Understanding Society

Working Paper Series

No. 2025 – 17

Report on the UKHLS pilot for the activity / sleep / geolocation tracker study

Owen Preston[1], Magda Borkowska[1], Annette Jäckle[1], Jonathan Burton[1], Giulia Peorio[2], and Jim Vine[1]

[1]University of Essex

[2]University of Sussex

Understanding Society

Economic and Social Research Council

Non-technical summary

This report documents the design, implementation, and results of a pilot study testing methods to collect data on physical activity, sleep, and geolocation from *Understanding Society* sample members.

Participants were asked to wear a Garmin Vivoactive 5 smartwatch for four weeks, to collect activity and sleep data. They were also asked to install a mobile app, developed by Avicenna Research, on their smartphone to collect geolocation data and complete a survey at the end of each day for the first ten days. At the end of the study participants were asked to complete a debrief survey.

The aims of the pilot were to test the feasibility and logistics of inviting sample members from *Understanding Society* to take part in an Activity Tracker study. We also used the pilot to obtain feedback from participants on their experiences with the study and how we could make it easier for them.

Participants in the Activity Tracker pilot were recruited from the existing *Understanding Society* pilot sample. A total of 28 participants (26% of those invited) signed up for the Activity Tracker pilot.

We document the fieldwork procedures and all participant communications documents, including letters, emails, information leaflets, FAQs in this report. We also document the three questionnaires pilot participants were asked to complete: the sign-up survey, the daily survey in the app, and the debrief survey.

We report results from the pilot in terms of answers given in the sign-up survey and in the debrief survey, the rates at which participants complied with the request to wear the smartwatch at least 22 hours a day for four weeks, and the issues about which participants contacted the *Understanding Society* Participant Communications Team. We conclude with lessons learned.

Overall, the conclusions from the pilot study are positive. Subject to funding decisions, we hope to implement the activity / sleep / geolocation data collection on the *Understanding Society* Innovation Panel.

Report on the UKHLS pilot for the activity / sleep / geolocation tracker study

Owen Preston[1], Magda Borkowska[1], Annette Jäckle[1], Jonathan Burton[1], Giulia Peorio[2] and Jim Vine[1]

[1]University of Essex

[2]University of Sussex

Abstract: This report documents the design, implementation, and results of a pilot study testing methods to collect data on physical activity, sleep, and geolocation from *Understanding Society* sample members. Participants were asked to wear a Garmin Vivoactive 5 smartwatch for four weeks, to collect activity and sleep data. They were also asked to install a mobile app, developed by Avicenna Research, on their smartphone to collect geolocation data and complete a survey at the end of each day for the first ten days. At the end of the study participants were asked to complete a debrief survey.

Keywords: accelerometery, wearable device, smartwatch, mobile app, GPS, data collection methods, survey

JEL classification: C81, C83

Acknowledgements: Understanding Society is an initiative funded by the Economic and Social Research Council and various Government Departments, with scientific leadership by the Institute for Social and Economic Research, University of Essex, and survey delivery by the National Centre for Social Research and Verian. The research data are distributed by the UK Data Service.

Corresponding author: Owen Preston, Institute for Social and Economic Research, University of Essex, Wivenhoe Park, Colchester, Essex CO4 3SQ, United Kingdom, email: op16174@essex.ac.uk.

Contents

1. Aims of the pilot

The aim of this project is to develop methods to collect data on physical activity, sleep, and geolocation from *Understanding Society* sample members. Participants will in addition be asked to complete a short daily survey asking about their wellbeing. The geolocation data will enable linkage to information about the nature of spaces that people spend time in.

The initial work on this project involved consulting with topic experts and reviewing different technical solutions and suppliers that could collect these data.

We have settled on a solution for which participants are asked to wear a Garmin Vivoactive 5 smartwatch for four weeks, to collect activity and sleep data. They are also asked to install a mobile app, developed by Avicenna Research, on their smartphone to collect geolocation data. Participants will also use the app to answer a survey at the end of each day for the first ten days, and to complete a debrief survey at the end of the study.

