

Time use diary design for our times - an overview, presenting a digital diary instrument

Oriel Sullivan, Jonathan Gershuny, Juana Lamote de Grignon and the CTUR team

Centre for Time Use Research

Social Research Institute, University College London

Introduction



- We present an online diary instrument that retains the visual simplicity of the 'light diary' design, but uses online functionality to offer expanded lists of activities and multiple fields via drop-down menus and pop-up boxes
- Making use of this technology, we are able to adapt the light diary visual design to collect the same information as the HETUS diary, the most advanced pen and paper diary design.

HETUS: The 'gold standard' time-use pen and paper diary

Day 1
Time: 7am – 10am
Morning

Day 1
Time: 7am – 10am

Were you alone or with somebody you know?
Mark all relevant boxes

Time: 7am-10am Morning (am)	What were you doing? Please write down one main activity.	If you did something else at the same time, what else did you do?	Did you use a smartphone tablet, or computer?	Where were you? Location, or mode of transport	People who live with you							How much did you enjoy this time? 1 =not at all 7 =very much
					Alone	Spouse / partner	Mother	Father	Child aged 0-7	Other person	Others you know	
7am-7.10	<i>Woke up the children</i>		<input type="checkbox"/>	<i>At home</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5
7.10-7.20	<i>Had breakfast</i>	<i>checked emails</i>	<input checked="" type="checkbox"/>	↓	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6
7.20-7.30	" "	<i>Talked with my family</i>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5	
7.30-7.40	<i>Cleared the table</i>	<i>Listened to the radio</i>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	
7.40-7.50	↓	↓	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	↓	
7.50-8am	<i>Helped the children dressing</i>	<i>Talked with my children</i>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	↓	
8am-8.10	" "	↓	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	↓	
8.10-8.20	<i>Went to the day care centre</i>	↓	<input type="checkbox"/>		<i>on foot</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1

Use an arrow or quote marks to record that an activity lasted longer than 10 minutes.

- Notice the visual simplicity and ease of completion characteristic of the HETUS design, based on decades of pen and paper diary design development
- As a 'diary' should, it resembles a day's activities.....

Principles of the 'light' diary: a brief history

Following design work in the 1990s the UK Office of National Statistics pioneered the 'light' diary design with the time use diaries attached to their 'omnibus' surveys of 2001 and 2005. The fundamental principles were:

- Pre-coded reduced list of activities (for speed of collection)
- Visual attractiveness and intuitive simplicity of design
- Independence of diary fields

Office of National Statistics Omnibus Survey 2005

Note:

- Introduction of continuous line
- Possibility of independent secondary activities (indicated by a ● rather than a x)

Activity groups	Activity codes and descriptions (Also see notes on right hand page)		Early morning						
			6am 30	7am 30	8am 30	9am 30			
Personal care	1	Sleeping	1	x	x				
	2	Resting (doing nothing, 'time out')	2						
	3	Washing, dressing/undressing, etc	3		x	x			
Eating, drinking	4	Eating or drinking/ having a meal (at home or away from home)	4			x	x		
Housework and other household tasks	5	Preparing food and drinks, cooking, washing up	5			x			
	6	Cleaning, tidying house	6						
	7	Washing, ironing or mending clothes etc	7						
	8	Maintenance of house, DIY, gardening	8						
	9	Pet care (including walking the dog)	9						
Travel	10	Travelling	10						
	10a	How you travelled (enter letter - see right page)	10a						
	10b	Type of trip (enter letter - see right page)	10b						
Work for paid job	11	Work for job (include paid and unpaid overtime and work brought home. Exclude lunch and other breaks)	11						
Education and courses	12	Formal education	12						
	13	Recreational courses and study	13						
Voluntary work	14	Voluntary work for or on behalf of an organisation, charity or sports club	14						
Caring for children and adults	15	Caring for/looking after and playing with own children	15		●	—	●		
	16	Caring for/looking after other children	16						
	17	Helping or caring for adults who live with you	17						
	18	Helping or caring for other adults who don't live with you (not as voluntary or paid work)	18						
Shopping and appointments	19	Shopping (incl. internet shopping), banking (incl internet banking), post-office, appointments with the doctor, dentist, hairdresser, plumber etc.	19						
Leisure	20	Watching TV and videos/DVDs, listening to radio or music	20						
	21	Reading	21						
	22	Playing sports, exercising	22						
	23	Spending time with friends, family, neighbours at home or at their homes	23						
	24	Going out with friends, family, neighbours (e.g. to the pub, restaurant etc.)	24						
	25	Contact with friends and family by telephone, text, e-mail, instant message or letter	25						
	26	Visits to cinema, theatre, concerts, sporting events, museums, galleries, historical monuments, library etc.	26						
	27	Attending church, temple, mosque, synagogue, or other religious meetings, praying alone, attending political or other meetings	27						
Computer and internet use	28	Hobbies and other leisure activities	28						
	29	Using a computer or accessing the internet - Record what the computer is being used for above e.g. internet shopping or banking code 19, playing games code 28, e-mailing friends code	29						

