by the partner's status with spousal effect being the more powerful the higher the level of education of the spouse (see above e.g. Sullivan).

3. It was also mentioned above that the age and shared time of the couple are in positive interaction because the likelihood of the length of the marriage increases. Therefore, we also wanted know whether the impact of the partner changes with age also here? It is hypothesized (3) that the spousal effect is more powerful the higher the age of the person in question (see above Ruuskanen). This kind of spousal influence need not to be tied to status and/or visibility.
4. We also wanted to find out about changes in time use on different activities, and to find out whether the partner's time use and/or social status was connected with possible changes between the years of the surveys. For instance, if the interactions between year and spousal time use and between year and education of spouse are positive, this means that spousal influence has increased over time. It is likely that no attention has been paid to these questions in earlier studies.

4 Data and variables

4.1 Data

This study was based on the original data from four Finnish Time Use Surveys covering the population aged 10 and over from the years 1999-2000 and 2009-2010. Respondents were asked to fill in a diary for two days (one weekday, one weekend day) running. They were asked to record, in their own words, their primary activity, and what else they were doing at the same time (secondary activity). Record keeping was on a 10-minute basis (Niemi and Pääkkönen, 2002, p. 11–12; 97–101). In the 1999–2000 survey and in the 2009-2010 survey, there were two phases in sampling. In the first phase, the random sample was drawn from persons living in Finland aged 15 and over. In the second phase, also all other persons, at least 10 years old and belonging to a selected person's household, were included in the final sample. This made it possible to study the time use of couples. Household members recorded their time use on the same two days that had already been decided on beforehand.

The collection was completed over the period between 1st March, 1999 and 12th March, 2000 (Niemi and Pääkkönen, 2002, p. 11). The number of cases (time-use diary days) was 10 500. The data of the 2009-2010 study were collected in the same way as in the study of 1999-2000 between April 23rd, 2009 and April 22nd, 2010. The number of diary days was 7 480 (Pääkkönen and Hanifi, 2011, p. 97).

However, the organization of data into a form that made it possible to compare the time use of both partners simultaneously was rather a complicated task because the data were not originally coded in this way. Moreover, the fact that in many cases household members had recorded their time use only on one day (weekday or week-end) posed problems. This

then created a problem because women had more often than men filled in the diary on two days. Thus, inevitably, the number of women in this sample became a little greater than that of men. In addition, in many cases there was no information on the respondent's background variables, such as education, whereas information on education should be covered. Therefore, only cases with complete background information were accepted. In addition, in the final sample, only couples with children under 18 years were taken into account. This is because it has been planned that in a future article the purpose is to compare spousal influence with parental influence. Thus, the sample here was reduced to 690 (women) or 628 (men) persons.

4.2 Dependent variables

Reading books was one of the studied activities. If the activity had been reading in general, it would have been, for instance, combined with computer use, because on the basis of survey from 2009-2010, newspapers were sometimes read via the computer. Further, it was supposed that reading books is more an individual and high status activity than reading in general.

The second of the activities was time used on highbrow culture attendance, i.e. attendance at high culture events or visiting cultural targets (operationalized as movies, theaters, concerts, museums, art exhibitions, and libraries). Thus, operationalization was very similar to the highbrow taste indicator used by Lizardo (see above).

The third of the variables was time devoted to computer use. It was the sum of time devoted to computer hobby and programming, to information searching, to communicating, to playing computer games, and to other computer use. If the computer was used only as a tool, e.g. in reading a book or in television watching, this was counted as book reading. However, in practice, drawing the line is troublesome.

4.3 Independent and control variables

On the basis of the section "Theoretical backgrounds", it is evident that there are two ways to understand spousal influence. The first is to study the time use of both partners. If it is assumed that one partner's time use has an impact on the other partner's time use, then time use of spouse is an independent variable. It can be called a *direct spousal influence*. However, there can be some other types of spousal influence than time use of spouse which have an impact on one's own time use. Firstly, very often the education or status of the spouse has been observed to have a spousal effect on own time use (e.g. Upright or Kraaykamp & al above). Secondly, the own education or status has been observed to have an impact on own time use *via* time use of spouse (e.g. Sullivan above). Both these two types of spousal influence are called here an *indirect spousal influence*. Therefore, also the level of education of spouse was taken into the analyses as an independent variable.

Just the age and education of both partners have been the essential variables in investigating spouse effect on different cultural hobbies, as was seen above (Upright 2004, Kraaykamp & alii 2007, Peterson and Rossman 2008). Therefore, education, and also age, were used here as control variables.

The level of education was measured here using the ISCED classification (International Standard Classification of Education 2011) (http://en.wikipedia.org/wiki/ISCED#ISCED_2011_levels_of_education_and_comparison_with_ISCED_1997). It goes as follows:

3. Level of upper secondary education or lower. Second/final stage of secondary education preparing for tertiary education and/or providing skills relevant to employment, e.g. practical nurse, plumber. (4. Level. Post-secondary non-tertiary education is not relevant in Finland.)

5. Level of short-cycle tertiary education. Short first tertiary programs that are typically practically-based, occupationally-specific and prepare for labor market entry. These programs may also provide a pathway to other tertiary programs, e.g. nurse, pipe installation technician.

6. Level of bachelor or equivalent. Programs designed to provide intermediate academic and/or professional knowledge, skills and competencies leading to a first tertiary degree or equivalent qualification, e.g. Bachelor of Medicine (BM), engineer.

7. Level of tertiary education, master or doctor or equivalent: Largely theoretically based programs intended to provide qualifications for gaining entry into more advanced research programs and professions with higher skills requirement, e.g. licentiate or doctor of medicine.

The amount of disposable time for various activities is limited because only 1 440 minutes are included in one day. Thus, time use on one activity constrains time use on other activities. This point of view has very often been omitted in other types of studies on leisure activities than time use studies. However, an individual can also regulate her/his time use more or less depending on the activity. Perhaps it is most difficult for an individual to decide how much time she/he devotes to paid work. Therefore, time devoted to paid work is here one of the independent variables. *It can be expected that time devoted to paid work has a significant diminishing effect on time used on our dependent variables.*

Because here we analyzed couples, some factors, which are possibly significant in analyzing these leisure activities of an individual, were ignored. For example, factors such as place of residence and family type were omitted because they are naturally identical for both spouses. Income also must be left out because data contained information only on household income. Further, it was impossible to construct any variable of social class, because information about economic activity, socio-economic position or occupation was missing in too many cases.

General univariate linear models (OLS) of the SPSS package were used here as the method of analysis. Attention was paid to coefficients of various control and independent variable terms in equations and to explanation percentages adjusted to the number of terms.

5 Results

The time use figures in this sample are not, of course, exactly the same as in the total time use samples of time use studies, because here only couples were included in the study. However, the figures were consistent with figures from the total sample: time devoted to high culture attendance has decreased from 1999-2000 to 2009-2010 (Table 1), and time devoted to computer use has strongly increased, but time devoted to book reading has slightly increased on the basis of this sample, from 10 minutes to 11 minutes. In the original sample, it remained unchanged (12 minutes). In any case, the universal decrease in book reading has not been strikingly evident in Finland as mentioned above. Females devoted more time to book reading than males, as well as to high culture, but on the contrary, males devoted more time to computer use and paid work. These findings were all consistent with figures from the total sample.

Three models were constructed to explain each time use category (Tables 2, 3, and 4). Because the models were constructed separately for females and males (a and b models), then in reality, the final number of models was six in each time use category. The models (1a and 1b) were basic models consisting only of four control variables: year, age, time devoted to paid work, and level of education, without any spousal influence variables.

5.1 Reading books

In respect to reading books (Table 2), in the female basic model (1a), statistically significant coefficients were time devoted to paid work (negative) and education (positive). Thus, the directions of significant coefficients were as expected: the more time spent on paid work the less time spent reading books, and the higher the level of education the more time devoted to book reading. However, the explanation percentage was low: only 3.4 per cent of variance. This last mentioned phenomenon is usual when trying to explain some time use category, because the variation in the time use of people is large as can be seen in Table 1. In the male basic model (1a), also own level of education was significant, as well as time devoted to paid work. The explanation percentage in the male model was even lower (1.7 %) than in the female model.

Table 1
List of variables and their descriptive statistics

	n	Min	Max	Mean	Std. Dev.	Participation rate
Time devoted to book reading, females	690	0	290	13	37	19
Time devoted to book reading, males	628	0	280	7	26	11
Time devoted to high culture attendance, females ¹	690	0	230	3	18	5
Time devoted to high culture attendance, males	628	0	230	2	17	3
Time devoted to computer use, females	690	0	280	7	21	17
Time devoted to computer use, males	628	0	330	13	36	21
Time devoted to paid work, females	690	0	1050	190	240	44
Time devoted to paid work, males	628	0	1410	246	281	53
Time devoted to book reading, 1999-00	802	0	290	10	28	13
Time devoted to book reading, 2009-10	516	0	285	11	28	11
Time devoted to high culture attendance, 1999-00	802	0	235	3	18	4
Time devoted to high culture attendance, 2009-10	516	0	225	2	16	3
Time devoted to computer use, 1999-00	802	0	250	3	16	6
Time devoted to computer use, 2009-10	516	0	430	18	43	38
Age, females	690	25	69	43	6	
Age, males	628	29	68	46	6	

¹Time devoted to movies, theaters, concerts, museums, art exhibitions, and libraries.

Source: Time Use Surveys 1999-2000 and 2009-2010, Statistics Finland, own calculations.

In the models (2a) and (2b), the variables, partner's educational level and partner's time devoted to reading were added to models (1a) and (1b). In both female and male models (2a and 2b), partner's time devoted to reading was highly significant. In addition, paid work and one's own level of education also remained as significant variables, and the explanation percentages were clearly higher than in the earlier models (1a and 1b): they were now 5.1 per cent and 2.8 per cent, respectively. Also the impact of age was significant in the male model: younger males devoted less time to reading than older ones.

However, the indirect spousal effect, the educational level of the partner, in time devoted to reading was a significant factor in neither the female nor the male model. Therefore our hypothesis (1) was not totally supported by the data in the case of book reading, because education of spouse had no influence (indirect spousal influence). This observation was contrary to the result of Kraaykamp & alii (2007) on the basis of Dutch data, because in their study the partner's education was also significant.

In models (3) four interaction terms were added to former terms. The interaction term between age and book reading of spouse reveals whether the spouse effect changes when people get older (hypothesis 3). If the sign is positive it means that the impact of spouse's book reading on one's own book reading is stronger when people are older than when they are younger. Interaction between education and spouse's book reading reveals whether the spouse effect is stronger among more educated people than among less educated people.

Because the data were from two periods, we looked at whether there were some changes between the surveys in the impacts of independent spousal effect variables. Was the impact of the spouse's education on reading stronger in the earlier period than in the later one (interaction between year and spouse's education)? Was the impact of the spouse's book reading on one's own reading stronger in the earlier period than in the later one (interaction between year and spouse's book reading)?

In the case of the female model (3a) it seems that all other terms lose their significance except time devoted to paid work. However, interaction terms added somewhat to the explanation percentage, from 5.1 per cent (model 2a) to 6.3 per cent, although none of the interaction terms was in itself significant. Perhaps because of multicollinearity between independent variables, the sign of direct effect of partner's reading shifted. The adjusted explanation percentage of male model (3b) with interaction terms decreased from 2.8 % (model 2b) to 2.4 %. Time used on paid work remained significant at the 0.05 level as did age, but there was no other significant effect. Here again, the sign of direct effect of partner's reading shifted. Therefore, the results of models (3) remain a little open to interpretation. Then, the interaction terms were not significant and hypotheses (2 and 3) were not supported by the data in the case of reading books.

Table 2
Univariate linear model – B-coefficients of covariates on time devoted to book reading of spouses

Model	(1a) Female	(1b) Male	(2a) Female	(2b) Male	(3a) Female	(3b) Male
Intercept	-303.90	361.15	-457.57	348.54	655.17	1248.55
Year	.15	-.17	.22	-.16	-.33	-.61
Age	.30	-.31*	.35	-.33*	.31	-.30*
Paid work	-.02***	-.01**	-.02***	-.01*	-.02***	-.01*
Level of education	3.00**	1.40*	2.32*	1.45*	1.60	1.33
Level of educ. spouse			1.23	-.54	-197.00	-172.33
Book reading of spouse			.17**	.08**	-49.50	-9.09
Age*book reading of spouse					.01	-.00
Year*level of educ. spouse					.10	.09
Year*book reading of spouse					.02	.01
Education*book reading of spouse					.07	.01
Adjusted 100 R ²	3.4	1.7	5.1	2.8	6.3	2.4

*=significant at 0.05 level, **=significant at 0.01 level, ***=significant at 0.001 level.
Source: Time Use Surveys 1999-2000 and 2009-2010, Statistics Finland, own calculations.

5.2 Highbrow culture

In respect of highbrow culture attendance models (Table 3), the explanation percentages of the basic models (1a) and (1b) were very low. Coefficients were statistically insignificant except for the time devoted to paid work in the case of males, although the signs of coefficients were as expected: time devoted to these activities has decreased over the years, the old devoted more time than the young, and the highly educated devoted more time than the less educated. The significance of the negative sign of paid work among males was quite natural because, on the average, they devote more time to paid work than females, as mentioned above. When attendance of spouse was added to independent variables, the explanation percentages rose strongly (models (2a) and (2b)): they were as high as 43.9 per cent and 44.0 per cent, respectively. For instance, coefficient of attendance of spouse was in the case of the female model .74, which means that if the partner devoted 10 minutes per day to high culture attendance we can forecast that the wife herself devotes 7.3 minutes per day to high culture attendance. The importance of spousal influence reflects the fact that no other term in the models was as significant as this direct spousal influence. Thus, the hypothesis (1) was partly strongly supported by data but not in respect of spousal education.

In interaction models (3a and 3b) explanation percentages are even higher in comparison with models (2); the adjusted explanation percentages rose in the female model from 43.9 per cent to 51.1 per cent, and in the male model from 44.0 per cent to 54.5 per cent.

Models (3a and 3b) revealed that our hypothesis (2) according to which spousal effect on time devoted to highbrow culture attendance is stronger the higher the education of the spouse was supported by the data. Coefficients were .23 and .16. Thus, the observation made by Sullivan in the context of domestic work and Kraaykamp & alii in the context of reading holds true here in the context of highbrow culture. Models (3a and 3b) also revealed that as age increases, also the spouse effect increases, i.e. as people age they behave in an even more similar way to their partners. This means that also hypothesis (3) was supported by the data, and also indirect spousal influence was strong.

In the case of females, the interaction between education of spouse and year was negative. It means that spousal influence by education has diminished. Similarly in the case of females, interaction between attendance of spouse and year was significant, but positive. Thus, females have become more dependent on their cohabitant partner's attendance. An interpretation could be that spousal education has lost its status influence over time because of educational inflation, but behavioural spousal influence has become more important over time. In the case of males, there has been no significant change over years. Thus, the answer to the research question (4) is that there were only minor changes, and only in the case of females.

Table 3
Univariate linear model – B-coefficients on time devoted to highbrow culture attendance of spouses

Model	(1a) Female	(1b) Male	(2a) Female	(2b) Male	(3a) Female	(3b) Male
Intercept	297.63	411.68	-.78.20	297.45	-1281.23*	260.74
Year	-.15	-.21	.04	-.15	.64*	-.26
Age	-.08	-.01	-.10	.03	-.17*	-.07
Paid work	-.01	-.01*	-.00	-.00	-.00	-.00
Level of education	.69	.50	.33	.19	.05	-63.56
Level of educ. spouse			-.02	.03	304.61*	-.10
Attendance of spouse			.74***	.59***	-43.64**	21.45
Age*attendance of spouse					.03***	.08***
Year*level of educ. spouse					-.15*	.03
Year*attendance of spouse					.02*	-.01
Education*attendance of spouse					.23***	.16***
Adjusted 100 R ²	0.2	0.8	43.9	44.0	51.1	54.5

*=significant at 0.05 level, **=significant at 0.01 level, ***=significant at 0.001 level.
Source: Time Use Surveys 1999-2000 and 2009-2010, Statistics Finland, own calculations.

Table 4
Univariate linear model – B-coefficients of covariates on time devoted to computer use of spouses

Model	(1a) Female	(1b) Male	(2a) Female	(2b) Male	(3a) Female	(3b) Male
Intercept	-3074.31***	-3817.40***	-3131.71***	-3819.78***	-2957.78**	-5398.02*
Year	1.54***	1.91***	1.57***	1.91***	1.48**	2.70**
Age	-.04	-.02	-.09	-.03	-.04	.08
Paid work	-.01	-.02***	-.01	-.02***	-.01	-.02***
Level of education	.12	1.27	.35	1.13	.17	1.09
Level of educ. spouse			-.14	.49	-39.58	399.09
Computer use of spouse			-.00	-.01	-.37	-34.56
Age*computer use of spouse					-.03	-.02
Year*level of educ. spouse					.00	-.02
Year*computer use of spouse					.02	-.20
Education*computer use of spouse					.01	-.01
Adjusted 100 R ²	13.1	8.8	13.0	8.6	12.6	8.5

*=significant at 0.05 level, **=significant at 0.01 level, ***=significant at 0.001 level.
Source: Time Use Surveys 1999-2000 and 2009-2010, Statistics Finland, own calculations.

Interaction models were confused by multicollinearity. In all interaction terms, direct spousal effect was positive, but in female model (3a) the main, direct, effect of attendance of spouse, the sign was negative. It seems as if the more time the spouse devotes time to highbrow culture the less a person in question does, and it is unbelievable.

5.3 Computer use

In respect of models on time devoted to computer use, the picture differs from the picture of previous models. In all models from (1) to (3), year was the statistically significant control variable. Among males, paid work also had a significant negative effect because of males' assumed longer hours in paid work than females. The term time devoted to computer use of the spouse and interaction terms had no significant effect on one's own computer use. On the contrary, adjusted explanation percentages from basic models (1) decrease systematically to models (3).

It was rather surprising that only the significance of year of survey was so strong, but not spousal influence and interaction terms. It could be thought that, in the beginning, computer use is independent of the partner's computer use but that over the years, spouses learn computer use from each other (interaction between age and computer use of partner). In hypothesis (1) it was assumed that in the activities where status value is lower and which are not so visible, spousal influence is also *lower* than in visible high status activities. This was not supported in the sense that there was *no* spousal influence. Not even hypothesis (3) according to which spousal effect is more powerful among older people than younger people was supported.

5.4 Conclusions and discussion

In this study the main purpose was to study the spouse effect in time use on some leisure activities. The result was that the direct spouse effect – spousal time use - in studied leisure time activities was as a whole remarkable in book reading and highbrow culture but not in computer use. These results were as expected. Instead, the indirect spouse effect – spousal education and spousal time use via own education – were not significant, and this result was different in comparison with earlier studies. The indirect spouse effect was significant only in the interaction of the direct spouse effect. We did not also found any remarkable changes in spousal effect over time.

However, strictly speaking, we cannot know whether the reason for the similar time use of both partners is due to the spouse effect. This means that if both partners devote much time, for instance, to attending concerts, it may be so because attending concerts has been one of the selection criteria of the spouse! Lizardo (2006) argues strongly for this alternative, which appears already in the title of her article *How cultural Tastes Shape Personal Networks*. However, her arguments cannot be finally persuasive, because she only used cross-sectional data.

However, although this study, strictly speaking, did not reveal the partner's influence on a person's time use, partner influence can be concluded on the basis of interaction between age and time use of the partner. Older couples use their time more similarly than younger ones.

In addition, it must be remembered that although the results proved strong spouse effect especially in the time devoted to high culture attendance, they do not tell us anything about the direction of the influence. This means that we do not know the effect of one spouse on the other spouse.

However, the results of this study do not reveal whether spouses devote time to the studied activities together. On the basis of the basic data of this study it would have been possible to approach this issue, because we also asked whether the respondent was alone or together with somebody when the activity was carried out. However, time use diaries were incompletely filled in this respect. However, it is reasonable to assume that in these cases couples do attend together because the time use of couples was recorded mainly on the same days. Also, on the basis of the study of Upright, it is much more usual to go together to a gallery, musical, classical concert, theater, dance or opera than to go alone (p. 133).

A problem in time use data is that when it tries to cover all human activities it is superficial in individual areas. For instance, we know only the time devoted to book reading, but we do not know if people read fiction or non-fiction, and we do not even know if they read popular or literary books.

In this study, only spouse effect on time use has been studied. In the following paper the purpose will be to broaden the view and to take also children into account. What is the impact of parents on the time use of their children? All in all, this study gives some new perspectives to the sociability of time use but, simultaneously, opened us new questions about the topic.

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The great recession and unpaid work time in the United States – Does poverty matter?

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Abstract

Using the 2003–12 American Time Use Survey, this paper establishes the presence of poverty-based differences in the changes in household production time of men and women during the Great Recession, contributing to our understanding of the heterogeneous impact of recession on the well-being of individuals. We find that poor men's unpaid work time increased whereas nonpoor men's unpaid work time decreased. Among women, only nonpoor women reduced their unpaid work time. We examine the forces behind these changes using the Oaxaca-Blinder decompositions. The decompositions reveal that poverty-based differences can be partially attributed to shifts in the structure of households whereas gender-based differences to shifts in own and spousal employment status. Nevertheless, sizable portions of the changes in unpaid work time remain unexplained by the shifting individual and household characteristics. The analysis of the unexplained portion of the changes supports the assertion that poverty matters to the adjustments in unpaid work time.

JEL Codes: D13, J16, J22, I32

Keywords: Time use, household production, poverty, gender, great recession

1 Introduction

The Great Recession resulted in significant reductions in jobs, paid work hours, and household income in the United States. Its distributional impact on individual and household well-being has been heterogeneous as income inequality widened and consumption inequality contracted (e.g. Meyer and Sullivan 2013). This study adds the time dimension to the assessment of the distributional impact of the Great Recession via the analysis of changes in the unpaid work time associated with household production. The importance of such analysis in the context of the recession is underpinned by the mitigating role that household production played during the Great Recession (Aguiar et al. 2013). Men have been the drivers behind the increase in the unpaid work time during the Great Recession although women remain the primary bearers of household responsibilities (Berik and Kongar 2013; Aguiar et al. 2013). Our study expands on these findings by evaluating the presence of income-based differences in the unpaid work time changes of men and women during the Great Recession and the factors responsible for these changes.

We use the 2003-12 American Time Use Survey (ATUS) data and separate the sample into the groups of low-income (poor) and high-income (nonpoor) men and women. We examine how the changes in unpaid work time vary based on poverty and gender. We then analyze the forces responsible for these changes by conducting the Oaxaca-Blinder decompositions of the unpaid work time changes of the four groups. In order to assess the role of the recession, we conduct the decompositions during the recession and after the recession.

The rest of the paper is organized as follows: The conceptual framework and literature section provides a framework for analyzing the relationship between unpaid work time and income shocks and reviews relevant previous work. In the data and methodology section, we review the data, provide a breakdown by gender and poverty status, and discuss the Oaxaca-Blinder decomposition approach used in the analysis. The results section discusses our findings and highlights the differences by poverty status in the unpaid work adjustments of men and women. It also provides a detailed elaboration of the forces responsible for the differences in the unpaid work adjustments. We conclude with a discussion of the implications of our findings.

2 Conceptual framework and literature

Household production plays an important in labor supply models (Becker 1965). Its incorporation into the analysis of business cycles has been motivated by its role in mitigating the welfare

impact of output fluctuations (Gronau 1977, Benhabib, et al. 1991; Greenwood and Hercowitz 1991; Aguiar et al. 2012). In the context of these models, recessions influence household production time in a multifaceted way. On the one hand, the unpaid work time may decrease if the drop in labor income is compensated for by the increase in paid work hours via the conventional income effect. The conventional income effect may also manifest itself due to non-labor income shocks, such as wealth contraction or spousal job loss. In the case of the spousal job loss, this response takes the form of the added worker effect, in which individuals enter workforce due to the employment loss or the reduction in work hours experienced by their spouses. Indeed, the evidence during the recent recession supports the presence of the added worker effect in the United States (Starr 2014). Additionally, spousal job loss may result in the greater sharing of household responsibilities further lowering unpaid work time. Indeed, Solaz (2005) provides evidence of the reallocation of domestic chores as a response to spousal job loss among both men and women in France.

On the other hand, the unpaid work time may increase if the recession-induced drop in income due to the decrease in the wage rate creates a disincentive to work via the conventional substitution effect. Further upward pressure on the unpaid work time may be placed from the inability to compensate for the income shock via increased work hours and the consequent substitution of household produced goods for market goods as a coping strategy for smoothing consumption. This is especially likely during recessions when the increase in labor supply often translates into higher excess supply due to labor rationing.

Other mechanisms employed by individuals to cope with recession, may have indirect effect on their unpaid work time. For example, if income shocks induce changes in household composition, as was seen post-2008 when the average household size increased after years of continuous decline (U.S. Census Bureau 2012), the unpaid work of individual household members may change. Despite the importance of the relationship between household structure and unpaid work time, it has received relatively little attention in the literature (with the exception of Gershuny and Sullivan 2014). This paper attempts to shed additional light on this important topic.

This conceptual framework suggests that the ultimate effect of income shocks on unpaid work time is ambiguous and has to be evaluated empirically. Existing empirical evidence from the Great Recession indicates that the unpaid work time in the United States decreased, and was accompanied by a reduction in working hours and an increase in leisure time¹. Aguiar et al.

1 The empirical literature documenting long-run time use patterns has revealed that between the 1960s and the onset of the Great Recession in 2008 working hours in the United States did not change while unpaid work time contracted and leisure time increased (Aguiar and Hurst 2007; Ramey and Francis 2009). Although women remain the primary providers of household production, the gender gap in the unpaid work time in the United States has narrowed since the 1960s (Ramey and Francis 2009). Evidence from other industrialized coun-

(2013) view these movements as the net effect of long-term trends and cyclical forces. They isolate these trends from cyclical shifts using state-level changes in time use. They find that the decrease in working hours observed during the Great Recession was associated with a modest 35% cyclical increase in unpaid work time, consistent with the view that household production rises during economic downturns. The evidence based on cross-sectional variation in the economic environment appears to support the conjecture that the cyclical decline of the labor market raises household production. For example, Burda and Hamermesh (2010) find that in the United States, the states experiencing higher increases in unemployment also exhibit higher levels of household production. In a related finding, regions in Spain with higher unemployment rates exhibit higher levels of household production among unemployed individuals (Gimenez-Nadal and Molina 2014). Hence, this evidence reveals the dominance of the factors that increase unpaid work time.

Our focus lies on investigating the presence of income-based variation in the changes in the unpaid work time of men and women during the Great Recession and on exploring factors that contributed to this variation. The previous literature that evaluates the heterogeneous impact of the Great Recession on low-income and high-income households analyzes this question using the lens of income and consumption inequality. For example, Meyer and Sullivan (2013) find that income inequality in the United States increased whereas consumption inequality decreased during the Great Recession. Another strand of literature related to our study assesses the presence of income-based variation in the unpaid work-time although it does not address the impact of the Great Recession (Frick et al. 2012; Frazis and Stewart 2011; Meyer and Sullivan 2008; Gelber and Mitchell 2012; Zick et al. 2008). Underpinning this work is the recognition of the importance of time constraints in our understanding of what constitutes economic well-being (Merz and Rathjen 2014; Zacharias et al. 2012) and the finding that household production played a role at absorbing the impact of the Great Recession (Aguiar et al. 2013). Our study complements this research by examining the changes in the unpaid work time spent on household production activities by low-income and high-income men and women during the Great Recession. Such analysis illuminates differences in the channels through which low-income and high-income men and women were affected by the recession and the approaches that they used in coping with its impact.

tries reveals similar gender patterns in paid and unpaid work since the 1970s, although the increase in the leisure time seen in the United States was not present in all countries (Gimenez-Nadal and Sevilla 2012; Gwozdz and Sousa-Poza 2010).

3 Data and methodology

The American Time Use Survey (ATUS) collects time use information from a nationally representative pool of residents of households who are at least 15 years of age, civilian and not-institutionalized. It draws from a subsample of households completing their final months of interviews in the Current Population Survey (CPS). Two to five months after the final CPS interview, one individual per household in this subsample is randomly selected and interviewed over the telephone. This person is asked to recount their activities over the previous 24 hours beginning at 4:00am on the day prior to the interview and the responses are recorded in individual diaries. With the exception of 2003, when over 20,000 diaries were collected, each year between 2003 and 2012 includes about 14,000 diaries. The initial sample contains 136,960 observations. To enable the assignment of the household-level poverty status, 13,698 observations without reported family income were dropped. We further constrain the sample to the respondents who are younger than 18 and older than 65 years old (25,016 observations) and exclude the records with data quality issues and missing observations (3,208 observations). In the end, 95,038 diaries remain in the final dataset, comprising 69% of the original dataset. In all our estimations, observations are weighted by the ATUS sampling weights².

We split the sample into low income (poor) and high income (nonpoor) groups using the federal poverty guideline issued by the United States Department of Health and Human Services. The poverty guideline is adjusted by year, household size, and location (including the lower 48 states, Alaska and Hawaii). Family income recorded at the time of the final CPS interview is used as the basis for poverty identification, and includes the monetary income from various sources including pensions and social security payments of all members of the household who are 15 years of age or older. The income information is available only as a categorical variable on an ascending scale of 1 through 16. The income category in which the poverty guideline is nested is classified as poor. For example, 130 percent of the poverty guideline for a one-person household in a lower-48 state in 2003 was \$11,674. This amount was nested in the family income bracket of \$10,000 to \$12,499 with the code value 4 in the ATUS. The cases with family income at or below 4 were classified as income poor. In this approach, the poverty rate may be overestimated to the extent that some nonpoor individuals are classified as poor.³ Table 1 shows

² The ATUS weights do not adjust for the missing income observations. To assess the extent to which this issue may bias our results, we ran a non-survey weighted logit model to estimate the likelihood of having missing income using the same set of explanatory variables as in our main estimation. Although most of the variables are statistically significant, the weak overall fit of the model (pseudo-R² of 0.07) suggests that this issue may not be a problem.

³ We assess the sensitivity of our results to this particular classification of poor and nonpoor individuals by assigning to the poor group only those individuals whose income lies below the income category that nests the poverty threshold. In this alternative classification, some poor individuals are classified as nonpoor. We find that our results are robust to this alternative classification.

that the poverty rate increased between 2003 and 2012, especially since 2008. The annual increases in the poverty rate at 130 percent of the guidelines are statistically significant at 10 percent level starting in 2008. In the subsequent analysis, we use the 130 percent line as a representative criterion for determining the poverty status (in practice, a level between 100 and 200 percent of the guideline is typically used to determine the eligibility for various federal and state programs). We note that the assignment of poverty status in our paper aims at classifying the sample into low-income and high-income households rather than at separating those officially poor (e.g. eligible for receive welfare assistance) from those who are not.

Table 1
Poverty rates by year

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Rate	17.6	19.2	19.5	19.4	18.1	18.7	18.9	20.9	21.9	22.5

ATUS survey weights are applied.

Source: Authors' calculations using 130 percent of the federal poverty guidelines from the federal registry.

We evaluate the changes in the unpaid work time along the business cycle by separating 2003 - 12 into three periods: pre-recession (January 2003 - November 2007), recession (December 2007 - June 2009), and post-recession (July 2009 - December 2012), consistent with the NBER recession dates⁴. We split the sample into four groups: poor and nonpoor females and poor and nonpoor males; and evaluate the changes that take place between pre-recession and recession periods (during the recession) and between recession and post-recession periods (after the recession).

The dependent variable is weekly minutes spent on unpaid work⁵. Unpaid work activities are associated with household production for own consumption and include cooking, cleaning, shopping, household management, repair and lawn care, and caring for children and others. These activities are classified as unpaid work based on the third-party principle and include activities that individuals are not paid for but could pay a third-party to perform (Reid 1934). Although our detailed analysis evaluates the changes in total unpaid work time, in the preliminary analysis we also consider a more detailed breakdown of unpaid work-time activities into routine tasks, maintenance tasks and care (see Appendix for exact definitions). Routine activities include cooking, cleaning, laundry, shopping and household management. Maintenance activities include repair of household structures, appliance, vehicle, toys, and lawn care. Care activities

⁴ As a robustness check, we focus on the labor market conditions and re-define the three periods based on monthly changes in nonfarm payroll employment as follows: pre-recession (Jan 2003 – Jan 2008), recession (Feb 2008 – Dec 2009) and post-recession (Jan 2010 – Dec 2012). The results from this alternative recession dating are similar to the baseline model.

⁵ We multiply daily minutes by 7 and include the dummy variable for weekends and holidays in the estimation.

are defined as caring for and helping children and the elderly with daily tasks as primary activities. We further separate care activities into child care and care for other household members, taking into account that child care has been shown to follow patterns different from other household production activities, in part because child care contains leisure and investment components (Guryan et al. 2008, Kimmel and Connelly 2007).

Our set of explanatory variables includes standard individual and household characteristics (Burda and Hamermesh 2010). They include the number of children in the household; presence of children 5 years old or younger; the number of adults in the household; race, with white as the base; dummy variable for Hispanic origin; age of the respondent; education, indicating the highest level of schooling completed, with less than high school education as the base; own labor force status, with full-time wage worker status as the base; labor force status of a domestic partner (spouse or unmarried partner), with a respondent without a partner as the base; a dummy variable for weekends and holidays; a dummy variable for the summer months and a dummy variable for the region⁶.

Table 2 reveals the shifts in the demographic and socioeconomic characteristics of households that occurred during 2003 – 2012. Some of the most notable changes took place in the form of the worsening labor force composition. In particular, the proportion of unemployed increased in all four groups. Moreover, this proportion increased more sharply among the poor than among the nonpoor, due to the higher likelihood of the poor losing jobs, due to the nonpoor moving into poverty after losing a job or both. It is also notable that the proportion of full-time wage workers decreased in all groups but nonpoor women highlighting poverty- and gender-based differences in the changes in labor market characteristics. Shifts similar to the ones that occurred in the own labor force composition took place in the labor force composition of spouses, as the proportion of employed spouses declined for all groups but poor males after the recession.

Important shifts also occurred in household composition. In line with the long-term trend in the structure of U.S. households, during the recession the proportion of single individuals increased in all four groups, but it veered off the trend and decreased after the recession (Vespa et al. 2013). Consistent with these changes, before the recession, the proportion of households with three or more adults decreased in all groups but poor females; however during the post-recession period, we observe a pronounced spike for all four groups. These post-recession shifts, likely induced by the recession, are also confirmed by the Census data (U.S. Census Bureau 2012), which documents an increase in the proportion of individuals more than 18 years old in U.S. households after 2008. This finding has been attributed to adult children moving in with

⁶ As a robustness check, we include the age of the youngest child as an additional variable, as families with young children spend more time on childcare and housework. Restricting the sample to the households with children lowers the value of the number-of-children coefficient, but does not significantly affect other results.

their parents and/or elderly parents moving in with their children. Taylor et al. (2011) report that, whereas the number of people living in multigenerational households increased by about 2 percent per year since 1980, between 2007 and 2009, this number jumped by over 16 percent. Furthermore, Elliott et al. (2011) observe a rise in the complexity of the family structure during the Great Recession due to the growing incidence of members who are not a spouse or own children of the householder, possibly due to the mergers of different households with children. Consistent with Elliott et al. (2011), in our sample, this compositional change appears to be more substantial among poor households. This finding could be attributed to the greater likelihood of poor households merging as well as to the merged households having a greater likelihood of being categorized as poor.

Other changes in household composition pertained to the presence of children in poor and nonpoor households. In nonpoor households, in line with long-term trends, the proportion of households with two or more children decreased. In poor households, on the other hand, there is a cyclical pattern in that the proportion of households with two or more children increased during the recession (in contrast to the downward long-term trend) and decreased after the recession, potentially revealing the greater sensitivity of poor households to economic shocks. It is plausible that the temporary merging of multiple households for economic reasons lies behind the initial increase. In turn, the post-recession decrease may signify the reversal in these nontraditional household arrangements. Other notable changes during 2003 - 12 include the population becoming older and more educated (Table 2).

We decompose the unpaid work time of poor and nonpoor men and women separately using the Oaxaca-Blinder decomposition (Oaxaca 1973; Blinder 1973). We use the Ordinary Least Square (OLS) method, shown in this case to be the preferred approach over limited dependent variable methods, such as Tobit (Stewart 2013)⁷.

⁷ In addition to the OLS estimation, we estimate the Heckman sample selection model in order to control for the potential bias due to the selection into poor and nonpoor groups. We establish identification using property ownership (ownership versus renting) and age squared in the selection equation. The results are robust to the re-estimation. In addition, we evaluate the potential endogeneity of own and spousal labor force status variables, which stems from the impact that unpaid work time constraints may have on the labor force status (Leigh 2010; Kotsadam 2011). Given the difficulties in finding strong instruments, we opt not to use the instrumental variables approach. Instead, we re-estimate the model excluding care time from the unpaid work time, the most likely culprit causing the endogeneity. With the exception of the number of children, the re-estimation does not change our findings, supporting the robustness of our baseline model. The results of both sets of estimations are available upon request.

Table 2
Descriptive statistics of variables (proportions)

	Poor men			Nonpoor men			Poor women			Nonpoor women		
	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12
Number of children												
0	0.486 (0.012)	0.461 (0.021)	0.525 (0.012)	0.586 (0.005)	0.609 (0.009)	0.616 (0.006)	0.365 (0.009)	0.39 (0.017)	0.387 (0.01)	0.555 (0.004)	0.563 (0.008)	0.588 (0.005)
1	0.158 (0.008)	0.142 (0.014)	0.147 (0.008)	0.181 (0.003)	0.164 (0.006)	0.172 (0.004)	0.203 (0.007)	0.174 (0.011)	0.197 (0.008)	0.197 (0.003)	0.198 (0.006)	0.189 (0.004)
2 or more	0.356 (0.011)	0.397 (0.021)	0.328 (0.011)	0.232 (0.004)	0.227 (0.007)	0.212 (0.004)	0.431 (0.009)	0.436 (0.017)	0.416 (0.01)	0.248 (0.003)	0.239 (0.006)	0.222 (0.004)
Children 0-5 years old	0.302 (0.011)	0.321 (0.02)	0.257 (0.01)	0.174 (0.003)	0.163 (0.006)	0.16 (0.004)	0.367 (0.009)	0.355 (0.016)	0.349 (0.01)	0.19 (0.003)	0.187 (0.006)	0.176 (0.004)
Number of adults												
1	0.22 (0.009)	0.241 (0.016)	0.261 (0.01)	0.179 (0.003)	0.189 (0.006)	0.195 (0.004)	0.288 (0.007)	0.305 (0.014)	0.292 (0.009)	0.172 (0.003)	0.188 (0.006)	0.187 (0.004)
2	0.542 (0.013)	0.485 (0.023)	0.489 (0.013)	0.721 (0.004)	0.723 (0.008)	0.713 (0.005)	0.441 (0.009)	0.41 (0.018)	0.427 (0.011)	0.723 (0.004)	0.717 (0.007)	0.721 (0.005)
3 or more	0.238 (0.011)	0.274 (0.022)	0.251 (0.012)	0.101 (0.003)	0.087 (0.005)	0.092 (0.003)	0.271 (0.009)	0.285 (0.016)	0.281 (0.01)	0.105 (0.003)	0.095 (0.005)	0.092 (0.003)
Age												
18-24	0.255 (0.012)	0.205 (0.019)	0.229 (0.012)	0.127 (0.004)	0.136 (0.008)	0.133 (0.005)	0.24 (0.009)	0.221 (0.016)	0.214 (0.01)	0.121 (0.004)	0.118 (0.008)	0.123 (0.005)
25-44	0.474 (0.012)	0.463 (0.021)	0.42 (0.012)	0.457 (0.005)	0.443 (0.009)	0.423 (0.006)	0.464 (0.009)	0.472 (0.017)	0.458 (0.01)	0.452 (0.004)	0.427 (0.008)	0.407 (0.005)
45-65	0.272 (0.009)	0.332 (0.019)	0.351 (0.011)	0.416 (0.005)	0.421 (0.009)	0.443 (0.006)	0.297 (0.008)	0.307 (0.015)	0.327 (0.009)	0.427 (0.004)	0.455 (0.009)	0.471 (0.006)

Table 2 (Cont.)

	Poor men			Nonpoor men			Poor women			Nonpoor women		
	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12
Race												
White	0.750 (0.010)	0.763 (0.018)	0.745 (0.011)	0.853 (0.003)	0.848 (0.006)	0.837 (0.004)	0.705 (0.008)	0.707 (0.015)	0.696 (0.009)	0.843 (0.003)	0.824 (0.006)	0.828 (0.004)
Black	0.185 (0.009)	0.186 (0.016)	0.185 (0.009)	0.091 (0.003)	0.094 (0.005)	0.096 (0.003)	0.235 (0.008)	0.236 (0.014)	0.237 (0.008)	0.102 (0.002)	0.110 (0.004)	0.105 (0.003)
Other	0.065 (0.006)	0.052 (0.010)	0.070 (0.007)	0.055 (0.002)	0.058 (0.004)	0.067 (0.003)	0.060 (0.004)	0.057 (0.008)	0.068 (0.006)	0.055 (0.002)	0.066 (0.004)	0.067 (0.003)
Hispanic	0.316 (0.011)	0.363 (0.021)	0.308 (0.012)	0.115 (0.003)	0.124 (0.006)	0.128 (0.004)	0.283 (0.008)	0.283 (0.016)	0.275 (0.009)	0.102 (0.003)	0.108 (0.005)	0.111 (0.003)
Highest education												
Less than high school	0.330 (0.011)	0.330 (0.021)	0.298 (0.012)	0.093 (0.003)	0.085 (0.006)	0.084 (0.004)	0.315 (0.009)	0.286 (0.016)	0.267 (0.009)	0.067 (0.002)	0.066 (0.005)	0.053 (0.003)
High school	0.378 (0.012)	0.383 (0.021)	0.386 (0.012)	0.304 (0.005)	0.291 (0.009)	0.294 (0.006)	0.368 (0.009)	0.375 (0.017)	0.370 (0.010)	0.278 (0.004)	0.247 (0.008)	0.250 (0.005)
Some college	0.208 (0.01)	0.218 (0.017)	0.218 (0.01)	0.277 (0.004)	0.275 (0.008)	0.274 (0.005)	0.248 (0.008)	0.251 (0.014)	0.267 (0.009)	0.306 (0.004)	0.308 (0.008)	0.307 (0.005)
College degree	0.067 (0.006)	0.045 (0.007)	0.071 (0.007)	0.211 (0.004)	0.22 (0.007)	0.226 (0.005)	0.054 (0.004)	0.071 (0.009)	0.075 (0.005)	0.232 (0.004)	0.254 (0.007)	0.252 (0.005)
Post-graduate education	0.017 (0.003)	0.023 (0.006)	0.027 (0.003)	0.116 (0.003)	0.129 (0.006)	0.121 (0.004)	0.015 (0.002)	0.017 (0.004)	0.022 (0.003)	0.116 (0.003)	0.125 (0.005)	0.138 (0.004)
Work												
Full-time wage worker	0.485 (0.012)	0.44 (0.021)	0.387 (0.012)	0.703 (0.005)	0.693 (0.009)	0.652 (0.006)	0.274 (0.008)	0.261 (0.015)	0.227 (0.009)	0.533 (0.005)	0.541 (0.009)	0.522 (0.006)

Table 2 (Cont.)

	Poor men			Nonpoor men			Poor women			Nonpoor women		
	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12
Part-time wage worker	0.121 (0.009)	0.108 (0.014)	0.115 (0.008)	0.061 (0.003)	0.067 (0.005)	0.075 (0.004)	0.204 (0.008)	0.186 (0.014)	0.177 (0.008)	0.161 (0.003)	0.159 (0.007)	0.165 (0.005)
Full-time self-employed	0.054 (0.005)	0.074 (0.013)	0.053 (0.005)	0.085 (0.003)	0.084 (0.005)	0.078 (0.003)	0.014 (0.002)	0.015 (0.003)	0.02 (0.003)	0.033 (0.002)	0.034 (0.003)	0.03 (0.002)
Part-time self-employed	0.021 (0.003)	0.025 (0.005)	0.035 (0.005)	0.017 (0.001)	0.019 (0.002)	0.017 (0.002)	0.014 (0.002)	0.013 (0.003)	0.02 (0.003)	0.028 (0.001)	0.03 (0.003)	0.027 (0.002)
Unemployed	0.082 (0.007)	0.109 (0.015)	0.154 (0.009)	0.039 (0.002)	0.048 (0.004)	0.066 (0.003)	0.089 (0.005)	0.105 (0.011)	0.138 (0.007)	0.033 (0.002)	0.047 (0.004)	0.05 (0.003)
Not in the labor force	0.237 (0.009)	0.245 (0.016)	0.256 (0.011)	0.095 (0.003)	0.089 (0.005)	0.112 (0.004)	0.404 (0.009)	0.42 (0.017)	0.418 (0.01)	0.213 (0.004)	0.19 (0.007)	0.206 (0.004)
Partner's employment status												
No partner	0.592 (0.012)	0.581 (0.022)	0.605 (0.012)	0.395 (0.005)	0.424 (0.01)	0.445 (0.006)	0.64 (0.009)	0.659 (0.016)	0.671 (0.01)	0.365 (0.004)	0.384 (0.009)	0.409 (0.006)
Partner employed	0.158 (0.008)	0.133 (0.014)	0.148 (0.008)	0.424 (0.005)	0.404 (0.009)	0.38 (0.006)	0.255 (0.008)	0.226 (0.014)	0.207 (0.008)	0.546 (0.005)	0.524 (0.009)	0.483 (0.006)
Partner not-employed	0.25 (0.01)	0.286 (0.02)	0.247 (0.011)	0.182 (0.004)	0.173 (0.007)	0.174 (0.004)	0.105 (0.006)	0.115 (0.012)	0.121 (0.007)	0.089 (0.003)	0.092 (0.005)	0.108 (0.004)
Region												
Northeast	0.13 (0.007)	0.119 (0.014)	0.131 (0.008)	0.182 (0.004)	0.192 (0.008)	0.193 (0.005)	0.13 (0.006)	0.129 (0.011)	0.146 (0.007)	0.181 (0.004)	0.177 (0.007)	0.182 (0.005)
Midwest	0.206 (0.01)	0.2 (0.017)	0.219 (0.01)	0.258 (0.004)	0.231 (0.008)	0.238 (0.005)	0.219 (0.008)	0.208 (0.013)	0.224 (0.009)	0.254 (0.004)	0.256 (0.008)	0.236 (0.005)
South	0.393 (0.012)	0.405 (0.021)	0.421 (0.012)	0.327 (0.005)	0.342 (0.009)	0.341 (0.006)	0.425 (0.009)	0.447 (0.017)	0.412 (0.01)	0.336 (0.004)	0.342 (0.008)	0.352 (0.005)

Table 2 (Cont.)