The next phase of development involved testing the smartwatch and app-based data collection in house and examining the quality of the data collected (McCrorie and Caryl 2025). Following this initial assessment, we implemented a small-scale pilot study, to test the feasibility and logistics of inviting sample members from *Understanding Society* to take part in an Activity Tracker study. We also used the pilot to obtain feedback from participants on their experiences with the study and how we could make it easier for them. In this report we document the implementation, results, and lessons learned from the pilot.

2. Study design

Pilot sample

Participants in the Activity Tracker pilot were recruited from the existing *Understanding Society* pilot sample. We aimed to collect data on around twenty individuals (aged 18+) as part of the pilot. To do this we sent invitation letters via CDS, the University of Essex's printing company. Of the 109 sample members, 19 participants consented to receive the first batch of Garmin kits. Following reminder invitation letters being distributed, a further 9 participants signed up. That is, a total of 28 participants signed up to take part in this pilot, a sign-up rate of 26%.

What we asked respondents to do and for how long

Participants were invited to take part in the study via a postal invitation letter and accompanying information leaflet, sent to their home address. These documents included information about the study and how their data would be used.

As a first step, participants were asked to complete a sign-up survey via Qualtrics, where they were asked some questions to determine eligibility for the study. If they did not own a smartphone, or owned a Huawei smartphone, they were told that they were unfortunately not eligible for the study, as participants needed to install an app on their smartphone which was not compatible with Huawei phones. Eligible participants were asked further questions about the operating system of their smartphone, whether they owned and regularly used a smartwatch, the brand of that smartwatch, their dominant hand, whether they were a morning or evening type of person, and whether they consented to take part in the study. One round of reminder invitation letters was sent only to those participants who had not already signed up via the survey.

Consenting participants were then sent a Garmin kit via DHL Express which included a smartwatch to be worn on their non-dominant wrist as they went about their usual daily business. Participants were asked to wear the watch for at least 22 hours a day, including during activities like swimming, for 4 consecutive weeks from the point they completed the setup process according to the instructions included in the kit. The smartwatches required charging approximately every 5-7 days, when the battery level reached 10% or lower. The incentive for participants to take part was that they could keep the smartwatch at the end of the study, along with the other components included in the kit.

The smartwatch collected data about sleep (duration, sleep phases, time awake), and physical activity levels (intensity, heart rate, accelerometer). Participants were also asked to install the *Understanding Activity* app developed by Avicenna Research onto their smartphone. This app was used together with the smartwatch for GPS tracking. Via the app, participants were also asked to complete a 2-minute daily questionnaire for the first 10 days of the study which asked questions about mood, exercise, stress and social interactions. The daily questionnaire was available to complete between 6pm until 2am each evening. Participants could opt into receiving email or SMS reminders from Avicenna Research to complete the daily questionnaire. Reminders were sent at 6pm and 9pm each day. Outside of this, all participants received push notifications from the app on their smartphones as reminders too.

Included in the Garmin kit was a phone holder, which participants could wear during exercise to keep their phone with them for GPS tracking. Any participants who had received kits but had not begun data collection were contacted by email to offer support.

After the study period ended, participants received a thank you letter asking them to complete a debrief survey via Qualtrics to give feedback on their experiences with the study. We also provided instructions on how to reset their smartwatch back to factory settings and reminded participants to delete the app from their smartphone. No further data were collected from that point onwards.

Reasons for using the Garmin Vivoactive 5 smartwatch

Garmin is the only reputable consumer-grade brand that allowed recovering raw data from the smartwatch via a software development kit (SDK). This is not possible with Fitbits or any other consumer-grade devices. Garmin also has the best GPS sensors among well-known consumer-grade devices, as well as very good accelerometry data that has been rigorously tested against medical and research-grade devices. The brand also has a well-developed health research team that is willing to make adjustments for researchers and software developers who want to use their technology for research. Furthermore, Fitbit is being slowly phased out of the market after being acquired by Google. Garmin was recommended by all external companies and software developers we approached.

The Vivoactive 5 model was chosen because it was the least expensive option that allowed for collection of the data we needed. It also allowed the software developers to adjust the GPS data collection on the watch, although we did not use this option in the end as it drained the Garmin batteries too quickly. We chose the model in blue, as it was the most gender-neutral option.