EXAMPLE

Understanding Society Wave 7 (2014)

Activity groups	Activity codes and descriptions (Also see notes on right hand page)			Early morning											
				4am			5am			6am			7am		
				30			30			30			30		
Personal care	1	Sleeping	1	X			X								
	2	Resting (doing nothing, 'time out')	2												
	3	Washing, dressing/undressing, etc	3				X	X							
Eating, drinking	4	Eating or drinking/ having a meal (at home)	4							X	X				
Housework and other household tasks	5	Preparing food and drinks, cooking, washing up	5						X						
	6	Cleaning, tidying house	6												
	7	Washing, ironing or mending clothes etc	7												
	8	Maintenance of house, DIY, gardening, pet care	8												
	9	Other household tasks	9												
Travel	10	Travelling	10							X	X	X			
	10a	How you travelled (enter letter - see right page)	10a							P	P	T	T		
Work for paid job	11	Work for job (include paid and unpaid overtime and work brought home)	11										X	X	X

Extending the light diary online

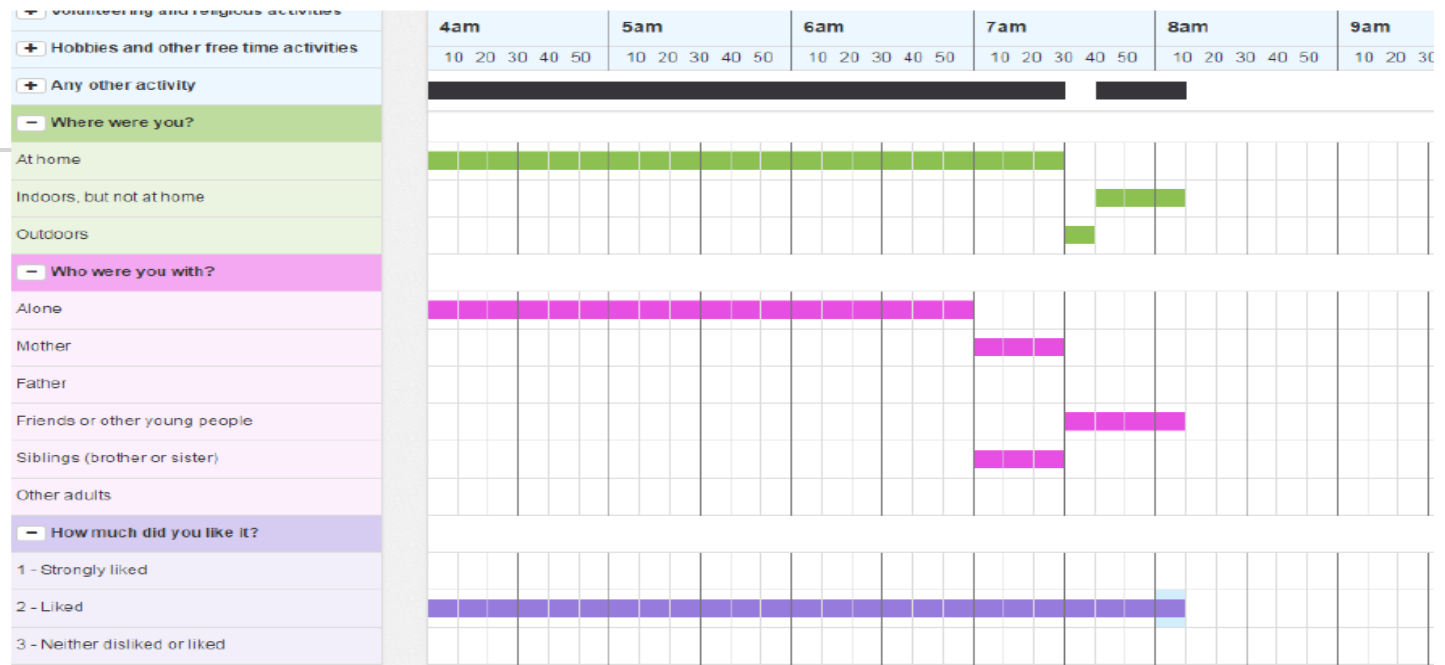
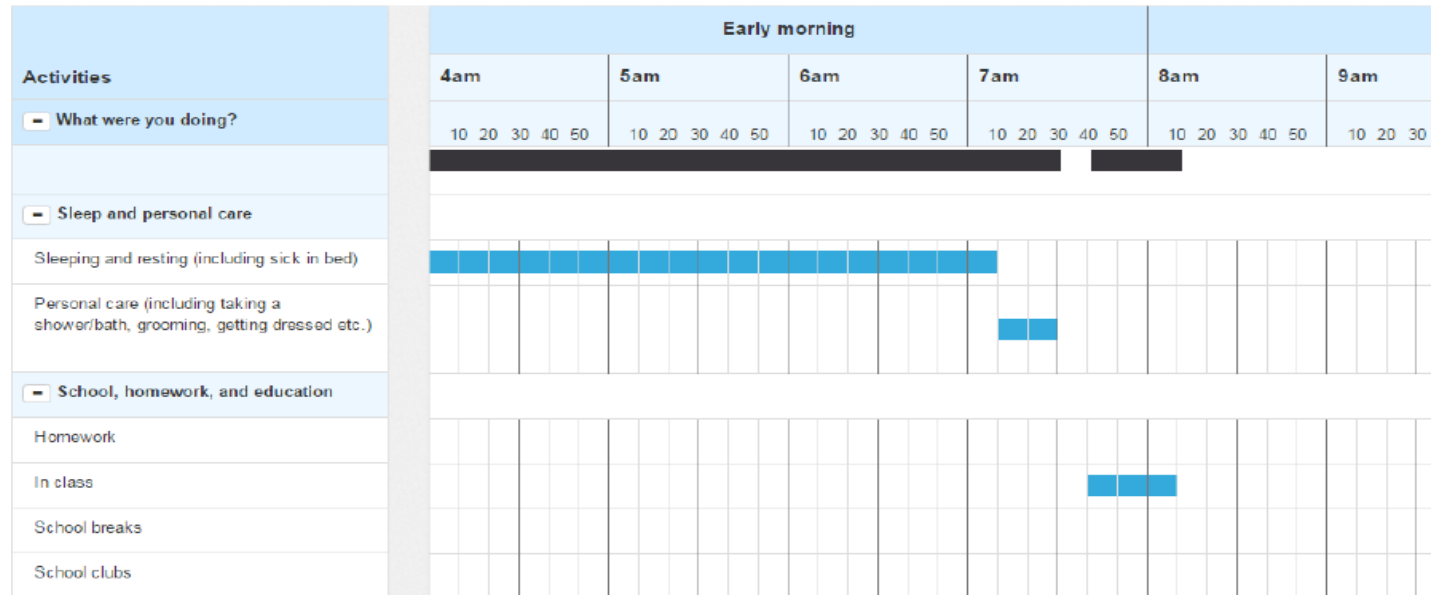
- First example the Millenium Cohort Study, Wave 6 (age 14)