	Poor men			Nonpoor men			Poor women			Nonpoor women		
	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12	Jan 03 - June 07	July 07 - Dec 09	Jan 10 - Dec 12
West	0.271 (0.011)	0.277 (0.02)	0.229 (0.01)	0.233 (0.004)	0.235 (0.008)	0.228 (0.005)	0.227 (0.008)	0.216 (0.014)	0.219 (0.008)	0.229 (0.004)	0.225 (0.007)	0.23 (0.005)
Weekends and holidays	0.306 (0.009)	0.294 (0.016)	0.314 (0.01)	0.296 (0.004)	0.308 (0.007)	0.294 (0.005)	0.293 (0.007)	0.315 (0.014)	0.292 (0.008)	0.301 (0.004)	0.301 (0.007)	0.3 (0.005)
Summer	0.254 (0.01)	0.213 (0.017)	0.25 (0.011)	0.242 (0.004)	0.211 (0.008)	0.273 (0.006)	0.255 (0.008)	0.251 (0.015)	0.266 (0.009)	0.257 (0.004)	0.219 (0.007)	0.261 (0.005)

Survey-weighted proportions, standard errors in parentheses.
Source: American Time Use Survey (ATUS) 2003-12, own calculations.

Let $Y_{g,t}$ represent the unpaid work time of group g at point t , where $g \in$ (poor females, nonpoor females, poor males, nonpoor males). Using the OLS specification, we estimate a linear model $Y_{g,t} = X'_{g,t} \beta_{g,t} + \varepsilon_{g,t}$, where $X_{g,t}$ is the vector of explanatory variables, $\beta_{g,t}$ is the vector of coefficients and $\varepsilon_{g,t}$ is the error term, such that $E(\varepsilon_{g,t}) = 0$.

The change in the mean values of the unpaid work time between points t and $t+1$, $E(Y_{g,t})$ and $E(Y_{g,t+1})$, can be expressed as:

$$(1) \quad R = E(Y_{g,t+1}) - E(Y_{g,t}) = E(X'_{g,t+1}) \beta_{g,t+1} - E(X'_{g,t}) \beta_{g,t}, \text{ since}$$

$$(2) \quad E(Y_{g,t}) = E(X'_{g,t} \beta_{g,t} + \varepsilon_{g,t}) = E(X'_{g,t} \beta_{g,t}) + E(\varepsilon_{g,t}) = E(X'_{g,t}) \beta_{g,t}.$$

The two-fold decomposition of this difference can then be expressed as:

$$(3) \quad R = [E(X_{g,t+1}) - E(X_{g,t})]' \beta^* + [E(X_{g,t+1})' (\beta_{g,t+1} - \beta^*) + E(X_{g,t})' (\beta^* - \beta_{g,t})],$$

where β^* is the coefficient vector from a pooled regression with the time dummy for period $t+1$.

In this decomposition, the first component, $[E(X_{g,t+1}) - E(X_{g,t})]' \beta^*$, represents the portion of the total difference due to the changes in the explanatory variables and is commonly referred to as the explained component. The second component, $[E(X_{g,t+1})' (\beta_{g,t+1} - \beta^*) + E(X_{g,t})' (\beta^* - \beta_{g,t})]$, represents the portion of the total difference due to the changes in the coefficients and is commonly referred to as the unexplained component.

4 Results

4.1 Changes in the unpaid work time of men and women over the business cycle

During the recession, the gap in the unpaid work time between poor and nonpoor men contracted as nonpoor men decreased their unpaid work time whereas poor men increased it. In fact, the increase in poor men's unpaid work time was so strong that it surpassed nonpoor men's time. These findings reveal contrasting patterns of time use changes between poor and nonpoor men during the recession and indicates a greater role of household production at absorbing the impact of the recession among poor men. After the recession, the gap remained about the same as both poor and nonpoor men decreased their unpaid work time. More specifically, during the recession poor men's unpaid work time increased by 146 minutes from 1,023 to 1,169 minutes. After the recession it decreased by 62 minutes down to 1,087 minutes albeit this decrease was not statistically significant (Tables 3 and 4). The cyclical nature of these changes was driven by the recessionary increase and the subsequent post-recessionary decrease in their childcare time, echoing findings from other studies for men (Berik and Kongar 2013). In addition, routine activities contributed sizably to the recessionary increase in

poor men's unpaid work time, also consistent with findings from other studies (Morrill and Pabilonia 2012; Hartmann et al. 2010). Nonpoor men decreased their unpaid work time during the recession by 47 minutes from 1,134 to 1,087 minutes and further down to 1,069 minutes although the post-recessionary decrease was not statistically significant. The finding that poor and nonpoor men exhibited contrasting movements in their unpaid work time during the recession, combined with the evidence of cyclicalities in poor men's time use, lends support to the view that income constraints matter to household production time use, motivating our investigation of the forces that underlie the changes in it.

Among women, the gap in the unpaid work time between poor and nonpoor individuals did not change substantially. Unlike men, poor women's unpaid work time did not increase highlighting gender differences in time use changes. If anything, it decreased albeit not statistically significant. Nonpoor women, similar to men, decreased their unpaid work time during and after the recession (Tables 3 and 4). This decrease was from 1,853 to 1,793 minutes during the recession and further down to 1,684 minutes after the recession. It is noteworthy that despite the continuous decline, the recessionary decrease in nonpoor women's unpaid work time appears to have been driven by forces different from those contributing to the post-recessionary decrease. In particular, during the recession, nonpoor women reduced their time in maintenance activities, which may be viewed as less urgent than the routine activities and childcare. The reductions in maintenance activities may also be connected to the recession-induced drop in the intermediate goods expenditures related to these activities. After the recession, on the other hand, nonpoor women reduced their time in routine and childcare activities. Hence, as labor market conditions continued deteriorating, nonpoor women appear to have tapped into their routine activities and even child care to make the necessary time use adjustments.

4.2 Decomposition

The decomposition results shed light on the role of the shifts in individual and household characteristics in explaining the changes in the unpaid work time of individuals by gender and poverty status. They also reveal that a sizable portion of the changes remains unexplained (Table 4).

4.2.1 Men

We find that the increase in poor men's unpaid work time during the recession was associated with the cumulative impact of the worsening labor market conditions, changing household composition and demographic shifts.

Table 3
Changes in unpaid work time 2003-2012 – Conditional means (in weekly minutes)

Variables		Unpaid work	Routine	Maintenance	Child care	Other care
Poor men	During recession	146.2**	88.40**	2.115	101.9***	-46.18***
		(66.56)	(41.89)	(25.68)	(33.21)	(16.29)
	After recession	-61.74	-22.54	-5.053	-68.48***	34.33**
		(68.10)	(43.09)	(25.98)	(34.52)	(16.18)
Nonpoor men	During recession	-46.87*	-13.79	-22.17	-1.439	-9.47
		(24.48)	(15.34)	(14.60)	(6.95)	(7.85)
	After recession	-18.43	15.28	-23.28	-1.763	-8.666
		(25.34)	(16.19)	(14.74)	(7.41)	(7.98)
Poor women	During recession	-77.78	-46.1	-9.478	10.94	-33.14*
		(58.94)	(43.52)	(13.25)	(25.70)	(19.22)
	After recession	-2.896	18.37	5.166	-13.67	-12.76
		(60.36)	(44.76)	(14.40)	(26.44)	(18.14)
Nonpoor women	During recession	-60.08**	-23.84	-24.41***	-9.422	-2.408
		(27.45)	(21.44)	(6.13)	(10.40)	(9.83)
	After recession	-108.9***	-66.74***	1.664	-30.59***	-13.27
		(28.78)	(22.40)	(6.35)	(10.89)	(10.43)

Standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1,
Source: American Time Use Survey (ATUS) 2003-12, own calculations.

Table 4
Summary of the Oaxaca Blinder decomposition results
(weekly minutes of unpaid work time)

	Men				Women			
	During recession		After recession		During recession		After recession	
	poor	nonpoor	poor	nonpoor	poor	nonpoor	poor	nonpoor
Prediction after	1,169*** (61.59)	1,087*** (21.35)	1,107*** (29.04)	1,069*** (13.65)	1,908*** (52.22)	1,793*** (24.39)	1,905*** (30.26)	1,684*** (15.27)
Prediction before	1,023*** (25.24)	1,134*** (11.99)	1,169*** (61.59)	1,087*** (21.35)	1,985*** (27.32)	1,853*** (12.59)	1,908*** (52.23)	1,793*** (24.39)
Difference	146.2** (66.56)	-46.87* (24.48)	-61.74 (68.10)	-18.43 (25.34)	-77.78 (58.94)	-60.08** (27.45)	-2.896 (60.36)	-108.9*** (28.78)
Explained	52.30*** (19.14)	-0.617 (9.451)	2.353 (21.40)	4.715 (10.04)	-1.490 (28.85)	-19.13 (13.85)	21.22 (29.79)	-8.610 (14.02)
Unexplained	93.93 (62.77)	-45.85** (22.80)	-64.10 (63.42)	-23.15 (23.53)	-76.29 (51.69)	-40.95* (24.10)	-24.12 (54.18)	-100.3*** (25.61)

Standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1,
Source: American Time Use Survey (ATUS) 2003-12, own calculations.

In particular, the increase in the proportion of unemployed poor men raised the unpaid work time by 22 minutes and the increase in the average number of children in poor households

contributed another 20 minutes (Table 5).⁸ The latter finding is consistent with the increase in childcare activities during the recession (Table 3). The ageing of poor men's population added another 14 minutes. These three shifts jointly contributed 56 minutes to the 146-minute increase in poor men's unpaid work time during the recession. The changes in the returns to characteristics during the recession shed more light on their economic vulnerability. For example, part-time self-employed poor men increased their unpaid work time. This could be due to the greater flexibility afforded by their status, also found to be the case in the context of other countries (Gimenez-Nadal et al. 2012), combined with the stronger financial pressure to substitute households goods for market goods. The latter reason may also explain why poor men with not-employed spouses increased their unpaid work time relative to their counterparts without partners.

The 62-minute post-recessionary decrease in poor men's unpaid work time is indicative of cyclicity although it was not statistically significant. The persistent upward pressure placed on poor men's unpaid work time by the weak labor market conditions was counteracted by the post-recessionary reversal in the changes in household composition as the average number of children in poor households dropped, lowering the unpaid work time by 25 minutes. This finding is also consistent with the cyclical pattern in childcare time use observed in the data. Post-recessionary changes in the returns to poor men's characteristics further highlight the cyclical nature of the time use changes among poor men. For example, after the recession part-time self-employed workers reduced their unpaid work time by 18 minutes in a reversal of the adjustments made during the recession. We also note that part-time wage workers increased it by 34 minutes, which underscores the sensitivity of time use adjustments of poor men to employment status.

In the case of nonpoor men, compositional changes largely negate each other only marginally explaining the 47-minute reduction during the recession. On the one hand, similar to their poor counterparts, the worsening of nonpoor men's employment situation placed upward pressure on their time but at 7 minutes the increase was of a small magnitude. On the other hand, the average number of children in nonpoor households during the recession decreased as did the proportion of nonpoor men with employed spouses, both forces reducing nonpoor men's time use, effectively negating the increase due to the worsening of their employment situation. Instead, the main mechanism contributing to the reduction in nonpoor men's unpaid work time appears to be the reallocation of time during the week and throughout the year. More specifically, during the recession nonpoor men reduced the unpaid work time on weekends and holidays relative to their working days by 32 minutes. They also made seasonal adjustments to their time use, reducing their summer unpaid work activities by 20 minutes compared to the rest of the year.

After the recession, nonpoor men's unpaid work time continued decreasing although not statistically significantly. This was in part because of the stronger upward pressure on men's unpaid work time placed by the persistently weak labor market environment as the proportion

⁸ Full regression results for poor and nonpoor men and women estimated over 2003 -12 are reported in Table B1 in the Appendix.

of not only unemployed but also inactive men increased, potentially in a manifestation of the discouraged worker effect. Nevertheless, downward pressure on nonpoor men's unpaid work time remained strong as well. At least to some degree, this was due to the reduction in the proportion of nonpoor men with employed spouses as the lingering effects of recession became more pronounced in sectors employing large proportions of women. The decrease was also associated with the post-recessionary increase in the number of adults in nonpoor households, potentially due to the greater incidence of adult children moving in with their parents.

Linking these findings to the conceptual framework, our findings corroborate the possibility that among poor men substitution of market goods with household produced goods may have played a role in the increase in their unpaid work time, driven by the worsening of their employment situation, the increase in the number of children during the recession, and by the adjustments that they made to their unpaid work time due to being poor. Among nonpoor men, negative non-labor income related shock in the form of the worsening of the spousal employment situation played a contributing role in reducing their unpaid work time, although the primary factor appears to be the sharp contractions during the summer months and weekends and holidays.

4.2.2 Women

Poor women's unpaid work time during the recession, in contrast to their male counterparts, did not increase. One reason is that for poor women the worsening of employment situation in the household during the recession manifested itself through the employment status of their spouses rather than through their own employment status. As a result, poor women's unpaid work time was pushed down by 14 minutes, likely due to the combined impact of the adverse non-labor income shock and the sharing of household responsibilities (Solaz 2005). This evidence is consistent with men's employment taking a stronger hit during the recession (Şahin et al. 2010). Interestingly, changes in the proportion of children did not pull up poor women's unpaid work time the way they did for poor men.

After the recession, poor women's unpaid work time once again did not change statistically significantly even though their labor market situation worsened and the subsequent increase in the proportion of unemployed and part-time self-employed women was associated with a 36-minute increase in their unpaid work time.

Table 5
Oaxaca-Blinder Decomposition of the weekly minutes of unpaid work time of men

	During recession				After recession			
	Poor		Nonpoor		Poor		Nonpoor	
	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
No. of children	20.32*	60.28	-5.191**	7.659	-25.42**	-77.09	-1.815	-5.150
	(11.92)	(94.93)	(2.131)	(17.11)	(12.44)	(94.66)	(2.218)	(17.63)
Children 0-5 years old	1.060	-25.35	-5.009***	-0.766	-9.171	47.72	-0.761	4.844
	(2.398)	(43.51)	(1.923)	(8.320)	(6.043)	(42.91)	(2.057)	(8.421)
No. of adults	-1.068	289.6	1.687	42.94	-4.053	-413.2*	-4.620**	-56.81
	(2.326)	(208.2)	(1.240)	(74.19)	(4.684)	(211.0)	(1.848)	(72.10)
Age	13.70**	-276.1	0.656	62.16	2.907	141.4	4.215	-96.59
	(6.264)	(174.2)	(2.856)	(91.69)	(3.951)	(177.3)	(2.890)	(93.70)
Black ^a	-0.303	-0.949	0.360	4.600	-0.238	20.89	-1.653*	-4.395
	(3.795)	(26.02)	(0.792)	(6.107)	(2.312)	(26.02)	(0.899)	(6.505)
Other Race	0.986	21.81	0.00394	-3.114	0.0295	-16.03	-1.176	-2.923
	(1.392)	(15.58)	(0.172)	(5.282)	(1.735)	(16.33)	(0.752)	(5.432)
Hispanic	-4.685	-39.79	-0.468	8.692	0.926	82.40*	0.0480	-0.649
	(3.529)	(47.05)	(0.465)	(8.809)	(3.646)	(48.54)	(0.158)	(9.318)
High school ^b	0.0456	-84.66	-1.513	16.90	-0.705	45.49	0.217	6.917
	(0.385)	(55.10)	(1.773)	(26.12)	(1.776)	(57.69)	(2.453)	(26.58)
Some college	0.0202	-5.820	-0.156	31.47	-0.0389	-9.380	-0.762	-17.25
	(0.619)	(34.04)	(1.967)	(24.43)	(0.927)	(36.28)	(2.490)	(24.85)
College degree	0.602	-8.338	1.852	3.822	-0.122	10.06	1.854	11.10
	(1.592)	(9.376)	(1.779)	(18.88)	(2.448)	(10.43)	(2.312)	(19.73)

Table 5 (Cont.)

	During recession				After recession			
	Poor		Nonpoor		Poor		Nonpoor	
	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Post graduate education	0.275 (0.782)	-3.576 (6.723)	1.533 (1.051)	22.37* (12.04)	-0.519 (1.218)	-3.121 (7.195)	-1.300 (1.773)	-4.228 (12.50)
Part-time wage worker ^c	-1.345 (2.150)	-29.61 (19.88)	0.968 (0.959)	-10.96 (7.433)	0.781 (2.321)	34.48* (19.64)	0.414 (0.497)	2.890 (7.400)
Full-time self-employed	0.268 (2.291)	0.0701 (14.24)	0.194 (0.914)	0.307 (6.317)	0.370 (2.526)	-1.472 (14.97)	0.716 (0.788)	3.196 (6.236)
Part-time self-employed	1.478 (2.602)	15.75** (7.520)	0.780 (0.877)	0.885 (3.928)	3.527 (2.652)	-17.83** (8.489)	-0.761 (1.115)	0.831 (4.273)
Unemployed	21.63* (12.40)	-14.43 (24.92)	6.937** (3.495)	-12.75* (6.563)	34.12** (13.61)	18.51 (27.79)	11.13*** (3.348)	2.924 (7.107)
Inactive	2.363 (4.933)	-0.786 (35.73)	-3.081 (2.907)	-7.058 (9.556)	2.190 (5.659)	14.54 (37.56)	11.09*** (3.425)	9.684 (10.21)
Employed spouse ^d	-7.266 (5.266)	45.34 (30.41)	-3.396* (1.872)	15.71 (24.10)	5.422 (6.521)	-29.10 (30.87)	-5.254** (2.528)	10.34 (24.18)
Not-employed spouse	1.612 (2.456)	66.48 (41.65)	-0.610 (0.577)	-16.88 (12.70)	-7.240 (5.083)	-14.43 (43.83)	0.0547 (0.273)	10.12 (12.80)
Midwest ^e	-1.842 (4.640)	29.87 (36.80)	-1.215 (0.872)	0.352 (17.01)	4.266 (4.028)	-44.19 (38.10)	0.484 (0.895)	14.86 (17.12)
South	1.290 (3.515)	17.65 (64.32)	-0.716 (0.648)	-10.82 (21.63)	0.966 (1.884)	-66.38 (67.27)	-0.00244 (0.0478)	32.96 (22.30)
West	1.228 (2.976)	36.43 (52.87)	-0.00722 (0.0705)	21.14 (17.18)	-5.743 (5.316)	-41.46 (52.74)	-0.431 (0.615)	-0.741 (17.60)

Table 5 (Cont.)

	During recession				After recession			
	Poor		Nonpoor		Poor		Nonpoor	
	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Weekends and holidays	-1.674 (4.960)	-30.46 (34.42)	6.643 (4.569)	-31.50** (13.81)	2.376 (3.130)	-10.60 (35.38)	-6.719* (4.083)	-1.641 (14.21)
Summer	3.608 (2.677)	-6.655 (26.46)	-1.269 (0.777)	-20.43* (11.09)	-2.272 (2.387)	13.43 (27.27)	-0.257 (1.459)	7.616 (11.67)
Total	52.30*** (19.14)	93.93 (62.77)	-1.018 (9.435)	-45.85** (22.80)	2.353 (21.40)	-64.10 (63.42)	4.715 (10.04)	-23.15 (23.53)
Prediction after	1,169*** (61.59)		1,087*** (21.35)		1,107*** (29.04)		1,069*** (13.65)	
Prediction before	1,023*** (25.24)		1,134*** (11.99)		1,169*** (61.59)		1,087*** (21.35)	
Difference	146.2** (66.56)		-46.87* (24.48)		-61.74 (68.10)		-18.43 (25.34)	
Constant		37.22 (292.0)		-170.6 (147.4)		251.3 (305.5)		48.95 (151.4)
Observations	4,383	4,383	23,681	23,681	3,852	3,852	17,433	17,433

Notes: Standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1; ^a white is the base; ^b less than high school education is the base;

^c full-time wage worker is the base; ^d without a partner is the base; ^e Northeast is the base,

Source: American Time Use Survey (ATUS) 2003-12, own calculations.

Nonpoor women, similar to their male counterparts, decreased their unpaid work time during and after the recession and in their case not only recessionary but also post-recessionary drop was statistically significant (Table 6). Some of the factors associated with these decreases were common for nonpoor men and women. For example, similar to men's case, the decrease in the number of children and in the proportion of employed spouses placed downward pressure on nonpoor women's time during the recession. However, unlike men, during the recession the worsening of nonpoor women's labor force characteristics pushed their unpaid work time further down. The reason was that the increase in unemployment was outweighed by the decrease in inactivity, potentially due to the added worker effect, resulting in the decrease in nonpoor women's unpaid time use.

After the recession, the inactivity rate of nonpoor women increased, lifting their unpaid work time. Similar evidence of cyclicity is observed in nonpoor women's time reallocation: whereas during the recession, nonpoor women reduced their unpaid work time during the summer months relative to the rest of the year by 22 minutes, after the recession they increased it by 27 minutes. On the other hand, further decrease in the number of children continued placing downward pressure on nonpoor women's unpaid work time after the recession, outweighing the upward forces. We note that the main drivers of the contraction in nonpoor women's unpaid work time after the recession appear to be women with above high-school education. This could be because they might be in a better position to afford substituting household-produced goods with market-produced goods.

The sensitivity of time use adjustments to employment status is visible in the changes in poor women's returns to characteristics after the recession. For example, among self-employed poor women, full-time workers reduced their unpaid work time by 10 minutes, possibly because of greater work time pressures. On the other hand, their part-time counterparts increased it by 11 minutes, potentially due to the greater flexibility afforded by their part-time status and/or greater financial pressures and the resulting need to substitute market goods with household produced goods. These factors highlight the vulnerabilities in poor women's position.

There is little evidence of the cyclicity in the changes in poor women's unpaid work time, as we observe for poor men, except for the changes in the unpaid work time of poor women with high school education relative to their counterparts with less than high school education. During the recession, they decreased their unpaid work by 97 minutes and after the recession they increased it by 88 minutes.

Table 6
Oaxaca-Blinder Decomposition of the
weekly minutes of unpaid work time of women

	During recession				After recession			
	Poor		Nonpoor		Poor		Nonpoor	
	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
No. of children	-2.601 (14.85)	37.17 (70.52)	-8.740* (5.292)	-9.502 (21.44)	-5.585 (14.67)	-58.60 (71.21)	-11.36** (5.500)	6.961 (21.93)
Children 0-5 years old	-5.012 (7.423)	-30.91 (30.19)	-0.570 (2.930)	-25.79** (10.16)	-1.884 (7.610)	32.84 (30.61)	-4.475 (2.798)	18.16* (10.95)
No. of adults	-8.864 (6.406)	55.64 (134.3)	0.992 (1.209)	-4.889 (93.01)	-5.121 (5.702)	-16.75 (132.8)	-4.110** (1.865)	-33.25 (96.69)
Age	3.562 (5.724)	-15.44 (160.2)	7.624* (3.891)	-255.6*** (90.22)	9.495 (7.873)	180.4 (164.8)	4.878 (3.358)	109.0 (94.45)
Black ^a	-0.682 (5.341)	-16.28 (29.95)	-1.233 (1.176)	-8.522 (6.971)	0.0897 (5.078)	25.25 (30.48)	-1.412 (1.256)	9.286 (7.303)
Other Race	0.154 (0.557)	3.645 (12.00)	0.182 (0.521)	-6.318 (6.637)	-1.533 (1.698)	-11.55 (12.70)	-0.0779 (0.316)	-0.0933 (7.191)
Hispanic	0.351 (3.111)	-7.921 (41.85)	0.105 (0.208)	12.95 (8.653)	-1.109 (2.518)	-8.255 (42.67)	0.490 (0.664)	-3.459 (9.252)
High school ^b	0.772 (2.118)	-96.65* (52.71)	-4.554** (2.003)	6.970 (30.73)	-0.321 (1.386)	80.88 (54.90)	0.352 (0.833)	-26.33 (32.65)
Some college	0.882 (2.475)	35.33 (39.27)	0.632 (1.573)	27.23 (37.58)	1.978 (2.366)	-42.75 (41.16)	-0.0383 (0.762)	-69.71* (40.62)
College degree	3.234 (2.592)	-17.05 (14.70)	4.367** (2.010)	25.76 (30.21)	0.223 (0.676)	0.500 (15.24)	-0.155 (1.203)	-54.85* (33.14)

Table 6 (Cont.)

	During recession				After recession			
	Poor		Nonpoor		Poor		Nonpoor	
	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Post graduate education	0.319 (0.797)	2.544 (5.841)	1.885 (1.249)	30.59* (16.66)	1.315 (1.589)	0.382 (6.497)	1.791 (1.227)	-41.97** (18.66)
Part-time wage worker ^c	-4.268 (4.358)	44.03* (25.89)	-0.706 (2.485)	7.101 (11.18)	-4.619 (6.726)	-6.213 (25.95)	1.912 (2.649)	-8.653 (11.75)
Full-time self-employed	0.374 (1.152)	4.870 (5.409)	-0.0301 (0.353)	8.175* (4.535)	0.445 (0.768)	-10.39* (5.980)	0.0165 (0.188)	-4.061 (4.763)
Part-time self-employed	-0.438 (1.102)	-4.134 (4.057)	0.389 (1.828)	-2.978 (4.554)	5.083* (2.951)	10.60** (4.854)	-1.301 (1.935)	3.401 (4.863)
Unemployed	15.04 (11.46)	3.263 (20.56)	13.07*** (4.480)	12.59* (7.509)	31.00** (12.68)	-2.535 (22.76)	2.834 (4.914)	-11.49 (8.522)
Inactive	10.71 (14.16)	6.100 (53.17)	-25.08*** (7.444)	-7.022 (13.80)	-0.619 (12.61)	-60.08 (56.34)	15.27** (6.832)	-27.39* (14.37)
Employed spouse ^d	-12.96* (7.552)	-0.890 (32.46)	-8.106** (3.594)	-17.84 (30.47)	-12.19 (10.36)	55.66* (31.78)	-15.94*** (4.368)	48.93 (31.28)
Not-employed spouse	1.973 (2.884)	6.462 (23.08)	0.373 (0.647)	6.710 (9.527)	2.673 (5.435)	22.57 (23.99)	2.862** (1.313)	1.297 (10.16)
Midwest ^e	0.687 (1.306)	75.12** (36.24)	-0.115 (0.431)	-12.94 (19.33)	1.549 (2.004)	-24.55 (37.09)	0.620 (0.765)	20.62 (19.77)
South	-1.072 (1.689)	95.31 (67.65)	-0.354 (0.655)	-8.610 (25.00)	-2.741 (2.815)	-15.04 (67.90)	-0.323 (0.471)	28.84 (26.38)
West	0.132 (0.843)	39.46 (36.05)	0.240 (0.583)	-2.928 (17.75)	0.0531 (0.363)	-30.24 (36.50)	-0.175 (0.359)	14.67 (18.63)

Table 6 (Cont.)

	During recession				After recession			
	Poor		Nonpoor		Poor		Nonpoor	
	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Weekends and holidays	-3.996 (2.872)	24.51 (27.71)	0.377 (2.287)	9.271 (14.23)	4.350 (3.127)	-31.07 (28.66)	-0.673 (2.395)	-12.25 (14.94)
Summer	0.212 (1.704)	16.61 (32.36)	0.123 (0.854)	-20.89* (12.45)	-1.311 (2.149)	-22.56 (33.33)	0.399 (1.101)	25.87** (13.12)
Total	-1.490 (28.85)	-76.29 (51.69)	-19.13 (13.85)	-40.95* (24.10)	21.22 (29.79)	-24.12 (54.18)	-8.610 (14.02)	-100.3*** (25.61)
Prediction after	1,908*** (52.22)		1,793 *** (24.39)		1,905*** (30.26)		1,684*** (15.27)	
Prediction before	1,985*** (27.32)		1,853 *** (12.59)		1,908*** (52.23)		1,793*** (24.39)	
Difference	-77.78 (58.94)		-60.08 ** (27.45)		-2.896 (60.36)		-108.9*** (28.78)	
Constant		-337.1 (332.8)		195.5 (187.7)		-92.64 (337.7)		-93.81 (198.5)
Observations	7,560	7,560	28,047	28,047	6,105	6,105	19,970	19,970

Notes: Standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1; ^a white is the base; ^b less than high school education is the base;

^c full-time wage worker is the base; ^d without a partner is the base; ^e Northeast is the base,

Source: American Time Use Survey (ATUS) 2003-12, own calculations.

Connecting these results to our conceptual framework, it appears that the decrease in nonpoor women's unpaid work time was due to the dominance of the income effect. The effect was caused by the negative non-labor income shock due to spousal job loss and the sharing of household responsibilities, combined with the declining number of children and, during the recession, with the added worker effect. Notably, poor women do not exhibit the evidence of the added worker effect. Furthermore, nonpoor women appear to have made other adjustments that lowered their unpaid work time, possibly indicative of the substitution of household-produced goods with market-produced goods. Support for this possibility is provided by the finding that after the recession, the reductions were substantially stronger among the more educated nonpoor women, who presumably could afford to make these substitutions. In addition, this explanation is consistent with nonpoor women reducing the amount of time they spent on enrichment activities with their children, to which they devoted significantly more time compared to poor women before the recession.

5 Discussion and conclusions

This study establishes the presence of poverty- and gender-based differences in the unpaid work time changes during the Great Recession. Poor men increased their involvement in household production activities during the recession whereas nonpoor men and nonpoor women decreased it, in the case of women both during and after the recession. As a result, the gap in the unpaid work time between poor and nonpoor individuals either contracted or remained the same. We identify several key findings that contribute to a better understanding of these poverty- and gender-based patterns.

Our first finding is that shifts in household composition played a role in poverty-based differences during the recession. Poor households experienced an increase in the average number of children and adults, in part due to the rise in the proportion of multigenerational poor households during the recession. In nonpoor households, on the other hand, the average number of children decreased, in line with the long-term trend that continued during the recession. These patterns were mirrored in the corresponding time use changes of poor and nonpoor individuals. In the case of poor men, in particular, the increase in the number of children during the recession was significantly associated with the rise in their unpaid work time.

Our second finding is that the worsening of the employment situation had a powerful and complicated effect on the unpaid work time of men and women. Our findings largely confirm the narrative in which the recession initially worsened men's and only later women's labor market conditions (Perivier 2014). We find, for example, that during the recession only men's worsening employment outcomes were associated with an increase in unpaid work time. Arguably, in a related development, nonpoor women's time use dropped due to their decreased inactivity, a likely manifestation of the female added worker effect in response to the worsening of men's employment prospects (Starr 2014). Also related to this was the drop in the unpaid work time associated with a decrease in the proportion of individuals with employed

spouses. This drop was more pronounced among women than among men because job losses among male spouses were proportionately higher (Şahin et al. 2010). After the recession, weak labor market conditions continued placing upward pressure on men's unpaid work time and downward pressure on women's unpaid work time (via spousal employment status). However we also observe that women's labor market conditions worsened and were associated with an increase in their unpaid work time after the recession. In sum, labor market related shifts contributed to the gender differences in unpaid work-time changes.

Furthermore, the analysis of the unexplained portion of the gap sheds additional light on contrasting changes in poor and nonpoor individuals' time use during the recession. The considerable size of the unexplained portion of the changes indicates that poor and nonpoor men and women made adjustments in their unpaid work time beyond those attributable to the changes in their characteristics. Our findings reveal that nonpoor individuals made downward adjustments in their unpaid work time during the recession, primarily driven by the reduction in summer household production activities. In turn, poor individuals, men in particular, appear to have made upward adjustments in their time during the recession as the unexplained portion of the change is positive albeit statistically insignificant. Its detailed analysis reveals that part-time self-employed poor men, especially, increased their unpaid work time relative to full-time wage workers, due to greater flexibility or financial pressures. Even more tellingly, poor men with not-employed spouses increased their unpaid work time, also potentially due to greater financial pressures. Taken together, the analysis of the unexplained portion of the changes suggests that household production was likely used as a coping strategy by the poor men, in particular, in response to the recession.

These results contribute to our understanding of the distributional impact of the Great Recession on the well-being of men and women in the United States and set the stage for a deeper investigation of the complex ways in which income constraints interact with household production.

Appendix

A. American Time Use Survey (ATUS activity codes)

Unpaid work includes three subsets of activities: maintenance, routine, and care:

Maintenance tasks include Interior and Exterior maintenance, repair, and decoration (0203-0204); Lawn, Garden, and Houseplants (0205); Vehicles (0207); Appliances, Tools, and Toys (0208); and Travel related to such activities (180203-180205, 180207, 180208).

Routine tasks include Housework (0201); Food and Drink preparation, presentation, and clean-ups (0202); Animals and pets (0206); Household management and other activities (0209, 0299); Consumer purchase (0701-0799); Professional and Personal care services (0801-0899), Household services (0901-0999); Government services and Civic obligations (1001-1099); Telephone calls related to such activities (160103-160106, 160108, 160199, 160201-160299); Travel related to such activities (180201, 180202, 180206, 180209, 180299, 1807-1810).

Care includes Caring for and Helping Household members and Non-household members (0301-0399, 0401-0499); Telephone calls to and from paid child or adult care providers (160107); Travel related to such activities (1803-1804).

Table B1
Regression results of weekly minutes of unpaid work 2003-2012

	Male		Female	
	Poor	Nonpoor	Poor	Nonpoor
No. of children	108.0*** (21.78)	106.2*** (8.359)	243.3*** (15.26)	280.6*** (9.163)
Presence of children 0 to 5 years old	194.8*** (68.40)	364.4*** (25.93)	516.8*** (46.29)	540.8*** (28.01)
No. of adults	-20.46 (20.60)	-50.29*** (11.56)	-98.73*** (17.85)	-64.33*** (12.15)
Age	7.742*** (1.467)	8.829*** (0.772)	12.86*** (1.460)	12.86*** (0.722)
Black ^a	-156.4*** (47.10)	-147.8*** (26.18)	-313.9*** (41.95)	-216.0*** (25.48)
Other Race	-63.79 (70.40)	-72.05** (30.67)	-97.56 (71.66)	-16.83 (33.50)
Hispanic	-46.91 (43.70)	-20.67 (24.86)	158.6*** (46.04)	54.26** (27.31)
High school ^b	-7.579 (44.59)	190.0*** (32.31)	114.2*** (43.97)	108.3*** (40.26)
Some college	-19.32 (51.31)	211.8*** (32.51)	122.6** (47.89)	112.2*** (39.36)
College degree	-1.044 (66.26)	235.7*** (32.59)	134.1* (71.76)	162.5** (40.05)

Table B1 (Cont.)

	Male		Female	
	Poor	Nonpoor	Poor	Nonpoor
Post graduate education	-71.95 (86.58)	193.7*** (34.66)	248.0** (108.7)	142.0*** (42.78)
Part-time wage worker ^c	160.2*** (58.64)	114.1*** (37.83)	314.9*** (47.16)	322.1*** (22.46)
Full-time self-employed	6.383 (76.59)	-135.6*** (28.81)	146.5 (106.8)	-81.30* (44.42)
Part-time self-employed	322.2*** (86.52)	337.1*** (69.92)	545.2*** (101.8)	613.7*** (52.50)
Unemployed	739.5*** (75.00)	682.3*** (46.94)	940.5*** (58.98)	883.4*** (52.69)
Inactive	279.5*** (46.37)	479.9*** (33.70)	677.3*** (42.53)	924.5*** (22.93)
Employed spouse ^d	313.2*** (59.96)	195.2*** (20.56)	549.3*** (45.74)	381.9*** (19.01)
Not-employed spouse	93.28* (50.21)	60.14** (25.50)	305.2*** (60.66)	142.2*** (32.16)
Midwest ^e	189.8*** (60.69)	72.82*** (23.22)	-7.562 (55.63)	-33.54 (23.90)
South	87.22 (53.92)	-20.56 (21.97)	2.653 (50.18)	-43.91* (22.84)
West	105.1* (61.09)	18.20 (23.46)	-10.92 (55.89)	-49.09** (24.54)
Weekends and holidays	210.3*** (34.66)	507.2*** (15.70)	-190.5*** (30.22)	288.4*** (15.52)
Summer	-60.70 (39.40)	28.25 (17.82)	-119.0*** (39.15)	13.52 (18.01)
Recession ^e	93.90 (66.91)	-44.91** (22.83)	-72.52 (52.39)	-40.12* (24.30)
Post-recession	19.97 (36.98)	-73.07*** (17.18)	-97.46*** (35.83)	-142.4*** (17.16)
Constant	313.9*** (95.75)	257.7*** (52.67)	699.4*** (99.64)	502.6*** (61.84)
Observations	7,141	34,881	11,833	41,183
R-squared	0.085	0.112	0.226	0.239

Notes: Standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1;

^a white is the base; ^b less than high school education is the base;

^c full-time wage worker is the base; ^d no partner is the base; ^e Northeast is the base;

^f pre-recession is the base, Source: own calculations.

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Double advantage or disadvantage? – Parental education and children's developmental stages in Italy

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Abstract

How do couples with different educational backgrounds alter their child care practices according to child development stages? In order to answer, I analyse the 2002 and 2008 waves of the Italian Time Use Survey. The subsample for this paper consists of heterosexual Italian couples with at least one child from age 0 to 13 years living at home (N=19,988). I differentiate between physical care, play, and teaching which are all key activities fostering child development at various developmental stages. An education gradient characterises the child care of two parents with tertiary education, emerging for physical care during workdays as well as for physical care and play during week-ends. A developmental gradient is evident in the child care of parents with tertiary and secondary education who have greater probability to invest time in physical care and play when children are below age 5 compared to two parents with less than secondary education. In educationally heterogamous couples, the parent with higher educational attainment spends more time in primary childcare than he/she would do in an educationally homogamous partnership. Having more than one child in family brings along a trade off between play and teaching. A son increases the probability of physical care, and play. Families where mother is not employed spend slightly more time in primary child care compared to families where mothers work. If small children attend pre-school care centres, they receive no less parental child care during workdays than children who stay at home.

JEL-Codes: I24, Z13

Keywords: parental education, parental involvement, child development, inequality

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1 Introduction

Many scholars have raised concerns about the diverging destinies of the next generation (McLanahan 2004). One reason for this concern comes from time use surveys that show that highly educated mothers and fathers have increased their child care time more than less educated parents during the last decades.

Previous research has documented that highly educated parents spend more time in active childcare than less educated parents which is known as the “education gradient” in child care. The child care gap between highly and lowly educated parents has risen over the last decades (Chalasani 2007). Moreover, there is evidence that highly educated mothers also alter the composition of their child rearing time for children of different ages to optimize children’s development. For instance, Kalil et al. (2012) show that while at age 0 to 2 highly educated mothers spend significantly more time on basic care and play than less educated mothers. When children are aged from 3 to 5, highly educated mothers spend more time on teaching, and while at age 6 to 13 highly educated mothers spend more time on child management, e.g. driving children to different activities, and accompanying children. A complementary study illustrates that a “developmental gradient” also exists for fathers’ child care time, however only for selected activities and for smaller children (Ryan, Kalil & Corey 2011). A study on Spanish fathers reveals that when children are aged from 0 to 5, father’s education has a positive effect on physical care, and when the youngest child is aged from 3 to 5, highly educated fathers provide more interactive care, especially teaching (Gracia 2014).

This paper tests the developmental gradient hypothesis, i.e. it tests whether highly educated parents tailor their child-rearing time to children's developmental needs more than less educated parents for the Italian case. It makes three main contributions. **First**, very high quality data from two Italian Time Use Surveys 2008-2009 and 2002-2003 are used to scrutinize the question whether highly educated mothers and fathers spend more time in developmentally enriching roles than less educated parents in Italy at different ages of the child. This is the first time when the developmental gradient hypothesis is tested for a non-Anglo-Saxon country and culture.

Second, the analysis is done separately for weekdays, and week-ends. The majority of past research has analysed parental practices on either week-end days or for an average weekday. The analysis of child-care in week-end days is theoretically and substantively reviling because parental options are less time constrained by market work on Saturdays and Sundays. In other words, parental preferences in terms of child-care activities can be expressed more freely in week-end days.

Third, and most importantly, the current paper takes into account the level of education of both parents within the same family. Previous analyses of the relationship between parental education and time use have usually been restricted to either mothers or, in some cases, to fathers. By considering different types of educationally homogamous and heterogamous fami-

lies this study provides a broader and more precise account of parents' time use with small children.

2 Theoretical background

2.1 Developmental Framework for Parental Time Investments

Developmental theory assumes that in order to assess parents' time investments in child development, finer distinctions between different types of parenting activities should be made because different activities foster child development in unique ways. According to developmental theory, children at different developmental stages need different types of parental investments. Certain investments such as warmth, nourishment and adequate monitoring remain constant throughout childhood. "Sensitivity" is the hallmark of effective parenting, i.e. responding contingently to children's needs (Adamson & Bakeman 1984, Bornstein 2002, Carew 1980, Waldfogel 2006). Sensitivity in parents' time investments means tailoring childcare time to the specific challenges that dominate each developmental period in a child's life. For example, an hour spent playing with a toddler and an hour spent helping with homework a school age child both bring developmentally positive outcomes. However, an hour spent with a toddler in formal teaching or an hour spent playing with a school age child do not bring along equal developmental benefits. Parents may increase different kinds of activities for their children of different sex: playing for sons and teaching for daughters which may partially explain boy-girl differences in preschool reading and math scores (Baker & Milligan 2013).

Kalil, Ryan and Corey (2012) conceptualise children's life stages as a central unit of analysis, and distinguish between four different categories of active parenting that are best suited for a particular developmental period. These are: (1) basic care which consists of routine tasks such as feeding, putting asleep, bathing, changing clothes, changing a diaper; (2) play which refers to playing games, pretending, doing art projects, outdoors physical games; (3) teaching which means helping with homework or reading to a child; (4) management which includes organizing and monitoring a child's life outside home. According to the developmental psychology framework, these activities are best suited for the following periods: (1) infancy - from 0 to 12 months; (2) toddlerhood – from 12 to 35 months; (3) the preschool period – ages 3 to 5 years; and (4) middle childhood – ages 6 to 13 years.

The greatest challenges of infancy (from 0 to 12 months) are establishing regular sleeping and eating routines. Therefore, the most important parental activities with children are basic caregiving tasks such as feeding, putting to sleep, comforting, bathing, which are all very time-consuming (Bornstein 2002). According to attachment theory, warm, consistent and sensitive responses to baby's emotional and physical needs create bonds between parents and infants which serve as the child's mental model for future relationships. Moreover, these bonds form the basis of the child's socio-emotional development (Ainsworth et al. 1978, Bowlby 1969). Both the quality and quantity of basic care that parents offer their infants shape mother-infant and father-infant attachments. In terms of cognitive development, the basis of language learn-

ing is laid during the first year. A greater quantity of time that parents spend with their infants increases opportunities to demonstrate and practice responsiveness as well as sensitive parenting.

During toddlerhood (from 12 to 35 months) children acquire the capacity for representational thought and begin to engage in “symbolic” or pretend play (Piaget 1952). Engaging in pretend play promotes children’s cognitive and social skills, including attention, memory, logical reasoning, vocabulary, creativity, and emotional regulation (Bergen & Mauer 2000, Berk 2001, Elias & Berk 2002, Lindsey & Mize 2000, Ruff & Cappozoli 2003). Sociocultural theory posits that play is most beneficial to toddlers when a grown-up structures their activities (Keren et al. 2005, Rogoff 2003) so that children learn to explore their environment, learn concepts, express curiosity, and gain competence motivation (Hubley & Trevarthen 1979, Sigel 1986). When parents actively guide children’s play, they also foster compliance (Parpal & Maccoby 1985), teach numbers and sizes, and foster language development (Duckworth 1972). In sum, the best developmental activity that parents can do with their toddlers is to engage in child-directed play.

During the preschool period (ages 3 to 5) children’s language and attention skills develop and they will start to appreciate didactic activities such as book reading, problem solving and doing puzzles (Hoff 2006). Such didactic activities develop children's cognitive skills which influence early academic outcomes like recognizing letters, numbers and words (Snow 2006). The frequency of early teaching activities influences language and literacy development (Bus et al. 1995, Roberts et al. 2005) as well as early math and reading scores (Bradley et al. 1988). Moreover, Heckman et al. (2013) found that a real driver for success in life are various soft skills developed at age 3 to 5 that have even greater impact on life outcomes than IQ. Both parents and kindergartens can develop academic motivation and help to deal with negative externalizing behaviour. Parents’ efforts in teaching their children prior to school entry are particularly important in countries where entrance exams to the 1st grade or other types of pre-selection are used.

During middle childhood (ages 6 to 13) children’s social networks expand and the roles of friends, school, and extracurricular activities rise. Now, parents spend less time in direct interaction with children and more time on planning and monitoring children’s busy lives. This management ensures that children learn to form positive relationships, self-management, and responsibility (Collins et al. 2002). In the earlier period of middle childhood, management tasks involve arranging academic, extracurricular, recreational and social activities (Dryfoos et al. 1999, Vuchinich et al. 1992). In the later period of middle childhood, management also entails monitoring social networks to avoid delinquent behaviour and negative influence from peers (Dishion et al. 1999, Dubow et al. 1997). Middle childhood is an important stage when children learn what they are good at, and how to fit into society (Erikson 1968). The various extracurricular activities can help children to develop self-confidence which is needed to get through the difficult teenage years successfully. During this life stage, it is vital that children develop healthy attitudes and behaviours which will have lifelong consequences. Parents’

language use at home still has a direct effect on children's school performance (Hart & Risley 1995).

2.2 The Italian Context

Both childhood and parenthood are socially constructed. Therefore, what is a common practice in one country, may not hold in other countries. In Italy, the welfare system is less developed and families are expected to care for their own members. Day-care for children below age 3 is both rare and costly. Adding that the society is very gendered, and work-family reconciliation policies virtually non-existent, it is no surprising that Italy was one of the first countries in the world to reach “lowest-low” fertility (Tanturri 2012). Today, Italian women postpone motherhood and the fertility rate is just 1.40 births per women (World Bank 2014). Using 2002-03 time-use data, Tanturri (2012) shows that women dedicate 8 to 10 hours to unpaid work each day if the family has three children, and the youngest is less than 3 years old. Men devote 4 to 5 hours to unpaid work per day regardless of family circumstances. Although men increase their paid work hours after transition to fatherhood, parenthood affects the total daily workload of women more seriously (Tanturri 2012). The time cost of children falls as the age of the youngest child in family increases, however, the number of children in family does not alter much the total time cost of children (ISTAT 2012, Tanturri 2012). The share of Italian women who are dissatisfied with childcare and domestic duties is much greater than the share of dissatisfied men. As a result, more women than men are dissatisfied with life in general (ISTAT 2012).

The Italian children are very time intensive, and not only in the early years (Tanturri 2012). Italian children spend less hours at school than children in other countries. However, they have a large amount of homework for each day (Mencarini et al. 2014). Such a peculiarity presumes that one parent, usually mother stays at home and helps the child with homework.