Experimentation with 4-vs-3-minute GPS intervals

Part way through the pilot study, the frequency at which the mobile app collected GPS data was changed from a to 3-minute interval to a 4-minute interval. The finer grained data collection is preferable in terms of data quality, however, comes at the cost of draining smartphone batteries more quickly. The change in settings was implemented to check test the impact on participants and on the resulting data.

The results suggested that changing the interval from 3 minutes (more battery draining) to 4 minutes (less battery draining) did not have a noticeable effect on participation in the study.

Materials

The Garmin kits were assembled by the project team, taking approximately 1-2 mins per kit to compile. Each kit was packaged in an A4 padded envelope and contained the following components. All participant communication documents (letters, emails, leaflets etc) are documented in Appendix 2:

- Personalised Garmin kit cover letter
- Participant instruction leaflet
- Garmin Vivoactive 5 smartwatch (unboxed so that the package would fit through letterboxes):

- 2 Garmin instruction leaflets from the original box
- Garmin charging cable
- USB-C adaptor (pre-attached to the Garmin charging cable):

- Phone holder:

Data flows

The flowchart in Figure 1 illustrates the data sources, flows and actors in place for the pilot.

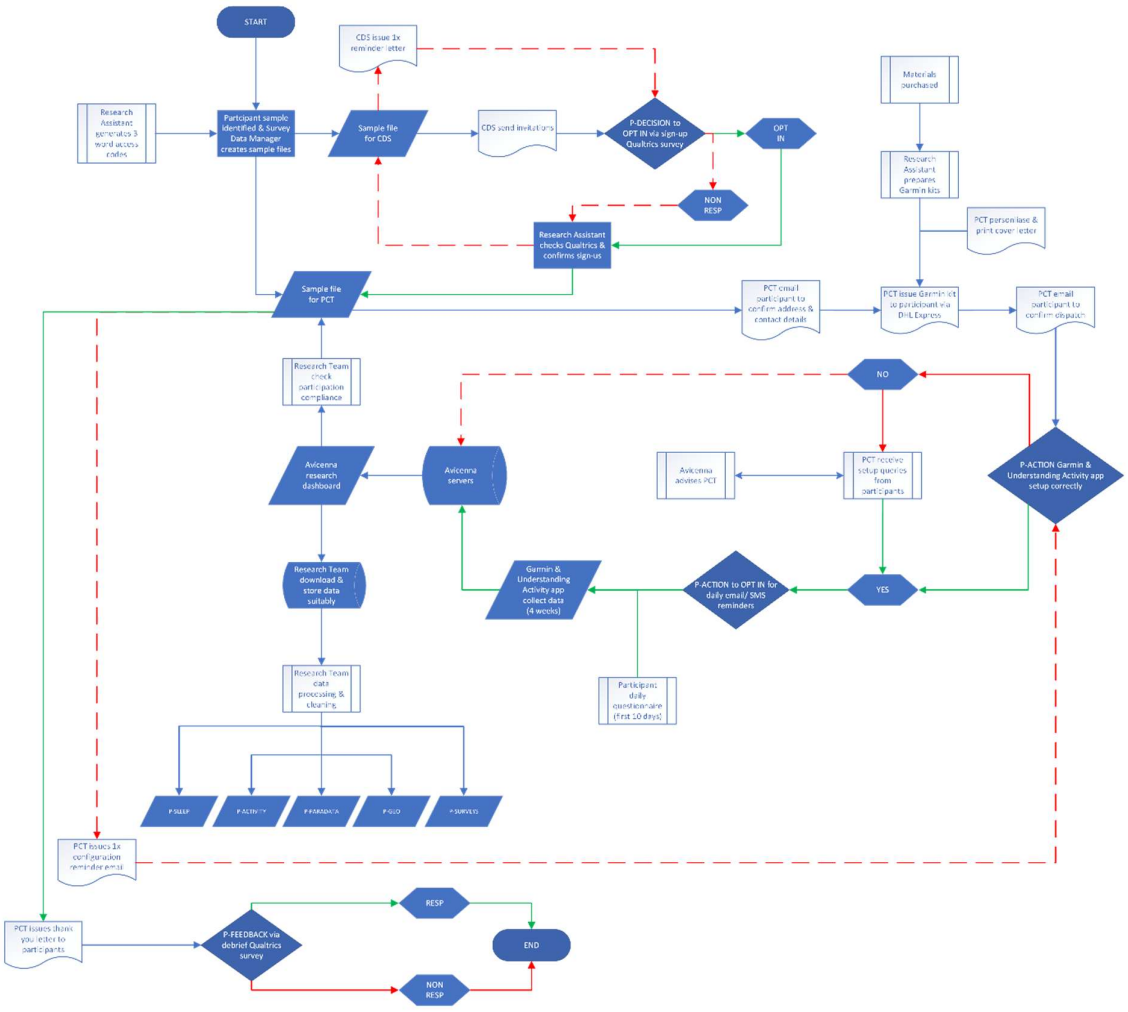


Figure 1: Structure of the Activity Tracker pilot data pipeline

Fieldwork documents

Appendix 1 contains a summary of the timelines and actions implemented in the pilot fieldwork. Appendix 2 contains copies of the participant facing communication documents used in the pilot, as listed here:

- Invitation letter
- Participant information leaflet
- Sign-up Qualtrics specification
- Sign-up reminder letter
- Garmin dispatch confirmation email
- Garmin kit cover letter
- Garmin instruction leaflet
- FAQs
- Daily questionnaire reminders (SMS, email, app notifications)
- Daily questionnaire specification
- Garmin configuration reminder email
- Thank you letter
- Debrief Qualtrics specification

3. Results from the pilot

Sign-up survey

Survey uptake

- Invitations were sent to 109 sample members.
- The sign-up survey received 38 responses.
- Of these 38, 9 were duplicate attempts of mixed completion progress and 29 were unique responses.