Collected 3 modes: paper, 'web-based' and app versions

Millenium Cohort Study (MSC) Light diary Wave 6 (age 14): Paper version

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	Sleeping and resting (including sick in bed) Personal care (including taking a shower/bath, grooming, getting dressed etc.)										Sleeping and resting (including sick in bed) Personal care (including taking a shower/bath, grooming, getting dressed etc.)
School, homework, and education	Homework In class School breaks School clubs Detention										School, homework, and education
Paid or unpaid work	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)										Paid or unpaid work
Chores, housework, and looking after people or animals	Cooking, cleaning, and shopping for the household Fixing things around the house, fixing bike, gardening Looking after brothers, sisters, other children in the household Looking after parent or other adult in the household (medical or personal care) Looking after animals										Chores, housework, and looking after people or animals
Eating and drinking	Eating or drinking in a restaurant or cafe Eating a meal Eating a snack or having a drink										Eating and drinking
Physical exercise and sports	Cycling Individual ball games and training (e.g. tennis, badminton) Jogging, running, walking, hiking Team ball games and training (e.g. football, hockey) Swimming and other water sports Other exercise (e.g. dancing, keeping fit) and other sports (e.g. skateboarding, gymnastics)										Physical exercise and sports
Traveling (including walking to school)	Travel by bus, taxi, tube, plane Travel by car, van (including vehicles owned by friends and family) Travel by physically active means (walk, bike etc.)										Traveling (including walking to school)
Social time and family time	Attending live sporting events Gowns, theatre, performance, gig etc. Exhibition, museum, library, other cultural events Shopping (including window shopping, hanging out at shopping centre) Speaking on the phone (including Skype, video calls) Speaking, emailing face-to-face										Social time and family time
Internet, TV, and digital media	Answering emails, instant messaging, texting Browsing and updating social networking sites (e.g. Twitter, Facebook, BBM, Snapchat) General internet browsing, programming (not time on social networking sites) Listening to music, radio, iPod, other audio content Playing electronic games and Apps Watch TV, DVDs, downloaded videos										Internet, TV, and digital media
Volunteering and religious activities	Volunteering Religious activities (including going to places of worship, praying etc.)										Volunteering and religious activities
Hobbies and other free time activities	Did nothing, just relaxing, bored, waiting Hobbies, arts and crafts, musical activities, writing stories, poetry etc. Reading (not for school)										Hobbies and other free time activities
Any other activity	Other activities not listed										Any other activity
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	

MSC Wave 6: Online version



- the app-based diary, in contrast, was constructed in survey-style, with multiple repeated questions asking about the duration of each primary activity through the day, then iterating through the other diary fields for each duration of those primary activities.....

MCS App

●●○○ EE

08:39



What were you doing at
4:00am?

Please select one option only

Sleeping and resting (including sick in
bed)

Personal care (including taking a
shower/bath, grooming, getting
dressed etc.)



NEXT



●●○○ EE

08:39

📶 🔗 🔋

What time did you finish
sleeping and resting?

06 58

07 59

08 00

09 01

10 02



NEXT



●●○○ EE

08:39



Where were you while you were sleeping and resting between 4:00am and 08:00?

Please select one option only

At Home

Indoors, but not at home

Outdoors

Don't want to answer



NEXT





08:40



How much did you like sleeping
and resting between 4:00am
and 08:00?

Please select one option only

1 - Strongly liked

2 - Liked

3 - Neither liked nor disliked

4 - Disliked

5 - Strongly disliked



NEXT



Next activity.....etc. etc.

●●○○ EE 08:39 ↗ * 🔋

What were you doing at
8:00am?

Please select one option only

Sleep and personal care

School, homework, and education

Paid or unpaid work

Chores, housework, and looking after
people or animals

Eating and drinking ✓

☰ < NEXT >

MCS Instrument comparison

‘Using new technologies for time diary data collection: instrument design and data quality findings from a mixed-mode pilot survey’, *Social Indicators Research*, 2018, vol. 137, pp. 379-390. Chatzitheochari, S, Fisher, K, Gilbert, E, Calderwood, L, Huskinson, T, Cleary, A and Gershuny, J.

- 3 methods were compared: the pen & paper version; the web-based diary and the app-based diary
- after controlling for observable characteristics associated with diary mode selection and adolescent time-use, the web and app diaries were shown to yield higher quality data than paper diaries.