Higher education is free of charge in Italy. Although sending a child to a university brings along additional costs, it is a smaller economic burden compared to the countries where tuition fees are a rule in tertiary education. In this respect higher education in Italy should be more open to the youth from different social backgrounds compared to Anglo-Saxon countries. Still, the proportion of population with tertiary education is smaller in Italy compared to the OECD average. “Only 15% of 25-64 year-old Italians have a university-level education, compared to the OECD average of 32%“(OECD 2013). When one looks at younger population, Italy stands out for its high proportion of 15-29 year-olds (23.2%) who are neither employed nor in education or training, also known as NEET youth. The OECD average of NEET young adults is 15.8% (OECD 2013).

In Italy, the absolute incidence of homogamous marriage has declined across cohorts, but an inversion of this trend is observed for the youngest cohort (Bernardi 2003). Persons with primary or no education have the highest propensity to homogamy: evidence of a social closure at the bottom. However, the rates of homogamy are increasing for subjects with higher education, raising concerns about the increasing polarisation of Italian society.

2.3 Hypotheses

2.3.1 Hypothesis 1: Developmental gradient

Based on previous findings from USA, one can also expect for the Italian case that highly educated parents tailor their childcare time to benefit children's developmental needs more than less educated parents. This means that highly educated parents spend more time in basic care when the child is aged below 1 year, more time in playing with children when the child is 1 to 3 years old, more time in teaching when the child is from 3 to 5 years old. The developmental gradient in childcare may co-exist with the education gradient in childcare, i.e. highly educated parents spend more time in all childcare activities compared to their less educated counterparts. As tertiary education is free and the proportion of population with university degree is relatively small, it is reasonable to expect that the developmental gradient in child care is less pronounced in Italy compared to USA.

2.3.2 Hypothesis 2: Educational homogamy and heterogamy

Simultaneous analysis of parents' time use may reveal interesting patterns that have not been discovered before. In educationally heterogamous families, the more educated parent may tailor his/her childcare time more than is common for highly educated parents in homogamous couples in order to compensate for the lack of childcare knowledge from the spouse. This may mean that highly educated fathers/mothers married to less educated spouses may spend additional time in developmentally enriching activities with children in the evenings of workdays or during week-ends.

2.3.3 Hypothesis 3: Time constraints

From the time availability (Presser 1994) and demand/response capacity (Coverman 1985), hypotheses, fathers react positively to their partner's job pressures, and increase their childcare inputs. Parents' child care practices should respond to their partners' as well as their own time constraints. Since there are less time constraints during week-ends, the educational and developmental gradients should be stronger for Saturdays and Sundays.

3 Data and method

3.1 Data

Time-budget surveys are considered to be the best statistical source for examining individuals' daily activities (Robinson 1985). Data for the current paper are drawn from two waves of Italian Multi-purpose Surveys on Families' Time Use, merging high quality datasets from 2002-2003 and 2008-2009. It is a representative time-use survey of the Italian population, collected by Istituto Nazionale di Statistica (ISTAT). In the 2002 survey, the data was collected from April 1st 2002 until March 31st 2003. In 2002, the sample consist of 55,773 individuals belonging to 21,075 families. In the 2008 survey, the total sample consists of 44,606 individuals

in 18,250 families. The data collection period started on February 1st 2008 and lasted until January 31st 2009. In both surveys, each family member aged 3 or older completed a time-diary. The sample in each region of Italy was divided into three, and assigned either a random workday, Saturday or Sunday when the family should fill in a time-diary. All family members filled in their time-diaries during the same day. In my analysis, I distinguish between work-days and week-end days. For younger children the diary was completed by parents. Each episode is given by the interval of 10 minutes, and distinction is made between “main” and “secondary” activities. Only information on the main activities is used in this analysis as the face-to-face activities with children are considered far more beneficial for child development than secondary childcare activities. As the number of immigrants was quite small, only Italian citizens are considered. In order to avoid extreme cases, only parents from age 20 up to 55 have been taken into analysis. In the final analysis I use the age of the youngest child as a classification tool just as it has been done in past research (Kalil, Ryan & Corey 2012). The subsample for this article comprises of 19,988 married or cohabiting parents with at least one child up to 13 years of age living at home.

While comparing the parenting activity codes of Italy and the USA, the core categories are the same, however, they are compiled of different minor activity codes (Table 1). Differences in results can partially be driven by the differences in activity codes. While there are differences in all the categories, the most important difference between the ATUS and the ISTAT survey lies in the field of child management. The Italian Time Use Survey captures mainly driving to and picking up of children from school and kindergarten. The ATUS management category is far broader, including attending household children's events, waiting for/with household children, activities related to household children's health, organization/planning for household children, and travel related to caring for/helping household children. As child management captures different activities in the two surveys, and only 11 per cent of Italian parents engage in child management, I exclude management as a separate variable in my analysis. The activities done under child management have been included under total childcare time along with other childcare activities. The comparison of parental activities between Italy and USA should be approached with caution. Summary statistics of the sample are presented in Table 2.

3.2 Measures

Four “dependent variables” of active parenting are used (Table 1). Basic care, i.e. feeding, bathing, putting children to bed, physically comforting, physically attending to health needs, counts the minutes that parents allocate to physical care of children. Play, for instance “pretend play”, and using clay with a child, counts parents' minutes of active play, both indoors and outdoors. Teaching activities include helping children to do homework, as well as reading and talking to children. All child care is a composite measure of primary child care time of both parents during the same day that records the amount of time spent in all of the primary developmental activities. As the key developmental activities have very low incidence, I use the probability of engaging in a given activity instead of minutes spent in each activity. Only

total childcare is measured in minutes per day. As child management is measured by very few sub-categories in the Italian data, and has very low incidence, these results are not presented.

Table 1
Activity Codes

Core Categories	American Time Use Survey	Italian Time Use Survey
Total care	Includes all time spent in child care as a “primary activity”; this time is divided entirely below into the four activity categories.	Includes all time spent in child care as a “primary activity”; this time is divided entirely below into the four activity categories.
Basic care	“Physical care for household children” “Looking after household children (as a primary activity)” “Caring for and helping household children (as a primary activity)”	“Physical child care for household children” “Looking after household children”
Play	“Playing with household children, not sports” “Arts and crafts with household children” “Playing sports with household children”	“Playing with household children”
Teaching	“Reading to/with household children” “Helping/teaching household children (not related to education)” “Activities related to household children’s education” “Talking with/listening to household children”	“Reading to and talking with household children” “Helping household children with homework”
Management	“Attending household children’s events” “Waiting for/with household children” “Picking up/dropping off household children” “Activities related to household children’s health” “Organization/planning for household children” “Travel related to caring for/helping household children”	“Accompanying children to school or kindergarten” “Other specified activities related to the care of household children”

Source: Italian Time Use Surveys (ISTAT), American Time Use Surveys (ATUS), own descriptions.

My main “independent variable” is parental education. I use the combined education of both parents. The educational level of both parents is based on the highest educational degree attained. Three mutually exclusive levels of education are used: less than high school diploma (low), high school diploma (middle), and university degree (high). Presumably the education of both parents matters in the realm of child development. Therefore, nine combinations of mother’s and father’s combined education are used with mother’s education in the first place (as mother’s education is presumably more relevant for the early child development stages) and father’s education in the second place: high-high, high-medium, high-low, medium-high,

medium-medium (reference category), medium-low, low-high, low-medium, and low-low. The largest groups consist of educationally homogamous couples (high-high, medium-medium, low-low), and the overall homogamy rate in education is 67%. Due to the fact that some of the nine categories of household level education are relatively small, the two youngest age groups “below 1” and “from 1 to 2 years” are added together in the final analyses.

Table 2
Summary Statistics

Variables	Mean	Std. Dev.
Dependent variables		
Minutes in primary child care	135.18	141.33
Probability of basic child care	0.49	0.50
Probability of play	0.26	0.44
Probability of teaching	0.24	0.43
Independent variables		
high-high	0.07	0.26
high-medium	0.05	0.23
high-low	0.01	0.12
medium-high	0.05	0.21
medium-medium	0.27	0.45
medium-low	0.15	0.36
low-high	0.01	0.08
low-medium	0.09	0.29
low-low	0.29	0.46
Mother's full-time job	0.35	-
Mother's part-time job	0.19	-
Mother not employed	0.46	-
Youngest child aged 0	0.07	-
Youngest child aged from 1 to 2	0.17	-
Youngest child aged from 3 to 5	0.20	-
Youngest child aged from 6 to 13	0.56	-
Control variables		
Son aged from 0 to 13 in home	0.52	0.50
Number of children: One	0.33	-
Number of children: Two	0.52	-
Number of children: Three or more	0.15	-
Parent's age	39.61	6.13
Pre-school childcare	0.15	0.36

N = 19,988

Source: 2002 and 2008 Italian Time Use Surveys (ISTAT),
own calculations.

The “control variables” are chosen for theoretical and empirical reasons. Age of the youngest child matters most as younger children have more time-consuming needs. Parental age is con-

trolled for, and only parents aged from 20 to 55 are included. Number of children living at home is also controlled for as having more than one child should increase total child care time, age is limited to children from 0 to 13 years. Mother's employment consists of three categories: full-time, part-time, and not employed. Mother's labour force participation increases time constraints, and is therefore controlled for. As traditional gender norms are still quite prevalent in Italy, I control whether there is a son, aged from 0 to 13 years, living at home. I expect families, especially fathers to spend more time with sons. I also control for pre-school care. This variable unites children going to nurseries (below age 3) as well as children attending kindergartens (from age 3 to 6). Pre-school care should provide parents with more time free from child minding, however, it may increase time spent travelling with children. I have only included nuclear families in the sample. The analyses are done separately for workdays and week-ends. The reference categories are as follows: one for the number of children, 6-13 years for the youngest child's age, and full-time for mother's paid work.

3.3 Method

Ordinary least squared (OLS) regressions are used to regress time in each activity type as well as in the global measure of all childcare time on parental education and child age groups, controlling for parental age, age of the youngest child, number of children in household, mother's employment, son in family, and pre-school care. I analyse the compound childcare time of both parents. Separate OLS models are presented for workdays and week-ends.

There is a long debate whether to use OLS or more adequate methods for censored data with time use datasets, for instance Heckman model or the Tobit model. Out of these options, Tobit models are more easily usable (Breen 1996). Tobit models estimate linear relationships between variables when there is extreme censoring on the dependent variable (Breen 1996, Greene 2003). Numerous 0-cases of time use data violate OLS assumption of normal distribution. However, several authors underline the robustness of results, and the possibility to use OLS with time-use data (Hook and Chalasani 2008). I have analysed the same ISTAT dataset with tobit, logistic regression, and OLS, and the results are robust. Tobit and logistic regression results are available upon request.

4 Results

4.1 Educationally homogamous couples

The statistically significant regression coefficients of couples' education reveal whether there is any proof of an education gradient at household level. Statistically significant interaction terms between couple's education and child age groups show the developmental gradient at household level, i.e. whether couples where at least one parent has tertiary education tailor their time to children's developmental needs more than couples with secondary education. Only statistically significant coefficients are referred to in the text. The results are presented in Table 3 for workdays, and in Table 4 for week-end days.

Table 3
OLS results for couples' time spent in each activity on workdays

	Full childcare (minutes)	Basic care (%)	Play (%)	Teach (%)
High-High	7.17 (5.74)	0.09** (0.03)	0.01 (0.03)	0.03 (0.03)
High-Medium	-2.46 (8.05)	0.05 (0.05)	-0.06 (0.04)	0.05 (0.04)
High-Low	30.85** (12.01)	0.18* (0.07)	0.08 (0.06)	0.06 (0.07)
Medium-High	-1.09 (6.25)	-0.04 (0.04)	-0.03 (0.03)	0.06† (0.03)
Medium-Low	1.09 (4.24)	-0.01 (0.02)	-0.02 (0.02)	<-0.01 (0.02)
Low-High	-17.89 (15.34)	-0.07 (0.09)	0.03 (0.07)	-0.16* (0.08)
Low-Medium	-2.60 (4.89)	-0.03 (0.03)	0.01 (0.02)	-0.02 (0.03)
Low-Low	-0.73 (3.40)	-0.02 (0.02)	-0.01 (0.02)	-0.03† (0.02)
Youngest Child Aged 0-2	87.09*** (4.36)	0.32*** (0.03)	0.44*** (0.02)	-0.07** (0.02)
Youngest Child Aged 3-5	35.46*** (5.02)	0.22*** (0.03)	0.21*** (0.02)	0.03 (0.03)
High-High x 0-2	5.04 (9.39)	-0.03 (0.05)	-0.01 (0.04)	0.01 (0.05)
High-High x 3-5	-0.46 (10.57)	-0.06 (0.06)	0.01 (0.05)	-0.11† (0.06)
High-Medium x 0-2	2.32 (11.24)	-0.04 (0.07)	0.12* (0.05)	-0.03 (0.06)
High-Medium x 3-5	12.51 (13.65)	<-0.01 (0.08)	0.06 (0.06)	-0.04 (0.07)
High-Low x 0-2	-11.44 (16.89)	-0.11 (0.10)	-0.05 (0.08)	<0.01 (0.09)
High-Low x 3-5	-47.96* (22.85)	-0.24† (0.13)	0.05 (0.11)	-0.23† (0.12)

Table 3 (Cont.)

	Full childcare (minutes)	Basic care (%)	Play (%)	Teach (%)
Medium-High x 0-2	17.64 (11.56)	0.15* (0.07)	<-0.01 (0.05)	-0.09 (0.06)
Medium-High x 3-5	-3.88 (12.85)	-0.06 (0.07)	0.02 (0.06)	0.02 (0.07)
Medium-Low x 0-2	0.94 (7.46)	-0.05 (0.04)	-0.02 (0.03)	-0.04 (0.04)
Medium-Low x 3-5	-11.51 (7.88)	-0.05 (0.05)	-0.01 (0.04)	-0.04 (0.04)
Low-High x 0-2	28.90 (60.70)	-0.12 (0.35)	0.36 (0.28)	-0.05 (0.33)
Low-High x 3-5	43.41 (40.37)	0.44† (0.23)	-0.47* (0.19)	-0.13 (0.22)
Low-Medium x 0-2	-29.46** (9.42)	-0.05 (0.05)	-0.14*** (0.04)	-0.03 (0.05)
Low-Medium x 3-5	-2.48 (10.01)	-0.01 (0.06)	0.04 (0.05)	-0.08 (0.05)
Low-Low x 0-2	-22.74*** (6.23)	-0.15*** (0.04)	-0.06* (0.03)	0.03 (0.04)
Low-Low x 3-5	-23.12*** (7.07)	-0.17*** (0.04)	-0.06† (0.03)	-0.11** (0.04)
Mother works part-time	3.61 (2.82)	0.03† (0.02)	0.03* (0.01)	0.01 (0.02)
Mother not employed	10.70*** (2.30)	-0.03* (0.01)	0.03* (0.01)	0.02 (0.01)
N Child: Two	5.38* (2.21)	0.03* (0.01)	-0.07*** (0.01)	0.07*** (0.01)
N Child: Three or more	-0.61 (3.11)	0.02 (0.02)	-0.09*** (0.01)	0.09*** (0.02)
Boy in family	2.26 (1.94)	0.03** (0.01)	0.01 (0.01)	<0.01 (0.01)
Pre-school care	2.80 (3.10)	0.04* (0.02)	0.10*** (0.01)	-0.05** (0.02)
Constant	33.95 (3.31)	0.37*** (0.02)	0.13*** (0.02)	0.26*** (0.02)
Adj R-squared	0.15	0.08	0.23	0.02

N = 7,433 ; Standard errors are displayed in parentheses below marginal effects.

† p < .10, * p < .05, ** p < .01, *** p < .001

Source: 2002 and 2008 Italian Time Use Surveys (ISTAT), own calculations.

Table 4
OLS results for couples' time spent in each activity on week-ends

	Full childcare (minutes)	Basic care (%)	Play (%)	Teach (%)
High-High	4.37 (4.39)	0.08*** (0.03)	0.04† (0.02)	0.02 (0.02)
High-Medium	-0.75 (5.02)	0.03 (0.03)	0.04 (0.02)	0.01 (0.03)
High-Low	27.46** (10.71)	0.05 (0.06)	0.17*** (0.05)	-0.02 (0.05)
Medium-High	11.88* (4.80)	0.05† (0.03)	0.01 (0.02)	0.08*** (0.02)
Medium-Low	1.60 (3.23)	-0.03 (0.02)	0.02 (0.02)	0.01 (0.02)
Low-High	-15.62 (10.98)	-0.13* (0.06)	0.06 (0.05)	-0.19*** (0.06)
Low-Medium	-2.20 (3.59)	0.02 (0.02)	-0.02 (0.02)	-0.04* (0.02)
Low-Low	-11.05*** (2.58)	-0.04* (0.01)	-0.03** (0.01)	-0.07*** (0.01)
Youngest Child Aged 0-2	96.57*** (3.39)	0.40*** (0.02)	0.44*** (0.02)	-0.04* (0.02)
Youngest Child Aged 3-5	39.08*** (3.71)	0.25*** (0.02)	0.28*** (0.02)	<-0.01 (0.02)
High-High x 0-2	20.56** (7.00)	-0.04 (0.04)	0.01 (0.03)	-0.03 (0.04)
High-High x 3-5	5.86 (8.24)	-0.07 (0.05)	-0.05 (0.04)	0.04 (0.04)
High-Medium x 0-2	14.34† (7.71)	<0.01 (0.04)	-0.04 (0.04)	0.02 (0.04)
High-Medium x 3-5	14.84† (8.03)	0.04 (0.05)	0.02 (0.04)	0.05 (0.04)
High-Low x 0-2	-18.46 (16.38)	-0.12 (0.10)	-0.13† (0.08)	-0.05 (0.08)
High-Low x 3-5	-0.94 (16.23)	-0.02 (0.09)	-0.22** (0.08)	0.18* (0.08)
Medium-High x 0-2	-14.80 (9.47)	-0.08 (0.06)	-0.05 (0.05)	<0.01 (0.05)
Medium-High x 3-5	-10.31 (9.58)	-0.13* (0.06)	0.09* (0.05)	-0.05 (0.05)

Table 4 (Cont.)

	Full childcare (minutes)	Basic care (%)	Play (%)	Teach (%)
Medium-Low x 0-2	1.61 (5.55)	-0.03 (0.03)	<0.01 (0.03)	-0.03 (0.03)
Medium-Low x 3-5	-10.85† (6.04)	0.01 (0.04)	-0.10*** (0.03)	<-0.01 (0.03)
Low-High x 0-2	28.41 (20.32)	0.28* (0.12)	0.25* (0.10)	-0.01 (0.10)
Low-High x 3-5	48.10† (25.99)	0.01 (0.15)	0.15 (0.13)	0.48*** (0.13)
Low-Medium x 0-2	-5.29 (7.01)	-0.07† (0.04)	-0.04 (0.04)	-0.02 (0.04)
Low-Medium x 3-5	-15.19* (7.19)	-0.11* (0.04)	-0.08* (0.03)	-0.02 (0.04)
Low-Low x 0-2	-19.20*** (4.94)	-0.14*** (0.03)	-0.09*** (0.03)	0.03 (0.03)
Low-Low x 3-5	-1.29 (5.00)	-0.10*** (0.03)	-0.05† (0.02)	0.01 (0.03)
Mother works part-time	5.21* (2.08)	0.05*** (0.01)	0.03** (0.01)	0.02* (0.01)
Mother not employed	5.61*** (1.75)	<-0.01 (0.01)	0.02* (0.01)	<-0.01 (0.01)
N Child: Two	3.38* (1.67)	0.03** (0.01)	-0.07*** (0.01)	0.04*** (0.01)
N Child: Three or more	1.24 (2.32)	0.02† (0.01)	-0.10*** (0.01)	0.06*** (0.01)
Boy in family	5.32*** (1.45)	0.02** (0.01)	0.03*** (0.01)	0.01 (0.01)
Pre-school care	10.46*** (2.34)	0.05*** (0.01)	0.09*** (0.01)	-0.04** (0.01)
Constant	31.71*** (2.52)	0.32*** (0.01)	0.12*** (0.01)	0.21*** (0.01)
Adj R-squared	0.21	0.12	0.22	0.02

N = 12,515 ; Standard errors are displayed in parentheses below marginal effects.

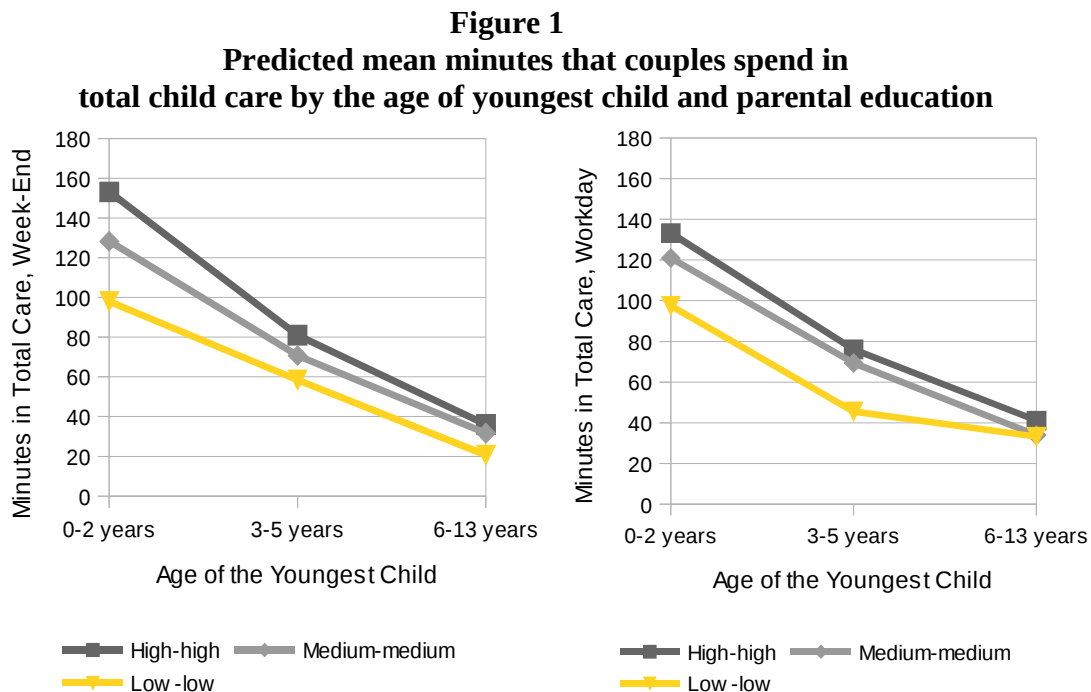
† p < .10, * p < .05, ** p < .01, *** p < .001

Source: 2002 and 2008 Italian Time Use Surveys (ISTAT), own calculations.

In order to make the main findings more easily interpretable, figure 1 shows the predicted mean minutes that educationally homogamous couples spend on total child care, and figures 2 to 4 illustrate the probabilities of engaging in various childcare tasks on workdays and week-

ends by child's age and parental education. All regression coefficients have been included in the computations for the figures.

An “education gradient” exists so that university-educated couples (high-high) have a higher probability to engage in basic care tasks during workdays, and in basic care and play during week-ends. Moreover, there exist a “developmental gradient” in total child care time of highly educated homogamous couples when the youngest child is aged from 0 to 2 years during week-ends. The differences between couples are greatest during week-ends when the youngest child is less than 2 year old (Figure 1). The gap between university-educated couples and high school-educated couples in total care time is over 20 minutes per week-end day when youngest children are aged below 2. Families with two lowly educated parents spend about 30 minutes less than couples with secondary education with their children below age 2 during week-end days.

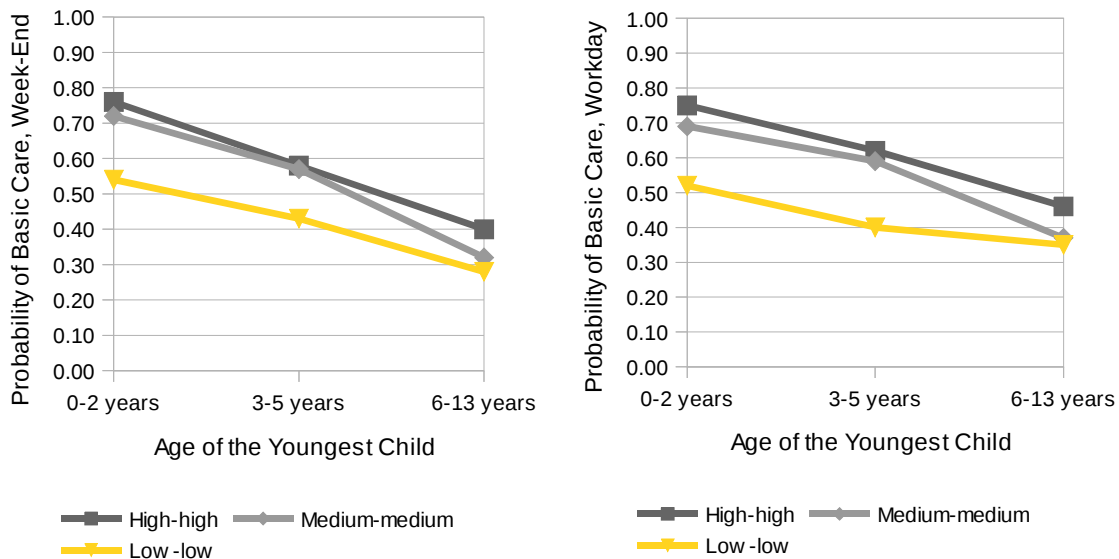


Source: 2002 and 2008 Italian Time Use Surveys (ISTAT), own illustrations.

For couples' propensity to engage in basic care, significant negative interactions emerge for low-medium and low-low couples and youngest child age groups that suggest a “developmental gradient” in couple's time in basic care. The “education gradient” of basic care is on average 9 per cent greater for high-high couples during workdays, and 8 per cent greater during week-ends when compared to medium-medium couple. Compared to couples with secondary education, couples with less than secondary education provide basic care to their 0 to 2-year-old children 18 per cent less often during week-end days, and 15 per cent less often during workdays. Quite similar pattern emerges for play. As Figure 3 illustrates, highly educated couples have more or less the same probability of playing with a child as couples with high school education, and lowly educated couples have a lower probability of playing with children on all days of the week. The education gradient is statistically significant only during

week-ends when highly educated couples have a 4 per cent greater probability of playing with children than couples with medium education (see Table 4).

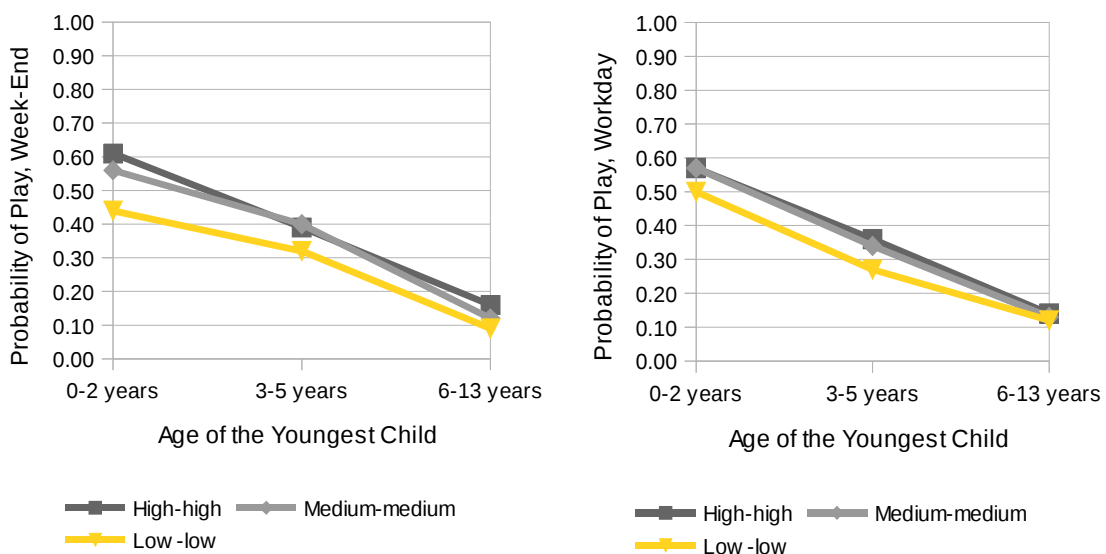
Figure 2
The probability of basic care by the age of youngest child and parental education



Source: 2002 and 2008 Italian Time Use Surveys (ISTAT), own illustrations.

There is no statistical proof of a developmental gradient in the probability of play between couples with tertiary and secondary education.

Figure 3
The probability of play by the age of youngest child and parental education



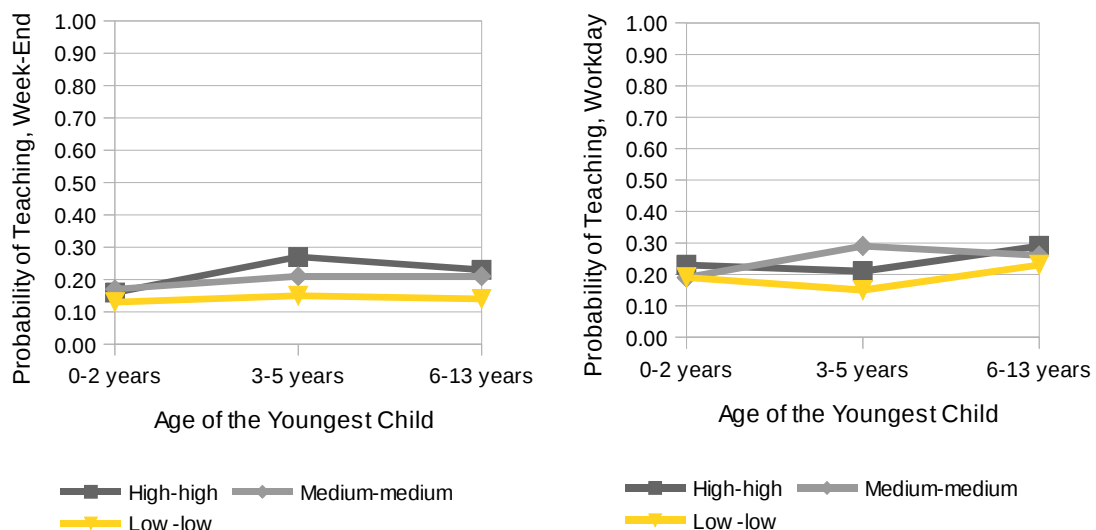
Source: 2002 and 2008 Italian Time Use Surveys (ISTAT), own illustrations.

However, couples with less than secondary education have a 9 per cent lower probability to play with their children aged below age 2 when compared to couples with secondary education. In the case of play, statistically significant difference exists between lowly educated couples and couples who have at least secondary education.

According to child development literature, the key age for teaching children is from 3 to 5 years of age. We can see from figure 4 that highly educated couples have the highest probability of teaching 3 to 5 year old children during week-ends, and teaching 6 to 13-year-olds during workdays. An education gradient in teaching emerges only during week-ends when couples with a lowly educated mother (low-high, low-medium, and low-low couples) show a smaller probability to teach a child than couples with more educated mothers. The only statistical evidence of a developmental gradient comes when comparing couples with medium and low educational backgrounds. During workdays, lowly educated couples with 3 to 5-year-old children engage 11 per cent less often in teaching activities than couples with medium education (Table 3).

Unfortunately it is not possible to distinguish how many children receive parental care simultaneously. As the average number of children is greatest in families with less than secondary education (2.04 children in low-low families compared to 1.76 children in high-high and medium-medium families), it is plausible that the results are biased downwards. A complementary data analysis with one-child families (available upon request) reveals that the results about the “education gradient” and “developmental gradient” remain the same.

Figure 4
The probability of teaching by the age of youngest child and parental education



Source: 2002 and 2008 Italian Time Use Surveys (ISTAT), own illustrations.

4.2 Educationally heterogamous couples

For couples where the wife has university diploma and the husband less than high school degree (high-low), the coefficients for full childcare, and basic care are significant and greater than for a couple with medium education during workdays. However, the interaction terms for

full care, basic care, and teaching are negative. When both coefficients and interaction terms are taken into account, a 0 to 2 year-old child with a highly educated mother and a lowly educated father, receives about 7 extra child care minutes during workdays, and 21 extra child care minutes during week-end days compared to a child with two highly educated parents.

In couples where the husband has university education, and the wife has less than high school degree (low-high), 0 to 2 year-old children receive as much child care time than children with two highly educated parents during workdays. During week-end days, 0 to 2 year-old children in low-high families receive less active childcare time than their counterparts in high-high families, but still about 13 minutes more than children in medium-medium families. For example, 0 to 2 year-olds in low-high families have 15 per cent higher probability of receiving basic care, and 3 to 5 year-olds have 29 per cent higher probability of receiving teaching care during week-ends compared to children of the same age in medium-medium families (Table 4 in Appendix). Low-high families tailor the composition of their their childcare time according to child development literature during week-ends.

5 Discussion

In order to understand the complex dynamics of parental child care, both mothers', and fathers' time should be considered and a distinction be made between workdays and week-ends. The present study shows how both parents' education influence not only the amount of time they spend with children (which may not be related to efficiency in a linear fashion) but also the composition of that time with their children at different ages. The "education gradient" in parental childcare is found in most cases: highly educated mothers and fathers have a higher probability to engage in basic care, and play than less educated parents. During week-ends when parents are expected to be more free to spend time with their children, children with two highly educated parents receive additional basic care, play, and teaching time from parents which results in higher amount of full childcare time by both mothers and fathers during week-ends when compared to children with two parents with secondary education.

Although highly educated Italian parents do not seem to tailor their time as much as US mothers do (Kalil et al. 2012), education gaps in parental child care time remain statistically and substantially significant with all the control variables. A separate analysis with mothers reveals that Italian children receive more primary childcare from their mothers than children in USA. Devoting more time to children at all developmental stages may reduce the pressure to tailor childcare time. While holding all other variables constant, and taking into account only statistically significant regression coefficients, 0 to 2 year-olds with two university-educated parents receive, on average, 41 extra childcare minutes per week, while 0 to 2 year-olds with two lowly educated parents receive, on average, 152 childcare minutes less per week, when compared to children of the same age growing in families with two parents with secondary education. This net difference masks important variations in basic care, play, and teaching which are all more pro child development in families with highly educated parents.

5.1 Developmental gradient

According to hypotheses 1, highly educated parents are expected to spend more time in basic care when the child is aged below 1 year, more time in playing with children when the child is 1 to 3 years old, and more time in teaching when the child is from 3 to 5 years old. Hypotheses 1 is only partially correct in the Italian case. A “developmental gradient” is present in full care during week-ends. One can see that in the Italian case, the high-high and medium-medium families are not that different from each other in tailoring their time according to child development stages. Indeed, low-low families act quite differently when compared to medium-medium families (Tables 3 and 4).

When comparing the results from Italy to those of USA, we have to be aware of the fact that activity codes inside each broad activity category differ from each other (Table 1). Another major difference concerns teaching children. While the peak teaching age in USA is from age 3 to 5 (preschool period), in Italy the teaching gap between highly and lowly educated parents widens further at early school age from age 6 to 13 years. This may be due to the peculiarity of the Italian school system which puts more emphasis on homework than other school systems (Mencarini et al. 2014). These differences do not necessarily mean that Italian parents are less aware of child development compared to the parents in the USA. The differences may well be contextual.

In a nutshell, both the “education gradient” and the “developmental gradient” exist in Italian families with two university-educated parents. The general pattern echoes the findings reported by Ramey and Ramey (2010), who describe a “rugrat race” among highly educated parents, meaning that such parents spend an ever increasing amount of time in childcare in order to increase the chances that their children would gain access into a good college. In Italy, the education gradient appears in households with the youngest children, which may mean that parents have adopted the mantra, present in academic research (e.g. Heckman et al. 2013) and popular press, that parental investments in the earliest years are the key ingredients for children’s lifelong success.

5.2 Educational homogamy and heterogamy

Analysing both mother’s and father’s time use simultaneously provides a deeper insight into the everyday decisions, and “rugrat race” in child care. According to hypothesis 2: In educationally heterogamous families, the more educated parent tailors his/her childcare time more than is common for highly educated parents in homogamous couples in order to compensate for the lack of childcare knowledge from the spouse. The most extreme cases of educational heterogamy are those where one spouse has university education and the other less than high school education. The results indicate that when a highly-educated mother is married to a lowly educated husband, their children receive no less parental care than children with two highly educated parents. This finding is mainly driven by highly educated mothers doing additional childcare tasks. It may partially be driven by the greater bargaining power of women in these families which may increase childcare inputs from the lowly educated husband.

A different case of extreme educational heterogamy happens when a university-educated man marries a woman with less than high school diploma. In such families, children do not receive less childcare than in high-high families. During week-ends, these children receive more parental childcare than children with two parents with secondary education. Highly educated fathers in educationally heterogamous families also compensate for the lack of childcare knowledge and involvement from their lowly educated wives. Longitudinal data with child outcomes is needed in order to answer the question whether the children in educationally heterogamous families turn out like their highly educated or lowly educated parent. At the moment I can just conclude that in educationally heterogamous families the parent with higher education is more involved in child raising than is common for highly educated parents in educationally homogamous couples.

Children in educationally heterogamous families with one highly educated and one lowly educated parent receive more direct parental childcare than children with two parents with medium education, and in some cases even more total child care time than children with two highly educated parents. There are several explanations for this finding. First, the highly educated parent in educationally heterogamous families may try to make up the relative disadvantage that their children face, and do more childcare than highly educated parents in educationally homogamous families do. Second, the lowly educated parent in educationally heterogamous families may try to invest more in children than lowly educated parents in educationally homogamous families for knowing more about child development from the more educated spouse, or in order to gain approval from the highly educated spouse (bargaining). Third, “high-low” and “low-high” families are small in number and the lowly educated men and women who marry highly educated women and men are highly selected people.

In his latest book, Esping-Andersen (2009) warns about increasing social polarisation based on the educational homogamy of couples. It happens because people tend to marry a partner with similar values, interests and a world-view. Bernardi (2003) has found that educational homogamy has started to increase for the youngest cohort in Italy. In my nationally representative sample, approximately two thirds of couples with children aged from 0 to 13 years have an educationally homogamous marriage. The results indicate that university-educated parents, parents with high school diploma, and parents with less than high school diploma all have statistically and substantially significant differences in childrearing activities.

5.3 Time constraints

“Time famine” or “time squeeze” is an increasingly common part of contemporary family life. Time constraints are greatest for dual-earning couples with small children. As mother’s higher education increases her chances to work, the highly educated couples should face more time constraints than couples with high school education or less where one parent is often working part-time or is at home with children. Fathers and mothers with high school education may surpass parents with university education in total childcare at some child development levels during workdays. However, during week-ends, university-educated parents surpass less educated parents in their combined childcare time at all child development levels.

Moreover, they tend to tailor their time more than less educated parents in order to foster child development at different stages. Although mothers who are employed full-time, spend less time in childcare than mothers who stay at home, the general findings on the education effect remain the same. Families with least education spend significantly less time in all primary child care tasks during week-ends compared to families with secondary education or more. The third hypothesis: The educational gradient is stronger for Saturdays and Sundays in general and in particular for fathers, finds empirical support.

6 Conclusion

In Italy, the education gradient in childcare is less pronounced compared to the USA. For example, during week-ends American mothers with university degree spend additional 82 minutes on all childcare when children are aged 0-2 compared to mothers with less than high school education (Kalil, Ryan & Corey 2012). In Italy, mothers of 0 to 2-year-olds with tertiary education spend around 51 extra minutes on primary child care tasks during a week-end day than mothers with less than secondary education. It is important to note that on average, Italian mothers spend more time in primary childcare at all child developmental stages regardless of their educational background than American mothers. This finding is important for child well-being scholarship, and may mean either that Italian mothers face less time constraints than American mothers with small children (if they face less time constraints, they may not need to tailor their childcare time that much), or that Italian mothers are more child-oriented, regardless of their educational background. This result is in line with Tanturri's (2012) finding that Italian children are particularly time-intensive.

It is important to note three limitations of the current study. First, I have no data on child outcomes at various child development levels. Second, I have no longitudinal data on the same families with children. Due to these limitations I am unable to assess the impact of various child care activities during different child development stages on children's school outcomes, enrolment rates to universities, future work, salary, marriage, parenthood, health, and life expectancy. However, previous research (e.g. Heckman et al. 2013, Lareau 2011) implies that such future benefits exist for the "concerted cultivation" of children. Third, I do not know which child receives the childcare minutes reported by parents. It is plausible to presume that the youngest child in the family receives more attention than older children. Therefore, the analyses are done based on the age of the youngest child in family just like Kalil et al. (2012) have done. Moreover one third of Italian families in the sample have only one child. A complementary analysis done with only one-child families supports the findings on "education" and "developmental gradients" in the childcare of more educated Italian couples.

The main contribution of my study is the focus on how both mother's and father's child care time in the same family varies across families with different educational backgrounds, and children of different ages, during different week days. Scholars have rarely conceptualized children's life stages as a central unit of analysis, and no-one has done it while analysing the

full picture of parental childcare. The main results are: 1) both education gradient and developmental gradient exist in the childcare patterns of highly educated Italian parents, raising concerns about the diverging destinies of the children of university-educated parents and their less-advantaged peers, 2) child raising differs in educationally homogenous and heterogenous families, in the latter the more educated parent compensates for the deficit from the less-educated parent's side 3) the education gradient is greater during week-ends showing that without work-related time constraints, the education gradient in childcare would be even greater in Italy.

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Working around the clock? – The time and location of paid work in Finland 1979-2010

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Abstract

This article draws on Finnish time use data spanning the past three decades (1979–2010) with a focus on the prevalence of wage and salary earners' work at different locations, namely at the employer's facilities, at home, outside the home or the main place of work, and on the move. The diary data (N = 13,277) depicts respondents' time budgets in ten minute intervals around the clock. According to the results, work practices have remained surprisingly conventional. Although the absolute time spent at the respondents' main place of work has been decreasing, the vast majority of employees still work at their employer's facilities during normal business hours, lending no support to the 24/7 working society thesis. However, during a standard working week, alternating between different business facilities has become more common than before, pointing to the growing importance of distributed work arrangements. The data also shows that the share of employees working on days off has not increased, but this kind of activity has lengthened over the years by those who do it, implying that the burden of working time is divided more unevenly than before.

JEL-Codes: D10, J20, J22

Keywords: Distributed work, flexible work, home-based work, mobile work, telework, time use diary data, working from home, working time

1 From an industrial to a post-industrial working time regime?

This article investigates when and where employees work during a typical day, with an emphasis on the changes occurring between 1979 and 2010. The analysis draws on the time use diary data collected by Statistics Finland (N = 13,277). Earlier research on the spatial and temporal dispersion of work has mainly relied on conventional survey and case study materials (Andriessen and Vartiainen, 2006; Fealstead and Jewson, 2000; Hinds and Kiesler, 2002; Huws, 2003; Sibis, 2003). Although highly important in their own right, these kinds of studies lack the detail of time use diaries and rarely provide the opportunity to investigate long-term changes.

The data of this study provides an interesting platform for comparison. In the late 1970s, Finland was on its way to becoming a post-industrial information society, but in many respects, it still lagged behind its European rivals (Pyöriä et al., 2005). By the turn of the millennium, however, Finland had been fully modernized and even labelled an exemplar of the new information economy (Andersson, 2008; Castells and Himanen, 2002; Schienstock, 2007). Today, Finland does indeed have a high level of education and R&D intensive industries, and a high penetration of ICT use among employees and other citizens, perhaps pointing the way to the future.

In research literature pertaining to post-industrialization, it has been suggested that the time and location of paid work are losing their relevance (Pyöriä, 2009; 2011). Rapid technological development, stiffening global competition, de-standardization of employment contracts as well as collaboration and networking across organizational boundaries are factors behind the spatial and temporal dispersion of work, allegedly leading us towards a 24/7 society characterized by non stop activity in the spheres of work, communication, consumption, and profit creation (Hassan and Purser, 2007; Presser, 2003). Examples of new forms of flexible work organizations include the deployment of management teams in different countries, call centre services across different time zones, and mobile work.

According to the proponents of post-industrialization, changes in the social division of labour have also contributed to reducing the dependence of work on time and place. An integral part of this development is the growth of knowledge work, i.e. jobs requiring a high level of formal education, symbolic skills, and the use of ICT (Blom et al., 2002; Pyöriä, 2005; Pyöriä et al., 2005). In particular, people in expert jobs often take their work home or on the road, and they are accustomed to staying connected with their colleagues and customers beyond normal business hours (Hislop and Axtell, 2007). Other typical environments for knowledge work include meetings, training seminars, and customer consultations. It should, however, be kept in mind that many traditional jobs also involve mobility.

In the wake of these changes, it has been theorized that people are becoming accustomed to living in a constant present, with the clock time of industrialism being replaced by network time as work and organizational processes have grown in complexity and communication has

become ubiquitous (Hassan, 2003; Hochschild, 1997; Rosa, 2003; Westenholtz, 2006). According to this line of argument, the industrial time regime was founded on the clear demarcation between paid work and non-market activities such as home production and leisure. Today, this order has not ceased to be, but the once clear-cut boundaries of work have become blurred.

In contemporary organizations, there indeed are increasing numbers of jobs that could – at least in principle – be organized independently of time and place. In addition to traditional home-based telework, typical examples of flexible work include alternating between different business facilities and mobile work in private vehicles and public transportation (Davison et al., 2006; Hislop and Axtell, 2007). The need to answer customer inquiries promptly, a trend towards inter-organizational collaboration, and the rapid development of laptop computers and smart phones all facilitate the further growth of distributed work (Kuldeep et al., 2009; Schönauer et al., 2013). This is the image that is often conveyed to us.

Time use research provides an interesting point of departure for theoretical discussions. In contrast to the popular discourse describing the growth of boundaryless and flexible work, time use research shows that the majority of paid work is still done at conventional times on the employer's premises. Time use research also shows that the amount of free time has not decreased; in fact, it has actually increased in many parts of the developed world since the mid-twentieth century (Callister and Dixon, 2001; Fisher and Layte, 2004; Gershuny, 2000; Robinson and Martin, 2009). Only Anglophone neoliberal market economies seem to diverge from this, as evidence points towards a slight increase in the total hours devoted to paid work in the UK, US, Canada, and Australia (Gershuny, 2011, p. 208; see also Chatzitheochari and Arber, 2009; Hamermesh and Stancanelli, 2015).

In this study, we concentrate on employees' time use as an 'objective' and quantifiable phenomenon. We are aware of the fact that the social nature of time has been debated at length in previous studies going back over a century, but here our orientation is empirical. Subjective perceptions of time are beyond the scope of the present discussion. The time frame (1979–2010) of the study allows us to compare the temporal rhythms of the industrial and post-industrial phases of societal development in Finland and to see what kinds of changes (if any) can be detected. We focus on paid work and especially on upper-level white-collar workers, whose jobs are typically considered suitable for spatial and temporal dispersion (Hislop and Axtell, 2007; Peters et al., 2004). Entrepreneurs and the economically inactive are excluded from the analysis.