- Of these 29, we had 28 unique responses that completed the survey in its entirety and were therefore eligible to participate.
- This equates to a sign-up rate of 28/109*100 = 26%.
- Of the 28 sign-ups, 19 participants consented to receive the first batch of Garmin kits after the initial invitation.
- Following reminder invitation letters being distributed, a further 9 participants signed up to receive the second batch of Garmin kits. However, of these 9 sign-ups, 4 were from the same household. Because we only had contact details for 1 of these 4, we agreed to send 1 kit to the participant we had the details for with an additional note in their kit prompting

them to ask the other 3 participants to make contact with our Participant Communications Team. As no further contact was made, we decided not to distribute the other 3 kits. Therefore, this reduced our Batch 2 sample to 6 potentially 'active' participants.

How the sign-up survey was accessed

- Of the 38 responses,10 (26%) accessed the survey via the direct URL link and 28 (74%) accessing the survey via scanning the QR code provided in the invitation letter.
- Of the 28 unique responses that completed the survey in its entirety, 7 (25%) accessed the survey via the direct URL link and 21 (75%) accessing the survey via scanning the QR code.

Survey drop-off

- Only 3 respondents accessed the survey but did not proceed past the login screen and never came back for another attempt.
- 1 respondent answered 'no' when asked whether they owned a smartphone (*To collect the data, you will need to be able to link the smartwatch we send you with a smartphone. Do you own a smartphone?*) and thus was routed out of the study as they were ineligible.
- 1 respondent answered 'Huawei' when asked about the brand of their smartphone (*What brand of smartphone do you currently use?*) and thus was routed out of the study as they were ineligible.

Completion rate

Table 1 shows for the 28 eligible to participants the speed at which they completed the sign-up study.

Table 1: Speed of completing the sign-up survey

	Mean	**Median**	**Min**	**Max**
Seconds	220.32	153.50	70	1537
Minutes: seconds	3:40	2:33	1:10	25:37

Table 2 documents the answers participants gave to the other questions in the sign-up survey. For example, 32% of participants who completed the sign-up survey already had a smartwatch; the most common brand of smartwatch was Apple (67%).