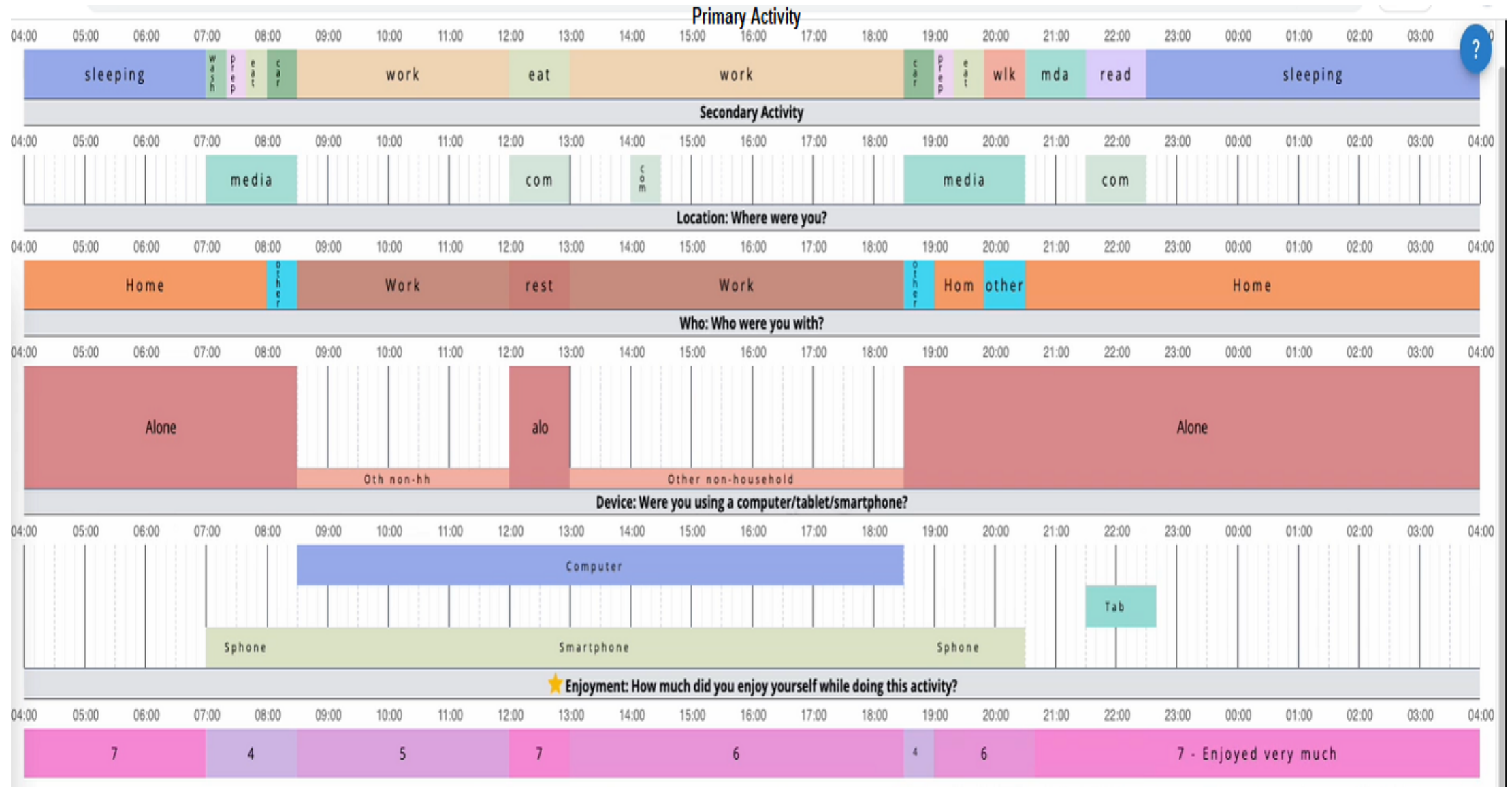
- However, compared to both paper and app diaries, the web-based design yielded a higher average of episode changes per day, and higher numbers of reported activities per day (measures of diary detail and hence quality). The authors conclude:

“our analyses show that app diarists were more likely to use the ‘any other activity’ code than paper or web diarists. We argue that this is associated with the markedly different diary format of the MCS app instrument, which is more cognitively demanding than the paper and the web instrument, both of which provide a visual representation of the surveyed day and the range of broad time-use domains available to the diarist.” (Chatzitheochari et al., 2018)