We first set the scene by briefly introducing the case of Finland. Then, we break down the results of the Finnish time use data by time and place of paid work, both of which have seldom been addressed by time use researchers (see, however, Callister and Dixon, 2001; Glorieux et al., 2008, 2009; Jacobs and Gerson, 2004; Merz et al., 2009; Minnen et al., 2015; Williams, 2004). The majority of existing time use studies have focused on unpaid work (household chores, volunteering) and spare time activities, or alternatively on paid and unpaid work combined, while survey research on the temporal and spatial dispersion of paid work has mostly been based on questionnaire data.

Our aim is to contribute to the debates on the arrival of the 24/7 society and the growing flexibility of work patterns from the point of view of the spatial and temporal dispersion of work. It is impossible to take into account all possible forms of spatially flexible work in a single study, so our analysis focuses on three forms: home based work, working somewhere other than at home or on the employer's premises, and mobile work. On the temporal dimension, we analyse the exact time of day that employees work. Flexibility dictated by the type of employment contract (e.g. shift work and on-call jobs) is beyond the present analysis.

2 Flexible working in the light of questionnaire data

The idea of working free from temporal and spatial restrictions is far from novel (Hinds and Kiesler, 2002). In its current meaning – work done independently of time and place with the help of ICT – it has attracted interest since at least the 1970s, when research on telework began to gain ground (Nilles, 1998). In this discussion, distributed work has increasingly often been used as an umbrella concept to encompass various alternatives to working at the traditional office, including, for example, flexible working time arrangements, mobile work, and telework (Bélanger and Collins, 1998).

In this respect, Finland – where working times are highly flexible – is a case in point: approximately every fifth employee in Finland teleworks. When an employee has agreed with his/her employer to work from home some of the time and uses information technology to do so, we may use the term teleworking. Defined in these terms, official statistics indicate that teleworking by Finnish wage and salary earners has grown tenfold – from 2% to 20% – between 1990 and 2013 (Sutela and Lehto, 2014).

Although telework seems to have increased substantially, few employees rely on it alone. In 2013, a mere 1% of Finnish employees reported working from home full-time (Sutela and Lehto, 2014). Finnish studies also indicate that working from home is often informal in nature. It supplements and continues duties already done on the employer's premises, and as such, it seldom substitutes formal daytime working hours; rather, it actually lengthens them at the expense of free time (Nätti et al., 2011; Ojala, 2011; Ojala et al., 2014). This may have adverse consequences for some individuals, although Finland does not have a culture of excessively long working hours (Anttila et al., 2009; Lee et al., 2007).

A similar pattern has been observed in the US. In his analysis based on the Current Population Survey (CPS), Song (2009) found that only 3.4% of US employees worked from home with pay, whereas 12.5% of homeworking employees had no formal agreement with their employer. In another representative US study, Noonan and Glass (2012) reported that teleworkers had longer working weeks than non-teleworkers. These extra hours essentially occurred as overtime work, leading Noonan and Glass to conclude that 'the ability of employees to work

at home may actually allow employers to raise expectations for work availability during evenings and weekends and foster longer workdays and workweeks' (ibid., p. 45).

In addition to telework, other flexible work arrangements are commonly accepted practices in Finland. According to the 2005 European Working Conditions Survey (EWCS), an average of 8% of European employees reported working at least a quarter of their working time from home with a computer (Parent-Thirion et al., 2007). In Finland, the corresponding figure was 13%. Two thirds (67%) of wage earners in the countries surveyed had fixed starting and finishing times in their work. Such fixed working times were most uncommon in Finland (51%). It was also found that working times in Finland vary on a daily and weekly basis more than in most other European countries.

Furthermore, Finland differs from its European counterparts in the amount of work that is done outside the employees' main place of work (Broughton, 2007; Lehto and Sutela, 2009). In the 2005 EWCS, the respondents were asked how much of their working time was spend somewhere other than at home or on their company's/organization's premises. In this aspect of working life, Finland is ahead of its European neighbours: 58% of wage and salary earners do at least some of their work outside the home or the main workplace. The EU27 average is clearly lower than this at 40%.

Finland also stands out in the 2013 European Company Survey (ECS), which covers more than 24,000 public and private sector establishments with ten or more employees (Eurofound, 2015). According to this study, the proportion of European establishments offering employees the option of choosing the time they begin and finish their working day varies between 30% and 90%, with Finland being the top performer. Nine out of ten establishments practice a flexitime scheme in Finland, with Denmark (88%) and Sweden (82%) following closely behind. More than 90% of Finnish establishments also allow some or all employees the opportunity to accumulate overtime to be used as time off.

Finally, working on the move is common in Finland. This is understandable because Finland is a geographically large and sparsely populated country with fewer than 5.5 million inhabitants. Two thirds of Finnish wage and salary earners travel beyond their main workplace at least occasionally (Sutela and Lehto, 2014).

3 Measuring the time and place of work

As the brief outline above indicates, various forms of distributed and flexible work arrangements are more common in Finland than in most other European countries. In this respect, however, Finland is not totally unique. It quite closely resembles the other Nordic countries (see Eurofound, 2012; 2015).

Conventional survey studies have their limits though. Typical survey questions are easy to answer, but the simplicity of the survey items comes at a price. The EWCS, for example, does not reveal how often employees switch between different work locations or how much time

they allocate to telework or working in secondary locations. Due to such restrictions inherent in questionnaires, including high quality surveys like the EWCS, our knowledge of the prevalence of the temporal and spatial dispersion of work remains incomplete.

Measuring time use in particular is problematic (Offerbach and Souza-Poza, 2010; Schulz and Grunow, 2012; Sonnenberg et al., 2012). Surveys rely on memory of historical events and often deploy subjective categories such as ‘sometimes’, ‘often’ or ‘never’ when referring to the time and place of work, rather than the employee’s actual work time in various locations (Breedveld, 1998). People may remember the hours worked incorrectly or they may report more or less work than they actually do (perhaps due to social desirability), in both cases creating systematic errors (Bonke, 2005). If we want to take a closer look at employees’ time budgets, the time use survey (TUS) based on diaries not only provides more accurate information than a retrospective questionnaire-based approach, but it is also a highly useful tool when evaluating societal changes over time (Hamermesh, 1999; Robinson and Bostrom, 1994; Robinson et al., 2011).

In time use survey studies, the respondents keep an accurate diary of their daily activities. With diary data, it is possible to study the rhythm and sequencing of daily activities, the occurrence of multiple simultaneous activities, the duration of specific activities, and the social context of the activities (see, e.g. Gershuny and Sullivan, 1998). Although highly suitable for collecting comprehensive information on individuals’ daily activities, they are infrequently produced due to the high costs involved and the burden the completion of the diaries creates for participants. On the plus side, they provide information that is more detailed and in certain respects more reliable than ‘the estimate approach’ based on standard survey questions that rely on subjective categories and the respondent’s memory (Hamermesh, 1999; Kan and Pudney, 2008; Niemi, 1993; Robinson et al., 2011). Since time use diaries always add up to 24 hours per day and the information is collected ‘in the moment’, they are much less prone to over- and underestimations (van Tienoven et al., 2014, p. 238).

Time use studies have been criticized for usually collecting individual information for a very short period. They are often limited to one day (e.g. the yesterday recall method in the US) or two days (e.g. European HETUS guidelines suggest one weekday and one weekend day) (Minnen et al., 2015). It has been implied, for example, that people who work non-standard hours on their diary days may or may not do the same on other days of the week, or vice versa (Callister and Dixon, 2001: 17). It is indeed true that time is not a constant in the sense that each hour, day, and week is different from one another (Lesnard, 2004, p. 62). In this respect, all survey instruments have their limits. However, in comparison to questionnaire-based studies, the short time-span of the diary method should not pose a problem when the data is properly weighted and the analysis is confined to the aggregate level.

Time use diaries have also been criticized for being ‘poor sources of information on time spent on economic work’ (Budlender, 2007, p. 5; *italics in original*), since they generally regard this time as a ‘black box’ (Mata Greenwood and Hoffman, 2003, p. 4) where respondents are requested to state only whether they were at work or not, and to specify breaks from work. In this respect, time use evidence is limited (e.g. respondents are not required to distinguish

between the different activities carried out at their workplace), but it nevertheless allows us to analyse the exact timing of work throughout the day and where this work takes place. This information can be derived from diary data with greater precision than would be possible with standard questionnaires.

4 The Finnish Time Use Survey 1979-2010

Following international conventions, the Finnish TUS, collected by Statistics Finland, examines working time; the time used on domestic work, sleeping, and eating; leisure time activities; the time spent together with other people; and the place of activity. It also examines where the respondent is and with whom. The activities are classified into specific categories based on diaries completed for two 24-hour periods at ten-minute intervals (Anttila et al., 2009; Liikkanen and Pääkkönen, 2004; Pääkkönen and Hanifi, 2012).

The Finnish TUS is updated every ten years, and so far, it has been collected four times: in 1979 (around 12,000 diary days), 1987/1988 (around 15,000 diary days), 1999/2000 (around 10,500 diary days) and 2009/2010 (around 7,500 diary days). This makes it particularly suitable for the investigation of social changes and trends.

Since 1999/2000, the Finnish TUS has been part of the Harmonized European Time Use Survey (HETUS), and it represents the entire population. The Finnish TUS is based on a household sample, the survey units of which are households and persons aged 10 or over at the time of the survey (Pääkkönen and Liikkanen, 2012). The first two Finnish surveys were individual-based, but they are nevertheless comparable with later data.

The first two surveys were based on a stratified random sample, whereas in the two consecutive studies a single-stage cluster sampling procedure was deployed (Liikkanen and Pääkkönen, 2004; OSF, 2014; Pääkkönen and Hanifi, 2012). The response rate was 41% in 2009/2010 and 52% in 1999/2000. The individual-based surveys from earlier years had significantly higher response rates (82% in 1979 and 74% in 1987/1988). In 1999/2000 and 2009/2010, the proportion of accepted diaries was lower due to the household-based nature of the data. However, the response rates from the last two surveys are close to the rates obtained in similar studies in the other Nordic countries (Bonke, 2005), and are somewhat better than that commonly achieved in time use surveys (Chatzitheochari and Arber, 2009).

The first TUS in Finland took place in autumn 1979 (September–November), whereas the three consecutive surveys were collected over the entire year (Liikkanen and Pääkkönen, 2004; OSF, 2014; Pääkkönen and Hanifi, 2012). In 1979 and 1987/1988, the respondents kept a diary for two consecutive days, the first of which was drawn by lot. The surveys conducted in 1999/2000 and 2009/2010 included one weekday and one weekend day. The major drawback of this method is that not all weekdays are recorded for every respondent.

Because the Finnish TUS is based on diaries kept for two days – in line with HETUS guidelines – diary days constitute the unit of analysis, and the analysis must be confined to the ag-

gregate level. Proper weighing of the data has been provided by Statistics Finland to guarantee that the whole population is adequately represented (OSF, 2014; Pääkkönen and Hanifi, 2012).

In addition to the data at our disposal, Statistics Finland has collected week-long diaries. Those at work kept a weekly record of the time they spent on gainful employment over seven days (Pääkkönen and Hanifi, 2012). These diaries, however, do not have information on the location of work and therefore could not be included in the present analysis (see also Minnen et al., 2015).

5 Research setting

In this study, we separated the following locations of work in order to analyse the employees' allocation of their daily working time:

1. The main place of work (employer's facilities; excluding commuting);
2. Home (or other private locations);
3. Other places outside the main workplace or home (e.g. restaurants, cafés, customers' premises, seminars and meetings);
4. On the move (e.g. vehicles or public transport).

In the survey diary, the respondent is instructed to write down his/her main and secondary activity in ten-minute sequences over the course of the day. However, the respondent is not instructed to specify the location of his/her main activity: this information is derived from the context of the diary. The coding of location and necessary imputations have been the responsibility of Statistics Finland. In the two earliest data sets, ten location categories were included. The wider categories included in the 1999/2000 and 2009/2010 data were reduced to match the earlier categories. The location information we use in our analysis is missing from less than 1% of the diaries. On this basis, we could calculate how many minutes the respondents spent working at the exact time of the day and where this activity took place.

Our research questions were:

1. According to the Finnish TUS, where do employees work? (RQ1)
2. How has the allocation of working time in different locations changed between 1979 and 2010? (RQ2)
3. Has working on days off increased between 1979 and 2010? (RQ3)

Working days throughout the week (weekdays and weekend days) were analysed (RQ1 & RQ2); they serve as the analytic units instead of typical quantitative units, such as employed vs unemployed persons, women vs men, etc. Only those diaries where the respondents indicated that they were engaged in paid work were selected for the analysis. By definition, paid work is an activity that comprises working time in main and secondary jobs, including work

done at all locations and overtime hours. Unpaid breaks or commuting do not count as working time. If the employee has marked doing paid work at home in the evening (and this has been marked to be a working day), this information has been included in the analysis.

In the analysis, blue-collar workers are separated from lower and upper-level white-collar employees in assessing the overall change of participation rates in paid work and the minutes spent in different places of work. The analysis then continues with a graphical description of employees' daily time use with a focus on upper-level white collar workers – the group whose jobs are supposed to be the least bounded by time or place (Hislop and Axtell, 2007; Peters et al., 2004).

In the final part of the analysis, working on days off is assessed (RQ3). Working in one's own time is indicative of the 24/7 economy where the boundaries between work and free time are supposed to be eroding (Noonan and Glass, 2012). Unfortunately, it was not possible to break down the results by weekdays and weekend days due to the small number of diary days (N = 979).

The total amount of diary days (N) spent in paid work by year and socio-economic status is shown in Table 1. The low frequencies of diary days for weekend work pertain to upper-level white-collar workers, which leads us to mainly focus on weekdays in the analysis (RQ1 & RQ2). The diary data quite accurately reflects the change in the social division of labour observed in official labour force statistics and other surveys (Lehto and Sutela, 2009). In the Finnish TUS, the share of upper-level white-collar employees increased from 12% in 1979 to 30% in 2010, with a concurrent decline in blue-collar work (52% in 1979 and 31% in 2010). The share of lower-level white-collar workers remained rather stable (36% in 1979 and 39% in 2010).

6 Change and continuity

In the light of the Finnish TUS, the basic characteristics of people's time use have remained quite unchanged over the past three decades. Research conducted in other OECD countries points to the same conclusion: aggregate working time patterns seem to change relatively slowly (Callister and Dixon, 2001, p. 11; Gershuny and Fisher, 2014). In Finland, the clearest change between 1979 and 2010 is the decrease in time spent in gainful employment due to the recent economic downturn; in addition, at the same time, free time has increased (OSF, 2011). This result also reflects the trend of the working-age population in Finland declining more sharply than elsewhere in Europe (Laine and Maiväli, 2010).

Table 1
Frequencies (N) of diary workdays by socio-economic status and week/weekend days, 1979-2010

		1979		1987/1988		1999/2000		2009/2010		Total
		Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends	
RQ1 & RQ2	Blue collars	2024	197	1973	186	855	87	484	46	5852
	Lower level white collars	1413	124	1569	106	956	73	594	56	4891
	Upper level white collars	522	20	780	15	628	34	520	15	2534
	N = 13,277	3959	341	4322	307	2439	194	1598	117	13277
		All days		All days		All days		All days		Total
RQ3	Blue collars	115		138		62		36		351
	Lower level white collars	79		115		73		50		317
	Upper level white collars	56		106		89		60		311
	N = 979	250		359		224		146		979

Source: Finnish Time Use Survey (TUS), Statistics Finland, own calculations.

In Table 2, the duration of Finnish wage and salary earners' paid work is calculated in minutes by working day, and Table 3 presents the participation rate of employees working in different locations. When comparing Tables 2 and 3, it is important to keep in mind that the former depicts the absolute amount of time spent working in different locations, while the latter depicts the proportion of respondents by location in a workday. In Tables 2 and 3, the results concerning weekend work by upper-level white-collar workers should be interpreted with caution due to the small number of diary days.

Between 1979 and 2010, the total time spent on paid work slightly decreased among all employees during normal weekdays (-9 min.) but increased during weekends (+13 min.). The most significant change concerns working on the employer's premises. Less time is spent on the employer's premises (-38 min. during weekdays), whereas working elsewhere outside the main workplace (or home) has increased (+11 min. during weekdays). In practice, this means alternating between different business facilities (e.g. customers' premises, seminars, and meetings). A possible explanation for this trend lies in the current tendency to encourage teamwork and inter-organizational collaboration. As of 2005, about two thirds of the wage earning population in the EU-27 reported working in teams. In Finland, the corresponding figure was 74% (Lehto and Sutela, 2009). This is important because teamwork seems to be positively related to the practice of distributed work. Teamwork structures may allow employees to overcome fears of social isolation that might result from working outside the regular workplace (Suomi et al., 1998).

In contrast to our expectations, the total number of hours spent working from home has not increased, but in line with previous studies (Pyöriä, 2003), telework remains the realm of employees with a high socio-economic status. In our data, the share of home-based work is clearly highest among upper-level white-collar employees. Working on the move has not increased either, with the exception of blue-collar workers, who work more often in vehicles than before (+12 min. during weekdays). This is an important reminder that research on distributed work should take into consideration traditional occupations and not only concentrate on knowledge workers. In this respect, there is a clear bias in the literature. The definition of mobile work has often been narrowed down to include knowledge professionals and those working on the road and/or on customers' premises with the aid of ICTs (Daniels et al., 2001). However, this excludes many traditional jobs that may involve significant amounts of mobility.

Table 2
Duration of paid work by location and socio-economic status, 1979-2010 (hh:mm per workday)

			1979	1987/ 1988	1999/ 2000	2009/ 2010	Change 1979-2010
All paid work (all locations)	Weekday	Blue-collar	7:45**	8:03***	7:57***	7:36ns	-9***
		Lower-level white-collar	7:34	7:40	7:34	7:27	-7*
		Upper-level white-collar	7:31	7:52	7:51	7:30	-2***
		Total	7:40	7:53	7:46	7:30	-9***
	Weekend day	Blue-collar	6:01ns	7:10*	6:57*	6:20ns	+19**
		Lower-level white-collar	5:53	6:12	6:39	6:10	+16ns
		Upper level white-collar*	6:11	6:11	5:08	5:59	n.a.
		Total	5:59	6:47	6:32	6:12	+13**
Working at the work- place	Weekday	Blue-collar	7:29***	7:48***	7:13*	7:08***	-21***
		Lower-level white-collar	7:27	7:07	6:59	6:54	-32***
		Upper-level white-collar	7:01	7:07	6:51	6:17	-45***
		Total	7:25	7:26	7:02	6:46	-38***
	Weekend day	Blue-collar	5:33ns	4:01*	5:36*	5:49ns	+16**
		Lower-level white-collar	5:44	3:55	5:53	5:55	+11ns
		Upper-level white-collar*	6:08	4:22	3:43	3:45	n.a.
		Total	5:39	6:18	5:22	5:36	-4**
Working from home	Weekday	Blue-collar	0:14***	0:07***	0:07***	0:03***	-10***
		Lower-level white-collar	0:06	0:21	0:13	0:15	+9***
		Upper-level white-collar	0:25	0:21	0:26	0:24	-1ns
		Total	0:12	0:15	0:14	0:14	+2ns
	Weekend day	Blue-collar	0:24**	0:18*	0:10*	0:07***	-17ns
		Lower-level white-collar	0:03	0:14	0:08	0:04	-1ns
		Upper-level white-collar*	0:03	0:55	0:35	1:14	n.a.
		Total	0:15	0:19	0:14	0:14	-1ns

Table 2 (Cont.)

			1979	1987/ 1988	1999/ 2000	2009/ 2010	Change 1979-2010
Working outside home / workplace	Weekday	Blue-collar	0:02*	0:01***	0:06***	0:04***	+2***
		Lower-level white-collar	0:01	0:03	0:09	0:12	+11***
		Upper-level white-collar	0:05	0:05	0:20	0:21	+16***
		Total	0:02	0:02	0:10	0:13	+11***
	Weekend day	Blue-collar	0:04ns	0:00ns	0:12ns	0:03*	0ns
		Lower-level white-collar	0:07	0:00	0:15	0:06	-1ns
		Upper-level white-collar*	0:00	0:00	0:29	0:58	n.a.
		Total	0:05	0:00	0:16	0:12	+7***
Working on the move	Weekday	Blue-collar	n.a.	0:08***	0:29***	0:20**	+12***
		Lower-level white-collar	n.a.	0:08	0:12	0:05	-3***
		Upper-level white-collar	n.a.	0:19	0:13	0:18	-1***
		Total	n.a.	0:10	0:18	0:14	+4***
	Weekend day	Blue-collar	n.a.	0:11*	0:59ns	0:15ns	+4***
		Lower-level white-collar	n.a.	0:03	0:24	0:04	+1**
		Upper-level white-collar*	n.a.	0:54	0:20	0:02	n.a.
		Total	n.a.	0:10	0:39	0:08	-2**

p ≤ 0.001 ***, p ≤ 0.01 **, p ≤ 0.05 *, ns = non significant, n.a. = not applicable,
Source: Finnish Time Use Survey (TUS), Statistics Finland, own calculations

Table 3
Participation rate in paid work (at least ten minutes working in a day)
by location and socio-economic status, 1979-2010 (%)

			1979	1987/ 1988	1999/ 2000	2009/ 2010	Change 1979-2010
Working at the workplace	Weekday	Blue-collar	97**	99***	94ns	97**	0***
		Lower-level white-collar	99	96	96	95	-4***
		Upper-level white-collar	98	97	96	92	-6***
		Total	98	97	95	95	-3***
	Weekend day	Blue-collar	82ns	94*	84ns	91**	9**
		Lower-level white-collar	89	88	88	89	0ns
		Upper-level white-collar#	95	80	74	60	n.a.
		Total	85	91	84	86	1ns
Working from home	Weekday	Blue-collar	9***	6***	5***	3***	-6***
		Lower-level white-collar	8	11	9	6	-2***
		Upper-level white-collar	29	24	23	18	-11***
		Total	11	11	11	9	-2*
	Weekend day	Blue-collar	18**	11**	8***	4***	-14*
		Lower-level white-collar	6	10	5	7	1ns
		Upper-level white-collar#	10	40	32	47	n.a.
		Total	13	12	11	11	-2ns

Table 3 (Cont.)

			1979	1987/ 1988	1999/ 2000	2009/ 2010	Change 1979-2010
Working outside home / workplace	Weekday	Blue-collar	2***	2***	3***	3***	1ns
		Lower-level white-collar	1	2	5	6	5***
		Upper-level white-collar	4	5	11	10	6***
		Total	2	2	6	6	4***
	Weekend day	Blue-collar	3ns	1ns	6ns	0*	-3*
		Lower-level white-collar	2	2	8	2	0ns
		Upper-level white-collar#	0	0	15	13	n.a.
		Total	2	1	8	3	1***
Working on the move	Weekday	Blue-collar	n.a.	6***	8ns	9***	3*
		Lower-level white-collar	n.a.	9	8	5	-4*
		Upper-level white-collar	n.a.	16	11	12	-4**
		Total	n.a.	9	8	9	0ns
	Weekend day	Blue-collar	n.a.	6ns	15ns	2ns	-4*
		Lower-level white-collar	n.a.	4	12	2	-2*
		Upper-level white-collar#	n.a.	13	12	7	n.a.
		Total	n.a.	6	13	3	-3***

= Low N = 15–34, $p \leq 0.001$ ***, $p \leq 0.01$ **, $p \leq 0.05$ *, ns = non significant, n.a. = not applicable,
Source: Finnish Time Use Survey (TUS), Statistics Finland, own calculations.

Figures 1–4 illustrate the proportion of upper-level white-collar employees working at different locations by the time of day. During the daytime, the share of white-collar employees working at their main place of work has decreased since 1979, while working outside the home or employer's premises has increased, the highest peak occurring between 10 and 11 a.m., which is a natural time for business meetings.

Although collaboration among upper-level white-collar workers outside their own organization has increased at the expense of time at the workplace, the change remains modest. The vast majority of employees still rely on conventional work arrangements: at 10 a.m. and 2 p.m., around 75% of all employees and an even higher proportion of upper-level white-collar employees report working on their employer's premises. This implies that the workplace as a social community has not lost its relevance.

Similar findings on working time have been reported in New Zealand and Belgium. In their analysis of the New Zealand TUS (1998/1999), Callister and Dixon (2001, p. 8) found that approximately three-quarters of all paid working hours were carried out in traditional business hours between 8 a.m. and 6 p.m. from Monday to Friday. In Belgium, Glorieux et al. (2009, p. 178) observed that work performed during non-standard working times decreased from 19.6% in 1966 to 13.8% in 1999 due to the reduction in Saturday work. At the turn of the millennium, 86% of total working time in Belgium occurred between 6 a.m. and 7 p.m. during weekdays. In both studies, it was unequivocally stated that the 24/7 society is a myth as far as working time is concerned. Our results corroborate this interpretation.

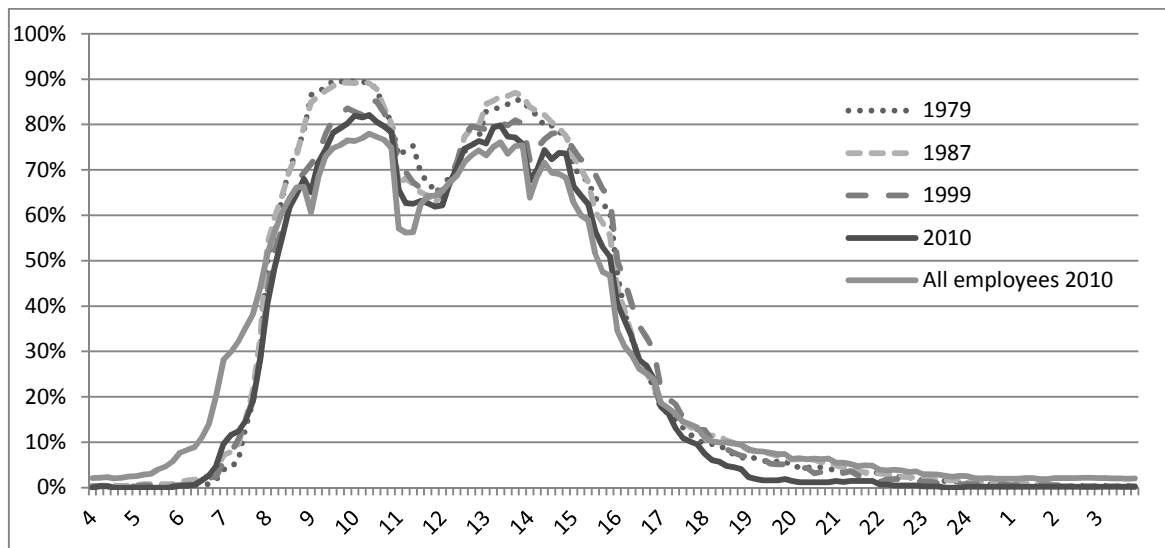
Interestingly, although we did not find any evidence of an increase in home-based work, today this kind of arrangement seems to be spread more evenly throughout the day than before. This trend is especially pronounced among upper-level white-collar workers. The recent economic downturn may explain this finding. At earlier time points (1979, 1987, 1999), the economy was growing, which may be reflected in the peak that occurred in homeworking in the evenings between 6 and 10 p.m. Due to the current economic downturn, people probably have less need to extend their working days at home.

Working on the move is also spread out rather evenly throughout normal business hours, except for a small peak in the late afternoon hours. Mobile work, however, is not the territory of white-collar workers alone. Blue-collar workers spend as much of their working time on the move as white-collar workers (see Table 2). This is explained by the fact that many blue collar workers, employed for example in construction and maintenance, routinely alternate between different worksites and/or transport goods to contractors and customers on a regular basis, whereas making business calls, checking emails or preparing memos are typical tasks for knowledge workers on the move (Green, 2002; Hislop, 2013).

Overall, the popular discourse on the rise of electronic nomads who work free from the constraints of time and space is far-fetched. In the latest EWCS report (Eurofound, 2012, p. 95), for example, one quarter of European workers were labelled e-nomads who occasionally work outside their employer's or their own business premises and habitually use computers, the Internet or email for professional purposes. In the EWCS, any work performed at a secondary

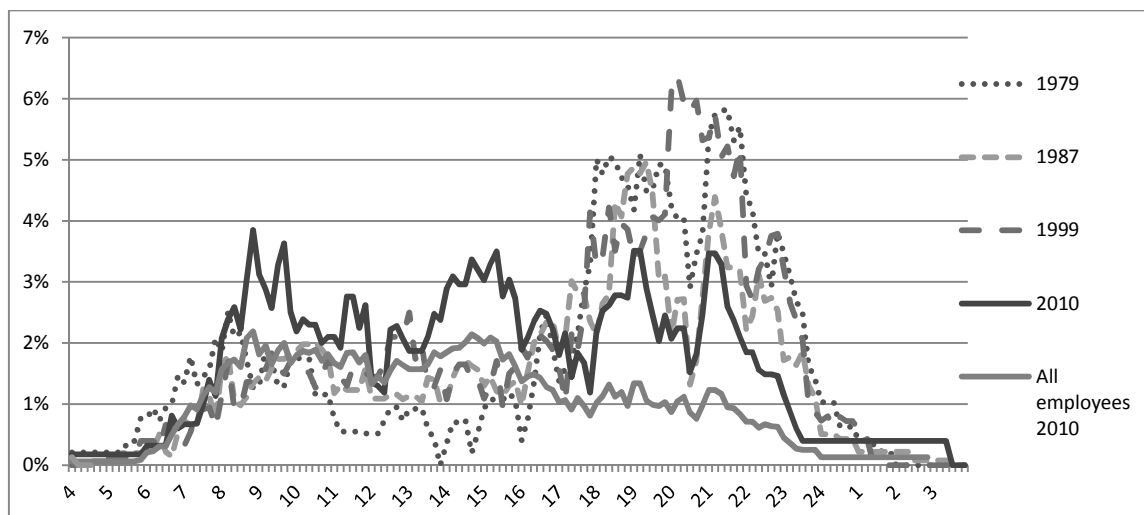
location during a three-month period prior to the survey is counted as distributed work, which is a vague definition to say the least. Time use diaries, by contrast, provide a much more accurate and realistic picture of the spatial and temporal distribution of work.

Figure 1
Working at the workplace by the time of the day on weekdays
1979-2010 (upper-level white-collar workers, %)



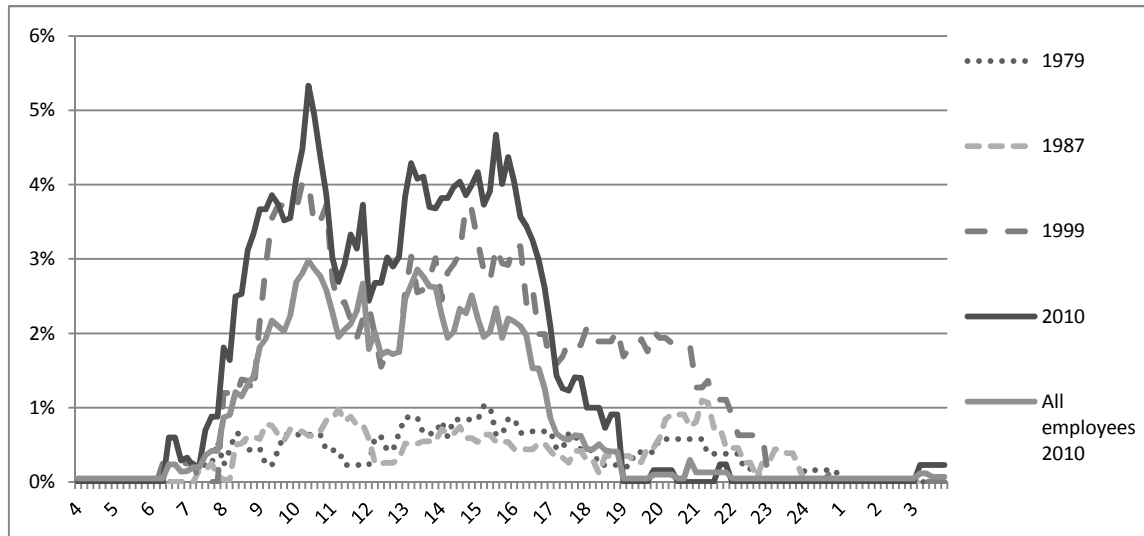
Source: Finnish Time Use Survey (TUS), Statistics Finland, own illustrations.

Figure 2
Working from home by the time of the day on weekdays
1979-2010 (upper-level white-collar workers, %)



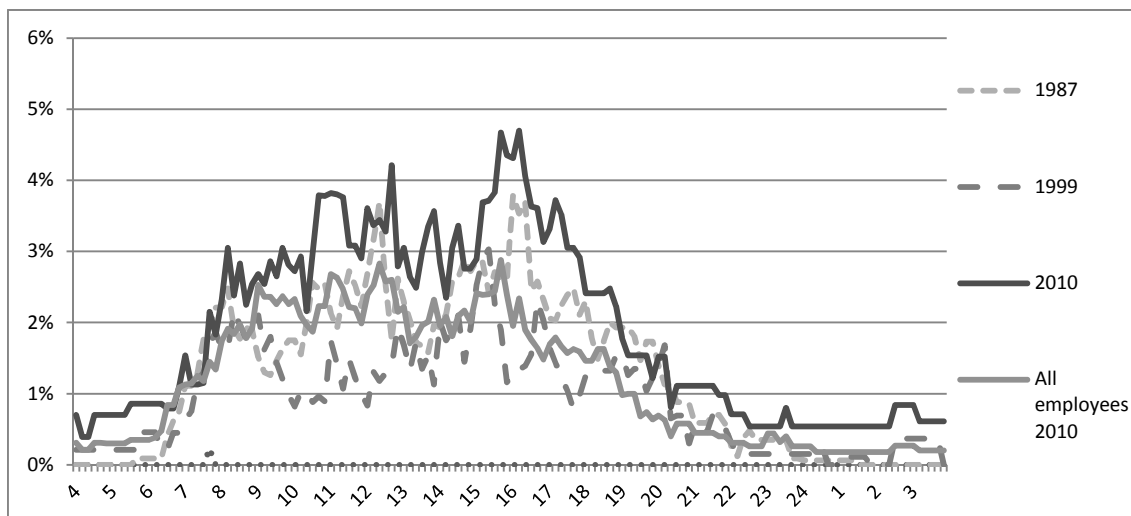
Source: Finnish Time Use Survey (TUS), Statistics Finland, own illustrations.

Figure 3
Working outside the home/workplace by the time of the day on weekdays
1979-2010 (upper-level white-collar workers, %)



Source: Finnish Time Use Survey (TUS), Statistics Finland, own illustrations.

Figure 4
Working on the move by the time of the day on weekdays
1979-2010 (upper-level white-collar workers, %)



*Data for 1979 not available.

Source: Finnish Time Use Survey (TUS), Statistics Finland, own illustrations.

7 Working on days off has not increased

Finally, we examine the hypothesis that the 24/7 economy has extended the boundaries of work at the expense of free time. It has been theorized that flexibilization of working schedules, deregulation of the operating hours in the service sector, and Sunday shopping have con-

tributed to the ‘de-synchronisation’ of daily lives in modern societies (Zuzanek, 2014, p. 6–7). This seems not to be the case in Finland.

Table 4 presents the proportion of employees who have done paid work on their own time and the absolute time spent on this kind of working. All days off – weekends and annual leave periods combined – are included in the analysis. Because of the low number of cases, working during weekends could not be separated from holidays.

Table 4
Working on days off by location and socio-economic status, 1987-2010 (%)

		Has worked on days off	Duration of work, hh:mm	Location of work, participation rate if the re- spondent has worked on days off			
				Workplace	Home	Other places	On the move
Upper- level white- collar	1979	7%	2:18	27%	82%	9%	n.a.
	1987	8%	2:17	36%	71%	5%	5%
	1999	8%	3:42	30%	65%	23%	16%
	2010	6%	3:20	38%	67%	5%	3%
Change	1979-2010	-1	+1:02	+11	-15	-4	-2
Lower- level white- collar	1979	3%	4:04	49%	44%	15%	n.a.
	1987	4%	3:01	50%	49%	7%	8%
	1999	4%	2:46	47%	62%	12%	8%
	2010	4%	2:55	46%	42%	18%	14%
Change	1979-2010	+1	-1:09	-3	-2	+3	+6
Blue- collar	1979	4%	3:39	54%	43%	11%	n.a.
	1987	4%	3:54	62%	47%	3%	0%
	1999	4%	4:50	69%	29%	10%	7%
	2010	4%	5:06	67%	29%	14%	31%
Change	1979-2010	+/- 0	+1:27	+13	-14	+3	+31

Source: Finnish Time Use Survey (TUS), Statistics Finland, own calculations.

Surprisingly, we found little support for the assumption that paid work is taking over free time. Only 6–8% of upper-level white-collar workers and 3–4% of other employees have worked during their own time, with no change taking place between 1979 and 2010. In international comparison, Finnish working time culture is best described as healthy due to legislative limits and collective agreements (Lee et al., 2007).

It also seems that whenever work is carried out during one’s own time, the majority of employees prefer to commute to their workplaces instead of working from home. Among upper-level white-collar workers, the opposite is true, although we may observe a growing tendency towards commuting on days off. Based on a more detailed analysis (not included in Table 4), we found that the longer one needs to work on free days, the more likely it is that the work occurs on the employer’s premises. For shorter periods of work, working from home remains the preferred choice.

However, when the duration of work in free time is calculated, the lengthening of this kind of activity is remarkably clear among both upper-level white-collar and blue-collar workers. Among these groups, the length of working on days off increased by over one hour between 1979 and 2010. Even though no more employees than before work during their own time, those who choose or are obliged to do so work longer hours. This obviously implies that the burden of work and working time is not equally distributed (see also Chatzitheochari and Arber, 2009).

8 Conclusions and discussion

It is often argued that in post-industrial societies, it is increasingly difficult to define and demarcate working hours and places of work. There is some truth to this argument, as our analysis of the Finnish TUS has shown. A growing number of jobs involve spatial mobility, which is seen in the fact that during a standard working week, alternating between different business facilities has become more common than before, pointing to the growing importance of distributed work arrangements. We also found that the share of employees working on days off has not increased, but the duration of this kind of activity has lengthened over the years.

The changes we have observed are rather moderate, however. Much like getting rid of paper in offices, escaping the constraints of time and space has proven difficult even for the new knowledge workers, who may in principle work at any place and at any time by staying connected to their colleagues using wireless internet and smart phones. Our analysis clearly shows that the vast majority of employees still carry out most of their work on their employer's premises during conventional business hours, although working at other locations augments and supplements 'normal' work practices. In the light of our data, the reality nevertheless remains far removed from the theories hypothesizing the emergence of a 24/7 working society.

It is surprising to see how stable the time spent working from home has remained during the thirty year period our data covers, although, as shown by reliable questionnaire-based surveys, a growing number of employees report doing telework. It is likely that increasing numbers of people have the option of teleworking, either formally or informally, but this option is used only occasionally. This is probably explained by Finland's strict legislation on labour market regulation and working time. Weekly working hours do not typically exceed the standard 40 hours. Thus, paid work still seems to remain confined to the traditional office environment and complies with standard work schedules. This implies that post industrialization has not rendered clock time obsolete for the majority of Finnish employees.

A possible reason why visions of post-industrialization and a boundaryless 24/7 society are so appealing today is that they are essentially Anglo-American in origin. In Anglo-American countries, a general trend towards intensification of work and the extension of working hours can indeed be observed. It is clear that if taking work home or working on days off increases

the total workload too much, this is detrimental to work-life balance, health, and well-being. In Finland, unlike in neoliberal market economies, labour market regulations fortunately seem to protect employees from extensively long working weeks.

In the future, it would be interesting to see comparative time use studies assessing the rise of a 24/7 society in different cultural contexts. It would also be of great benefit to merge cross sectional diary material with register-based follow-up data to study the long-term outcomes of the temporal and spatial flexibility of work at individual and household level. Further studies should also pay attention to entrepreneurs, who are known to work the longest hours and whose work is spatially more dispersed than employees' activities.

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Love and retirement – Older couples' leisure time before and after retirement

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Abstract

The paper investigates older spouses' individual and joint leisure time before and after retirement. To identify the impact of retirement on individual and joint leisure time, we use a regression discontinuity approach with the official retirement age as the instrument. The sample consists of 55-74-year-old married or cohabiting men and women and data stem from the Danish Time-Use and Consumption Survey and administrative registers at Statistics Denmark. We find that spouses' simultaneous retirement has the same impact on joint leisure time as does non-simultaneous retirement. Further, there is no impact of a partner's retirement on men and women's own leisure time. Joint and individual leisure time, however, increases when she retires, while his retirement has no impact on the couple's joint leisure time.

JEL-Codes: C26, C31, J26, J22

Keywords: Regression discontinuity, retirement, leisure, time-allocation

1 Introduction

There are several studies showing that joint retirement of spouses is not only explained by their economic opportunities after retirement, but also by their preferences for spending time together, i.e. complementarity in leisure (see e.g. Banks et al. 2010 and Stancanelli & Van Soest 2011, 2012a, 2014). That said, few studies have compared the actual time use of older men and women still active on the labor market with that of their retired counterparts. Gauthier & Smeeding (2003) find in nine European and North American countries that a substantial share of paid work is converted into passive leisure time when men and women retire and, concurrently, that the number of activities, including those partaken alone, increases with older people's age (Herzog et al. 1989, McKenna et al. 2007). Further, Stancanelli & Van Soest (2012a, 2014) find that French pensioners spend only a small amount of leisure time together with their partner, which, however, also holds for couples still active on the labor market with or without children, see e.g. Bonke (2012), Hamermesh (2002) and Hallberg (2003) for Denmark, USA and Sweden, respectively.

That people with a preference for leisure time are supposed to retire early indicates that it is not only retirement that determines leisure time, but also the preference for leisure time that explains retirement (Smith & Moen 2004). Hence, the official retirement age is used to identify the causal relationship between retirement and leisure time. In comparison, Hospido & Zamarro (2014) apply the official early retirement and normal retirement ages in various European countries to investigate the impact of the partner's retirement on own retirement from the labor market.

In accordance with Stancanelli & Van Soest (2012a, 2014), who investigated the correlation between retirement and the use of leisure time in France, we analyse the impact of both spouses' retirement on joint and individual leisure time applying the official retirement age to explain the time of retirement. However, we also use an earlier retirement age as an instrument because of the early retirement option in Denmark. The information covers 55-74-year-old Danish spouses' time use in 2008/09 (DTUC).

A summary of the Danish pension system is given in Chapter 2, and Chapter 3 explains the data sources and includes descriptive statistics. Chapter 4 shows time allocation before and after retirement, while the analyses are presented in Chapter 5. Chapter 6 concludes.

2 The Danish pension system

The Danish pension system includes three pillars: the public pensions (early retirement, official retirement, and disability pension), labor market pensions, and private pension arrangements.

The official retirement age has been 65 years since 1999, where it decreased from 67 years for those born on or after 1939. Hence, in 2008 – the year of the survey (DTUC) used in this paper – 69+-year-olds' (born before 1939) retirement age was 67 years, while it was 65 years for people younger than 69 years (born in or after 1940). From 2004 a premium was given to people postponing their retirement beyond the age of 65 years but not later than 70 years, and from 2009 until the age of 75 years. In January 2012 the official pension age increased for people born during January 1, 1954-June 30, 1960 (younger than the individuals in this sample – born 1934-53). For people born before 1954 the official retirement age is 65 years.

In 1979 pre-retirement benefit became an option for 60-year-olds born before 1954 with a working career longer than 30 years and who had contributed to this arrangement. In 1999 entitlement to the pre-retirement benefit became more stringent and in 2012 people born before 1954 could apply for this benefit at the age of 65 ½ years at the earliest and for a maximum of 5 years. For those born in or after 1963, the earliest age is 67 years and 3 years is the maximum period for receipt of this benefit.

In comparison, the French system allows people to retire as early as of 60 years of age, although the legal early retirement age was set to 62 years becoming effective in 2018, see Stancanelly & Van Soest (2012a).

The Danish public old-age retirement pension is a non-contribution system following the “pay-as-you-go” principle serving as a social safety net, which ensures a minimum living standard for all old people not on the labor market. The public old-age retirement pensions include a flat-rate payment and a means tested additional payment. The largest public pension benefit is equal to around 45 % of an average production worker's income (APW).

The Danish labor market pension system – the second pillar – is based on agreements between the unions and the employers' organizations and depends solely on their own contributions. Since 1990, every part of the Danish labor market has had labor market pensions, where the employer usually pay two thirds and the employee one third equal to 9-16 % of the gross wage.

The third pillar of the Danish pension system is private pensions with premiums paid individually by the holder of the pension. In 2008, 57 % of all 18-64-year-old men and 52 % of women had an individual private pension. These men and women had an average of 217,000 DKK and 156,000 DKK in private pensions, respectively (Amilon 2012).

For an overview of the distribution of pension savings between different groups in the Danish population see the Ministry of Economy and Internal Affairs (Ministry of Economic Affairs and the Interior 2014).

3 Data and descriptive statistics

The primary data source used here is the Danish Time-Use and Consumption Survey 2008/09 (DTUC). It consists of a randomly chosen sample drawn from the CPR register among 18-74-year-old Danes, of whom 68 % (the response rate) or 6,000 individuals participated in a telephone (CATI) or a web-based (CAPI) interview during April 2008-March 2009. Of the participants, 3,755 completed diaries for a randomly chosen ordinary weekday and weekend day, and for those who had spouses, they did the same for the same two days, see Bonke & Fallesen (2009) for a further description of DTUC.

The present study includes 55-74-year-old married/cohabiting participants who completed diaries in the DTUC. Because the spouse of the respondent can be younger or older than the respondent, an age limit of 35 years is imposed. The number of couples included is 1,166 with survey information for both the husband and the wife merged with information about income, education, etc. obtained through the administrative registers in Statistics Denmark. Information about retirement ages of early and ordinary retirees who left the labor market as employed or unemployed during 1989-2012 stems from the administrative registers.