Table 2: Answers to other questions asked in the sign-up survey

Variable	Response options	N	%
Brand of smartphone	Apple	20	71
	Samsung	6	21
	Motorola	2	7
Smartphone operating system	IOS (Apple)	19	68
	Android	8	29
	Nonresponse	1	4
Has a smartwatch	Yes	9	32
	No	19	68
Brand of smartwatch	Fitbit	1	11
	Apple	6	67
	Other (R3 Pro)	1	11
	Don't know	1	11
Dominant hand	Right hand	22	79
	Left hand	5	18
	Both equally (ambidextrous)	1	4
Chronotype	Definitely a 'morning' type	4	14
	More a 'morning' type than an 'evening' type	12	43
	More an 'evening' type than a 'morning' type	8	29
	Definitely an 'evening' type	3	11
	Nonresponse	1	4

Participation and compliance

Table 3: Compliance with data collection by first batch of participants

Participant	Number of days	Average minutes per day	Total minutes
1	29	1377	39959
2	29	1313	38101
3	29	1370	39744
4	29	1307	37927
5	29	1361	39495
6	29	1288	37374
7	29	1374	39870
8	29	1360	39446
9	29	1351	39201
10	28	1387	38855
11	27	1348	36411
12	27	1376	37155
13	26	1411	36709
14	26	1395	36289
15	25	1306	32653
16	12	1212	14548
17	4	1096	4384
18	0	0	0
19	0	0	0

Despite the tricky layout and lengthy instructions, most participants seemed to setup their smartwatches and app correctly.

Of the 19 participants issued Garmin kits in Batch 1, we received data back from 17 of them. Table 3 shows the number of days on which each of these participants wore the Garmin smartwatch, the average number of minutes per day they wore it (a day has 1,440 minutes), and the total number of minutes throughout the study. These initial results suggest good compliance rates.

Debrief survey

Meta data:

- To date, 16 participants have completed the debrief survey.
- Participants were asked a mix of closed and open-ended questions.

Summary of responses to the closed debrief questions

- Only 3 used the smartphone holder supplied with the Garmin kit.
- All 16 used the USB-C adaptor supplied.
- None had problems with charging the Garmin smartwatch.
- 7 participants charged the Garmin every 4-6 days, 6 every 2-3 days, 2 every day, 1 once a week.
- 12 participants said the watch never ran out of charge during the study, 3 said it ran out once or twice, 1 said it three or more times.
- All 16 said they wore the smartwatch every night.
- All 16 said they wore the smartwatch every day.
- 7 participants said the smartwatch was very comfortable, 7 said it was somewhat comfortable and 2 said it was somewhat uncomfortable.
- 13 participants said they looked at the feedback in the smartwatch on their activity levels and sleep every day, 2 said they looked some days, 1 said they never looked.
- 11 participants said they did not change their behaviour during the study (sleeping or exercising more or less than usual), 5 said they did.
- All 16 said they found the reminders to complete the daily survey helpful.
- 10 said they received the reminders for the daily survey by SMS, 10 noticed in-app notifications, 6 received the reminders by email.
- 7 participants did not have a problem with the Avicenna app draining their smartphone battery, 8 said the app did drain their battery but it was not a problem, 1 said it was a problem.
- 12 said they would be very likely to participate in a similar study again, 4 said they were somewhat likely to.
- All 16 said they would be happy to participate in the study for longer, though there were variations in how much longer: 8 said they would be willing to do an additional month, 4 said they would be willing to do an additional year, 3 said they would be willing to do an additional 3 months, 1 an additional 6 months.

Responses to the open-ended debrief questions

Table 4 documents the answers participants gave to the open-ended questions that were asked in the debrief survey.