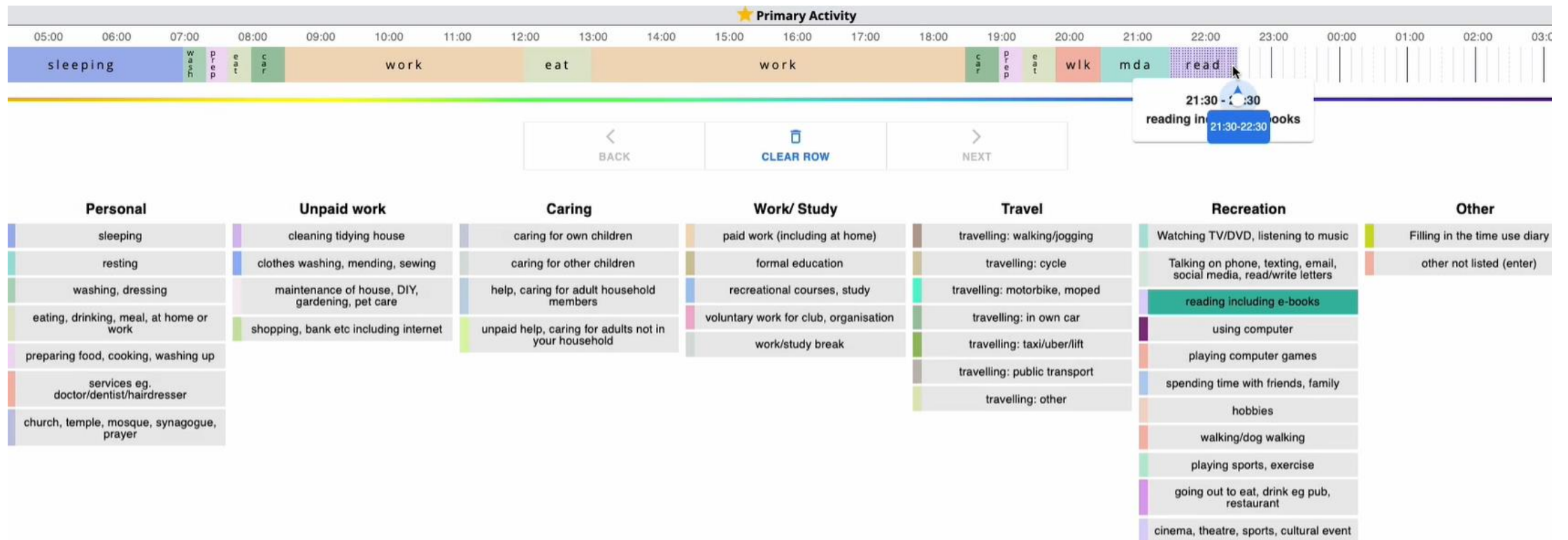
Extended Light Diary Digital Instrument (ELiDDI)

- Digital technology enables simple extension of the light diary format to incorporate many of the features of the full pen and paper diary
 - For example, extended drop-down menus of activities
 - Pop-up supplementary questions