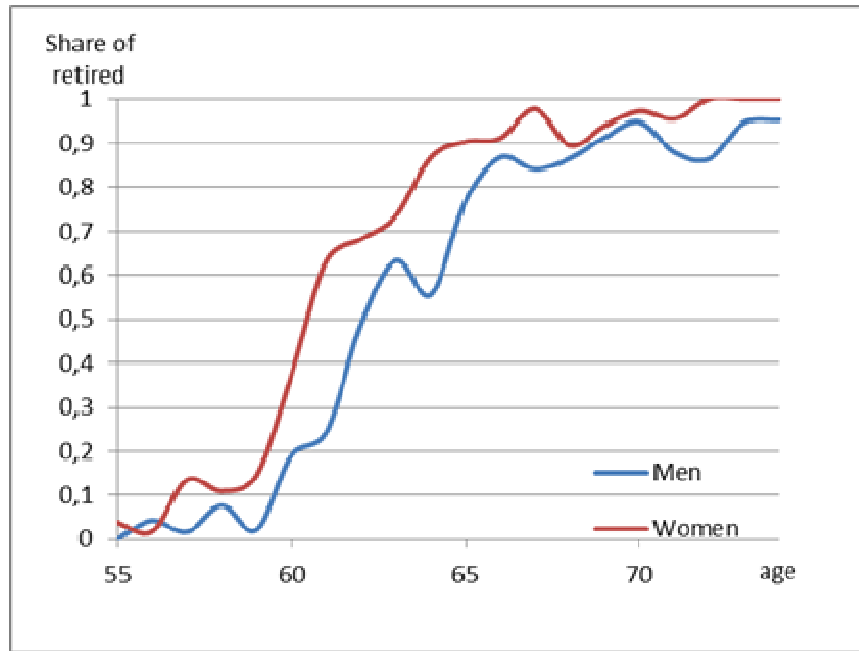
The age band 54-74 years is used because it gives a 10-year interval around the official pension age, i.e. imposed by our discontinuity approach. However, we also do estimations with a 5-year age band to test the robustness of our analyses. Stancanelli & Van Soest (2013) also used two age bands, namely 50-70 years and 54-66 years in their study for France.

Figure 1 shows by age the number of 55-74-year-old married/cohabiting men and women who were pensioners in 2008/09. Unsurprisingly, the official pension age at 65 years implies that considerably more men of that age have retired compared with 64-year-olds, i.e. 77 and 56 %, while for women the figures were 90 and 87 %. Moreover, the opportunity to receive early pension benefits had an impact on retirement as 49 % of the 62-year-old men relatively to 24 % of the 61-year-old men had retired in 2008/09. For women the difference in the number of retirees was much smaller with 68 % at the age of 62 years and 63 % at the age of 61 years. Figure 1 also depicts that the average retirement age – half the age group had retired – was 62-63 years for men and 60-61 years for women.

Because the average ages of men and women in the sample of 55-74-year-olds were 65.6 and 63.0 years, respectively, and two-thirds had retired, it indicates that very many spouses retired at the same time, see below. However, the spouses' age differential is higher when we compare couples where the husband had retired with couples where the husband was still active

on the labor market. Conversely, if the wife had retired, the spouse's age differential was smaller than for couples where she had not yet left the labor market.

Figure 1
Share of retired men and women aged 55-74 years in 2008/09



Source: Danish Time Use and Consumption Survey (DTUC)
2008-2009, own illustrations.

Regarding educational background, men and women on the labor market were more educated than retired men and women. This is not only due to a cohort effect because people with further education generally retire later than skilled and unskilled workers and those without any post-secondary education (Table 1).

There is also a significant income differential between non-retired and retired men and women. Hence, 44-83-year-old retired men's personal gross income was 56.2 % of non-retired men's, and for 41-86-year-old women the percentage was 68.6. Because of the correlation between income and retirement, income is not included in the estimation of the decision to retire – first stage, see below.

The likelihood of participating in regular leisure-time activities on a weekly basis was smaller for pensioners than for non-pensioners, which is also the case when only 60-70-year-olds are considered. We also find that retired husbands and wives' satisfaction with the amount of leisure was larger than for non-retired husbands and wives, and that husbands and wives' leisure satisfaction is the same before and after retirement.

Table 1
Descriptive statistics – Average and std. dev., 55-74-year-olds 2008/09

	Men		Women	
	Mean	Std. Dev.	Mean	Std. Dev.
Age (years)	65.63 (44-83)	6.22	62.96 (41-86)	6.26
Age (65+/-64) (share)	0.561		0.406	
Retired (share)	0.660	0.499	0.646	.478
<65 year	0.326	0.469	0.429	0.495
65+ year	0.917	0.276	0.949	0.220
Further education (share)	0.208	0.406	0.193	0.394
Employed	0.272	0.445	0.277	0.48
Retired	0.172*	0.377	0.151 *	0.358
Personal income before tax (DDK)	202.840	175.597	174.869	102.332
Employed	286.788	249.896	220.895	120.841
Retired	161.118*	88.848	151.443 *	82.210
Participates in regular leisure activities every week (share)	0.471	0.499	0.433	0.496
Employed	0.537	0.499	0.525	0.500
Retired	0.436*	0.496	0.371 *	0.483
Observations	610			556

	Men/Women	
	Mean	Std. Dev.
Satisfaction with leisure time (ip) 1-6	5.283/5.293	0.988/1.053
Employed	4.709/4.586	0.081/0.955
Retired.	5.601*/5.567*	0.034/0.041
Age differential M-W (years)	2.650	
Employed	1.797/3.570	4.480/4.919
Retired	3.087*/2.070*	4.392/3.984
Children	0.052	0.223
Employed	0.110	0.313
Retired	0.022*	0.145
Cohabiting (share)	0.083	0.276
Employed	0.127	0.333
Retired	0.055*	0.229
Renter (share)	0.217	0.413
Employed	0.183	0.387
Retired	0.235	0.424
Observations	1,166	

*, **, *** significant difference relative to employed on 0.05, 0.01 and 0.001- levels,
Source: Danish Time Use and Consumption Survey (DTUC) 2008-2009, own calculations.

Because we exclude people who received disability benefit but no old-age pension, no respondents – employed or retired – reported physical or mental disabilities (not shown in table). Unsurprisingly, more men and women with children living at home were employed than retired – 11 versus 2 % – and the number of cohabiting couples was also the largest among employed people. Lastly, we find that renters retired at the same age as house owners.

3.1 Time allocation – Leisure time

Here, leisure time is defined as the time *not* spent on the labor market or on commuting, doing household work, sleeping or personal care. Hence, leisure time is spent on socializing, on other activities (e.g. reading, TV, computer, sport), and on eating. We distinguish between “leisure time A”, which is when people are socializing with others, “leisure time B”, which is leisure time A and engagement in other leisure activities partaken together, and “leisure time C”, which is leisure time B and time spent eating, see a similar categorization in Stancanelli & Van Soest (2012a, 2014).

For all three leisure-time categories we distinguish between joint time and individual time, where joint time means that the spouses are involved in the same activity at the same time of day, and individual time means that only one spouse is involved. However, we do not know whether joint means that the spouses are actually together or do the same activity alone or with other people – there is no such distinction in the questionnaire – neither do we know whether the spouses are together doing different leisure or other activities when their time is categorized as individual leisure time. This problem also holds for most other time-use surveys, see Bonke (2012).

The problem of not knowing whether the partners participated in the same activities at the same time is because the “together-with-whom” category in the DTUC refers to family members in general not necessarily only to the partner, which is also the case for the French time-use survey (Stancanelli & Van Soest 2012a, 2014). Another problem is that this information is not reported by all respondents.

We find that all kinds of individual leisure time – leisure time A, B and C – was shorter for wives than for husbands and that the times were also shorter for employed than for retired men and women: 2 and 2 ½-3 hours for leisure time I; 4 ½ and 6-6 ½ hours for leisure time B; and 5 ½-6 and 7 ½-8 hours for leisure time C on an average day, i.e. weekdays and weekend days weighted together.

Moreover, joint leisure time (leisure time A) was also found shorter than husbands and wives' time spent individually on these activities. Where employed husbands and wives spent 34 minutes and those who were retired 52 minutes jointly, individual leisure time occupied 2 hours for those employed and nearly 3 hours for those retired (Table 2). Hence, the time spouses were involved in the same social activities (leisure A) was less than a third of the time they spent individually on such activities.

Table 2
Descriptive statistics – Leisure time before and after retirement,
55-74-year-olds 2008/09

Joint leisure time	Hours average weekday		Individual leisure time	Men		Women	
	Mean	Std. Dev.		Mean	Std. Dev.	Mean	Std. Dev.
A – Leisure	0.75	1.20	A – Leisure	2.26	2.01	2.32 ^a	1.81
Employed	0.56	0.86	Employed	2.10	1.67	1.95	1.65
Retired	0.86*	1.34	Retired	2.90*	2.12	2.54 ^a	1.87
B – Leisure	3.73	2.74	B – Leisure	5.88	3.35	5.33 ^a	2.96
Employed	2.83	2.21	Employed	4.82	2.92	4.33	2.58
Retired	4.17*	2.87	Retired	6.41*	3.43	5.92 ^a	3.02
C – Leisure	4.40	3.16	C – Leisure	7.22	3.69	6.76 ^a	3.26
Employed	3.45	2.59	Employed	6.03	3.22	5.61	2.83
Retired	4.89*	3.32	Retired	7.83*	3.76	7.45*	3.31

***, ** significant at 0.05, 0.01 and 0.001 - levels,

^asignificant relative to men at 0.05- level,

Source: Danish Time Use and Consumption Survey (DTUC) 2008-2009, own calculations.

Relative to joint leisure time A, time spent simultaneously was much longer for leisure time B and C, which is also to be expected because of the higher number of activities in the latter leisure-time categories. Hence, employed spouses spent nearly 3 hours a day jointly on leisure time B, while employed husbands spent nearly 5 hours and wives more than 4 hours individually on that leisure category. For retired husband and wives, the same time spent jointly was more than 4 hours against 6 ½ hours for husbands and 6 hours for wives spent individually. Lastly, we find that joint leisure including eating (leisure time C) occupied 3 ½ hours for those employed and nearly 5 hours for retired husbands and wives against 6 and 5 ½ hour of individual leisure C for those employed and around 7 ½ hours for retired husbands and wives, respectively.

3.2 Simultaneous retirement

The average age differential between spouses in this sample was 2.65 years, while it was 2.2 years for 50+-years-olds in a number of SHARE countries (Denmark, Sweden, Holland, Belgium, Germany, France, Austria, Switzerland, Spain, Italy and Greece) (Hospido & Zamarro 2014). The most common retirement pattern for spouses aged 55-74 years was that husbands left the labor market one year after the wife, which was the case for 18 % of the couples (Figure 2). Retirement within the same year occurred in 44 % of the couples or with an age distance of more than two years, and for 61 %, the husband retired one year earlier or three years later than did the wife. Lastly, the percentage of couples where the husband retired 2 or more years before versus 4 or more years later than his wife was about 20 % each in couples with husbands aged 55-74 years.

Figure 2
Difference in man and woman's time of retirement
years, 55-74-year-olds 2008/09



Source: Danish Time Use and Consumption Survey (DTUC) 2008-2009, own illustrations.

4 Leisure time before and after retirement

Table 3 shows that leisure time C increased significantly until the time of retirement, more for men than for women. We control for age to avoid the increase in leisure time being only because of the higher ages being closer to retirement. Where husbands' individual leisure time C increased around 45 minutes, wives' only increased nearly 30 minutes per day until both retired – for the group of 55-74-years-olds – and for the joint leisure time C the increase was nearly half an hour for husbands and around 20 minutes for wives. After retirement, husbands and wives' joint and individual leisure time C did not increase. It must be mentioned that the average distances to retirement were 5.2 years and 5.0 years for husbands and wives, respectively, and 3 years for both sexes regarding the distance from the year of retirement. Hence, the changes in time use shown in Table 3 were around these mean points of time.

Table 4 shows that the joint leisure time of couples retiring simultaneously – within one year's distance at the most – was of nearly the same length as the joint leisure time of couples where the spouses retired more than one year apart. This holds even when controlling for age differentials between the two groups (not shown in table).

Table 3
Men and women's leisure time before and after retirement – Hours per day, OLS-regressions, 55-74-year-olds 2008/09

	Individual leisure time				Joint leisure time			
	Men		Women		Men		Women	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Until retirement	.740***	.140	.428*	.174	.448***	.119	.387*	.161
After retirement	.019	.047	-.043	.036	-.023	.040	.063	.033
Age	-.066	.038	-.075*	.035	-.039	.032	.027	.032
Constant	11.048***	2.49	10.753***	2.308	6.730**	2.113	2.612	2.132
R ²	0.039		0.020		0.023		0.017	
Observations	708		531		708		531	

***** significant at 0.05, 0.01 and 0.001- levels,

Source: Danish Time Use and Consumption Survey (DTUC) 2008-2009, own calculations.

Table 4
Joint leisure time and simultaneous retirement – Hours per day, 55-74-year-olds 2008/09

	Joint leisure time A	Joint leisure time B	Joint leisure time C
	Hours/day (Std. Dev.)		
Simultaneous retirement (+,- 1 year difference)	0.953 (0.095)	4.336 (0.206)	5.164 (0.243)
Non-simultaneous retirement (>1 years difference)	0.840 (0.059)	4.233 (0.132)	4.920 (0.150)

Note: No significant difference between joint and non-joint retirement,

Source: Danish Time Use and Consumption Survey (DTUC) 2008-2009, own calculations.

5 The analyses

5.1 A double regression discontinuity approach

Because most Danes retire close to the official retirement age of 65, we use this information to analyze the relation between spouses' retirement and their use of individual and joint leisure time. An argument for using the official retirement age is that an increase from 65 to 67 of this official age in Germany implied that more people actually retired later (Coppola & Wilke 2014). Applying a "discontinuity-approach", as we do here, assumes that retirement is not a continuous function of age, whereas the time spent on leisure is not considered dependent on peoples' age per se. This allows for identifying the causal relation of retirement on the time spent on leisure, i.e. the outcome, see Stancanelli & Van Soest (2011, 2012a, 2012b,

2014) and Battistin et al. (2009), who use the same approach when analyzing the retirement decision among Italian people.

Because early retirement benefit in Denmark is available from the age of 62 years and this age was the average retirement age in 2008, we also use 62 years of age as an instrument in our analyses, but it does not change the results significantly for which reason only the first stage-results are shown in Table 7 in Appendix.

Formalizing the analyses, the time spent on individual leisure, L_i , is to be explained by retirement, R_i , individual factors, Z_i and some residuals, v_i (error term):

$$(1) \quad L_i = R_i\gamma + Z_i\beta + v_i.$$

By using the official retirement age as an instrument in a two-stage-least-squares analysis, where the error term is not necessarily uncorrelated with age, the first stage has the following form:

$$(2) \quad R_i = D_i\delta + \text{Age}_i D_i\eta + \text{Age}_i\iota + Z_i\beta + v_i.$$

where D_i is a dummy for 65+/64 years of age, and $\text{Age}_i * D_i$ an interaction term for age and the age dummy. We assume that there is no discontinuity for the Z_i variables around the age of 65 years.

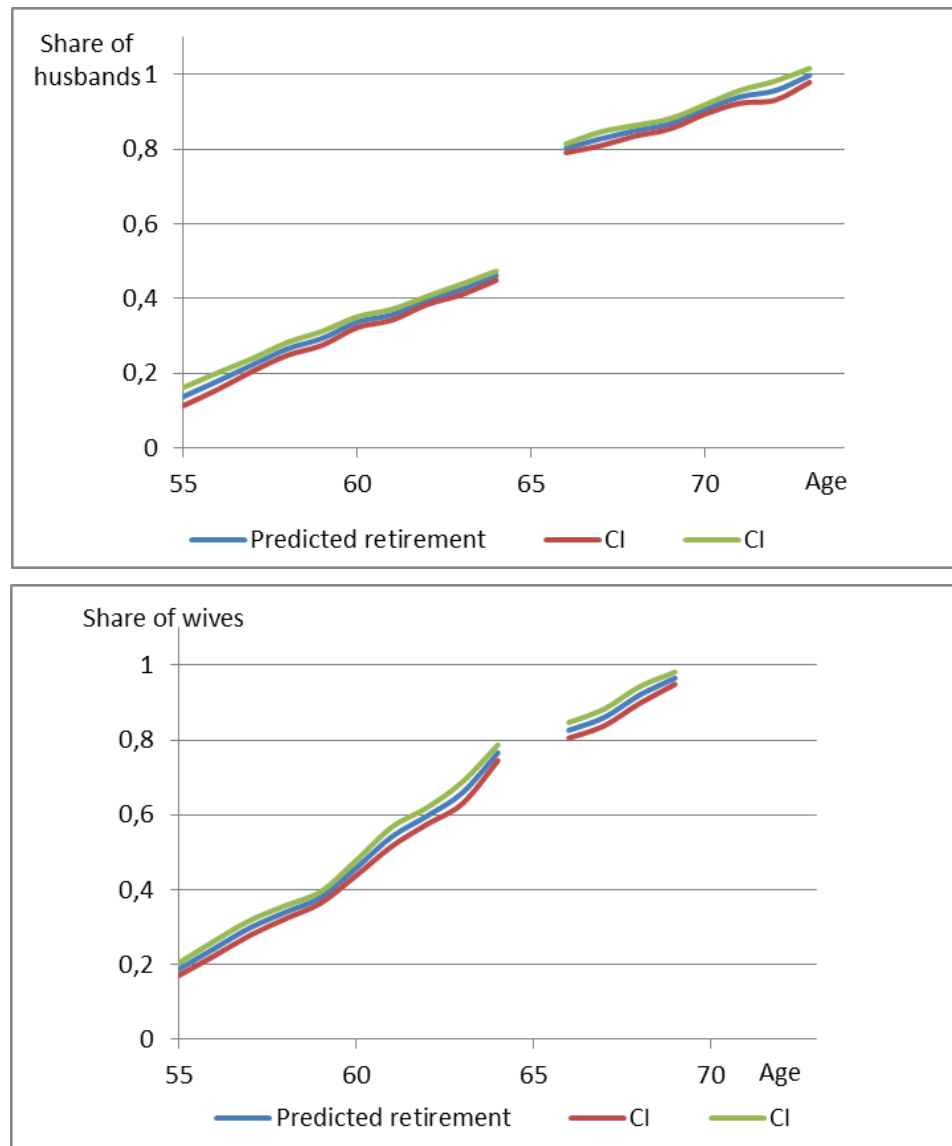
For joint leisure the specification of the equation is similar with the only exception that L_j (joint leisure) is dependent on the retirement of both spouses, R_m and R_f , their different ages, Age_m and Age_f , and the interaction between age and the age dummy for the husband and the wife, respectively. Additionally, the other factors, Z_m and Z_f , are now sex-specific.

Figure 3 shows that the likelihood of retiring increased up to and also after the age of 65 years for husbands and for wives. However, there is a significant level differential between the curves around the 65-years-olds – bigger for husbands than for wives. This shows that the official age of retirement is a reasonable predictor of retirement, especially men's retirement. The same is found in other studies for European countries (Coe & Zamarro 2011, Hospido & Zamarro 2014).

To test the discontinuity of the Z covariates around the age of 65 years, we estimated the likelihood of retirement as a function of these covariates (partners' education, the relative disposable incomes of the partners, civil status, season of the year, having children living at home and homeownership) and there was still a discontinuity around that age. This was also the case when including health status, which is properly because of the correlation between educational background and health status in old age.

As mentioned in Chapter 3, we use three different measures of leisure as outcomes in the estimations assuming that an exogenous variation in the partners' retirement can be used to identify the causal effect of their retirement on their joint and individual leisure times.

Figure 3
Predicted retirement for men and women as a function
of the Z covariates, 55-74-year-olds 2008/09



Note: CI is confidence interval at a 0.05-level,
 Source: Danish Time Use and Consumption Survey (DTUC)
 2008-2009, own illustrations.

5.2 Results – 1st stage

In the following we show the results of the two-stage-least-square regressions, where the likelihood of retirement around the age of 65 years – the first stage – is estimated first, and then the impact of retirement on the spouses' joint and individual leisure time – the second stage estimation.

We find that it was three to four times more likely that men and women were retired after the age of 65 years than before they reached that age – for women 3.8 and for men 3.4, when we look only at 55-74-year-olds, take their respective ages into consideration and interact their

ages with the age limit 64/65 years (Model I in Table 5). For men the differential remained even when controlling for the wife having passed the age of 64/65 years and the interaction between her age and the retirement age of 64/65 years, cf. Model II in Table 5. For women the likelihood of retirement around the age of 65 decreased – 3.8 relative to 3.0 – when controlling for the same factors as for men, cf. Model II relative to Model I. However, if we add controls for the partners' educational background, their relative income, having children, being married relative to cohabiting, and being renters – Model III – this did not impact the relationship between the official retirement age and the husband's or wife's retirement from the labor market, nor did the inclusion of health have any impact on the relationship (not shown).

Table 5
Linear likelihood model of partners' retirement at the age of 65 years –
First-stage-regression 2SLS, 55-74-year-olds 2008/09

	Model I		Model II		Model III	
	Man retired	Woman retired	Man retired	Woman retired	Man retired	Woman retired
Man 65+/ years	3.367 *** (0.361)		3.303*** (0.406)	1.383*** (0.398)	3.451*** (0.422)	1.676*** 0.408
Woman 65+/ years		3.840*** (0.378)	0.685 (0.425)	3.013*** (0.417)	0.565 (0.471)	2.908*** 0.456
Men's age	0.059 *** (0.004)		0.054*** (0.005)	0.011* (0.005)	0.055*** 0.005	.0151** 0.005
Men's retirement age	-0.048 *** (0.006)		-0.048*** (0.006)	-0.019** 0.006	-0.050*** 0.007	-.0239*** 0.006
Women's age		0.067 (0.003)	0.014*** (0.004)	0.058*** 0.004	0.012* 0.004	.059*** 0.004
Women's retire- ment age		-0.058*** (0.006)	-0.010 (0.006)	-0.045*** 0.006	-0.008 0.007	-.045*** 0.007
Controls ¹	No	No	No	No	Yes	Yes
Constant	-3.226 *** .267	-3.541*** .183	-3.674***	-3.688*** 0.281	-3.571*** 0.311	-4.107*** .301
Adj. R ²	0.464	0.500	0.480	0.513	0.480	0.528
Observations	1.188	1.152	1.144	1.144	1.124	1.124

*** significant at 0.05, 0.01 and 0.001- levels,

¹Education husband and wife, relative disposable income (M/K), summer interview, children, cohabiting, and renter. . Including health does not impact the coefficients in the table.

Source: Danish Time Use and Consumption Survey (DTUC) 2008-2009, own calculations.

When it comes to the spouses' retirement age – when s/he becomes 65 years of age – it is only when he reached that age that it impacted her retirement age, namely 1.4 times. When she was 65 years or older, it had no impact on when her husband retired (Table 5). Hence, when the

husband passed his 65th birthday there was an impact on his own and his wife's retirement, whereas her 65th birthday impacted only her own retirement not that of her husband.

We also find that the inclusion of the spouses' educational background, their relative income, having children, being married or cohabiting, and renters (Model III in Table 5) did not impact the correlation between the husband's or the wife's reaching the age of 65 years and their retirement decisions, nor did it have any impact on their spouses' decision. The coefficients remained of nearly the same size as those of the model without these controls (Model II in Table 5).

Because of the option of receiving early retirement benefit from the age of 62 years in 2008/09, many individuals left the labor market at that age, for which reason we replicated the analyses with the age of 61/62 years as the age limit, see Table 7. Unsurprisingly, the likelihood of retiring was smaller than around the age of 65 years independently of the model used, and again it is only when the husband reached the age of 62 years that the wife's retirement was affected. When she reached that age, it had no impact on her husband's decision regarding retiring.

For France, Stancanelli & Van Soest (2012a, 2014) find that at the age of 60 years, where early retirement is possible in France, the likelihood of retirement increased significantly for the husband as well as for the wife, whereas neither the husband's nor the wife's retirement age was influenced by their partner's 60th birthday.

For all models in Table 5 the R^2 's are as high as 0.5.

5.3 Results – 2nd stage

Table 6 shows the impact of husbands and wives' retirement on their joint and individual leisure time taking into account that the retirement age depends on the spouses' ages, i.e. the first stage regression. For social leisure (leisure A) his or her retirement did not impact their joint time spent on this activity. Including other leisure activities (leisure B) the spouses' joint leisure increased by more than 1 hour or 39 % when she retired, whereas his retirement had no impact on their joint leisure.

We find the same pattern when eating is included as a leisure activity (leisure C). Hence, her retirement increased joint leisure time by more than 1 ½ hours or nearly 50 %, whereas his retirement had no impact on their joint leisure.

Concerning the husband and the wife's individual leisure time A, B and C, we find no impact of the partner's retirement, which follows expectations (Table 6). Nor did the husband have more social leisure time when he retired, whereas her retirement offered her nearly 1 hour and 20 minutes or 70 % more social leisure time. However, leisure time B increased by nearly 1 ½ hours or 30 % for a retiring husband, and 2 ¼ hours or 51 % for a retiring wife.

The biggest impact of retirement on leisure time is obtained when eating is included. Hence, retired husbands spent more than 1 ½ hours on leisure time (leisure C) compared with non-retired husbands, and for wives the difference was nearly 3 hours a day. The differentials measured in percentages, however, are of nearly the same size for the spouses irrespective of whether we look at leisure without and with eating included when the husband or the wife retires.

Table 6
Partners retirement and individual and joint leisure time –
2SLS instrument-regression¹, 55-74-year-olds 2008/09

	Individual leisure time man	% Change	Individual leisure time woman	% Change	Joint leisure time	% Change
Leisure A						
Man retired	.567 (.425)	21.7	-.578 (.391)	-28.9	-.0075 (.264)	-2.0
Woman retired	-.030 (.408)	-1.6	1.384*** (.376)	69.9	.330 (.251)	58.9
Constant	2.871*** (.381)		2.201*** (.351)		1.074*** (.237)	
Wald qui ²	78.57***		76.15***		22.21**	
Adj. R ²	0.077		0.027		0.022	
Leisure B						
Man retired	1.467+ (.714)	29.9	-.746 (.627)	16.7	.204 (.578)	7.7
Woman retired	-.391 (.686)	-7.3	2.257*** (.602)	51.3	1.129* (.555)	39.2
Constant	3.309*** (.640)		4.730*** (.562)		3.383*** (.519)	
Wald qui ²	49.20***		63.73***		65.08***	
Adj. R ²	0.065		0.067		0.077	
Leisure C						
Man retired	1.528+ (.782)	24.9	-1.079 (.686)	18.8	-.179 (.672)	-4.9
Woman retired	-.330 (.751)	-4.9	2.854*** (.659)	50.1	1.658** (.645)	47.5
Constant	4.500*** (.702)		6.149*** (.615)		4.337*** (.602)	
Wald qui ²	51.25***		78.44***		65.43***	
Adj. R ²	0.070		0.074		0.066	

+, **, *** significant at 0.1, 0.05, 0.01 and 0.001- levels, ¹Controls: Education husband and wife, relative disposable income (M/W), summer interview, children, cohabiting and renter.

Including health does not impact the coefficients in the table. Note: The coefficients do not change significantly if the retirement age is 62 years (not shown in table).

Source: Danish Time Use and Consumption Survey (DTUC) 2008-2009, own calculations.

Compared with the results of Stancanelli & Van Soest (2012a, 2014) for France, the major difference is that we do not find any impact of Danish men's retirement on their wives' individual leisure time. In France the wife's leisure time decreases when her husband leaves the labor market. However, when French husbands retire, the couple's joint leisure time increases, which is not the case in Denmark, where there is no such impact on spouses' joint leisure

time. Although the decrease in French wives' individual leisure time is of the same size as the increase in joint leisure time, this does not mean more time spent on household work, which actually decreases, when their husbands leave the labor market.

Table 7
Linear likelihood models for partners' retirement at 62 years of age –
First-stage regression 2SLS, 55–74-year-olds 2008/09

	Model I		Model II		Model III	
	Man retired	Woman retired	Man retired	Woman retired	Man retired	Woman retired
Man 62+/ <62 yrs	0.401*** (0.034)		0.413*** (0.036)	0.191*** (0.035)	0.407*** (0.036)	0.199*** 0.035
Woman 62+/ <62 yrs		0.417*** (0.033)	0.042 (0.035)	0.353*** (0.034)	0.031 (0.036)	0.322*** 0.035
Partner's age	No	No	Yes	Yes	Yes	Yes
Controls ¹	No	No	No	No	Yes	Yes
Constant	-0.529***	-1.399***	-0.609*	-0.768***	-0.469***	-1005***
	.190	.185	0.243	0.237	0.258	.249
Adj. R ²	0.488	0.522	0.500	0.537	0.498	0.545
#	1.188	1.152	1.144	1.144	1.124	1.124

*** significant at 0.05, 0.01 and 0.001- levels,

¹ Education of the man and the wife, relative disposable income (M/W), summer interview, children, cohabiting, renter.

Source: Danish Time Use and Consumption Survey (DTUC) 2008-2009, own calculations.

6 Conclusion

There are a number of studies on when people retire from the labor market with the focus on work efforts, savings and economic conditions in general. However, only a few have addressed the impact of spouses' preferences for leisure on the desire to spend leisure time together. This is despite the fact that spouses' leisure complementarity may contribute to the understanding of joint retirement.

Here, we investigated the impact of married and cohabiting men and women's retirement on their joint and individual leisure time taking into consideration the influence of their preferences for leisure relative to income. For the causality problem – do preferences impact retirement or is it retirement that determines preferences – we have used the public pension age, when most people retire, as an instrument in the retirement estimation.

The information on the age of retirement stems from administrative registers in Statistics Denmark and DTUC-2008/09, which is a survey of randomly chosen Danes' labor market attachment, and time use for the same weekday and weekend day for both partners in married

and cohabiting couples. By looking at couples where the husband is aged 55-74 years and distinguishing between employed and retired spouses, we found that the latter group did not have more individual and joint leisure time than did the first group, and that leisure time is longer the broader the definition is of that time.

We also found that simultaneous retirement – within a year's distance at the largest – did not impact the spouses' joint leisure time more than non-simultaneous retirement.

In the discontinuity regression analysis, where 65-year-olds – the old-age public pension age – was used as an instrument to avoid the problem of reverse causality – we found that the wife's retirement increased her social leisure time, leisure time extended, and leisure time inclusive of eating time, whereas leisure time and eating time, not the social leisure time, increased when the husband retired. However, we found no impact of the partner's retirement on the husband's or wife's individual leisure time. However, their joint leisure time inclusive of time spent eating increased, when the wife retired, whereas the husband's retirement had no impact whatsoever on the length of their joint leisure time.

Comparing these results with those for France, the difference is that in France the wife's leisure time decreases when her husband leaves the labor market. Further, when French husbands retire, the spouses' joint leisure time increases, which is not the case in Denmark, where there is no such impact on spouses' joint leisure time. Why this country differential appears is beyond the scope of this paper to explain.

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Automobile accessibility and the allocation of time 1990-2010

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Abstract

Using detailed travel surveys conducted by the Metropolitan Council of the Minneapolis/Saint Paul region for 1990, 2000-2001, and 2010-2011, this study analyzes journey-to-work times, activity allocation, and accessibility for automobile commuters. The analysis shows declines in the time people spent outside of their homes and in travel. Although distances per trip are increasing for workers, they are declining for non-workers. The number of trips is declining, resulting in less distance traveled and less time allocated to travel. This study finds accessibility to be a significant factor in commute durations. Accessibility and commute duration have large effects on the amount of time spent at work. We posit this is due to increased home-work blending.

JEL-Codes: J01, J22

Keywords: Travel duration, activity allocation, accessibility

1 Introduction

Accessibility measures the potential for interactions (Cao et al. 2010, Geurs and Van Wee 2004, Grengs 2015, Hansen 1959, Haugen 2011, Tschopp et al. 2005, VanWee and Geurs 2011, Yang and Ferreira 2005). It is a function of both mobility (speed and directness of the network) and density of destinations. Simply put it is the number of destinations that can be reached in a given time. This study examines how accessibility affects time spent traveling to, and at, work for automobile commuters by examining three travel surveys conducted in different years in the Minneapolis – St. Paul (Twin Cities), Minnesota (USA) region.

While the Cleveland Regional Area Traffic Study in 1927 was the first such metropolitan survey sponsored by the US federal government, the lack of comprehensive survey methods and standards at that time precluded the systematic collection of information such as travel time, origin and destination, and traffic counts. The first US travel surveys appeared in urban areas after the Federal-Aid Highway Act of 1944 permitted the spending of federal funds on urban highways (Weiner 2012). A new home-interview origin-destination survey method was developed in which households were asked about the number of trips, purpose, mode choice, origin and destination of the trips conducted on a daily basis. In 1944, the US Bureau of Public Roads printed the Manual of Procedures for Home Interview Traffic Studies (United States Department of Commerce 1944). Highway engineers and urban planners made use of the new data collected after 1944 Highway Act extended federally sponsored planning to travel surveys as well as traffic counts, highway capacity studies, pavement condition studies and cost-benefit analysis. As computer technologies have evolved from mainframe punched cards to reel tapes to minicomputers to personal computers, historic travel survey data are not always readily accessible. Moreover, because of the long timespan between surveys (sometimes 20 years), much institutional memory, the computer files, and even documentation are lost between surveys. While the methods for conducting such surveys have evolved over the past half-century (from in-person home interviews to computer administered telephone interviews (CATI)), and new methods like GPS devices are being tested, the basic data coming out of these surveys remains largely unchanged.

This project illustrates the utility of preserving and archiving travel surveys, as done in the Metropolitan Travel Survey Archive (<http://surveyarchive.org>). Travel surveys are useful instruments that provide valuable insight into the travel behavior characteristics of people at a city, county, state, or other geographical scales. Historical surveys help researchers to observe a temporal shift in travel preferences which may play an important role in making appropriate transportation related policies and producing better forecasts. With improved statistical techniques, a survey dataset may provide insight into the social behavior of the community. Use of data from the present and the past makes it possible to validate and calibrate new transportation planning models.

Previous research using travel surveys has found that in US average commute trip durations have remained relatively stable over time, despite the changing urban landscape (Gordon et al. 1991, Levinson 1998, Levinson and Kumar 1994b, 1995, 1997). People travel increasingly on faster suburban roads rather than slower urban roads, and their destinations are becoming more decentralized. Decentralization and spread of both households and work locations increases distances. The extent to which this results in shorter commutes durations is disputed Cervero and Wu (1998) (and likely depends on context and existing congestion levels). A comprehensive literature review finds that household structure, demographics, destination activity, and the characteristics of the region traveled in found that all have measurable effects on travel time budgets (Mokhtarian and Chen 2004).

Using detailed travel surveys conducted by the Metropolitan Council of the Minneapolis/Saint Paul Region in Minnesota for 1990, 2000-2001, and 2010-2011, this paper analyzes journey-to-work times, activity allocation and accessibility. Given the data are collected every 10 years, we can observe changes in the travel behavior in the region, as well as any changes in the relationships important to the transportation network. This paper focuses on the behavior of auto commuters, for which there is a much larger sample size (and much larger mode share) in the Twin Cities region.

Subsequent sections in turn formulate the theory and hypotheses, describe the data, present the methodology, conduct a descriptive analysis, and then conduct a statistical modeling analysis of the data to test the hypotheses of the paper. The paper concludes with some implications for planning and research.

2 Theory and hypotheses

This study extends previous research by examining factors that affect travel and activity time use. E.g. Levinson (1998) used a gravity based accessibility model for the Washington, DC metropolitan area and applied it to data from a 1988 household survey to test several hypotheses that analyze the relationship between accessibility and the commuting times of various individuals.

The mechanisms by which travelers reach jobs through accessibility are a function of opportunities and competition. The more jobs available, the more likely a job will be accepted by a worker. Thus a higher accessibility to a desired trip end like jobs reduces time required to reach that trip end. However the more competitors who seek that same job, the less likely the job will actually be available (Shen 1998). Thus increased job accessibility in housing rich areas, and labor accessibility in employment rich areas are expected to decrease commute time. In brief the core hypotheses are formally defined below (extending and testing (Levinson 1998, Levinson and Kumar 1994b)):

- H1: Individuals living in areas that have high housing accessibility will have longer commutes due to competition for jobs.

- H2: Individuals living in areas with high job accessibility will have shorter commutes because one of those jobs may be theirs.
- H3: Individuals working in areas that have high housing accessibility will have shorter commutes because they are more likely to live in said housing.
- H4: Individuals working in areas with many competing jobs will have longer commutes because they will have to search for housing further from their work due to competition in the housing market.

We would anticipate the same relationships for transit commuters were transit service as uniform as road networks. But the relationship is confounded by significant positive feedback between transit service and demand, as observed by the Mohring Effect (Mohring 1972). Increasing transit service reduces headways, which makes transit more attractive, which increases ridership, which may, in a virtuous circle, further reduce headways. This tends to occur in thick transit markets, which will occur where either job accessibility is high (i.e. high density job centers) or housing accessibility is high. Levinson (1998) found that transit commute durations drop when employment is higher near either the origin (home) or destination (work) end for trips.

Extending the analysis from travel duration to activity duration, we expect a relationship between accessibility and time spent at work. Two new hypotheses are tested relating accessibility and time spent at work:

- H5: Individuals with longer work journey times will spend more time at work.
- H6: Individuals with more daily work trips will spend less time at work.

While there is a finite amount of time and thus a budget (Levinson and Kanchi 2002), so more time at one activity must reduce time available for other activities, there are also complementarities between travel activities and out-of-home activities (travel and out-of-home activities are complements). The more out-of-home activities that are engaged in, the more travel that is employed to engage in them. The travel time ratio for work trips (work travel time / time spent at work) varies with socio-economic factors, but less with urban form (Schwanen and Dijst 2002). There could be several reasons for this.

Areas of high employment accessibility are associated with higher salaries (Melo et al. 2013). More productive employees (justifying the salary) work longer hours. The travel survey reports only household income, and it is impossible to identify from this data whether more hours cause higher annual salaries or higher wages per hour attract more hours of work, supporting H5.

Higher salary workers historically have been found to have longer commutes in the US. Higher salary workers have a greater choice in housing (they can afford both lower and higher cost houses, while lower income workers can only afford lower cost housing), which should give them a choice of closer housing. Higher income workers also by definition have a higher value of time, which also should push toward shorter commutes. However they may (or one

might say, must) have a higher value of amenities (land, lakefront property, etc.) which can only be obtained farther from the workplace. This process is further complicated by two-income households, which cannot necessarily jointly choose housing that is close to both workplaces.

Individuals with long commutes may work fewer days per week, but more hours per day, to compensate for the additional travel time. Unfortunately, a one-day travel diary cannot give us direct information about this. Studies of telecommuters using the same data find that telecommuting has no significant affect on the commute distance for single-worker households, and is negative for multi-worker households (Cao 2015), similarly supporting H5.

Individuals who work near their place of employment are able to travel back and forth between home and work readily, and may more easily blend the two. A person who lives near their job will, due to the easier commute, have more exibility in their hours (if the employer allows it), popping into the office as needed rather than needing to camp at their workplace in case something comes up. They may also be more likely to return home for lunch. We call this the Work-Home Blending explanation, and while it cannot be fully tested with the available data, would be supported by (H6). H6 could also be explained by more part-time jobs, or simply eating out (though not at home).

Finally, since we have multiple years, we can test whether the results are robust over time. We do this by examining significance and sign of the coefficients for H1-H6 for all three time periods.

- H7: The results are robust over time.

3 Data

The primary data for this study were collected by the Metropolitan Council for the Travel Behavior Inventories (TBI) conducted in 1990, 2000, and 2010. The TBI collects data on a variety of factors; from information about household size and makeup, employment information, and specific information about trips. A travel diary is included, which has self-reported travel times.

Due to the changing nature of the surveys in each decade, the data needed to be harmonized in order to be compared on a decade-to-decade basis. Also, much of the data is self-reported by the individuals who participated, and therefore there are errors in the reporting.

Certain censoring thresholds were used to address this issue. Trips were excluded if:

- The calculated distance traveled was greater than 200 km (though not technically impossible, any trip greater than this seemed unlikely and out of the realm of the analysis).
- The calculated average speed was greater than $150 \text{ km} \cdot \text{H}^{-1}$ (again, not technically an impossibility, however an average speed that fast would be highly unlikely, and some calculated speeds were impossibly high).

- Trip durations exceeded than 120 minutes. While durations greater than that may or may not be errors, it was determined that they fell beyond a reasonable application of this study. Or,
- Any of the fields were missing or unreported.

When a trip was omitted, so were all of the other trips made by that respondent, so as not to artificially affect the time allocations.

Table 1 shows the filtering parameters and the remaining sample size for each year after the filters. Most of the filtering and analysis of the data in this study are the same as Levinson and Wu (2005), which analyzed TBI data from 1990 and 2000, however with a few definitional changes in order to directly compare 2000 with 2010. Only adult respondents of working age were used (between 18 and 65), as well as only respondents who had begun and ended the travel day at home. The latter parameter is needed to calculate the time spent at home. In Levinson and Wu (2005) the respondents were separated by gender and employment status, however telecommuting was not taken into account. Additionally, anyone who made a trip reported to be greater than 120 minutes was excluded. This is due to the assumption that they are making “unusual” trips, rather than a daily routine trip. There is no guarantee that the remaining records represent usual or typical behavior for any particular individual. Telecommuting is becoming a significant means of employment, which may have deep impacts on the transportation network, however for the purposes of comparison to Levinson and Wu (2005), it was decided to omit the work-at-home category for this study as well.

The trip purposes for each separate TBI were harmonized, as defined in Owen et al. (2015). A worker is defined as someone who made a work-trip on the travel day. A work-at-home respondent is defined as someone who did not have a work outside of home trip on the travel day but did have work-at-home listed as an activity.

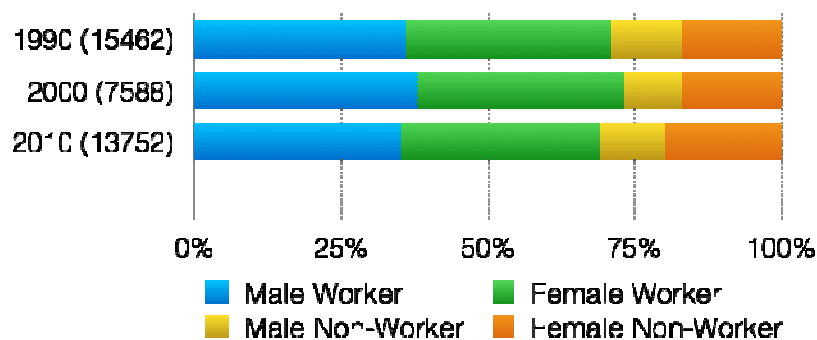
One significant difference between this study and Levinson and Wu (2005) is the inclusion of “work-related” trips as work trips, and the inclusion of formerly “non-workers” who made work related trips into the worker category. This change was made due to the 2010 TBI lacking a “work-related trip” purpose. In the 2010 survey, a work trip included any trip made for work outside of the home, regardless of whether that trip was to the primary place of employment or not. This change affected the 1990 and 2000 results, and as such they were recalculated, as discussed later in this report. The sample size of each category can be seen in Figure 1. Filtering may introduce bias compared to the original sample, though the original sample is, despite efforts, not unbiased either compared to the population. Weights are not used in the statistical analysis below.

Table 1
Filtering

Description of Constraints	1990	2000	2010
Subtotal	24509	14671	30286
Reason for dropping records			
Gender not recorded	0	0	45
Age [18,65]	7513	6279	11992
Did not start travel day at home	975	237	700
Did not end travel day at home	385	209	1820
Trip Duration > 120	31	17	653
Travel+activity duration > 1440	63	5	91
Missing 1 or more trips	60	266	535
Work-at-home only	20	70	698
Total dropped	9047	7083	16534
Net total	15462	7588	13572

Source: Metropolitan Council for the Travel Behavior Inventories (TBI) 1990, 2000, and 2010, own calculations.

Figure 1
Sample size distribution*



* Sample size in parenthesis

Source: Metropolitan Council for the Travel Behavior Inventories (TBI) 1990, 2000, and 2010, own illustrations.

The Metropolitan Council divided the 7-county region into 1201 Transportation Analysis Zones (TAZs) for the 2000 TBI Guidelines (n.d.). These TAZs allow for a higher resolution of data than just municipality level statistics, especially for the large cities of Minneapolis and Saint Paul. Different TAZ systems were in use for the different surveys. For this analysis the year 2000 TAZ system is used to be consistent with the accessibility calculations that are used.

For all years, accessibilities were calculated based on a cumulative opportunities model, where the number of opportunities from a TAZ given a certain travel time threshold (in minutes) is calculated. Additional population and employment data were collected from the United States Census Bureau. Accessibility measures for 2010 were calculated by (Owen and Levinson 2012). The auto accessibilities for 1995 and 2000 were computed by (El-Geneidy and Levinson 2006).

4 Methods

The activity durations were calculated by linking the trips taken by each respondent and then subtracting the arrival time of the former trip from the departure time of the latter. The remaining time was calculated by adding the travel times for each trip to the calculated activity durations and subtracting the total from 1440 minutes. This time was cross-checked by subtracting the time of departure of the first trip from midnight and the last trips' arrival from midnight and adding the two. This remaining time was attributed to time at home due to the filter that all respondents began and ended their travel days at home. Figure 2 illustrates this calculation process on an idealized data set.

Figure 2
Activity Duration Calculation

Person ID	Origin	Destination	Trip departure time	Trip arrival time	Travel time	Activity Duration (min)	Total
1	Home	Shop	8:30	8:45	15	30	45
1	Shop	Work	9:15	9:30	15	360	420
1	Work	Dining	15:30	15:45	15	105	540
1	Dining	Shop	17:30	17:40	10	20	570
1	Shop	Home	18:00	18:20	10	850	1440
2	Home	Work	8:00	8:20	20		360

Source: Metropolitan Council for the Travel Behavior Inventories (TBI) 1990, 2000, and 2010, own illustrations.

Each activity's allocation of time was calculated by taking the mean of the activity durations for each gender/employment category, where the total sample size was the size of that category. This equates to the average time that each respondent spent on that activity, including those who did not partake in that activity on the travel day. Thus, each category represents a time budget that adds to a total of 1440 minutes. The results from 2000 were compared to 1990, while the results from 2010 were compared to both 1990 and 2000 using a t-test to determine if any changes were significant.

In order to analyze the effects of suburbanization in the region, the network distances to the central business district (CBD) were calculated. It is assumed that the density of development decreases, and the average velocities of vehicles increase as distance to the CBD increases. These factors are all intertwined with accessibility, but also looked at independently and in relation to accessibility. Due to the nature of the Minneapolis - Saint Paul region being the "Twin Cities" and essentially having two CBDs, the distances were calculated from both. All trips were then placed into categories based on their minimum distance to the CBDs (for ex-

ample, if a trip origin was closer to Downtown Minneapolis than Downtown Saint Paul, its category was determined by its distance to Downtown Minneapolis.)

Accessibility is defined using a cumulative opportunities measure (Vickerman 1974, Wachs and Kumagai 1973). Here, the Cumulative Opportunity measure counts the number of jobs in a given travel time threshold. The cumulative opportunity measure for job accessibility is typically expressed as,

$$(1) \quad A_{T,i} = \sum_j O_j f(C_{ij})$$

$$(2) \quad f(C_{ij}) = \begin{cases} 1 & \text{if } C_{ij} \leq T \\ 0 & \text{if } C_{ij} > T \end{cases}$$

where:

$A_{T,i}$ - job accessibility of block i, within threshold T, O_j - jobs in block j, C_{ij} - shortest travel time between block i and block j and T - the travel time threshold.