Completed diary day: wide screen



Filling in the primary activity: wide screen



Filling in the primary activity: vertical screen

What were your main activities of the day: ?
Mon, 03 Oct, 2022

< BACK CLEAR ROW NEXT >

Primary Activity

04:00

05:00

06:00

07:00

08:00

09:00

10:00

11:00

sleeping

04:00-06:00

DONE

Dropdown selection

What were your main activities of the day: ?
Mon, 03 Oct, 2022

< BACK CLEAR ROW NEXT >

What were you doing? ×
Please select an activity

See all

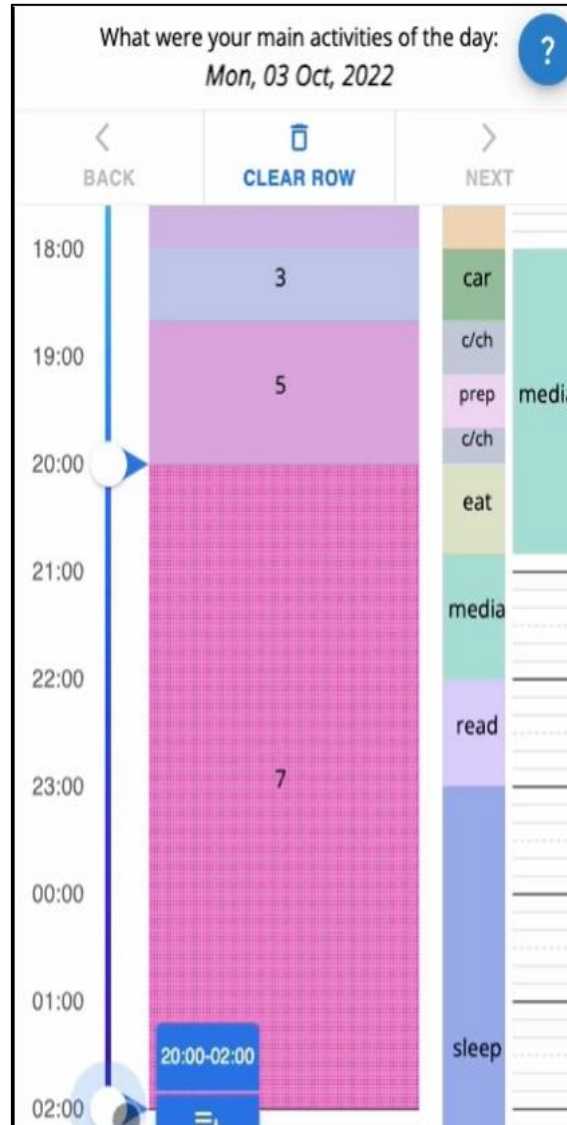
- ✓ Personal
- ✓ Unpaid work
- ✓ Caring
- ✓ Work/ Study
- ✓ Travel
- ✓ Recreation
- ✓ Other

10:00 _____

11:00 _____

A screenshot of a mobile application interface. At the top, a header asks "What were your main activities of the day:" followed by the date "Mon, 03 Oct, 2022" and a blue circular help icon with a question mark. Below the header is a navigation bar with three buttons: "BACK" (left arrow), "CLEAR ROW" (trash icon), and "NEXT" (right arrow). A white modal dialog box is open in the center, titled "What were you doing?" with a close button (X) in the top right corner. The dialog contains the text "Please select an activity" and a toggle switch labeled "See all" which is currently turned off. Below the toggle is a list of activity categories, each with a downward-pointing chevron: "Personal", "Unpaid work", "Caring", "Work/ Study", "Travel", "Recreation", and "Other". At the bottom of the screen, a portion of a time-based activity log is visible, showing time slots for "10:00" and "11:00" with horizontal lines for activity entry.

Completed diary: vertical screen



ELiDDI – horizontal and vertical versions

- https://d2n88fe5uqdqty.cloudfront.net/rnd/projects/caddi/2022/assets/Desktop_short_v7_x264.mp4
- https://d2n88fe5uqdqty.cloudfront.net/rnd/projects/caddi/2022/assets/Mobile_cut_v2_x264.mp4

Click and drag: accessibility?

- This technology is not accessible to everyone, and is listed as level AA (webpages should conform) in the latest Web Content Accessibility Guidelines (WCAG), which the UK government is committed to.
- Access can be provided, though, with use of zoom tools for the timeline, and clicking at the start and end of an activity, rather than dragging (ie click-click rather than click and drag)
- In addition, and at least as important, those not able to access the online tool at all need alternative options (e.g. CATI)

HETUS-style survey (for comparison with the UK ONS OTUS) – run in April 2023

- National population-representative sample of individuals
- Individual questionnaire completion + 2 randomly allocated diary days
- Full HETUS activity classification and diary fields
- Phone completion by interviewer offered to ‘hard to reach’ population
- N= 3874 diary days collected

- Data available from CTUR

Concluding.....



The ELiDDI design mimics the visual intuitiveness and simplicity of the light diary design.



While the light diary was only able to collect a limited range of activities in order to keep to a single page/booklet, the online functionality of the ELiDDI design enables the expansion via dropdown menus to the full complexity of the HETUS diary, while maintaining the simple and intuitive light diary visuals



This makes it analogous both visually and in terms of functionality to the gold-standard HETUS pen and paper design, and maintains the built-in independence of diary fields.

CONSIDERATIONS FOR ANALYSIS: The independence of diary fields

- Standard techniques of the analysis of longitudinal data (a close analogy to time use diary sequence data) depends on field independence for the definition of episodes
- For example, intervals between births do not coincide with intervals between employment spells
- Neither do periods of co-presence coincide with activities; watching TV could be done in succession alone, with a partner or with a partner and children
- As with any longitudinally organised data, a change in any field should define a change in episode
- Multichannel methods of diary analysis require this flexibility in design



THANK YOU