This measure of cumulative opportunity is calculated for each TAZ for multiple time thresholds. To avoid multi-collinearity, a composite weighted accessibility ($A_{W,i}$) at each TAZ was calculated by using the equation

$$(3) \quad A_{W,i} = \sum_j (A_{T,i} - A_{T-Z,i})e^{\theta x}$$

where: $A_{T,i}$ = accessibility within T minute threshold (10, 20, 30, 40, 50, or 60 minutes), $A_{T-Z,i}$ = accessibility within the previous minute threshold, where Z is the threshold size (10 minutes) and θ = travel time decay factor.

The travel time decay factor θ has previously been estimated to be -0.08 using data from the Washington DC (DC) region (Levinson and Kumar 1994a). To ensure comparability between the Twin Cities and DC models, that value is retained in the results presented herein. If θ were zero, then people are indifferent to travel time. If θ is very negative, people are very sensitive to travel time, and value close destinations much more highly than far away destinations.

This weighted accessibility calculation combines the multiple cumulative opportunities accessibility measures (the exact number of opportunities available within a certain travel cost) into a gravity-like model of accessibility, and maintains comparability with Levinson (1998). In order to test the validity of this model (specifically the θ coefficient of -0.08) for the Twin Cities region, the regression analysis was tested using a variety of coefficients for 2010. A large test of alternative model formulations can be found in Brosnan (2014).

An OLS regression was performed for auto users where the dependent variable was the commute duration. Using the same explanatory variables as previous studies allows for direct comparison to the DC results, with a few exceptions; the addition of workers aged 70+ to the age 60 category, since there were none in the 2010 and 1990 samples, and very few in 2000, and the elimination of the female head of household variable, since the TBI survey did not

record that and it would be difficult to determine from the questions asked to the same confidence as the DC study.

A second analysis was conducted with the dependent variable as the time allocated to work for auto commuters. For these regressions, the data was organized by worker (based on the previously stated criteria) and an additional explanatory variable of the number of work trips made that day was added. Income as an explanatory variable was initially found to be insignificant, but was removed from the regression due to the multitude of problems with the income records in the TBI; the income is recorded for the household, not at the person level, it is self reported, and more than half of the survey respondents declined to answer the question, which greatly reduced the sample size and accuracy of the regressions.

Regressions were conducted for work duration using only the accessibility variables (plus demographics), with commute duration substituting for accessibility, and with predicted commute duration from the best fit model as a substitute for accessibility. Results with predicted time are reported here. Additional results can be found in Brosnan (2014).

5 Descriptive Analysis

Table 2 shows the characteristics of trips taken in the region (speeds are in $\text{km}\cdot\text{H}^{-1}$). Trip durations for workers have risen for all activities from 2000 to 2010, but for non-workers it has gone down. This rise may be due to economic factors in that workers may have taken less desirable jobs based on distance from their homes, or caused people to move further from their workplace. In addition specialization may increase commute distances, particularly in two-worker households. The latter may have had an effect on non-work trips as well. Despite trip durations being higher, the daily time spent in travel for non-workers (and overall) is down (see Table 3). This observation matches other research that shows that less time is being spent traveling, as evidenced by a decrease in the total vehicle travel in the United States (Levinson and Krizek 2015, United States Department of Transportation, Federal Highway Administration 2013). Interestingly, the average trip duration for 2000 and 2010 did not change much (18 minutes for 2000 and 19 minutes for 2010), implying that the reductions are in the willingness to make a trip, but not based on the distance of said trip.

This decline in the amount of time spent travelling has been a topic recently in the transportation field. The rate of change in total vehicle travel has been steadily decreasing, and the per capita total distance travelled has begun to decline. As technologies change, the attitude towards cars and car travel has also changed, with the car becoming a less desirable form of transportation to alternatives or simply not making a trip (Metz 2010). The term "Peak Travel" has been used to describe the idea that travel growth in the United States has ceased and may begin to decline (Millard-Ball and Schipper 2011). The results of this study indicate that, while per trip times remain largely steady, total travel is declining in the Twin Cities region.

Table 2
Average travel times (minutes) and travel distances (km) auto

Desti- nation	Year	Worker				Non-Worker			
		Male	Std. Dev.	Female	Std. Dev.	Male	Std. Dev.	Female	Std. Dev.
Work	Time	1990	23.1	16.8	20.2	14.9			
	Time	2000	22.8	16.9*	19.8	15.3*			
	Time	2010	23.9	16.8***	21.6	15.3***			
	Distance	1990	11.0	15.2	8.4	12.1			
	Distance	2000	12.1	16.9*	9.8	13.7			
	Distance	2010	14.2	15.6***	12.3	13.2**			
	Speed	1990	28.6		25.0				
	Speed	2000	31.8		29.7				
	Speed	2010	35.6		34.2				
Shop	Time	1990	12.9	11.5	12.4	12.0	13.8	12.3	12.4
	Time	2000	13.2	11.7	13.0	11.7	14.2	13.1*	12.8
	Time	2010	15.4	13.7***	14.1	12.1***	13.6	12.7*	12.4
	Distance	1990	7.2	6.4	6.3	6.4	7.3	11.2	7.2
	Distance	2000	7.6	12.1*	6.8	11.5*	7.4	12.3	7.3
	Distance	2010	8.4	11.0***	7.1	9.6**	7.0	10.8	6.5
	Speed	1990	33.5		30.5		31.7		34.8
	Speed	2000	34.5		31.4		31.3		34.2
	Speed	2010	32.7		30.2		30.9		31.5
Other	Time	1990	16.4	14.2	13.4	12.9	18.4	16.4	15.6
	Time	2000	16.6	15.5	14.6	13.3	18.2	16.8	15.3
	Time	2010	16.6	14.6	15.5	13.1***	17.8	15.7**	15.8
	Distance	1990	7.8	12.9	7.8	12.2	10.2	13.4	8.0
	Distance	2000	8.2	15.4	7.2	12.3	9.8	15.3	8.1
	Distance	2010	8.9	7.6	8.1	10.3	9.2	13.1**	7.9
	Speed	1990	28.5		34.9		33.3		30.8
	Speed	2000	29.6		29.6		32.3		31.8
	Speed	2010	32.2		31.4		31.0		30.0

* Indicates statistically different from previous year (2000 vs. 1990, 2010 vs. 2000),

** Indicates 2010 statistically different from 1990,

***Indicates 2010 statistically different from both 1990 and 2000, $p < 0.05$,

Source: Metropolitan Council for the Travel Behavior Inventories (TBI) 1990, 2000, and
2010, own calculations.

Table 3 summarizes the allocation of time over these three surveys. The time spent working for both genders and both work from home and work outside of home have decreased by a large amount. This is in part due to the economic recession of 2008, which caused a rise in the number of part-time laborers (United States Census Bureau 2012). However there has also

been a decade-long decline in labor force participation rates beginning prior to the 2008 recession (United States Department of Labor 2014).

Table 3
Activity durations auto (minutes)

Activity	Year	Workers				Non-Workers			
		Male	Std. Dev.	Female	Std. Dev.	Male	Std. Dev.	Female	Std. Dev.
Home	1990	777	286	816	302	1101	453	1172	482
	2000	778	340	809	349	1082	482	1140	485
	2010	787	340	825	351	1175	494	1175	486
Work	1990	514	206	477	198				
	2000	502	237	471	205				
	2010	495	218	470	202				
Shop	1990	7	22	15	32	21	43	41	61
	2000	8	38	14	31	21	43	41	61
	2010	5	64	9	44	32	74	41	53
Other	1990	52	85	55	79	143	167	132	144
	2000	59	78	62	67	243	192	177	128
	2010	65	72	55	64	171	134	161	115
Travel	1990	88	22	77	20	79	21	80	20
	2000	93	17	84	15	82	16	81	14
	2010	87	17	81	15	73	15	74	14

Source: Metropolitan Council for the Travel Behavior Inventories (TBI) 1990, 2000, and 2010, own calculations.

Total time spent shopping decreased for everyone except for non-working females, likely caused in part by an increase in online shopping, as well as economic factors. According to the United States Census Bureau, the percentage of households in the United States that had access to the Internet increased from 41.5% in 2000 to 71.7% in 2011 (United States Census Bureau 2013). The Internet has provided electronic accessibility, much as the transportation network has in the material world. It helps to facilitate commerce, communication, education, and leisure. This may lead to a decreased need for people to travel, and account for more time spent at home. The recession of 2008 may have had an impact on shopping traveling habits as a reduction in the household budgets for luxuries such as eating out, shopping for unemployed persons, but also those nervous about the potential of unemployment. Further, time spent in all other activities also declined from 2000 to 2010. These decreases require a concomitant increase in the amount of time spent at home.

6 Results

Tables 4 tests and largely corroborates H1-H4: 11 of 12 results (4 models for 3 time periods) were significant and had the expected sign, with the exception of resident accessibility in 2010 auto users, which was not-significant. These models used the same variables as the DC

study (with a few modifications, see Section 4). This allows for a comparison between the different regions. In these 11 cases, the relationships of the accessibility variables retain the same signs as the DC study.

Table 4
Models of commuting duration by auto

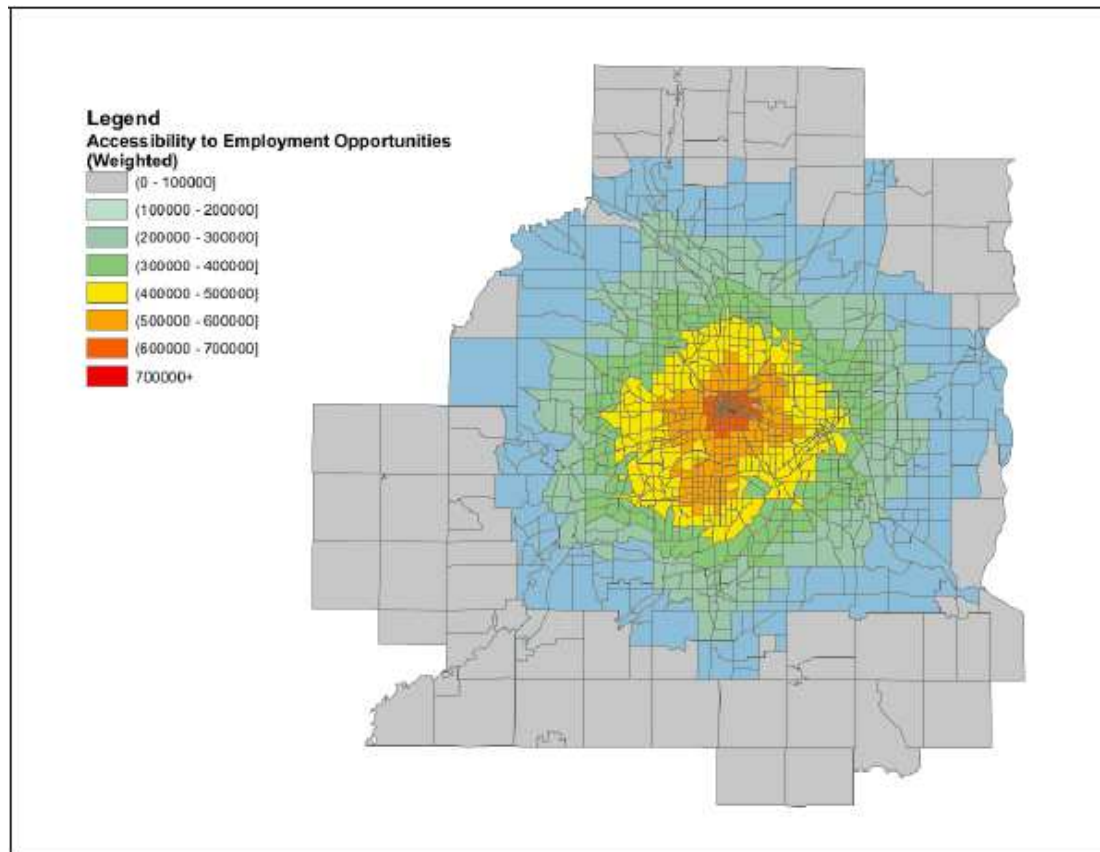
	DC	2010 MSP	2000 MSP	1990 MSP
Age 10-19	-5.85*** (-2.75)	-5.76*** (-2.98)	-6.92*** (-3.26)	-5.87*** (-4.12)
Age 20-29	1.90** (1.96)	-1.38** (-1.75)	-1.216* (-1.42)	-0.28*** (-0.26)
Age 40-49	0.434 (0.50)	0.65 (1.12)	0.643 (2.31)	0.697 (1.25)
Age 50-59	-0.62 (-0.62)	-1.04** (-1.85)	-0.44 (-0.61)	-0.35 (-0.76)
Age 60+	-0.77 (-0.56)	-0.83 (-1.19)	-0.52 (-0.35)	-0.62 (-0.42)
Male	1.82** (2.52)	1.53*** (4.26)	1.79*** (5.12)	1.42** (4.32)
SF home	0.16 (0.18)	-0.155 (-0.275)	-0.78 (-0.41)	-1.23 (-0.31)
Vehicles per driver	1.03 (1.07)	0.179** (0.44)	1.24* (0.98)	1.09** (1.27)
Children	0.936* (1.72)	-0.341 (-0.948)	0.32 (1.02)	0.12 (0.15)
HH size	0.0857 (0.24)	0.196 (0.909)	0.22 (1.05)	0.19 (1.03)
A _{iEa}	-8.68E-05*** (-4.86)	-1.60E-05** (-1.97)	-7.231E-06*** (-3.214)	-7.892E-06*** (-2.923)
A _{iRa}	1.18E-04*** (2.75)	-1.14E-05 (-0.869)	1.989E-05*** (2.43)	2.003E-05** (2.63)
A _{jEa}	7.13E-05*** (4.21)	3.73E-05*** (5.04)	3.68E-05*** (4.29)	3.02E-05*** (5.02)
A _{jRa}	-1.47E-04*** (-3.26)	-4.03E-05*** (-3.17)	-2.72E-05*** (2.46)	-3.09E-05*** (-3.02)
D _{io}	0.63*** (5.82)	2.75E-02** (2.71)	0.43** (4.036)	0.53*** (5.23)
D _{jo}	-0.55*** (-3.77)	-5.21E-02*** (-4.31)	-0.32** (-2.29)	-0.30** (-3.02)
Constant	23.29*** (4.61)	28.26*** (11.30)	25.42*** (9.85)	24.32*** (11.26)
Sample Size	1950	5228	2978	6574
Adj. R ²	0.17	0.1398	0.14	0.142
F	22.79***	52.94***	42.21***	44.26

* indicates P < 0.10, ** indicates P < 0.05, *** indicates P < 0.01,

Source: Metropolitan Council for the Travel Behavior Inventories (TBI) 1990, 2000, and 2010, own calculations.

Some of the other significant demographic variables differ in their signs. These differences may be related to different external factors that govern behavior for the different regions. Similarly, the magnitudes of the coefficients of the models differ likely due to both the different accessibility and other definitions, as well as the different urban structure between the two cities (amongst other factors such as culture and changing dynamics over time).

Figure 3
2010 Employment Accessibility by Auto



Source: Metropolitan Council for the Travel Behavior Inventories (TBI) 1990, 2000, and 2010, own illustrations.

Table 5 shows the results of the regressions to predict the time spent at work. Commute duration is positively associated with time at work, corroborating H5, and supportive of the home-work blending hypothesis. Similarly the number of work trips per day is negatively associated with time at work, corroborating H6. The relationships appear to be relatively stable over time, supporting H7.

The main factors that affect time spent at work are age, the number of work (destination) trips and commute duration. Age plays a large role, especially at the younger brackets due to younger workers being more likely to work part-time shifts, with people in their 20s to 40s spending the most time at work. The effect of the number of work trips was at least in part because of the way the data were recorded, if a person left for a lunch break or on an errand during the work day on personal business, that would likely show up as multiple work trips,

whereas someone who ate their lunch at their workplace would have that lunch time included in their time at work. Interestingly, the number of children one has, while a significant factor statistically, did not decrease the time spent at work by a large amount.

Table 5
Regressions to predict time at work for auto users
using predicted travel times

	2010	2000	1990
Age 10-19	-64.8** (-2.14)	-57.77** (-1.90)	-48.32** (-1.59)
Age 20-29	-10.7 (-0.982)	-12.278 (-1.12)	-13.066 (-1.19)
Age 40-49	1.74 (0.252)	1.818 (0.26)	2.077 (0.3)
Age 50-59	14.8** (1.975)	13.745** (1.83)	13.523** (1.8)
Age 60+	-8.74 (-1.053)	-10.191 (-1.22)	-9.351 (-1.12)
Male	25*** (4.78)	4.184 (0.63)	4.284 (0.64)
SF home	-3.94 (-0.587)	-3.959 (-0.58)	-3.487 (-0.51)
Vehicles per driver	11.3** (2.367)	12.377** (2.59)	10.185** (2.13)
Children	-10.4** (-2.432)	-12.197** (-2.85)	-13.067** (-3.05)
HH size	-0.455 (-0.178)	-0.38 (-0.14)	-0.41 (-0.16)
Number of work trips	-150*** (-43.759)	-146.634*** (-42.77)	-123.232*** (-35.9)
Predicted Commute Duration	10.5*** (3.001)	9.15*** (2.61)	8.55*** (2.44)
Constant	772*** (21.43)	266.388* (2.13)	251.157* (2.01)
Sample Size	5228	2978	6574
Adj. R ²	0.274	0.2987	0.2964
F	165.4***	162.1***	164.5***

* indicates P < 0:10, ** indicates P < 0:05, *** indicates P < 0:01,
Source: Metropolitan Council for the Travel Behavior Inventories (TBI) 1990,
2000, and 2010, own calculations.

7 Conclusion

The results of this analysis show a measurable decline in the time people spend outside of their homes as well as the amount of time people spend in travel over the past decade. The rise of the Internet and mobile telecommunications and changes in the economy between 2000 and 2010, along with changing demographics and new modes of work may be among

the factors causing people to reconsider the necessity of travel. Although trip distances per trip are getting longer the willingness to make those trips is declining, and as a result fewer kilometers are being traveled and less time on average is being allocated to travel per capita.

This study corroborates, updates, and extends previous studies showing that accessibility is a significant factor in commute durations. Though commutes do not make the majority of trips in the US, even during the peak (Pisarski 1987, 1996, 2006), they are the most important and regular trips made by workers (about half the population), and do constitute a majority of travel distance in peak hours. This study shows that the accessibility pattern within a city affects average commute durations and time spent at work.

In addition, this study shows a correlation between commute duration and the amount of time spent at work. Further analysis into the cause of this should try to directly test the extent to which this is due to a blending of the work and home environments when workers live near their jobs. Further research should also investigate these behaviors for other modes in more depth (transit is examined in Brosnan 2014).

Finally, the results are robust, even as travel patterns change. Using three different surveys collected by three different survey organizations with three different sets of subjects, and using two distinct measures of accessibility, we find the hypothesized relationships between accessibility, journey to work, and time at work to be fairly stable over time (although the magnitudes do vary). This means that adjusting land use patterns to increase the number of workers living in job-rich areas and the number of jobs in labor-rich areas is a likely to remain a reliable way of reducing auto commute durations.

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Nomenclature

Table 6
Variables used in regressions

Demographic and socio-economic variables	
Age 10-19 [0,1]	1 if individual aged 10-19, 0 otherwise
Age 20-29 [0,1]	1 if individual aged 20-29, 0 otherwise
Age 30-39 [0,1]	1 if individual aged 30-39, 0 otherwise
Age 40-49 [0,1]	1 if individual aged 40-49, 0 otherwise
Age 50-59 [0,1]	1 if individual aged 50-59, 0 otherwise
Age 60+ [0,1]	1 if individual aged 60+, 0 otherwise
Children	Nuber of children 0 - 16 in the household
HH size	Number of persons in the household
Male [0,1]	1 if individual is male, 0 otherwise
SF home [0,1]	1 if individual lives in a single family home, 0 otherwise
VPD	Number of vehicles licensed per driver
Accessability variables	
A_{iEa} , A_{iEt}	Origin (home-end) accessibility to employment, by auto, transit
A_{iRa} , A_{iRt}	Origin (home-end) accessibility to population (housing for DC), by auto, transit
A_{jEa} , A_{jEt}	Destination (work-end) accessibility to employment, by auto, transit
A_{jRa} , A_{jRt}	Destination (work-end) accessibility to population (housing for DC), by auto, transit
D_{io}	Distance (km) between origin (home-end) and IDS tower (miles, White House)
D_{jo}	Distance (km) between destination (workplace) and IDS tower (miles, White House)
T_w	Time spent at work
T_E	Travel time to work
WT	Number of work trips (a trip that had work or work-related as ist destination)

Source: own definitions.



Cruising through the millennium – 2003-13 changes in American daily life

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Abstract

The aim of this research is to examine recent US national time-diary data for evidence of an accelerating pace of everyday life in society, based on diary self-reports of how Americans spend their time since 1965. Earlier such diary studies had documented declines in women's housework, increases in parental child care and overall gains in free time. These trends stood in marked contrast to the increased time pressure cited by societal critics of the style of life in the US and other Western countries. Since 2003, the US government's American Time-Use Survey (ATUS), now conducted continuously by the US Bureau of the Census, has asked more than 145,000 Americans how they spent their time. Analysis of these 2003-2013 ATUS diaries reveals rather minimal change over this first millennial decade, with about an hour's decline in both paid work and domestic work/shopping, as in previous decades mainly among women. Unlike previous studies, that decline included about a 30% decline in help to neighbors and members of other households, a key indicator of the country's social safety net. These declines in productive and other more pressured activity were offset by small gains in less pressured activities, like sleep and TV viewing. There was also a notable decline in reported travel activities, particularly by automobile. The 2010 ATUS also began asking how these respondents felt during their diary activities, with results generally consistent with less-pressured lifestyles and earlier measures.

JEL Codes: A14, C12, C32, C32, C55, C83, J51

Keywords: Time pressure, pace of life, daily time trends, gender differences, changes in social contacts and locations

1 Introduction

The aim of this research is to examine recent US national time-diary data for evidence of an accelerating pace of everyday life in society, based on diary self-reports on how Americans spend their time (as conducted every decade since 1965). There has been a continuing debate about an increased pace of daily life, not just in America (e.g., Schor 1991; Burns 1993; Darrah et al. 2005; Wajcman 2015), but in societal life generally (Rosa 2005). At the same time, there is harder empirical evidence that little such social change has occurred: trends from time-diary studies indicate that Americans now enjoy more free time than in 1965 (e.g., Aguiar and Hurst 2006, 2009; Robinson and Godbey 1999). Trend data on personal stress from the American Psychological Association (2012) actually report declines in these stress levels since 2007. Robinson (2013) found General Social Survey (GSS) and other national samples reporting lower levels of feeling “rushed” in 2010 than earlier. More recently in that GSS, 29% of its 2014 national sample of workers reported being “always” or “often” stressed at work, compared to 40% in 1989. Yoon et al. (2010) report no change in US blood pressure readings among adults in National Institutes of Health surveys between 1998 and 2007.

National US time-diary studies have been conducted in roughly every decade since 1965 to document changes in the structure and quality of American daily life, using standardized time-diary procedures. This national time series began with diary collections by academic survey firms, first at the University of Michigan in 1965-75 (Szalai 1972; Juster and Stafford 1985) and then at the University of Maryland in the 1980s and 1990s (Robinson and Godbey 1999), again using national probability sampling methods to ensure comparability with US Census population demographic figures.

Since 2003, this time series has been expanded and replicated by the American Time-Use Survey (ATUS), now conducted annually by the US Bureau of the Census for the Bureau of Labor Statistics (BLS) (Hofferth, Flood and Sobek 2013; Abraham, Maitland and Bianchi 2006). As in the earlier university time-use surveys, the ATUS also conducts random telephone diary interviews to collect retrospective data on how Americans spend their time across the previous 24 hours. A great advantage of the ATUS survey, unlike other diary surveys and elsewhere, is its continuous sampling, allowing one to identify the periods when social change takes place. A disadvantage is that it was developed independently with little intent of linking with earlier US studies. However, several authors have treated the ATUS as a part of a time-series with earlier US diary surveys, with no obvious serious problems (e.g., Fisher et al. 2006; Aguiar and Hurst 2006).

As in diary surveys conducted 40-50 years previously, Table 1 shows that national 2013 ATUS respondents reported lower amounts of both paid work and unpaid (domestic) work than in 2003, with women reporting about a third of their work as paid work and two-thirds as domestic work, the reverse of the roughly 3:2 ratio of paid work to unpaid work for men. Although their personal care and educational activities generally remained about the same, wom-

en in the new millennium reported almost 4 less hours of weekly free time than men. Like men, women's dominant free-time was also watching television. Indeed, TV viewing now represented virtually half of all the US public's free time.

2 Methodology

Time-diary Studies: Unlike early measures of work, family and free time figures based on single *estimate* questions on one's work hours (e.g., "How many hours did you work last week?"), hours spend watching TV or doing housework, more detailed and precise figures can be derived from their time diaries. The important value of these diary accounts is that respondents report on *all* their daily activities, not just their work or TV time, and these diary accounts must add up to exactly 24 hours. Using sequential diaries of all their daily activities, respondents are thus less prone to encounter problems of memory loss, self- projection or double counting of time than when they make time estimates. This is especially the case when the diary period only refers to a single day, and one that should be most vivid in their memory (Szalai 1972).

Time-diary methodology: The time diary is a micro-behavioral technique for collecting self-reports of an individual's daily behavior in an open-ended fashion on an activity-by-activity basis. Individual respondents keep or report these activity accounts (in their own words) for a short, manageable period, such as a day — usually across the full 24 hours of a single day (Michelson 2005). In that way, the technique capitalizes on the most attractive measurement properties of the time variable, namely:

- All 24 hours of daily activity is potentially recorded, including activities in the early morning hours, when few respondents may be awake.
- The 1,440 minutes of the day are equally distributed across respondents, thereby preserving the "zero sum" property of time that allows various trade-offs between activities to be examined; that is, if time on one activity increases, it must be zeroed out by decreases in some other activity.
- Respondents are allowed to use a time frame and an accounting variable that is highly familiar and understandable to them and accessible to the way they probably store their daily events in memory.

The open-ended nature of diary reporting means that these activity reports are automatically geared to detecting new and unanticipated activities (for example, in past decades, new activity codes had to be developed to accommodate aerobic exercise, and use of e-mail, iPods and other new communications technologies).

Earlier Diary Surveys in the United States: As noted above, there have been roughly decade-interval (1965, 1975, 1985, 1992–1995, 1998–2001) national time-diary surveys by academic survey firms from which to make trend comparisons with the current American Time-Use Survey (ATUS). These have been archived with explanations and examples of their use to

draw time-trend conclusions at the American Heritage Time-Use Surveys (AHTUS) at the University of Oxford (www.timeuse.org). Each diary survey employed strict national probability methods, in which all residents (of the 90+ % of US residents with telephones) in the country had an equal chance of selection. Interviews are now completed with at least half of selected individuals to ensure their representativeness of the general US population. Data were weighted by post-stratification to be further representative of the gender, age, marital status, employment status, parental status and income composition of the country. These trend data and conclusions have been reported in Fisher et al. (2006).

Since 2003, this time-diary series has been replicated and expanded with the arrival of the American Time-Use Survey (ATUS), now conducted annually by the US Bureau of the Census for the Bureau of Labor Statistics (BLS). Like earlier national diary studies, the ATUS also collects retrospective data on how Americans spent their time across the previous 24 hours, but now with much larger samples and a more elaborate coding scheme. Another unique feature of the ATUS is its continuous monitoring of daily activity, allowing the opportunity to identify exact periods when national changes occur (such as the great recession of 2008 and its gradual recovery), unlike diary studies in other countries conducted only every decade or less often.

The 2003-2013 ATUS employed telephone interviews, using these “yesterday” diaries based on the recall of what respondents did on the previous day. Different methods of diary interviewing have been shown to produce equivalent results to those done earlier (e.g., Robinson and Godbey 1999), and especially great BLS care was expended to ensure the representativeness of the latest ATUS sample (as documented in Abraham, Maitland and Bianchi 2006).

This 2003-2013 Bureau of Labor Statistics ATUS *study* has now collected more than 140,000 daily diaries continuously across each year since 2003, using the telephone yesterday method with a Census Bureau sample and a very detailed set of more than 400 activity categories, as described at <http://www.bls.gov/tus/> and as archived at <https://www.atusdata.org/atus/>. Parallel data from more than 30 other countries can be found there as well, which employ similar activity reporting methods.

3 Results

3.1 Decade differences in time use

Table 1 outlines a broad year-by-year account of Americans’ overall time expenditures in 32 activities between 2003 and 2013 for the entire ATUS sample aged 15 and older. These were derived from the official accounts in Table 1 of BLS press releases for each year of that report (www.bls.gov/tus/). These hour-per-day figures there were translated into weekly terms by multiplying each entry by the 7 days of the week. To ease interpretation, these BLS activities were also been rearranged by activity category, from paid work and education hours at the top through the various domestic productive activities and personal care in the middle, and with

mainly free-time figures at the bottom (and separately showing the roughly hour per week of unreported or missing activity time).

Table 1 first shows that these overall time differences in ATUS across the 2003- 13 decade tend to be rather modest, with some 1-2 hour per week ATUS declines in both paid work and in domestic work. These declines in domestic work included time for core housework and for shopping for various goods and services—but also declines for help and care to neighbors and other non-household adults and children. At the same time, there was no such decline in time for formal volunteering through organizations, shown in the bottom half of Table 1.

Offsetting these paid and domestic work declines of roughly an hour or two per week were increases in sleep (but not other personal care) and in watching TV, as well as in IT use and various other free-time and non-free activities. There is also the roughly one hour increase in unreported diary activity in the bottom half of Table 1. These overall results shown in Table 1 thus outline more than 25 diary activities according to type of activity. Examining each of these general types of activities in turn:

- *Paid work:* As noted above, time spent working at one's main job showed a decrease of one-two hours per week, plus another half hour on the commute and other related activity.
- *Education:* Attending classes and related travel remained almost constant across the decade.
- *Housework:* Perhaps not surprisingly, and consistent with earlier diary studies, most routine housework activities declined across the decade, mainly for women. Most other household production activities remained the same, with a small decline in shopping.
- *Child care:* As in previous studies, activities involving child and adult care within the household remained about the same.
- *Care and helping:* Perhaps most notable change was the slow but steady decline in helping neighbors and others living outside the household. For both men and women, this amounted to declines of about 40 minutes a week – but across the decade that was a decline of more than a third of the overall decline spent in such time helping others.
- *Personal care:* Sleep time increased about an hour for both men and women, although activities involving other personal care (like eating, drinking or grooming) stayed rather steady.

Table 1
2003-2013 ATUS activity differences by year
(in hours per week, ages 15+)

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change
n	20720	13973	13038	12943	12248	12723	13133	13260	12479	12443	11385	
Paid work	25.9	25.6	25.9	26.2	26.7	26.1	24.7	24.5	25.0	24.7	24.2	-1.6
Work	23.3	23.3	23.5	23.8	24.3	23.6	22.2	22.0	22.4	22.3	22.0	-1.3
Commute	2.5	2.3	2.4	2.4	2.4	2.5	2.5	2.5	2.6	2.4	2.3	-0.3
Education	3.3	3.4	3.0	3.4	3.0	3.3	3.3	3.3	3.3	3.5	3.3	+0.0
Classes	2.0	2.1	1.8	2.1	1.8	1.9	1.8	1.9	1.9	2.0	1.8	-0.2
Homework	0.9	1.0	1.0	1.0	0.9	1.1	1.1	1.1	1.1	1.2	1.3	+0.3
Other	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	-0.1
Family	24.4	24.3	23.8	23.4	23.5	22.8	23.1	22.8	22.5	22.1	22.7	-1.6
Housework	4.3	4.1	4.3	4.3	4.5	4.1	4.2	4.0	4.1	4.2	4.0	-0.3
Cook	3.7	3.6	3.6	3.7	3.6	3.7	3.8	3.9	3.9	3.7	4.0	+0.3
Lawn, etc.	1.4	1.4	1.4	1.4	1.4	1.3	1.4	1.5	1.3	1.3	1.3	-0.1
Manage	0.9	1.0	1.0	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	-0.0
Other house- work	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.1	-0.2
Shopping	2.8	2.8	2.9	2.8	2.8	2.7	2.6	2.6	2.6	2.5	2.6	-0.2
Services	2.9	2.9	2.7	2.8	2.7	2.7	2.7	2.6	2.5	2.6	2.6	-0.2
HH child care	3.0	3.0	3.0	2.9	2.9	2.9	3.0	2.8	2.8	2.8	2.9	-0.1
HH adult care	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	-0.1
Non-HH care	2.0	1.9	1.6	1.5	1.4	1.6	1.5	1.5	1.5	1.3	1.4	-0.6
Other	0.3	0.3	0.3	0.1	0.3	0.0	0.2	0.2	0.3	0.1	0.2	-0.1

Table 1 (Cont.)

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change
Personal care	73.8	74.0	74.7	74.5	74.0	74.3	74.7	75.0	75.1	75.1	75.4	+1.6
Sleep	60.0	59.8	60.4	60.4	60.0	60.2	60.7	60.7	61.0	61.1	61.2	+1.2
Eat	8.4	8.7	8.7	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.6	+0.2
Groom	5.4	5.5	5.6	5.5	5.3	5.5	5.4	5.6	5.4	5.3	5.6	+0.2
Free Time	39.3	39.7	39.3	39.0	39.5	40.1	40.4	39.9	40.0	40.9	40.1	+0.8
Religion	1.0	0.8	0.9	0.8	1.0	1.0	1.0	1.1	1.1	1.0	1.0	+0.0
Club, org.	1.0	1.0	1.0	0.9	1.1	1.1	1.1	1.1	1.1	0.9	1.0	+0.0
Socialize	5.5	5.3	5.2	5.3	5.1	5.0	4.9	4.9	4.9	5.2	5.0	-0.4
Telephone	1.3	1.3	1.2	1.3	1.3	1.5	1.4	1.2	1.1	1.1	1.0	-0.3
Fitness	2.0	2.0	2.0	2.0	2.2	2.1	2.2	2.1	2.1	2.2	2.1	+0.1
TV	18.1	18.5	18.0	18.0	18.4	19.4	19.8	19.1	19.3	19.8	19.4	+1.3
Other free	10.5	10.7	10.9	10.7	10.4	10.1	10.2	10.4	10.5	10.6	10.6	+0.1
Other	1.3	1.0	1.2	1.5	1.4	1.4	1.7	2.4	2.1	1.7	2.2	+0.9
Total	168	168	168	168	168	168	168	168	168	168	168	

Source: American Time Use Survey Data Extract System – Version 2.4; Maryland and Minneste,
own caluclations.

3.2 Free time

- *Religion and Other Organizations:* As in previous studies, religious and volunteer activities stayed about the same.
- *Social Life:* Socializing and visiting activities in general dropped about half an hour a week, with some decline in telephone conversations as well.
- *Recreation:* Fitness activities, like swimming, basketball and golf, along with hobbies and playing games stayed about the same.
- *Media and communication:* By far the most common free-time and leisure activity of TV viewing increased another hour per week, now representing almost half of all free time.
- *Travel:* The travel associated with each of the activities in Table 1 has been incorporated into each activity. As shown in Table 5 below, differences by travel itself shows about a decline of about 2/3 hour per week across the decade, almost all by the means of automobile (primarily as driving, rather than riding as a passenger).
- *Gender Differences:* Table 2 then shows that these overall activity differences sometimes broke out differently for men and for women across selected years. In terms of these gender differences, men showed the biggest difference across the decade in work time, with a decrease of about 2 hours a week. That was mainly concentrated in time at work itself, but also with about half an hour decrease in commuting and other work-related activity (like work breaks). Women also showed a decrease in work hours, but closer to a half hour decrease, and little decline in commuting and work-related time. Neither men nor women showed any consistent difference in the hours spent in education-related activity.

Likewise, the overall decrease in domestic labor time in Table 1 was found mainly among women, and mainly in their decreased time on basic housework (like cleaning and laundry). As in Table 1, the most prominent differences were in the declines in care given to non-household children and adults. Men also shared in this decline in outside help to non-household members.

Offsetting these declines in paid and domestic work, then, were the hour gains in sleep (but not other personal care) and in free time. Both men and women reported an hour's more sleep time, and women gained another hour's more time in some personal care activities.

As in Table 1, then, the 1-2 hour gains in free time were mainly found for increased TV time for both men and women. Men also continued to spend more of their 40+ hours of weekly free time on TV and on fitness activity than did women, while women spent more of their increased 36 hours of free time socializing, attending religious services, club meetings and in telephone conversations. An increase in unreported activity time of more than an hour a week was also found for both man and women at the bottom of Table 2.

Table 2
2003-2013 ATUS Differences for selected years by gender
(in hours per week, ages 15+)

Year	Men						Women					
	2003	2006	2009	2012	2013	Change	2003	2006	2009	2012	2013	Change
N	9052	5516	5642	5536	5082		11,668	7427	7491	6907	6303	
Paid work	31.9	31.7	29.8	29.2	29.4	-2.5	20.2	21.1	19.9	20.6	19.4	-0.8
Work	28.6	28.7	26.7	26.2	26.6	-2.0	18.4	19.2	18.1	18.7	17.6	-0.7
Commute	3.3	3.0	3.1	3.0	2.8	-0.5	1.9	1.9	1.9	1.9	1.8	-0.1
Educations	3.1	3.1	3.0	3.7	3.3	+0.2	3.4	3.7	3.5	3.3	3.3	-0.1
Classes	2.0	2.0	1.8	2.1	1.9	-0.1	2.0	2.2	1.9	1.8	1.7	-0.3
Homework	0.8	0.9	1.0	1.2	1.2	+0.4	1.1	1.2	1.2	1.1	1.3	+0.3
Other	0.3	0.2	0.2	0.4	0.3	-0.1	0.4	0.3	0.4	0.3	0.3	-0.1
Family	18.3	17.4	17.7	16.8	17.4	-0.9	30.0	29.0	28.2	27.0	27.7	-2.3
Housework	1.6	1.7	1.8	1.9	1.8	+0.2	6.8	6.6	6.4	6.3	6.1	-0.7
Cook	1.8	2.0	2.0	2.0	2.3	+0.5	5.5	5.3	5.4	5.3	5.6	+0.1
Lawn, etc.	1.8	1.8	1.9	1.7	1.8	-0.1	1.0	1.0	0.9	0.9	0.8	-0.1
Manage	0.8	0.8	0.8	0.7	0.7	-0.0	1.1	1.0	1.1	1.0	1.1	+0.0
Other housework	2.1	2.0	1.9	1.8	1.9	-0.1	2.4	2.4	2.2	2.2	2.2	-0.2
Shopping	2.2	2.0	2.1	1.9	2.0	-0.2	3.4	3.6	3.2	3.0	3.1	-0.2
Services	2.6	2.5	2.4	2.3	2.4	-0.2	3.2	3.2	3.0	2.9	2.9	-0.3
HH child care	1.7	1.7	2.0	1.9	1.9	+0.2	4.1	4.0	4.0	3.7	3.8	-0.3
HH adult care	0.7	0.6	0.6	0.6	0.6	-0.1	1.2	1.0	0.9	0.9	1.1	-0.1
Non-HH care	1.8	1.3	1.4	1.1	1.2	-0.6	2.1	1.7	1.5	1.4	1.5	-0.6
Other	1.3	0.9	0.8	0.8	0.8	-0.5	-0.7	-0.7	-0.3	-0.5	-0.5	+0.2

Table 2 (Cont.)

Year	Men						Women					
	2003	2006	2009	2012	2013	Change	2003	2006	2009	2012	2013	Change
Personal care	72.6	73.3	73.6	73.6	74.0	+1.4	75.0	75.6	75.8	76.6	76.7	+1.7
Sleep	59.3	59.9	60.3	60.2	60.6	+1.2	60.5	60.8	61.1	62.0	61.7	+1.2
Eat	8.7	8.8	8.8	9.1	8.8	+0.2	8.2	8.5	8.4	8.4	8.4	+0.1
Groom	4.6	4.5	4.5	4.3	4.6	+0.0	6.2	6.3	6.3	6.2	6.6	+0.4
Free time	40.9	41.1	42.3	43.1	41.9	+1.1	37.9	37.0	38.8	38.8	38.4	+0.5
Religion	0.8	0.7	0.9	0.8	0.8	+0.0	1.1	0.9	1.2	1.3	1.2	+0.0
Club, org.	0.9	0.9	1.1	0.8	0.9	+0.0	1.0	0.9	1.0	1.0	1.0	+0.0
Socialize	5.1	5.0	4.4	5.0	4.6	-0.5	5.8	5.6	5.4	5.4	5.4	-0.3
Telephone	0.9	0.8	1.0	0.8	0.7	-0.2	1.7	1.8	1.8	1.4	1.4	-0.3
Fitness	2.7	2.7	2.9	2.9	2.8	+0.1	1.4	1.3	1.5	1.7	1.4	-0.0
TV	19.3	19.6	21.7	21.5	20.9	+1.6	16.9	16.5	17.9	18.3	18.0	+1.1
Other free	11.1	11.4	10.5	11.3	11.2	+0.1	10.0	10.0	10.0	9.9	10.0	-0.0
Other	1.2	1.4	1.6	1.6	1.9	+0.7	1.4	1.5	1.8	1.7	2.4	+1.0
Total	168	168	168	168	168		168	168	168	168	168	

Source: American Time Use Survey Data Extract System – Version 2.4; Maryland and Minnesta, own caluclations.

Differences in the 18-64 Age Active Population: Tables 1 and 2 focus on the total US population aged 15 and older, and they thus include two older and younger age groups that could skew these overall figures for the more normal working population, namely: 1) those age 15-17 still mainly in high school and 2) those in the usually retired population aged 65 and older. Table 3 therefore focuses on the more active labor-force population aged 18-64, and it also includes detailed times for six free-time activities of IT use, audio listening, reading, hobbies, games and relaxing not detailed in the BLS official press reports. Of these six, only IT showed an increase across the decade, offset by a decrease in reading for both men and women. That reading decrease was probably concentrated in reading of newspapers, although that print medium distinction is not covered in the ATUS coding scheme in Table 3).

In general, Table 3 does continue to show much the same pattern of changes as in Tables 1 and 2, with (smaller) declines in paid and domestic work, along with decreased sleep and free time (especially watching television). It also continues to include the overall two-thirds of a weekly hour declines in care to non-family members noted for the overall samples in Tables 1 and 2. Despite their increased free time, men and women both spent 0.3-0.4 hours less hours socializing and visiting.

Regression-adjusted differences: There have been many changes in the demographic composition (age, family structure, employment, etc.) of the population since 2003, and it is possible that many of the differences in Table 3 could be due to these demographic shifts and not to differences in daily activity *per se*. For that reason, these ATUS data were subjected to a special multiple regression program to control for these demographic shifts (such as more women working or workers retiring earlier, and not to trends in daily activity *per se*). The regression program Multiple Classification Analysis (MCA) was developed for survey data like the ATUS by survey economists and methodologists Andrews et al. (1972), and it has the advantage of showing the differences in time use before and after adjustment for each of these other predictors of time use for individual groupings (like those age 25-34, college graduates, etc.) of each ATUS demographic predictor. To increase the sample sizes involved, the time-diary numbers in Table 4 then are for the four combined year periods of 2003 and 2004, 2005-07, 2008-10 and 2011-2013. Again, only those working-aged years of 18-64 are included in these Table 4 adjustments.

The demographic predictors included in the MCA adjustment include each respondent's age, race, education level, family income, employment status, marital status, and age of children. In order to highlight the most significant changes after regression adjustment, only the significant and consistent activity changes from 2003 are shown.

The biggest change difference that is noted after MCA adjustment in Table 4 is for the removal of the declines in paid work time and doing classwork as significant. That indicates that the differences in paid work hours in Tables 1-3 are simply due to different numbers of employed workers in each year.

Table 3
2003-2013 ATUS grouped year differences by gender
(in hours per week ages 18-64)

	Men					Women				
	2003- 2004	2005- 2007	2008- 2010	2011- 2013	Change	2003- 2004	2005- 2007	2008- 2010	2011- 2013	Change
N	11,999	13,015	13,538	12,510		15,142	16,687	16,754	15,105	
Paid work	37.3	37.5	36.0	35.4	-1.9	25.3	26.4	25.4	25.1	-0.2
Work	33.7	34.0	32.3	31.9	-1.8	23.1	24.1	23.1	22.7	-0.4
Commute	3.6	3.5	3.7	3.5	-0.1	2.2	2.2	2.3	2.4	+0.2
Education	2.0	1.8	1.8	2.3	+0.3	2.3	2.2	2.4	2.2	-0.1
Classes	1.0	0.8	0.8	1.0	-0.0	1.1	1.0	0.9	0.8	-0.2
Homework	0.7	0.8	0.8	1.1	+0.3	1.0	1.0	1.2	1.1	+0.1
Other	0.2	0.1	0.2	0.3	+0.0	0.3	0.2	0.3	0.2	-0.0
Family	18.3	17.9	17.8	17.1	-1.1	31.3	30.3	29.1	28.3	-3.1
Housework	1.6	1.8	1.8	1.9	+0.3	6.6	6.7	6.2	6.1	-0.4
Cook	1.8	2.0	2.2	2.2	+0.4	5.4	5.2	5.3	5.5	+0.1
Lawn, etc.	1.6	1.8	1.7	1.4	-0.2	0.9	0.8	0.7	0.7	-0.2
Manage	0.7	0.8	0.7	0.7	-0.1	1.1	1.0	1.0	0.9	-0.2
Other housework	2.0	1.9	1.9	1.9	-0.1	2.5	2.5	2.4	2.2	-0.3
Shopping	2.2	2.1	2.0	2.0	-0.2	3.6	3.6	3.3	3.1	-0.5
Services	2.4	2.3	2.2	2.2	-0.2	3.3	3.2	3.0	2.8	-0.5
HH child care	2.2	2.1	2.3	2.3	+0.1	5.2	5.1	4.9	4.8	-0.4
HH adult care	0.7	0.6	0.6	0.7	-0.0	1.3	1.2	1.1	1.1	-0.2
Non-HH care	1.7	1.3	1.3	1.2	-0.6	2.2	1.7	1.7	1.5	-0.7
Other	1.4	1.2	1.0	0.8	-0.6	-0.7	-0.7	-0.7	-0.5	+0.2

Table 3 (Cont.)

	Men					Women				
	2003- 2004	2005- 2007	2008- 2010	2011- 2013	Change	2003- 2004	2005- 2007	2008- 2010	2011- 2013	Change
Personal care	71.6	72.1	72.4	72.6	+1.0	73.9	74.3	74.6	75.8	+1.9
Sleep	58.4	58.7	59.2	59.5	+1.1	59.6	60.0	60.2	61.3	+1.7
Eat	8.6	8.8	8.7	8.7	+0.0	8.0	8.2	8.1	8.2	+0.1
Groom	4.6	4.6	4.6	4.4	-0.1	6.2	6.2	6.3	6.3	+0.0
Free time	37.9	37.5	38.4	38.7	+0.9	34.1	33.5	34.7	34.7	+0.6
Religion	0.7	0.7	0.8	0.8	+0.0	0.9	1.0	1.1	1.0	+0.1
Club, org.	0.8	0.9	0.9	0.7	-0.1	1.0	1.0	1.0	1.0	-0.1
Socialize	5.0	4.8	4.5	4.6	-0.3	5.6	5.4	5.2	5.3	-0.4
Telephone	0.8	0.7	0.8	0.7	-0.1	1.5	1.4	1.5	1.2	-0.3
Fitness	2.5	2.5	2.5	2.5	+0.1	1.3	1.3	1.3	1.5	+0.2
TV	18.4	18.2	19.6	19.4	+1.0	15.1	15.0	16.2	16.2	+1.1
IT	1.1	1.2	1.2	1.6	+0.5	0.8	0.8	1.1	1.3	+0.5
Audio	0.5	0.5	0.5	0.4	-0.1	0.2	0.2	0.2	0.2	-0.0
Read	1.6	1.6	1.3	1.3	-0.4	2.2	2.2	2.0	1.9	-0.2
Games	1.3	1.4	1.6	1.8	+0.5	0.7	0.7	0.9	0.8	+0.1
Hobbies	0.3	0.2	0.2	0.2	-0.0	0.2	0.2	0.2	0.2	-0.0
Relax	2.0	2.0	1.7	2.0	-0.0	1.8	1.7	1.6	1.7	-0.1
Other free	2.8	2.9	2.8	2.6	-0.2	2.7	2.7	2.4	2.5	-0.3
Other	0.9	1.2	1.6	1.8	+0.8	1.1	1.3	1.9	2.0	+0.9
Total	168	168	168	168		168	168	168	168	

Source: American Time Use Survey Data Extract System – Version 2.4; Maryland and Minneste,
own caluclations.

Table 4
2003-2013 MCA-adjusted grouped year differences by gender
(in hours per week, ages 18-64)

	Men						Women					
	2003- 2004	2005- 2007	2008- 2010	2011- 2013	Beta	p-value	2003- 2004	2005- 2007	2008- 2010	2011- 2013	Beta	p-value
N	11,999	13,015	13,538	12,510			15,142	16,687	16,754	15,105		
Paid work												
Work	26.86	27.52	27.13	27.38	0.01	NS	18.21	18.64	18.40	18.93	0.01	<.001
Education												
Homework	0.59	0.60	0.65	0.64	0.01	NS	0.79	0.78	0.89	0.87	0.01	NS
Family												
Housework	2.05	2.30	2.28	2.44	0.02	<.001	7.12	7.37	6.93	6.78	0.02	<.01
Non-HH care	1.83	1.48	1.39	1.30	0.03	<.001	2.11	1.60	1.56	1.41	0.04	<.001
Personal												
Sleep	59.44	59.77	60.31	60.52	0.03	<.001	60.72	61.20	61.68	62.07	0.03	<.001
Free time												
Socialize	5.69	5.49	5.15	5.14	0.02	<.001	6.29	5.99	5.94	5.83	0.01	<.01
TV	19.56	19.37	20.81	20.53	0.03	<.001	15.20	15.74	16.73	16.61	0.04	<.001
IT	1.17	1.18	1.18	1.44	0.02	<.001	0.75	0.78	0.93	1.20	0.04	<.001
Read	2.00	1.85	1.49	1.32	0.05	<.001	2.50	2.39	2.03	1.83	0.04	<.001
Games	1.15	1.20	1.28	1.37	0.01	<.05	0.70	0.76	0.87	0.78	0.02	<.05

Note: NS = not significant; Decreasing trends are highlighted in dark; increasing trends in lighter shade,
Source: American Time Use Survey Data Extract System – Version 2.4; Maryland and Minnesta,
own caluclations.

In general, however, most of the MCA-unadjusted differences in Tables 1-3 are confirmed after the MCA adjustment in Table 4. That means they are not simply a result of the population getting older, better educated, less employed and the like. Thus, the main other 2003-13 declining trends for care to others outside the household, socializing, and reading remain and are not affected by other predictors, as are the increases for sleep, TV viewing and IT use. That suggests the US public is simply doing less helping of neighbors and others outside the household, reading and socializing, which has been offset by their longer sleep, TV and IT hours.

Differences in location and social company: Table 5 shows differences in two other aspects of time use collected via the ATUS – *where* the activity was performed and *with whom*. These small differences again largely reflect the lack of change in activities between 2003 and 2013. One important exception is the significant decline in overall travel, which in Tables 1-4 is subsumed with its related travel.

In terms of times spent with others, there was an unfortunate change in coding of time alone and with co-workers starting in 2010, making it unclear whether the small increase in time spent alone from 2003 to 2009 continued after that – and whether time with co-workers was part of a trend – although that is unlikely given the lack of any consistent trend in work hours shown in Table 4. Time spent with one's family (spouse, children and relatives) and friends otherwise remain largely unchanged. There seems a small (less than a half hour) increase in time spent with neighbors, but otherwise little change.

In terms of where time was spent, the bottom half of Table 5 similarly shows remarkable consistency. There was a small uptick of almost two hours in time spent at home in 2008 to offset the decline in time at work during that recession year, but hours spent visiting others' homes, at restaurants, at places of worship, at schools, at businesses or just being outside remained rather steady. There was a half hour decline in time at businesses and stores to mirror the Table 1-3 declines in shopping time.

Perhaps reflecting that decline was almost an hour decline in travel time, particularly in driving by automobile. Most of that travel time in Tables 1-4 is hidden by being attached to its related activity. It is of course an important activity in its own right.

Table 5
2003-2013 MCA-adjusted grouped year differences by gender
(in hours per week, ages 18-64)

	Men						Women					
	2003- 2004	2005- 2007	2008- 2010	2011- 2013	Beta	p-value	2003- 2004	2005- 2007	2008- 2010	2011- 2013	Beta	p-value
N	11,999	13,015	13,538	12,510			15,142	16,687	16,754	15,105		
Paid work												
Work	26.86	27.52	27.13	27.38	0.01	NS	18.21	18.64	18.40	18.93	0.01	<.001
Education												
Homework	0.59	0.60	0.65	0.64	0.01	NS	0.79	0.78	0.89	0.87	0.01	NS
Family												
Housework	2.05	2.30	2.28	2.44	0.02	<.001	7.12	7.37	6.93	6.78	0.02	<.01
Non-HH care	1.83	1.48	1.39	1.30	0.03	<.001	2.11	1.60	1.56	1.41	0.04	<.001
Personal												
Sleep	59.44	59.77	60.31	60.52	0.03	<.001	60.72	61.20	61.68	62.07	0.03	<.001
Free time												
Socialize	5.69	5.49	5.15	5.14	0.02	<.001	6.29	5.99	5.94	5.83	0.01	<.01
TV	19.56	19.37	20.81	20.53	0.03	<.001	15.20	15.74	16.73	16.61	0.04	<.001
IT	1.17	1.18	1.18	1.44	0.02	<.001	0.75	0.78	0.93	1.20	0.04	<.001
Read	2.00	1.85	1.49	1.32	0.05	<.001	2.50	2.39	2.03	1.83	0.04	<.001
Games	1.15	1.20	1.28	1.37	0.01	<.05	0.70	0.76	0.87	0.78	0.02	<.05

Note: NS = not significant; Decreasing trends are highlighted in dark; increasing trends in lighter shade,
Source: American Time Use Survey Data Extract System – Version 2.4; Maryland and Minnesta,
own caluclations.

Table 6
2003-2013 ATUS year differences
(in hours per week), ages 18-64

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change
N	16,281	10,860	10,274	9,983	9,445	9,867	10,161	10,264	9,598	9,457	8,560	
With whom												
Alone	34.3	34.8	34.5	34.9	35.2	36.1	36.4	N/A	N/A	N/A	N/A	N/A
Mate	22.4	22.5	20.6	19.5	20.3	19.8	20.6	20.1	19.5	20.5	20.5	-1.9
Parents	1.8	1.9	1.8	2	1.9	1.9	1.9	2.2	2	2.2	2	+0.2
Own kid	16.9	16.1	18.1	18.2	17.6	17.6	17.1	17.4	16.7	16.9	16.1	-0.8
Other kid	2	2.1	2.3	2.1	1.9	1.8	1.7	2	1.5	1.6	1.7	-0.3
Other relative	12.5	12.4	13	13.4	12.5	13	13.4	13	12.4	12.8	12.7	+0.2
Neighbour	0.8	0.8	0.7	0.7	0.6	0.7	0.8	1.2	1.2	1.2	1.1	+0.3
Friends	6.9	7	6.5	6.3	6.3	6.1	6.3	6.9	6.7	6.5	7	+0.1
Co-worker	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20.7	21.5	21.8	21.6	N/A
Where												
Home	53.9	54.6	53.9	54.1	54.1	55.1	56	55.5	55.6	56.2	56.1	+2.2
Other's home	5.7	5.7	5.7	5.5	5.5	5.6	5.5	5.6	5.4	5.5	5.6	-0.1
Restaurant	2.2	2.2	2.2	2.3	2.3	2.2	2.1	2.2	2.1	2.1	2.1	-0.1
Outside	12.3	14	14	11.6	14.2	13.1	13.1	14.5	14.4	13.5	12.2	-0.1
Work	17.3	17	17.5	17.3	18.1	17.3	16.2	16	16.5	16	15.8	-1.5
School	1.7	1.6	1.7	1.7	2	1.7	1.7	1.7	1.8	1.5	1.5	-0.2
Store	3.3	3.3	3.2	3.3	3.2	3	3	2.9	2.9	2.9	2.9	-0.4
Church	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.8	1.8	1.8	0.0
Education	1.7	1.8	1.9	2.3	2	2	2.1	2.1	2.2	2	2	+0.3

Table 6 (Cont.)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change
Travel	9.2	8.9	8.9	8.8	8.5	8.6	8.4	8.5	8.5	8.6	8.5	-0.7
Public	0.5	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.0
Car	8.1	8	7.9	7.7	7.6	7.5	7.4	7.5	7.5	7.4	7.4	-0.7
Subway	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Other travel	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.5	0.0

Source: American Time Use Survey Data Extract System – Version 2.4; Maryland and Minneste,
own caluclations.

4 Summary and conclusions

Since 2003, the availability of the US government's American Time-Use Survey (ATUS), now conducted annually and continuously by the US Bureau of the Census for the Bureau of Labor Statistics (BLS), has provided an important advance in the ability to identify trends in US time use – with its larger sample sizes, standardized procedures and general activity coverage than in previous diary surveys.

Largely consistent with these earlier time-diary data that documented long-run slowdowns and possible improvements in the pace of US daily life in the 20th century, 2003-13 ATUS diaries continue to show declines in women's housework, little or no turning back from earlier gains in parental time with children, as well as overall gains in the US public's free time. Indeed, the main gains in this new millennium appear for the less active or time-pressured activities of sleep and TV viewing, with a further boost from less time in travel and more time at home. Thus, these patterns of change seem to reflect little long-term effort or scrambling to make up for any fallout from the great economic recession of 2007.

Perhaps, the most troubling development during this decade has been the significant decline in help given to neighbors and other non-household members, which although taking up a little over an hour a week, still represents a 30+% decline in such activity in a period of economic crisis. That slowdown was found across all ages and after regression adjustment for other predictors, and was not simply a response to this recession. (Personal discussions with ATUS staff responsible for activity reporting or coding has not revealed any procedural changes that may have accounted for these changes.)

Another surprise in these recent ATUS data was the gain in TV viewing in an era marked by the dramatic diffusion of new IT devices. IT use did increase significantly in Table 4, but not as much as the increase in TV use, bringing it to the point of consuming more than half of Americans' free time. If respondents were using an IT device to watch TV, that was still coded as "watching TV" in Tables 1-4. (New diary procedures may be needed to better capture the often rapid usage of these IT devices).

Consistent with the less hectic scenario is also the notable decline in reported travel activities, particularly by automobile. The overall constancy of activity patterns was also reflected in diary data on where and with whom these activities took place. Thus, analysis of these 2003-2013 ATUS activities reveals rather consistent evidence of minimal change over this first millennial decade or movement toward a more hectic style of living. This consistent set of trends also seems in line with conclusions from analysis of ATUS and other subjective measures of the quality of US daily life (Gershuny 2012; Robinson 2013). At the same time, it is important to recognize that these diary results may not challenge the stereotype of Americans being a hard-working and industrious people. Rather, it indicates that those who are putting in long hours of work are being outnumbered or replaced by those finding more time to "smell the roses".

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SPENDING TIME ON MEDIA – RESULTS OF USING ‘MULTITASKING FREQUENCY QUESTIONNAIRE’ IN POLAND

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Media multitasking seems to be a part of modern lifestyles and could be interpreted as a reaction to busy lives in which participants have multiple responsibilities and tasks to complete (Kenyon 2008). Nowadays, the increasing frequency of using the media is related to the growing availability of new technology. Over the last decade, the amount of time spent on the media by American adolescents (8-18 years old) increased by 20%, to about eight hours per day (Rideout et al. 2010). Despite the fact that the time devoted to media is growing rapidly, the time spent on multitasking is growing even faster. It turned out that in the same age group of American youth the propensity to use several media at the same time was up to 120 percent (Rideout et al. 2010). According to Dutch researchers, media multitasking is not only specific to young people (Voorveld & van der Goot 2013). Indeed, in the group of 13-16 years' people spent the largest amount of time using multiple media at once, but a group of 17-24 years spent less time in this way than those aged 50-65 years. As Rogers (2009) notes, this means that using the media has become a global phenomenon, more and more independent of different social variables such as age or place of living. One thing is certain: the media multitasking issue is brought up in many theoretical and research papers (Ophir et al. 2009, Wajcman 2015).

To understand how we can measure media multitasking, we should take a closer look at its definition. This term seems to be more specific than traditional multitasking in that it contains two aspects. Firstly, media multitasking concerns all types of switching from one medium to another (e.g. listening to the radio and watching television). Secondly, it also includes switching from one activity to another within the same medium (e.g. using Facebook and checking email while

browsing the web). Furthermore, it is hard to measure this phenomenon due to the diverse types of media. On one hand, there are traditional analog media, called ‘old’ media, like television, radio and press. On the other hand, the proliferation of new media is being observed, especially various activities on the Internet. The differences between them are significant - for instance, the use of traditional media is often limited in time and space (Kramarczyk & Osowiecka, 2014). In other words, if we want to watch our favourite show on TV, we should be in front of screen at a certain time, while process of communication by using Facebook or email can be done without temporal and spatial obstacles. Traditional media are also - as opposed to the ‘new’ – synchronous. This divergence, especially in the multiplicity of opportunities to access and share data in case of online media, suggests that the new media more could be more conducive to multitasking in comparison to the traditional ones.

The tendency to be a media multitasker is not the same for everyone who uses online tools or applications. Several additional factors are in play here. Based on research, Ophir, Nass and Wagner (2009) divided people into two groups: heavy multitaskers and light multitaskers - in terms of the amount of time which people spend on multitasking performance. The level of media multitasking depends on both individual and social variables. The propensity to media multitasking is correlated to impulsiveness (Sanbonmatsu et al. 2013), experience in media using (Brasel & Gips 2011), age, and sex (Todorov et al. 2014). Moreover, it is worth noting that this phenomenon is determined by cross-cultural context (Kopecky 2008, Kononova 2013).

From what has been said so far, it is pretty clear that there is a research need to measure time spending on multitasking, particularly on the Internet, also paying special attention to differentiation of multitasking skills. The most commonly used tool for measuring media multitasking is media-multitasking index, created by Ophir, Nass, Wagner (2009). This questionnaire lists twelve types of media, both traditional and new. It allows researchers to gather data concerning the amount of time spent on their usage per week. In addition, respondents are asked to quantify (on the Likert’s scale) how often, while using one type of medium, they also use another kind of medium. Each rate, describing frequency of using, has different numeric value (e.g. ‘always’ = 1, ‘sometimes’ = 0,67), so that values can be easily added up for each medium. The index value represents the following formula¹:

$$(1) \quad \text{MMI} = \sum_{i=1}^{11} \frac{m_i \times h_i}{h_{\text{total}}}$$

To measure media multitasking among Polish Internet users, we have decided to test multitasking frequency questionnaire, designed by Srivastava (2010). It contains twenty-four questions, including 14 items, regarding traditional media (e.g. newspapers, television, radio) and 10 statements relating to the Internet (e.g. Facebook, browsing websites, using email). The main

¹ m_i - sum of values concerning multitasking of each of 12 media, h_i – the number of hours devoted to the use of the medium, h_{total} - the number of hours spent on the use of all 12 types of media. The overall index is the sum of the results calculated by the following formula for all types of media.

idea was to ask respondents about frequency of using several media at the same time. The answers were ranked on the Likert's scale from 1 to 7 and the final results were obtained after summing all estimates. I have to add that in the first stage of tool adaptation all statements with instructions were translated into Polish and that 'back-translation' procedure was used afterwards. Next phase included developing an online questionnaire (by using QUALITRICS) with additional respondent's particulars, such as age, sex, place of living, and education.

In order to test the reliability of multitasking frequency questionnaire, it was made using Cronbach's alpha ($\alpha = 0,85$). After selecting items relating to the use of traditional media and the Internet, reliability for traditional media was at $\alpha = 0.84$, and in case of Internet and other various online applications at $\alpha = 0.82$. The scale turned to be reliable.

The study was carried out in February 2015. There were 64 respondents, but only 45 people were qualified for the final analysis ($M = 23,47$; $SD = 5,47$), including 27 women and 18 men. Respondents were students ($n = 29$) and employees with different profiles of activity ($n = 16$). Nineteen people did not complete a full questionnaire - missing data accounted for over 50% of responses - therefore we omitted these results during further analyses.

The first important demographic variable was age. The results were statistically significant: $t(43) = 2,048$, $p < 0,05$. In group of women, the average number of points obtained on the scale of media multitasking was higher ($M = 96,48$; $SD = 19,42$) than among men ($M = 85,22$; $SD = 15,77$), which means that women use several media at the same time more often than men. It could be a very interesting conclusion, compared to other results, which show that men are better at media multitasking (Todorov et al., 2014). The analysis has also revealed a difference between women and men at the level of media multitasking when dividing it into traditional and 'online' media. Study has shown that women receive higher scores in media multitasking, taking into account the traditional media ($M = 53,00$; $SD = 13,38$) than men ($M = 44,00$; $SD = 12,46$) – $t(43) = 2,271$, $p < 0,05$. A similar analysis in the context of online media has shown no gender differences.

What is more, analysing the average number of points obtained in questions relating to combine activities in categories of traditional media and online media (using both types separately), subjects received on average a higher number of points on the scale of media multitasking regarding traditional media ($M = 49,40$; $SD = 13,63$) than new media ($M = 42,58$; $SD = 9,89$), as shown Student's t-test for dependent samples: $t(44) = 3,11$, $p < 0,05$.

Age of multitaskers turned out to be second significant variable. The results were compared in two age groups: up to 20 years old and in the group over 27 years. Analysis, by using Student's t-test, proved to be significant at the border of statistical trend: $t(27) = 2,012$, $p = 0,054$. People under 20 years old are more advanced in media multitasking ($M = 98,29$; $SD = 21,77$) than those over 27 years ($M = 84,73$; $SD = 13,91$).

The ability to be a multitasker is recognized as an indicator of our times. This short note about multitasking among Polish Internet users provides good background for further research efforts.

It seems worthwhile to take into consideration different types of multitasking activities and their sequence depending on time budget. From the time - use perspective, it can also be significant in terms of other daily practices that younger people as well as women use several media simultaneously more often than older people and men.

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HARMONISING TIME USE MICRODATA FOR THE 2010 WAVE OF THE EUROPEAN TIME USE SURVEYS

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The Harmonised European Time Use Survey HETUS has been carried out twice, in 2000 and 2010. Around 20 countries participated in the survey at both occasions. Statistics Finland and Statistics Sweden prepared a harmonised database and a tabulation application based on the microdata from the 2000 wave with financing from the Statistical Office of the European Communities, Eurostat. The database contains 15 comparable countries: Belgium, Bulgaria, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom (www.tus.scb.se).

At the moment, Statistics Finland is harmonising the microdata from the second wave with financing from Eurostat. Nearly 20 countries are included. The data for the surveys were collected between 2008 and 2015. Statistics Finland instructs the participating countries to prepare three files from their data: an individual and household information file, a diary day file concerning background data, and an episode file concerning time use data. Statistics Finland checks the data and delivers harmonised files to Eurostat. The files are sent and received using Eurostat's eDAMIS system. Statistics Finland prepares a quality report concerning the database and compiles the metadata. The metadata are collected and published using with the European Statistical System Metadata Handler (ESS-MH) tool.

The harmonised data of the first country were completed in autumn 2014. So far, Statistics Finland has received data for harmonisation from nine countries, eight of which (Finland, Spain, France, Serbia, Romania, Italy, Estonia, Hungary) have already been sent to Eurostat. The project will continue until the end of 2016.

Eurostat will produce tables on time use for Eurostat's online database (<http://ec.europa.eu/eurostat/data/database>). The tabulation application maintained by Statistics Sweden concerning the 2000 wave will no longer be supplemented with the data of the 2010 wave.

GERMAN TIME USE SURVEY

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The third national Time Use Survey of the Federal Statistical Office since 2001/2002 and 1991/1992 is held in 2012/2013. This survey describes the time use structures of population groups and household types – in particular for topics related to policy on families, gender aspects and education. Also, the data collected have made it possible to construct a satellite sys-

tem of household production in parallel to the National Accounts. The Time Use Survey 2012/2013 will provide information in particular about the time spent on employment, household activities, child care, education and cultural activities, voluntary work, social engagement, the time use of children and shared time in housework and child care. According to the recommendations of the Stiglitz-Sen-Fitoussi report additional questions of the subjective feelings of time use, like lack of time and wishes to spend time were included in the survey. The data are collected using household and individual questionnaires and a time use diary. Each person of over 10 years of age fills in a diary for three days, i.e. two weekdays and one Saturday or Sunday. The sample consists of 5,000 households including 12,000 individuals. The total sample size is evenly distributed over 12 months. The field work started in August 2012 and will be finished at the end of July 2013. The design of the new survey is comparable with the design of 1991/92. At the same time, the methodological requirements set by Eurostat for European Time Use Surveys (HETUS) are included in order to facilitate comparison with other states. The time use survey is much desired by many users of the data at home and abroad, such as the German ministries, academia and researchers as well as other organizations and associations who require up-to-date results.

Introduction

The German Time Use Survey 2012/2013 (German TUS) is the third one of its kind in Germany. In the process about 12,000 participants from the age of ten keep diaries, describing for three days each of their activities which take longer than ten minutes. Furthermore these participants have to answer questions about employment, voluntary work, use of care facilities, out-of-school activities of children and culture activities as well as questions about subjective feelings. The goal of the survey is to generate data including information about families' workload and division of labour, child care as well as social engagement of all generations, different life situations of women and men as well as the time use of children and young persons. The time use data also provide information that takes the recommendations of the Stiglitz Commission (2009) into account, which suggest including into national accounts unpaid work of households as a basis of informative economic indicators. Measuring subjective well-being is a main topic of the Stiglitz Commission as well. Interrogating subjective evaluations of personal activities is one possibility to estimate the well-being of different population groups.

Shortly after the German reunification the first German time use survey was conducted in 1991/1992 including 7,200 households from different population groups. The goal was to help answering questions, particularly from topics of women and family policy, and to provide data for the satellite system of household production.

In 2001/2002 the Federal Statistical Office conducted the second time use survey (for further information about the two previous time use surveys in Germany see Merz and Ehling (1999) or Ehling et al. (2001)), taking into account that this survey had to be comparable with the previous survey and with time use surveys of other countries. Before the field work started, in particular for financial reasons, survey instruments had been developed which replaced the direct

questioning by interviewers as used in the first survey. As a consequence a method including two questionnaires – household questionnaire and personal questionnaire – and a diary was designed.

The concept of the current German TUS is based on the surveys of 2001/2002 and 1991/1992 and takes into account the international requirements in line with the HETUS guidelines (Harmonised European Time Use Surveys, Eurostat 2008). During a time period of 12 months (August 2012 – July 2013) about 5,000 households and about 12,000 persons will be questioned on a voluntary basis. Each person in the household, aged 10 years and older, is requested to fill in the individual questionnaire and the diary for three days. The activities will be recorded in an activity list.

The time use survey 2012/2013 in combination with the two preceding surveys shall contribute to picture trends of the time use of German households over a period of 20 years.

This paper presents the methods used for the current German Time Use Survey, describes the survey design and furthermore gives an insight into how the requirements of the Stiglitz-Sen-Fitoussi Commission (Stiglitz et al. 2009) are implemented in the content of the survey.

Method of the German Time Use Survey 2012/2013

Sampling design

The sampling of the German TUS 2012/2013 is based on quota sampling. The allocation of the quotas is based on data taken from the German microcensus for which citizens are legally obliged to give information. For quotation the characteristics of Land (federal state), household type (one-person households, couples without children, single parents, couples with children and not more than one parent employed, couples with children and both parents employed) and social status of the household member with the highest income (self-employed, public officials, salaried employees, wage earners, pensioners, other persons not engaged in economic activity) were used. Households that already participated in other household surveys were recruited according to the given quotas. In this process about a third of the households are taken from an access panel. This panel includes all households who, after the last microcensus, voluntarily agreed to participate in surveys of official statistics. In addition to the allocation to quota cells, given through the three characteristics, the sample was allocated into rural and urban areas using a classification of four municipality size classes. However, the results of this classification are not quotas but target values which should be reached as closely as possible in the sample.

The total sample size is evenly distributed over the whole 12-month period to avoid seasonal effects and also over all 365 days to cover all activities.

For estimation in the German TUS, a calibration method (Generalised Regression Method) will be applied. The same weight will be used for all individuals in the household. The calibration weights increase the accuracy of estimates, giving consistent estimates according to the variables that are included in the calibration method. The demographic variables, e. g. sex, age

groups, level of education and employment status (working full-time or part-time, non-working), will be used as calibration variables.

A second weight will be used for the diaries in order to include non-response adjustment for missing diaries or days. The diary weight depends on the number of days an individual keeps a diary. By using calibration techniques, the diary weight will include seasonal correction where response rates and postponing have changed weekly or daily sample sizes.

Survey design

All participating households receive a household questionnaire at least two weeks before the beginning of their specific questioning period and each household member from the age of ten gets a personal questionnaire as well as a diary.

The household questionnaire includes 24 questions referring to household composition, housing situation, household net income, received assistance and the use of day care facilities for children under the age of ten.

The personal questionnaire has to be filled in by each household member from the age of ten. They answer about 40 questions referring to their labour force participation, their level of education or training, their use of school and out-of-school learning opportunities, their cultural activities and their voluntary engagement as well as questions about their subjective time perception.

Again the diary, which covers a total of 72 hours, is the core tool of the survey 2012/2013. Each person from the age of ten describes in his/her own words all performed activities, applying ten-minute cycles. The division into ten-minute intervals is consistent with the guidelines for Harmonised European Time Use Surveys (HETUS Guidelines 2008). Instructions and examples referring to the correct description of the activities are given in the diary. Besides the main activity there can be entered a secondary activity and the participants have to choose which secondary activity is their first one. Furthermore they have to describe with whom the time was spent during the activity and which means of transport was used for journeys that took longer than 10 minutes.

The activities described in the diaries will be structured in an activity coding list covering 200 different activities. The coding list is based on the Eurostat recommendation (HETUS Guidelines 2008) and the list of the previous survey in order to make surveys more consistent and comparable, i.e. internationally on the cross-sectional level and nationally on the longitudinal level. The activity list keeps the main structure of the classification and generally the same categories. The changes introduced in the new activity coding list take into account rare frequencies (combined with other codes) and new policy needs, for example, the division of the school subjects.

At the end of each day the participants are asked for additional information on their diaries, for example, when they filled out their diary exactly, whether the described days were usual or ra-

ther unusual days or if they did a longer travel during the diary day, and there are questions about the subjective time perception, too.

Short versions of the household and the personal questionnaires as well as the diary were tested in a qualitative pretest including 16 cognitive interviews.

Content issues of the German Time Use Survey 2012/2013 referring to the Stiglitz Report

One of the demands of the Stiglitz-Sen-Fitoussi Commission in 2009 was to record data that provide information about the society's quality of life and wealth and thereby to complete traditional national accounts. Also, in its guidelines that will be published soon, the UNECE (United Nations Economic Commission for Europe) Task Force on Time Use Surveys suggests that methods should be applied in time use surveys that can help answering that kind of questions.

The current time use survey in Germany tries to meet part of these demands. Hence there are questions in the personal questionnaire as well as in the diary about the subjective feelings of the participants and their assessment of whether they have enough time at their disposal for different activities.

Subjective questions in the personal questionnaire

In the personal questionnaire the participants are asked to describe their personal sensation about the time they spend on 13 different areas of life (e. g. household care, employment, personal interests or friends). More specifically they are asked whether or not the time they spent on these specific areas during the past four weeks was enough. They give their answer on a five-point scale from "totally enough" to "not at all enough". As the pretest shows, spending "not enough" time on an activity (e. g. household care) can either be attributed to time restrictions or to a lack of motivation. One has to keep this fact in mind when interpreting the survey results.

The second subjective question is about the topics of time stress and time wishes referring to oneself, family or friends. Here the participants can agree or disagree with statements regarding the topic on a five-point scale from "agree completely" to "disagree completely". Furthermore, at the end of the personal questionnaire, the respondents are asked about their time wishes. They can use their own words to answer the question "For which activity do you want to have more time?". By allowing a free description of the answer one gets all sorts of activities and the participants are not affected by a choice of possible answers. The answers are classified in the same way as is done with the diary activities.

Subjective questions in the diary

Besides the above questions about travels and characteristics of the day, additional personal questions about time perception are to be answered at the end of each day. The respondents are asked to describe the activity that gave them the greatest pleasure and as well the one that gave them the least.

Furthermore they are asked for which activity they would have liked more time during the past day. They describe the activities in their own words and code them on the basis of the coding list. The participants are only allowed to describe activities of the specific diary day.

The number of activities the participants can describe is not specified exactly. However, a maximum number of three different activities is assumed when processing the data.

The question about time wishes is picked up both in the personal questionnaire and the diary. However two different concepts are pursued for subsequent analysis: The personal questionnaire gives a general view about the time use, the diary is linked to specific diary days. For instance different time perceptions on weekdays vs. weekend days can be analysed.

The survey will show what problems may occur with the questions about subjective time perception, what new findings can be reached from the analysis and if they can be a useful addition according to the requirements of the Stiglitz Report.

Conclusions

The presentation will focus on the methodology of the time use survey 2012/2013. The German TUS' concept is based on the two surveys of 2001/2002 and 1991/1992 and takes the European requirements according to the HETUS Guidelines into account. During a period of twelve months (August 2012 – July 2013) about 5,000 households and about 12,000 persons will be asked on a voluntary basis. A household questionnaire and, for each person from the age of ten living in the household, a personal questionnaire will be completed and a diary kept. First results are expected at the end of 2014.

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INNOVATIONS AND LESSONS FROM THE UK 2014-2015 EVERYDAY LIFE SURVEY

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The United Kingdom has a long history of time use research, spanning back to the early 20th century (Pember Reeves 1913). The Multinational Time Use Study includes British surveys collected in every decade since the 1960s (Fisher and Gershuny 2013). While the UK participated in the first round of the Harmonised European Time Use Surveys project, the most recent official survey was a small-scale light diary attached to four waves of the 2005 Omnibus survey – until now. The Centre for Time Use Research raised funding from the Economic and Social Research Council (grant ES/L011662/1) to conduct a second round British HETUS survey, which has been in the field from April 2014 through June 2015, with an additional period of data collection in the autumn of 2015.

CTUR commissioned the National Centre for Social Research (NatCen) to administer the survey. We initially sampled 10,960 private households drawn from the Postcode Address File (PAF) covering England, Wales, Scotland, and the Land Property Services Agency (LPSA) in Northern Ireland. In the main period of data collection, over 7,600 people in over 4,000 households returned at least one completed diary. The additional period of fieldwork involves different interviewers re-approaching some initial non-respondents as well as a fresh sample of new households to boost the overall response rate.

The survey includes an advance letter, then face to face follow-up with an interviewer, who collects a household questionnaire, then collects individual questionnaires from all household members aged 8 and older. Interviewers leave behind two time diaries and a one-week work schedule with each diarist (person eligible for the individual interview). All household diarists are asked to complete their work schedule for the same week and their diaries on the same two days (one week day and one weekend day) during the work schedule week. Following HETUS guidelines, the diaries contain 10 minute time slots for the period of 4AM through 4AM the next calendar day, and include columns for people to enter main and simultaneous activities as well as locations in their own words.

The diaries require a significant time input from participants. Each person who completed a diary was given a £10 gift voucher as token of appreciation for their participation. Experience on the doorstep showed that selling the survey as research into everyday life to find out what

activities most contribute to people's wellbeing proved more effective than other approaches. NatCen also collects surveys with similar degrees of participation burden and higher response rates in collaboration with a number of UK government agencies. We suspect that British people may be more willing to participate in surveys more directly linked to government policies than in surveys co-ordinated by universities.

Initial review of the returns so far indicate that the survey has collected high quality data. Three features of the UK diary instrument offer new research opportunities currently not widely available in the time use field: allowing participants to record multiple secondary activities; including a tick-box for events which involved the use of a smart device; and collection of enjoyment ratings alongside each event. Our experience collecting these features raises questions for how this field handles some dimensions of capturing activities.

Conventionally, most time use surveys collect only a one main and one secondary activity. HETUS guidelines suggest asking participants to report only a single secondary activity (if they did more than one thing at the same time). Some participants in previous HETUS surveys nevertheless wrote more detailed activity descriptions, even with this instruction, forcing coders to prioritise which part of the account to code. Some multi-tasked activities have policy implications. In this survey, the secondary activity column asked only "If you did something else at the same time, what else did you do?"

In the beta version of the data (not including the final period of data collection), 92.8% of diaries contained at least one secondary activity in at least one episode. A smaller number, 37.5% of diaries, included two secondary activities in at least one episode, and a further 5% of diaries included three secondary activities at the same time at least once. Where participants recorded multiple simultaneous activities, coders entered these activities in the order in which participants wrote their account in the secondary activity field. Table 1 shows that a wider range of activities appear only as a first (or only) secondary activity.

Table 1
Most common UK secondary activities in 2014-15

	1st Mention	2nd Mention	3rd Mention
1) Eating; 2) Housework; 3) On-line activities; 4) Personal care; 5) Reading to children; 6) Socialising; 7) TV/Radio/Music	X	X	X
8) Fill in diary; 9) Pet care; 10) Rest; 11) Sleep	X	X	
12) Adult care; 13) Child care; 14) Computer games; 15) Education & Study; 16) Exercise & Sport; 17) Paid work; 18) Shops & Services; 19) Travel; 20) Volunteering	X		

Source: United Kingdom 2014-2015 Everyday Life Survey, beta version (not including last round of fieldwork), own calculations.

Nevertheless, some of the common activities that also appear as a second or a third simultaneous activity have policy implications. Eating behaviours are associated with quality of life, health, and risk of obesity (Oh et al. 2014). Reading to children can have beneficial effects on children's language development and education outcomes (Mullan 2014). Patterns of sleep not only have association with health but also reflect changing social expectations (Hsu 2014, Michelson 2014) – the appearance of sleep as one of three simultaneous activities raises concerns as well as curiosity. Knowing the extra detail additionally may inform investigation of levels of physical activity as well as the environmental impact of chains of behaviours. These examples reflect only some of the possibilities to investigate simultaneous activities that this survey will facilitate. Results of such research might give rise to arguments to allow diarists to report more detail of their activities (or reinforce the current practice of collecting only one secondary activity).

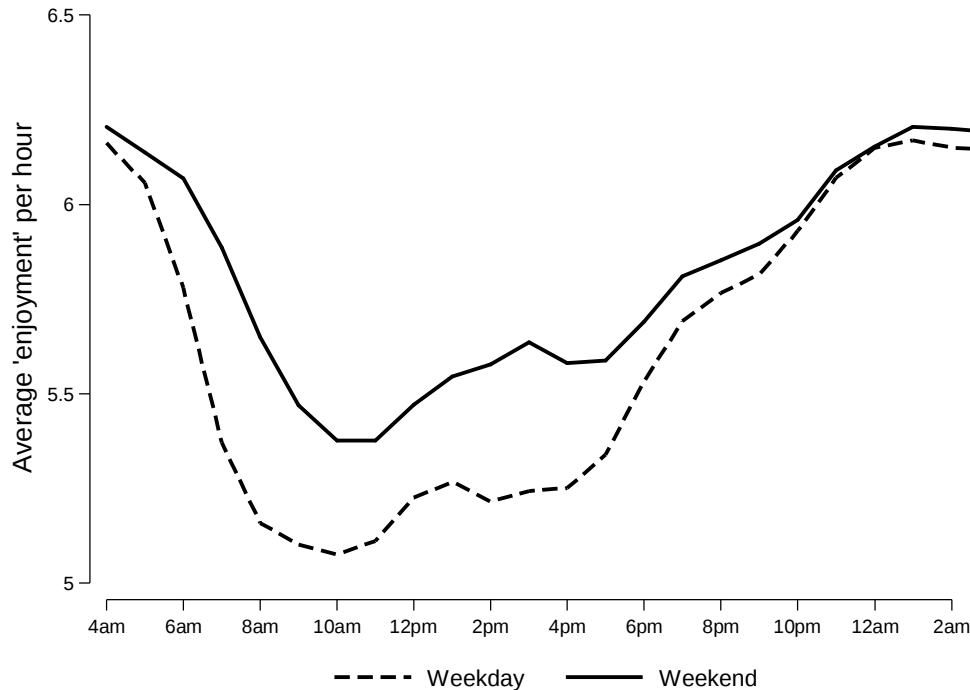
The current UK HETUS survey includes a “how much did you enjoy this time” rating column at the end of the diary grid. Surveys in the mid-1980s in both the USA and the UK included similar enjoyment rating scales for all activities. The 2009-10 French and 2008-09 Italian HETUS surveys also included an enjoyment column for all activities. The French survey asked people to rank activities from -3 to +3 (a seven point scale), and included this column only in a subsample of the diaries. A limited number of other surveys, including the American Time Use Survey, have asked six or more affect questions of three randomly selected events in a time diary.

This survey initially followed the French diary example, adding the enjoyment field for all activities only in a sub-sample of the diaries. Interviewers reported that they found sampled household members showed more interest in the survey when they were selected to complete the diary that included the enjoyment field, compared with those selected to complete the HETUS diary without this field. Early response rates in the UK were higher in households given the enjoyment diary. For this reason, all diaries in the remaining three-quarters of the UK HETUS survey fieldwork included the enjoyment field. The figure shows that Britons enjoy time periods when most people are home more than time when most people are at work, and enjoy weekends more than week days.

Diary level measures matter. First, policy research using well-being both seeks to promote greater well-being, and also to reduce harm and suffering. Negative daily experiences are associated with negative overall outlook, but negative experiences have separate drivers and mitigators. Activity level affect data inform understanding of what factors in the day make some experiences particularly unpleasant for certain groups of people and how policy might alter circumstances of daily experience to reduce the negativity of these experiences.

Figure 1

Enjoyment ratings (7= highest enjoyment) by time of day on week days and weekend days in the United Kingdom in 2014-2015



Source: United Kingdom 2014-2015 Everyday Life Survey, beta version (not including last round of fieldwork), own illustration.

Second, policies which change people's behaviours generate unintended consequences. Convincing people to do more of something (like walking), less of something (like smoking) or to switch mode of doing something (more cycling, less driving), opens space in the day to be filled by other activities, reduces space in the day, forcing people to modify time in other activities, or puts people in locations and contexts that change other activity choices (Fisher, Shahbazian and Sepahvand 2012). A policy may generate any of a range of outcomes:

- A policy may succeed in fostering a behaviour change, but also incentivise other changes of behaviour that have negative consequences, and make the overall effect of the policy worse than doing nothing.
- A policy may succeed in fostering behaviour change, and produce neutral or complementary entailments, making the overall policy a success, possibly a greater success than anticipated.
- A policy may have no effect whatever.
- A policy may fail to achieve the desired behaviour change, but incentivise other behaviour change that has positive policy value.
- A policy may fail to achieve the desired behaviour change and incentivise other undesired behaviour changes.

Emotional responses can represent a significant part of the judgement of the success or failure of a policy. For example, people who smoke modest amounts and smoke more often in pubs and bars may smoke less in response to an anti-smoking policy, and also report that they enjoy time in pubs and bars less on account of not being able to smoke (in the same way or at all) in these venues. Nevertheless, the enjoyment time of non-smokers in the same venues might increase. Even the light smokers might find themselves able to walk longer as a result of cutting smoking behaviours, and enjoy this additional walking time more – raising their overall reported level of life enjoyment. Diary level enjoyment or other satisfaction data addresses these questions with accuracy and detail that other survey designs cannot match.

Anecdotal evidence from the 2015 wave of the UK Millennium Cohort Survey suggests that the inclusion of the enjoyment column may have helped response rates. This column is one element of the survey the participating young people most frequently expressed an interest in completing and reported finding particularly meaningful. The French HETUS experience and early analysis of the MCS diaries (Chatzitheochari et al. 2015) suggest that respondents are at least as likely to return completed enjoyment columns as they are to answer other context columns, and response in the enjoyment field sometimes is higher than in other context fields.

Subjective ratings of events represent an under-used element of time use surveys – but this may change soon as the value of using affect data associated with behaviour patterns to construct accounts of national wellbeing gains prominence (Gershuny 2013, Krueger 2009). Analysis of the UK HETUS will contribute to methodological research into which diary approach best captures affect for policy purposes.

Since the first round, HETUS survey codes have distinguished some activities that take place on the internet and smart devices from off-line activities (for instance distinguishing household management on-line or using a banking app from off-line household management). Already, research considers the possibility that technologies might speed up the way people live their lives (Wajcman 2015). During preparations for the second round of the HETUS, Klas Rydenstam from Statistics Sweden noted a complication related to measuring internet-based activities: people for whom such behaviour is long-established and routine may feel less inclined to report this detail than those who recently started using smart devices. He proposed a tick-box for the use of the internet or smart devices. A limited number of HETUS surveys implemented this tick box. The French survey added this column only in a subsample of the diaries.

All diaries in this survey contain this tick box for a “yes” answer to the question “Did you use a smartphone, tablet, or a computer?” positioned just after the secondary activity column and before the location column. The UK survey additionally followed HETUS activity coding guidelines. If a diarist wrote an activity description like “ordered pizza using just eat app”, this would be coded as “3722: shopping for and ordering food via the internet”. As a result, the UK can give insight into the impact of adding this column by allowing comparison of the difference between using activity reports alone and using the device tick box.

The smart device column increased the number of episodes (changes of report in any diary column from the information on the previous 10 minute time slot) by nearly 4%. The mean daily time on-line in the UK rises from 50 minutes to over 2.5 hours with the addition of the tick box column. These device-tick-box-driven episodes would not appear in the traditional HETUS design without this column (shown in Table 2). Also, the tick box collected information modifying sleep, paid work, and education which otherwise would not have been collected in the traditional HETUS design (in the UK, apps monitoring quality of sleep attract many downloads).

Table 2
Smart device and web use reports in UK HETUS surveys

	2000-01	2014-15 (Act codes)	2014-15 (Tick box)
% of episodes only from smart device use shifts	none	none	3.7%
% of episodes involving smart device use shifts	1.7%	7.1%	19.3%
% of diaries with no smart device or web use	85.3%	47.2%	22.8%
% of diaries with 24 hour smart device/web use	none	none	0.1%

Source: United Kingdom 2014-2015 Everyday Life Survey,
beta version (not including last round of fieldwork), own calculations.

The UK HETUS experience suggests that future surveys would benefit from including a similar device tick box column. Testing in the UK suggests that this column does not increase participant burden. Even though this is an extra column in the diary, the device tick box also offers a shorthand way of reporting some activities and might save more conscientious diarists time for some accounts. Adding this column is not unproblematic, however. By increasing the episode count and changing the reporting of some activities, the device column also introduces an element of complexity into analysis of changes of behaviour across time. Adding this device column requires analysis of the impact of this column to construct backwards comparability calibration strategies.

Once the data are released in the spring of 2016, we hope many researchers will make the most of this data.

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INTRODUCING THE AMERICAN HERITAGE TIME USE STUDY DATA EXTRACT BUILDER (AHTUS-X)

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Patterns of daily activities situated in the context of the location, time of day, presence of others and emotional experiences which time diaries collect offer essential data enabling us to understand what factors drive long-term trends in behaviour, and to predict how policies might encourage desirable shifts in behaviour while avoiding simultaneous change that might undermine policy aims. As daily life offers an essential dimension to a vast range of research topics, time use surveys offer better value for money than most surveys considering the potential uses for the money expended on data collection. To achieve this value for money, however, researchers need to use the data. Even now, few universities offer training in the analysis of time use data.

Making access to customised data subsets ready for analysis quickly matters to the success and continued expansion of this field. The IPUMS Time Use data extract builder suite is one tool delivering essential data resources to time use researchers. This timepiece details the release of the latest project in this collection of archives, the American Heritage Time Use Study Data Extract Builder (AHTUS-X).

Background

Time use researchers at the Maryland Population Research Center and Minnesota Population Center, with funding from the National Institutes of Health and the United States Department of Agriculture Economic Research Service, developed the extract system alongside the early years of the American Time Use Survey, funded and managed by the Bureau of Labor Statistics and collected by the United States Census Bureau. The ATUS is the first large-scale continuous national time use study. The ATUS is a ninth wave extension of a subsample of the longitudinal Current Population Survey (CPS). The initial project – the American Time Use Survey Data Extract Builder (ATUS-X) – aimed to ease the use of the complex combination of CPS and ATUS files. An earlier time piece in the eIJTUR (Hofferth, Flood, and Fisher 2012) details the extension of the ATUS-X, and outlined plans to expand this project into a suite of archives also covering historical time use data from the USA and harmonised international collections of time use data. The development of the new dimensions involves collaboration with the Centre for Time Use Research at the University of Oxford. The Minnesota Population Center Integrated Public Use Microdata Series (IPUMS) houses the IPUMS Time Use data extract builder archives.

The logical first companion resource to join the ATUS-X is the American Heritage Time Use Study (AHTUS-X). The ATUS builds on a long history of time diary data collection in the USA, which dates back to the early part of the 19th century (Kneeland 1929, Sorokin and Berger 1939). The first large scale national sample time use survey in the USA accompanied the 1965-66 US contribution to the Multinational Time Budget Research Project, the first input-harmonised comparative time use survey involving twelve mostly European countries (Godbey and Robinson 1997). Combinations of academic and national government agencies have collected at least one large scale national time use survey every decade since (Fisher and Gershuny 2015).

In 2003, Yale University secured funding from the Glaser Progress Foundation to construct a harmonised archive of national USA time use surveys as a part of a wider Program on Non-Market Accounts project. Yale University commissioned the Centre for Time Use Research, then based in the Institute for Social and Economic Research at the University of Essex in the United Kingdom, to create this archive. The resulting American Heritage Time Use Study includes three files with cross-time harmonised variables for each survey:

- a collection of person and household demographic variables

- a summary files where each row represents the account of one person's day and total time spent in various activities appears in each column, and
- an episode file, where each row represents a change in at least one dimension of each participating diarist's day.

Later grants from the NIH and British Economic and Social Research Council facilitated the extension of the AHTUS to cover surveys not included in the original project. The AHTUS episode files informed the development of the episode file of the Multinational Time Use Study (Fisher and Gershuny 2013). Elements of the MTUS will be released as a new IPUMS Time Use archive in 2016.

The Centre for Time Use Research independently releases a set of the three harmonised files for each survey included in the AHTUS. Users combine surveys sets as required and delete or ignore variables they do not need. The new AHTUS-X draws on a database of all AHTUS survey cases and variables, speeding the process of accessing the cases users require for research.

Surveys Included in the AHTUS-X Archive

The datasets currently harmonised in the AHTUS-X (Fisher and Gershuny 2015) include:

- **1965-1966 - Multinational Comparative Time-Budget Research Project**, including a Jackson, Michigan and a national USA sample, conducted by the Survey Research Center at the University of Michigan and the Social Relations Department at Harvard University, with funding from the National Science Foundation (part of the Szalai Multinational Time Budget Research Project).
- **1975-1976 - American's Use of Time: Time Use in Economic and Social Accounts**, a panel study designed and administered by the Survey Research Center at the University of Michigan with funding from the National Science Foundation and the US Department of Health, Education, and Welfare.
- **1985 - American's Use of Time**, administered by the Survey Research Center, University of Michigan, with funding from the National Science Foundation and ATT, designed to compare the impact of self-completion mail-back, telephone interviewing, and face-to-face interviewing diary collection.
- **1992-1994 - National Human Activity Pattern Survey (NHAPS)**, administered by the Survey Research Center at the University of Maryland for the Environmental Protection Agency to produce data on exposure to environmental pollutants. This survey collected diaries from people of all ages, but did not ask marital status or income.
- **1994-1995 - National Time-Diary Study (NHAPS extension)**, administered by the Survey Research Center at the University of Maryland on commission for the Environmental Protection Agency to produce data on exposure to environmental pollutants. This survey collected an adult-only supplement as the original survey had only a single activity code for computing; however, this extension includes marital status and household income.

- **1998-2001** - This data set combines two small-scale surveys collected by the University of Maryland Survey Research Center, the **1998-99 Family Interaction, Social Capital, and Trends in Time Use Study (FISCT)**, a small-scale contiguous state sample funded by the National Science Foundation, and the **1999-2001 National Survey of Parents (NSP)**, funded by the Alfred P. Sloan Foundation.
- **2003-2014 - American Time Use Survey (ATUS)** conducted by the United States Census Bureau and funded and co-ordinated by the United States Bureau of Labor Statistics, which collected diaries from a sub-sample of the population that had just completed the last of eight waves of the Current Population Study.

Developments and Future Plans in the AHTUS and AHTUS-X

Some small improvements are entering the AHTUS original files, distributed on the Centre for Time Use Research website (<http://www.timeuse.org/ahtus>) and the AHTUS-X website (www.ahtusdata.org) simultaneously in 2016. These improvements involve breaking the current sport and exercise code into four codes:

- team sports and training
- dancing
- equestrian sports
- other sports activities;

The AHTUS additionally will include some new codes which make the multi-purpose nature of some activities (for instance travel related to job searches) more evident than at present.

CTUR has recovered 1920s and 1930s USDA paper diaries, and longer-term will be adding these to the AHTUS and AHTUS-X. The 2006 Princeton Affect and Time Survey (PATS), modelled on the ATUS, in which Daniel Kahneman and Allan Krueger trialled the emotion questions now collected in the ATUS well-being modules, will be added in the not too distant future.

How Does the AHTUS-X Differ from the ATUS-X

Current users of the ATUS-X will find a familiar layout in this new resource, with additional features. While the ATUS only collected one diary from one person in sampled households, and only collected limited ranges of secondary activity, other USA surveys collected more than one time diary from multiple household members, and many surveys encouraged more detailed reporting of secondary activities. The sample selection process in the ATUS-X swiftly guides users through the range of surveys including each feature, facilitating construction of appropriate extracts accordingly.

Use Enables Reuse

As with all archives, continued funding for this project depends on people using the resource. If you have an interest in time use patterns in the USA, you both access essential data and con-

tribute to the long-term preservation of this collection of documented historical change by visiting and making extracts from www.ahtusdata.org.

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A MIXED-MODE APPROACH TO MEASURING YOUNG PEOPLES' TIME USE IN THE UK MILLENNIUM COHORT STUDY

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The longitudinal Millennium Cohort Study (MCS) follows over 19,000 children born between 2000 and 2002 in the United Kingdom. The sixth round of fieldwork, when most participants are aged 14, began in January 2015 and concludes in early 2016. The cohort members and their families were visited by interviewers, who conducted a range of measures, including interviews, cognitive assessments, physical measurements, and saliva sample collection.

In addition, the MCS added two 24-hour time diaries, one for a week day and one for a weekend day. These days were randomly selected, and fell in the 10 days following the interviewer visit. Participants additionally wore an accelerometer during their two diary days.

The MCS time diary included 44 pre-defined, age-specific main activity codes. Participants additionally also were asked to record limited location detail (at home, away from home indoors, away from home outside), enjoyment on a 5-point scale, and who was with them at the time of each activity. The development process prior to the mainstage of fieldwork included cognitive testing of activity codes as well as two rounds of instrument usability testing, followed by two pilot phases. In this paper we describe the instruments, examine data from the two pilot phases and consider lessons for future surveys (more detail available in Chatzitheochari et. al. 2015).

Young people of this generation have grown up using the internet and smart technologies. Web and smart platforms offer opportunities to provide highly customised support to participants and to reduce processing of raw responses into research data. The MCS capitalised on these opportunities with an innovative mixed-mode data collection approach, including a smartphone diary app, a web diary, and a paper diary (shown in Figures 1-3).

The paper diary followed a conventional light diary format, where participants marked cells on pre-coded grids. The web diary mirrored the paper diary in the ordering of sections, but rather than presenting all choices at once, the web survey offered unfolding clusters of categories. This was to ensure the diary was usable on a computer screen, and enabled participants to see only the most relevant options on the screen at any one time. During instrument usability testing, participants reported confusion following the time points on the web grid. Adding a digital clock showing the time at the point of the cursor addressed this complication. As with the paper diary, the web diary allowed participants to complete diary domains in any order.

Like the web diary, the app nested sets of activity and context categories. As the small screen format imposes greater limitations, we used a question-based approach to reporting activities and contexts, rather than a grid. In this case, we defined episodes in terms of main activities. To start a new entry, the participant had to enter a main activity, select the end time of the activity, then complete the context details of the episode. The app thus organised reporting in terms of main activities – in contrast to the whole story and time of day organisation of accounts in the other instruments.

Participants could report a change in one or more context (location, enjoyment, who else was present) domains by entering a new episode of the same main activity. In all three diary instruments, episodes reflect changes in reporting of each diary domain (activity, location, who else was present, and enjoyment) individually, as well as in all combinations. Web and paper diaries collected a greater volume of episodes not associated with a change of the main activity than the app did.

The nesting of categories worked well in the web and app diaries. The three location codes proved less than ideal in early analysis as it is not always possible to triangulate movement between places combining the “indoors” and “outside” categories with the activity codes. We were limited by the physical space of readable font on paper for the final activity and context code lists. It may be possible for pre-coded web and app diaries to accommodate a modest number of additional codes across all domains with the nesting approach.

Interviewers offered participants the choice of either the web or app options, adding the paper alternative for those without ready access to appropriate devices, or those who refused to use the web and app modes. Once a young person selected a mode, they had to stick with this mode for both diaries. Future surveys might investigate whether allowing participants to switch mode might increase response rates for more reluctant participants. We found that take-up of the paper alternative proved higher than anticipated (around 20% in both pilot surveys). However, this was partly driven, we believe, by interviewer error, where some interviewers offered paper diaries upfront. More young people selected the app than the alternatives in the two pilot stages of the survey.

Figure 1
MCS paper-administered time-use diary; first grid page




EARLY MORNING

MORNING




WHAT WERE YOU DOING?	4am	5am	6am	7am	8am	9am	10am	11am	WHAT WERE YOU DOING?
	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	
Sleep and personal care									Sleep and personal care
Sleeping and resting (including sick in bed)									Sleeping and resting (including sick in bed)
Personal care (including taking a shower/bath, grooming, getting dressed etc.)									Personal care (including taking a shower/bath, grooming, getting dressed etc.)
Homework									Homework
School, homework, and education									School, homework, and education
In class									In class
School breaks									School breaks
School clubs									School clubs
Daycation									Daycation
Paid or unpaid work									Paid or unpaid work
Paid work (including paid babysitting and paid work for the family)									Paid work (including paid babysitting and paid work for the family)
Unpaid work for family or other non-household members (e.g. help in family business)									Unpaid work for family or other non-household members (e.g. help in family business)
Chores, housework, and looking after people or animals									Chores, housework, and looking after people or animals
Cooking, cleaning, and shopping for the household									Cooking, cleaning, and shopping for the household
Fixing things around the house, fixing bike, gardening									Fixing things around the house, fixing bike, gardening
Looking after brothers, sisters, other children in the household									Looking after brothers, sisters, other children in the household
Looking after parent or other adult in the household (medical or personal care)									Looking after parent or other adult in the household (medical or personal care)
Looking after animals									Looking after animals
Eating and drinking									Eating and drinking
Eating or drinking in a restaurant or café									Eating or drinking in a restaurant or café
Eating a meal									Eating a meal
Eating a snack or having a drink									Eating a snack or having a drink
Physical exercise and sports									Physical exercise and sports
Cycling									Cycling
Individual ball games and training (e.g. tennis, badminton)									Individual ball games and training (e.g. tennis, badminton)
Jogging, running, walking, hiking									Jogging, running, walking, hiking
Team ball games and training (e.g. football, hockey)									Team ball games and training (e.g. football, hockey)
Swimming and other water sports									Swimming and other water sports
Other exercise (e.g. dancing, keeping fit) and other sports (e.g. skateboarding, gymnastics)									Other exercise (e.g. dancing, keeping fit) and other sports (e.g. skateboarding, gymnastics)
Travelling (including walking to school)									Travelling (including walking to school)
Travel by bus, taxi, tube, plane									Travel by bus, taxi, tube, plane
Travel by car, van (including vehicles owned by friends and family)									Travel by car, van (including vehicles owned by friends and family)
Travel by physically active means (walk, bike etc.)									Travel by physically active means (walk, bike etc.)
Social time and family time									Social time and family time
Attending live sporting events									Attending live sporting events
Cinema, theatre, performance, gig etc.									Cinema, theatre, performance, gig etc.
Exhibition, museum, library, other cultural events									Exhibition, museum, library, other cultural events
Shopping (including window shopping, hanging out at shopping centre)									Shopping (including window shopping, hanging out at shopping centre)
Speaking on the phone (including Skype, video calls)									Speaking on the phone (including Skype, video calls)
Speaking, socialising face-to-face									Speaking, socialising face-to-face
Internet, TV, and digital media									Internet, TV, and digital media
Answering emails, instant messaging, texting									Answering emails, instant messaging, texting
Browsing and updating social networking sites (e.g. Twitter, Facebook, BBM, Snapchat)									Browsing and updating social networking sites (e.g. Twitter, Facebook, BBM, Snapchat)
General internet browsing, programming (not time on social networking sites)									General internet browsing, programming (not time on social networking sites)
Listening to music, radio, iPod, other audio content									Listening to music, radio, iPod, other audio content
Playing electronic games and Apps									Playing electronic games and Apps
Watch TV, DVDs, downloaded videos									Watch TV, DVDs, downloaded videos
Volunteering and religious activities									Volunteering and religious activities
Volunteering									Volunteering
Religious activities (including going to places of worship, praying etc.)									Religious activities (including going to places of worship, praying etc.)
Hobbies and other free time activities									Hobbies and other free time activities
Did nothing, just relaxing, bored, waiting									Did nothing, just relaxing, bored, waiting
Hobbies, arts and crafts, musical activities, writing stories, poetry etc.									Hobbies, arts and crafts, musical activities, writing stories, poetry etc.
Reading (not for school)									Reading (not for school)
Any other activity									Any other activity
Other activities not listed									Other activities not listed
WHERE WERE YOU?	4am	5am	6am	7am	8am	9am	10am	11am	WHERE WERE YOU?
	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	
At home									At home
Indoors, but not at home									Indoors, but not at home
Outdoors									Outdoors
WHO WERE YOU WITH?	4am	5am	6am	7am	8am	9am	10am	11am	WHO WERE YOU WITH?
	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	
Alone									Alone
Mother									Mother
Father									Father
Friends or other young people (up to 18 years old)									Friends or other young people (up to 18 years old)
Siblings (brother or sister)									Siblings (brother or sister)
Other adults									Other adults
HOW MUCH DID YOU LIKE IT?	4am	5am	6am	7am	8am	9am	10am	11am	HOW MUCH DID YOU LIKE IT?
	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	
1 - Strongly liked									1 - Strongly liked
2 - Liked									2 - Liked
3 - Neither liked nor disliked									3 - Neither liked nor disliked
4 - Disliked									4 - Disliked
5 - Strongly disliked									5 - Strongly disliked

Figure 2
 Web-administered MCS time-use diary (showing digital clock)

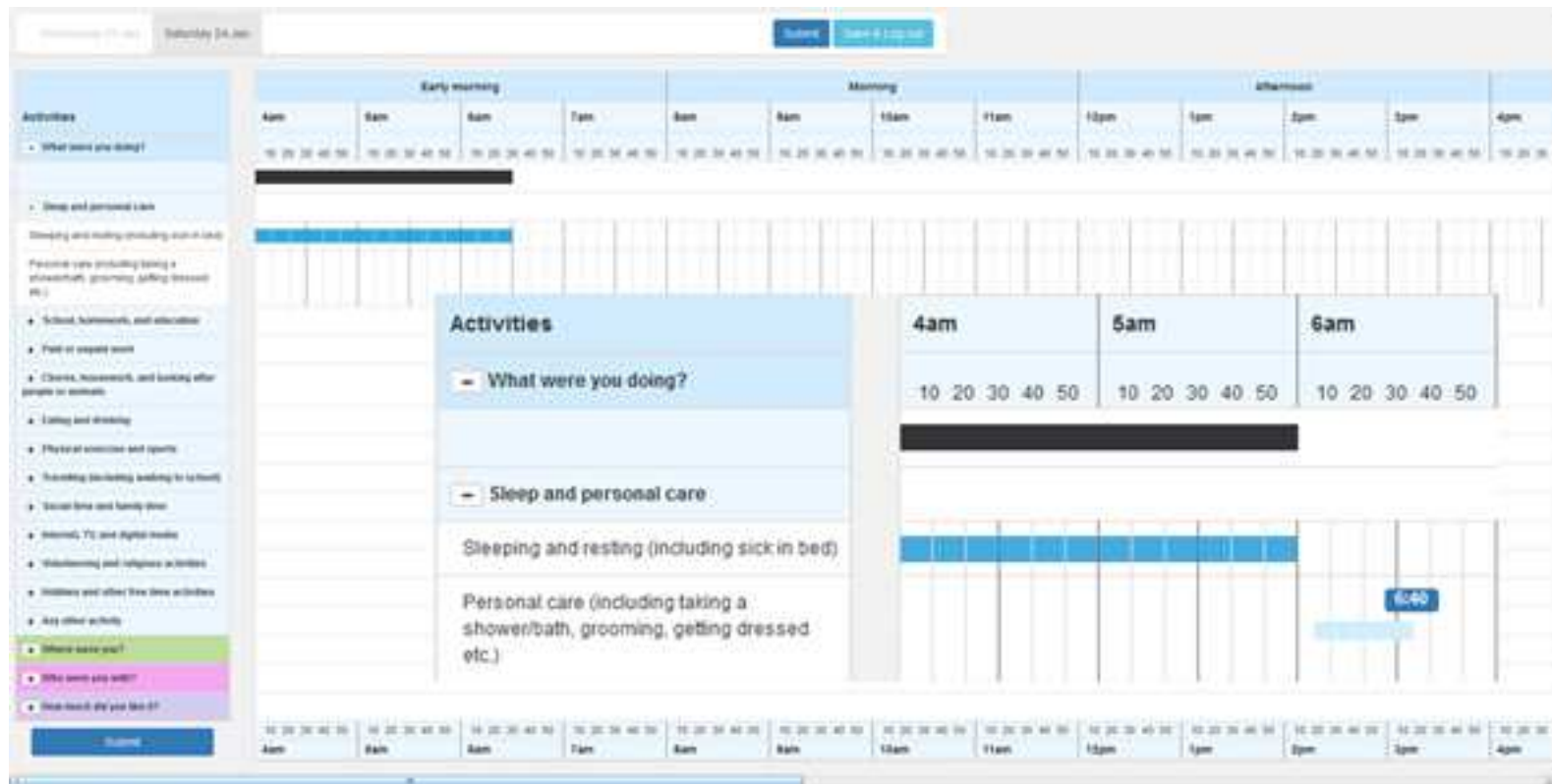
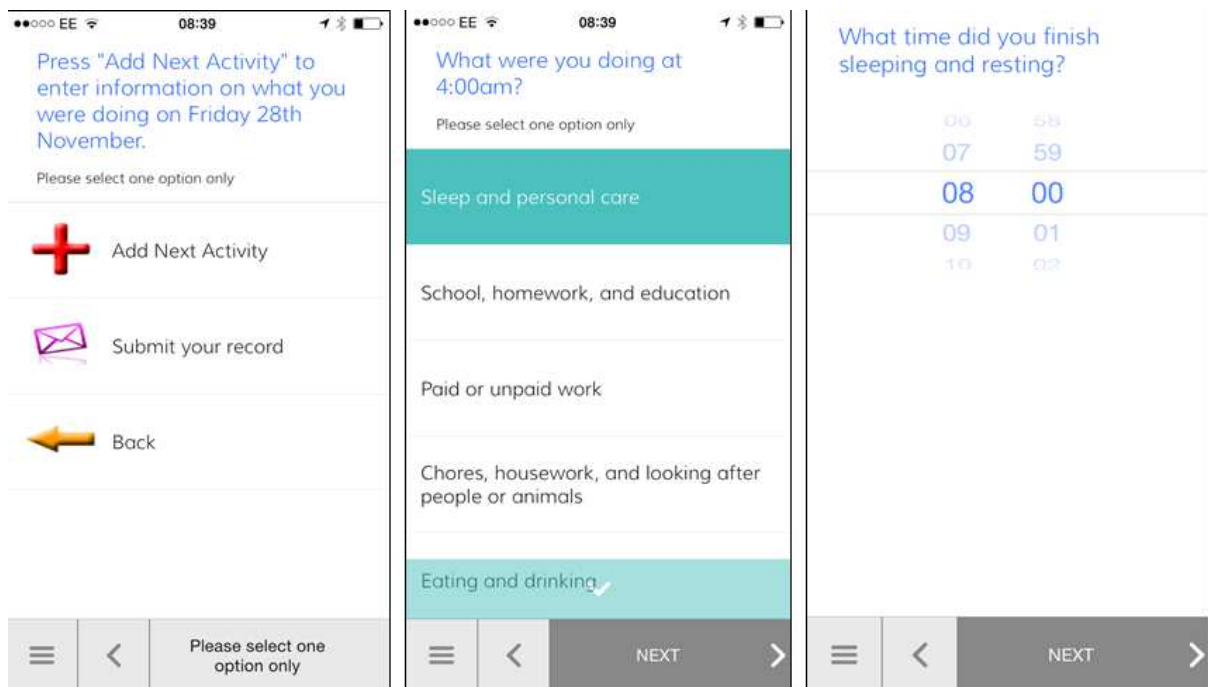


Figure 3
MCS time-use app screen shots



In the first pilot, roughly 70% of both online and paper diaries included episodes with secondary activities, consistent with reporting of secondary activities by young people of similar age in the 15 surveys included in the Multinational Time Use Survey with lower sampled age ranges (Fisher and Gershuny 2013). Secondary activity collection proved problematic with the app, and this survey dropped this field in the second pilot. Future surveys may find better solutions to capture secondary activities with app instruments.

Nearly half of participants returned two diaries of sufficient quality for analysis in the pilot phases. Another 35% returned one good quality diary. As Figure 4 shows, girls were slightly more likely than boys to return at least one usable diary – though girls also were more likely to return some information in one diary, and leave the second diary blank. Boys were more likely not to return the diaries, or to return two incomplete diaries.

One activity code, “44 - Other activities not listed” – may have reduced the level of good quality diary returns. A minority of participants selected this option, and of these, a smaller minority used the option as intended for short duration events in days otherwise well described. More young people choosing this option seemed to use it as an alternative to completing the diary – blocks of 4 to 24 hours of “other activities” effectively are missing data.

Figure 4
MCS diary response patterns (both pilot phases combined)

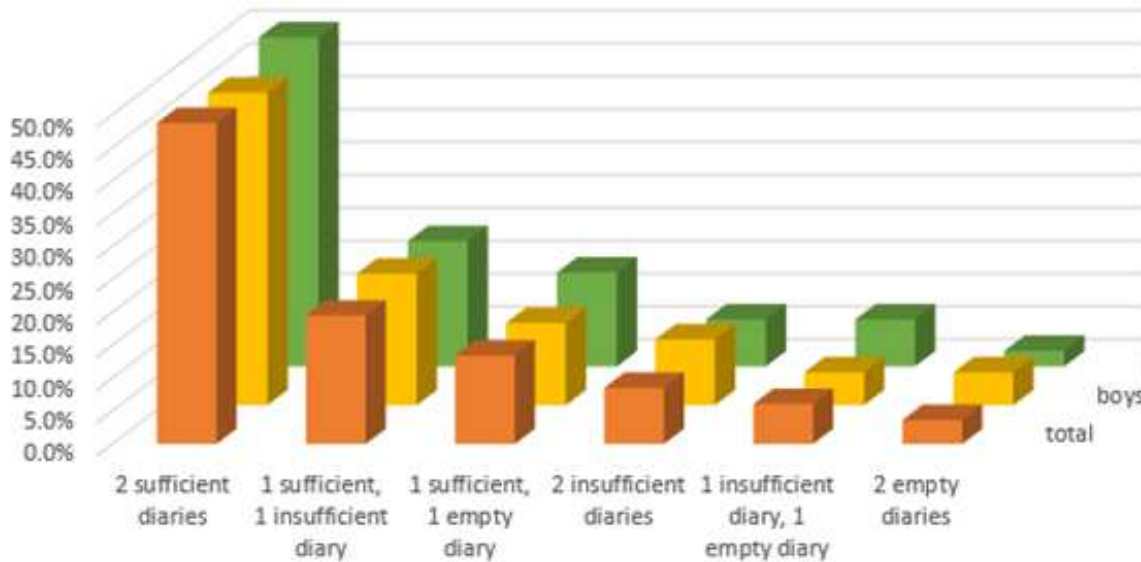


Figure 5
Percentage of good quality diaries by mode and pilot phases

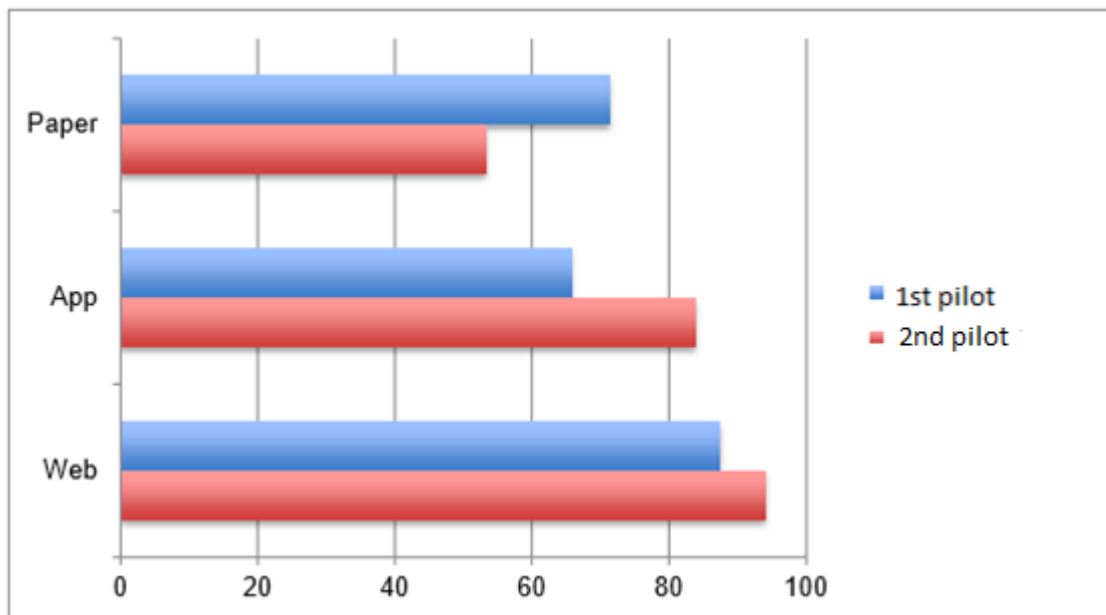


Figure 5 shows that the web mode collected the highest percentage of usable diaries. The paper diaries performed less well, largely as paper diarists did not receive feedback to amend errors. Automated prompts in the app and web instruments guided participants to return more complete records. As the diaries represented one supplement of a multi-element cohort study, arranging interviewer follow-up with the paper diaries was not practical and may have overbur-

dened participants, risking future participation in this survey. Future mixed mode surveys which can accommodate offering similar levels of support to people completing instruments of each mode might produce more comparable mode quality.

The activity distributions in the piloting phases were largely similar by mode, and modest variations more likely reflect small pilot samples rather than instrument performance. All three modes collected a mean of 26 episodes (paper and web diaries elicited more episodes than the app diaries, but even the app collected a mean of 22 episodes – which compares favourably to the means in paper and telephone interview survey diaries completed by young people and included in the MTUS). Overall, the instruments performed well.

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Acknowledgement

The development of the MCS time diary instruments was supported by the ESRC “Centre for Longitudinal Studies Resource Centre 2010-2015” grant (award number: RES-579-47-0001), as well as the ESRC “Millennium Cohort Study Sweep 6 (Age 14) Survey” grant (award number: ES/K005987). Supplemental funding was received from the ESRC cross-investment grant “Children's time use diaries: promoting research, sharing best practice, and evaluating innovations in data collections internationally” (award number: ES/F037937) that was a partnership between the Centre for Time Use Research (CTUR) at the University of Oxford and the Centre for Longitudinal Studies (CLS) at the UCL Institute of Education, University College London. CLS led this work in collaboration with CTUR and Ipsos MORI.

REFLECTIONS ON MEASURING TIME ALONE

Kimberly Fisher

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Time use surveys have included columns for participants to report time spent alone for decades. Early surveys, including those in the Szalai samples, included open-ended columns for people to note who they were with using their own words (Robinson 1977). More recently, phone sur-

veys tend to include a filter question asking if diarists were alone or with others. Paper and web-based diaries tend to offer a tick box in the who else was present section for people to designate time spent alone. Very little research analyses this wealth of data on time spent alone. This time piece sets out reasons why this field might benefit from thinking about what “being alone” means conceptually, what aspects of time alone might matter most for policy (hence should be captured in time diaries), and how we best collect data on this concept.

Some recent literature documents the time use of people who live alone. Utz (2014) examined the prevalence of walking and other healthy behaviour among people living alone in the USA who have or look after pets. Hanifi (2012) profiles the daily activities of men in Finland in single person households. Baxter (2011) examined the activities of Australians who reported having time on their hands – and those who made such reports in 1997 and 2006 were more likely to live alone (though Baxter does not consider time with and not with others, just the activity profiles of people who report having time on their hands).

More articles concentrate on time spent alone by specific populations of particular policy concern. Aizer (2004) summarised the literature on children and young people in the USA who spent time without adult supervision after school while their parents worked, and conducted original analysis showing an increased risk of anti-social and other problematic behaviours for those children spending less time in the care of adults. Golant (1984) and Jun (2014) demonstrate that longer time spent alone can serve as a measure of social isolation associated with negative health and well-being outcomes for older people.

Other research examines more general trends in time alone as an element of policy interest. Nabli and Ricroch (2013) observe a general shift from watching TV and on-line leisure as social activities to spending more time in front of screens alone in France. Older people and unemployed adults spent particularly long hours watching TV, while younger people spent longer spells in front of computers. Nabli and Ricroch (2013) note this shift not only reflects a growing proportion of the French population living alone but also that more people who live in family homes spending time apart in front of separate screens when at home. This alone and inactive time may raise health concerns. Hamrick, Hopkins and McClelland (2008) use the American Time Use Study Eating and Health Module to demonstrate the obesity risks associated with trends to preparing and eating food alone. Roberts (2014) summarises the literature examining safety concerns when people walk alone outside at night. Fisher, Shahbazian and Sepahvand (2012) show that in states in the USA with stronger environmental protection policies, people spend less time inside buildings alone, particularly less time alone engaged in energy-intensive leisure, like watching TV or playing computer games, compared to people living in states with more lax environmental regulations.

A common theme in much of the literature addressing time alone associates solo time with negative outcomes. Roeters, Cloïn and van der Lippe (2014) set out to see if spending time alone might offer respite to time-pressed employed women who also look after children or adults in the Netherlands. They found instead that for both women and men, spending a higher propor-

tion of total leisure time alone is associated with negative mental health consequences. Roeters, Cloïn and van der Lippe (2014), whose paper is the most detailed examination of the time alone literature available at the time of writing, found modest or no effects associated with time alone during other activities.

The current literature gives little consideration to what it means to be alone. Roeters, Cloïn and van der Lippe (2014) explicitly define alone as not being in the same room or space in the presence of household members, non-household family, friends or other well-known persons. When time diary instruments offer instructions defining being alone, these instructions use similar definitions. This is not the same as not being in the presence of other people.

In most surveys from most countries in the current episode file of the Multinational Time Use Study (Fisher and Gershuny 2013), the activity which features most frequently among episodes when people report being alone and also do not report other people being present in Australia, Austria, Finland, France, Germany, Spain and the United Kingdom is personal care. Personal care is the second most common activity in episodes where people report being alone in Israel, and features in the top 10 most frequent activities when people are alone in the USA. Sleep, food preparation, eating, and television viewing also feature frequently among episodes when people report being alone. While at face value, it is credible that people engage in such activities alone, there are instances where it is highly likely that other people are present. Even though the majority of instances of eating alone take place at home, there are a minority of episodes in all surveys in the MTUS where people report eating out alone in a restaurant, canteen, café, bar or pub. A small number of episodes of watching TV alone take place in cafes, bars and pubs.

In Israel, commuting appears most frequently in episodes where people report being alone and other people are not around. In the USA, personal or household care-related travel tops this list. Travel features among the ten most frequent activities in all surveys when people report being alone. Though the majority of travel alone takes place in cars, there is a sufficiently high proportion of diary episodes where people report being alone while travelling by public transport, on foot or on bicycle in public places during daylight and normal business hours to permit meaningful analysis.

In some episodes where people have reported being alone and not with others, diarists record their activities as conversation, physical child care or physical adult care, which are activities that generally necessitate interaction with other people. No research has considered what such reports might mean in terms of how we understand and explain behaviour.

The possibilities for interacting in real time with other people over the internet have expanded rapidly. Surveys increasingly explicitly code real time social media and video call interactions. At a minimum, future research should explore whether interaction with others on-line is more like face to face social time, alone time, or a distinctive form of interaction. Time use survey designers might explore how best to capture such activities. The time piece on the UK 2014-2015 Everyday Life Survey in this volume gives more detail on issues arising from adjusting

diaries to improve the reporting of on-line behaviours generally. No national survey has yet directly addressed the overlap of who else was present information with time on-line.

Time use data processing generally has proceeded under the assumption that being alone is the opposite of (or at least incompatible with) being with other people. A few surveys have documentation detailing that data cleaning involved recoding of cases where a diarist reported being alone at the same time as being with other people to simply time with other people (but not alone). Nevertheless, most surveys included in the MTUS episode file do not include cases where diaries contain reports of being alone at the same time as being with other people (except in cases of a limited number of child and adult care codes that necessarily involve the presence of another person). Only four surveys in the MTUS episode file contain episodes where diarists recorded being alone and being with other people for a range of activities (shown in the table). More recent surveys from each of these countries do not include such reports. This suggests that most surveys “correct” such reports before releasing data.

The experience with the 2014-15 UK Everyday Life HETUS Survey and the UK Millennium Cohort Survey age 14 wave (each described in other time pieces in this volume) indicates that people still report being alone while with other people in time diaries. In the UK HETUS (prior to the final period of data collection), 7916 episodes, representing 1.5% of episodes, contained in nearly one-fifth (19.4%) of diaries reflect this pattern.

Unlike the UK HETUS, which collected only paper diaries, the MCS survey conducted a mixed mode approach. From the first pilot test, the time diary app forced young people to select between alone, others present, or don’t remember. Selecting others present then brought up additional options. The app diary did not allow diarists to make an alone with others report. In the two pilot phases, the web diaries and the paper diaries did allow young people to report being alone while with others, and both these modes collected this pattern. In the main stage of data collection, the web diaries were programmed like the app diaries to prevent alone with others reporting, but the paper diaries allowed and have continued to collect this pattern.

Reporting of time alone while with others

Country	Survey years	Number of episodes including alone with others reporting	% of diaries including alone with others episodes
Spain	2002-03*	1837	3.9%
UK	1987	624	5.9%
USA	1965-66^	92	4.6%
USA	1975-76	1090	23.8%

* The MTUS includes both the Spanish national HETUS survey and the Basque country survey from 2002-03; these cases only appear in the national HETUS sample.

^ In this table, the Szalai Jackson, Michigan and USA national sample surveys are combined.

Is it right to assume that all alone with others reporting reflects participant errors? If such accounts arise by mistake rather than deliberate reporting, we might expect that alone with others episodes would appear disproportionately in diaries with other data quality problems and also would be dispersed across activity categories. In both the MCS pilot testing phases and in the mainstage data collection of the UK HETUS (excluding the final additional phase of data collection), the alone with others reporting primarily appears in good quality diaries (which have a variety of activities including basic behaviours people undertake every day - sleeping or resting, eating, personal care, and some form or exercise of travel; 7 or more episodes; no more than 90 minutes of missing activity time, attached to basic demographic details about the diarist and the date the diary account reflects). Most time alone while with others in the recent UK surveys clusters with eating, sleep, resting, personal care, food preparation, housework, listening to audio or watching video content on devices, paid work, and travel. The alone with others reporting tends not to appear in out of home leisure, social activities or physical activities. In the surveys in the MTUS that include this pattern, a majority of alone with others behaviours are associated with child care in all countries (though this partly is a function of the MTUS diary harmonisation process). In the Spanish 2002-03 survey, informal social time also features with this pattern, while in the UK in 1987, alone with others often appears with personal care. In the USA in 1965-66 and 1975-76, alone with others accompanies eating, shopping and service use. Alone while with others reports accompany a variety of activities, but the distribution is not random and varies by country.

Undoubtedly some participants record being alone with others by mistake. Quality checks (prompts in app or web-administered diaries, or follow-up questions from interviewers) could distinguish errors from conscious reporting. Qualitative interviews could reveal why people might identify some time near other people as alone. Would it be worth the effort to allow participants to make this choice and to try to understand what such reports mean to people?

Many people in this field will have observed the increasingly common phenomenon of groups of people sitting together on sofas or at tables paying more attention to content on hand held devices than they are to the people with whom they are in very close proximity. It might be possible that the way people use smart devices makes the concept of being alone with others more relevant now than before. If data cleaning phases do not automatically remove such reporting as assumed error for at least a few surveys, it will be possible to test who else is present reporting further – such data can be recoded later to remove alone with others reports if researchers so desire. When these accounts are removed before data are released, however, it is not possible to reconstruct which diaries included these patterns (or not cost effective or easy to do so). We may be missing research opportunities if we limit the way we permit people to report how they spend time alone (both generally and alone with others).

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Book notes

by Kimberly Fisher

**Anttila, A.-H., Anttila, T., Liikkanen, M.
and H. Pääkkönen**

**Ajassa kiinni ja irrallaan – Yhteisölliset
rytmit 2000-iuvun Suomessa (Rhythms of
social and community time in Finland in
the 2000s) (2015)**

Publisher: Statistics Finland

Website:

[http://www.stat.fi/tup/julkaisut/tiedostot/jul](http://www.stat.fi/tup/julkaisut/tiedostot/julkaisuluette-)

[kaisuluette-](http://www.stat.fi/tup/julkaisut/tiedostot/julkaisuluette-lo/yyti_aki_201500_2015_16146_net.pdf)

[lo/yyti_aki_201500_2015_16146_net.pdf](http://www.stat.fi/tup/julkaisut/tiedostot/julkaisuluette-lo/yyti_aki_201500_2015_16146_net.pdf)
Languages Available: Finnish

This book explores changing daily living patterns in Finland from the 1980s through the current decade. Finns now spend more time asleep on Sundays than other days, and less time with others on weekends, a change from earlier decades. Informal community time and weekend volunteering have declined, to be replaced by more time on-line or watching TV, often alone. Finns employment and earnings on weekend, by contrast, have changed little across recent decades. This book considers the role technologies have played in changing Finnish society.

Benería, L. Beriek, G. and M. S. Floro
**Gender, development and globalization –
Economics as if all people mattered, Sec-
ond Edition (2015)**

Publisher: Routledge

ISBN: 978-0-415-53749-0

Languages Available: English

This book addresses the oversight in conventional economic models of international development, which ignore the unpaid and informal economic activities of women as well as the significance of caring activities mostly performed by women. This book updates an earlier edition adding feminist economist perspectives to inform development policies. Some of the world's poorest women have been particularly disadvantaged as a consequence of many development initiatives. Policies which aim to help poor women can fail when those policies do not adequately address the time poverty and care requirements faced by these women. While all chapters have elements relevant to time use research, chapters 4 (on employment patterns and informal work) and 5 (on total work, including paid and unpaid labour) make the greatest use of time use data and information. One of the authors, Maria Floro, also was a grant applicant and an instructor on the time use training workshop programme IATUR developed to increase capacity to collect and use time use data in policy research in developing countries.

**Blanchard, P., Bison, I., Bühlmann, F.
and J. A. Gauthier**
**Advances in sequence analysis – Theory,
method, applications (2014)**

Contributing Authors: Andersson, H.,
Blanchard, P., Brzinsky-Fay, C., Bühlmann,
F., Buton, F., Colombi, D., Dietrich, J., El-
zinga, C. H., Fasang, A. E., Gauthier, J. A.,
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C., Lesnard, L., Mariot, N., Mercklé, P.,
Oris, M., Paye, S., Pollien, A., Ritshard, G.,
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Publisher: Springer eBooks
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Website:
[http://www.springer.com/social+sciences/b
ook/978-3-319-04968-7](http://www.springer.com/social+sciences/book/978-3-319-04968-7)
Languages Available: English

This e-book discusses a range of sequence analysis techniques, with much discussion of optimal matching and variations on this technique, as well as other techniques, from sequence synchronisation to event history method adaptations. The book informs the use of sequence analysis in the social sciences. Chapters span more theoretical to more applied subjects. All chapters consider life events in time. The third chapter by Laurent Lesnard specifically addresses the uses of optimal matching with time use data. Other familiar names in the field, including Brendan Halpin, contribute elements to this book.

Calero, A., Dellavalle, R. and C. Zanino
**Uso del tiempo y economía del ciudadano
(Time use and the economy of care)
(2015)**

Publisher: Secretaría de Política Económica
y Planificación del Desarrollo
Website:
[http://www.economia.gob.ar/peconomica/b
asehome/DT_09_uso-del-tiempo_03.pdf](http://www.economia.gob.ar/peconomica/basehome/DT_09_uso-del-tiempo_03.pdf)
Languages Available: Spanish

This book uses time use data from the 2013 INDEC survey in Argentina. The authors focus on the importance of considering unpaid productive work, particularly the care of children and adults in need of support, in economic and social policies. In addition to exploring the intricate dimensions of care of children and adults in Argentina, the paper also reviews the range of time use data collected in other Latin American countries.

Cornwell, B.
**Social sequence analysis – Methods and
applications (structural analysis in the
social sciences) (2015)**

Publisher: Cambridge University Press
ISBN: 978-1-107-50054-9
Languages Available: English

Benjamin Cornwell's sole authored exploration of sequence analysis follows the theoretical development of this family of techniques. Cornwell shows how network methods contribute to sequence analysis. He offers guidance on identifying sequence structures, and analysis of a range of social sequences and microsequences. Chapters 4 (identifying sequences) and 5 (comparing

whole sequences) make the most use of time use data as examples.

Damián, A.

El tiempo, la dimensión olvidada en los estudios de pobreza y bienestar (Time, the forgotten dimension in studies of poverty and wellbeing) (2014)

Publisher: El Colegio de México

ISSN: 978-6-074-62606-3

Website: <https://goo.gl/4VcX8r>

Languages Available: Spanish

This book explores time poverty in Mexico. The book opens with theoretical exploration of how the capitalist structure of the Mexican economy shapes the perceived value of free time. The book uses data from four surveys of Mexican time use, collected in 1996, 1998, 2002, and 2009. As a part of demonstrating the importance of measuring time poverty, the author develops an index of excess working time (ETT). The author also considers how gender struggles manifest in the experience of time poverty.

Draaisma, D.

The nostalgia factory – Memory, time and ageing (2014)

Publisher: Yale University Press

ISBN: 978-0-300-20539-8

Languages Available: English

This book explores how capacity to retain and recall memories alters as people age. The author includes an interview with fellow memory specialist Oliver Sacks. The book suggests that older people can find

value in working with the tendency to reminisce. While not a time use research book in a conventional sense, the meanings and experience of time effuses many sections of discussion.

Hilling, H. and S. Watts

Dads behaving dadly – 67 truths, tears and triumphs of modern fatherhood (2014)

Publisher: Motivational Press, Inc.

ISBN: 978-1-628-65101-0

Website: <http://dadsbehavingdadly.com/>

Languages Available: English

This guide (written from a USA-based perspective) offers fathers tips to preserve – even enhance – their masculinity by participating in the ranges of childcare activities. This is not an academic tome, but the book does offer an insight into one application of time use research into care, unpaid domestic work, and promotion of gender equality. Many sections about specific care activities resonate with events recorded in time diaries.

Kalenkoski, C. M. and G. Foster
The economics of multitasking (2015)

Contributing Authors: Allard, M. D.,
Brown, J., Chaudhury, P., Craig, L., Foster,
G., Hamrick, K. S., Kalenkoski, C. M.,
Sanchis, R. G., Stewart, J., Suziedelyte, A.,
and S. Wulff Pablonia

Publisher: Palgrave Macmillan

ISBN: 978-1-137-38143-9

Languages Available: English

People regularly undertake more than one activity at the same time. While some combinations of activities might decrease productivity or impose mental strain from shifting focus, other combinations might enhance productivity or enhance concentration. This book addresses an oversight in the economic literature, which primarily ignores multi-tasked time. Some chapters in this book use the American Time Use Survey data, which collected a main activity only account of days, then added secondary child care, and more recently also secondary elder care, markers in main activity episodes. Some supplements additionally collect secondary eating within the framework of the main activity report of the day. Other chapters use surveys from multiple countries where people had the option of including secondary activity in their initial report of their day. This book explores the ways people report simultaneous activities, and examines what these reports of non-market activities, including study, eating, housework and child care, mean for policy analysis.

Nuryetty, M. T. and S. Nakayama
Time use survey in Jakarta, Indonesia
(2015)

Editor: Midori Otake

Publisher: Tokyo Gakugei University Press

ISBN: 978-4-901-66536-0

Languages Available: Japanese, English

This volume offers the first overview in English of the Badan Pusat Statistik Republik Indonesia (BPS RI – the official statistical agency) 2004 pilot time use survey of all people aged 10 and older in households in five regions. This book additionally outlines patterns of daily activity in Indonesia, highlighting the unpaid contributions of women to the economic and social life of this country. Though slim, this book offers insight into a country with a culture seldom explored in the time use literature to this point.

Samantray, E.
Reconciling work and family life – A
study of women's time use patterns, un-
paid work and workplace policies (2015)

Publisher: V.V. Giri National Labour Institute, Chandu Press

ISBN: 978-9-382-90230-0

Website: <http://www.vvgnli.org/>

Languages Available: English

This book explores work-life balance and working time arrangements in India, where women trying to reconcile unpaid and paid work responsibilities face stiff challenges. Time poverty, lack of care support services, and low family support for working women contribute to women's low labour force

participation. This publication aims to influence policies enabling more Indian women to take up paid employment.

Shipp, A. J. and Y. Fried
Time and work, Volume 1 – How time impacts individuals (2014)

ISBN: 978-1-848-72133-3

Time and work, Volume 2 – How time impacts groups, organizations and methodological choices (2014)

ISBN: 978-1-848-72134-0

Publisher: Psychology Press

Language Available: English

This pair of books adapts time use research techniques from the perspective of business management. The first volume considers how time shapes employees motivation, creativity, emotional well-being, sense of identity and stress. The second volume considers how time influences organisational dynamics.

Torriti, J.
Peak energy demand and demand side response (2015)

Publisher: Routledge

ISBN: 978-1-138-01625-5

Website: for 2016 paperback edition

<https://www.routledge.com/products/9781138016255>

Languages Available: English

This book addresses how the European Union might encourage households and busi-

nesses to use energy in a more efficient fashion to reduce the environmental impact of European energy consumption. The book draws on a range of data sources, including time use data. This text makes novel linkages of time use and smart meter information and gives insight into using time use data to measure the environmental impact of behaviours.

Wajcman, J.
Pressed for time – The acceleration of life in digital capitalism (2015)

Publisher: University of Chicago Press

ISBN: 978-0-226-19647-3

Languages Available: English

Wajcman mixes time use analysis and theoretical discussion of time literature to explore the increasingly hectic pace of life. Wajcman suggests that instead of creating time pressure, smart devices reflect the demand for higher tempo living people expect as a consequence of the prospects for increased efficiency offered by modern technologies. This book explores how technology has changed daily activity patterns.