Table 4: Answers to open-ended debrief questions

Did you experience any other technical problems with the Garmin smartwatch?
"No problems using the watch. Connecting to the GPS took longer than expected"
"Battery life is good, but it did lose the connection to my mobile phone in our home, a lot"
"The setup of the watch and the app didn't quite match the instruction sheet so I needed to contact the team for support to make sure I had done it correctly."
"I found the strap annoying. It is either too lose or too tight. When too tight it gave me a bit of a rash"
"It was difficult to reconcile what I thought was happening with the watches readings. Sleep etc"
"After the daily survey finished I kept getting a notice that the app had stopped. But when I checked my Bluetooth setting it said the smartwatch was connected and I was able to upload data through the settings on the app. But the notices continued and when I was on the app, if I clicked on the watch icon it would often say 'disconnected'."
"Lost connection with phone on a couple of occasions. Think because out of mobile service due to travel in remote area of North Wales during half term."
What made it uncomfortable to wear the smartwatch?
"I got irritation and blistering on my skin from the strap."
"Probably because the band was too tight"
"The main issue was that wearing the plastic strap 23hours a day meant that my skin didn't get a chance to breathe and started to get itchy. *I use a Milanese loop metal strap with my Apple Watch that allows the skin to breathe despite wearing it for 23hours a day also.* *It wasn't a major issue but a minor irritation."*
"It is more bulky than the watch I normally wear. I'm also not used to wearing a watch whilst sleeping."
"The strap was sometimes too tight or too lose. When it was too tight it caused a rash."
"Sometimes itchy under strap and could get in the way when putting on coat."
"Itching after a few days. Sorted by washing up liquid!"
"Led to skin irritation so had to swap wrists for a while."

Did you experience any issues with using the Understanding Activity app on your smartphone?
"The only issue was on the first day the 3 unique words didn't work. But it was fix within a few hours."
"No issues other than first login"
"No issues once it was setup. My only comment would be that I expected to get the daily survey for the first ten days but it carried on for the full 28 and so I filled it in for all 28. As it only took a minute that wasn't a big burden though."
"I occasionally forgot I must not swipe the app page away but received reminders and stopped doing this - my fault not the app!"
"The size of the app went up steadily. It got too large for my device and had to delete it as soon as I could."
"I felt that sometimes the categorisation was hard to understand - for example how it decides whether sleep is good, fair or poor, how it decides you are awake, having a nap etc."
"Very little functionality"
"Only the issue of the notice saying it had stopped. I have an iphoneX"
"Only loss of connection and wasn't sure if it was tracking properly towards the end."
Do you have any suggestions for improving reminders (e.g., timing, frequency, or how they were sent)?
"I didn't need the text message as the app notifications was enough"
"No 6pm was good home from work and a good reminder for a very quick survey"
"No, they worked for me. Probably would have been better for me personally at about 8pm but that will vary from person to person."
"I think at least 5/6 reminders during the evening I was busy when the reminder came in on one day and completely forgot"
"No - the reminders were good. But it would have been useful to know when the daily survey stopped."
Do you have any additional comments on your experience of taking part in the activity trackers study? Is there anything else we could have done to make it easier to participate?
"It was really straightforward when I was able to set up watch"
"This was brilliant and both me and my husband enjoyed being part of the study. Also loved comparing sleep scores"
"Good reminder to get up and move as do a predominantly desk-based job. Nothing to make it easier to take part. I don't normally wear a watch so a bit weird getting used to that."

"Overall, it was an interesting experience and in general everything worked well and I hope you got some good data.
One minor observation is that I had my Apple Watch and Garmin watch running side by side at night and in general I found the Apple Watch was slightly more accurate in measuring my sleep (at least based on my perceptions). The Garmin watch tended to slightly overestimate the amount of sleep and not recognise periods I was awake in the night as accurately. Maybe by 15-20 mins or so.
Again, not a big deal from my perspective but may be of interest to you."

"I suspect the quality of my sleep will have been negatively impacted by wearing the smart watch, which will inevitably skew the results in some way. However, I suspect this is unavoidable."

"I am off work due to surgery for cancer and felt this will have skewed my usual activity and stress levels- but then again life happens."

"Sometimes it asked how do you feel question 3 times in a row."

"I think that my activity levels were a little higher than they would normally have been. This was partly because being able to track my activity encouraged me to do a little more walking. However, other factors (e.g. a news item on the benefits of taking one longer walk rather than several short walks) probably had more effect.

Weather had some effect in the opposite direction as I exercised less when there was very heavy rain."

"More explanation of watch function meanings. Carrier needs to be much longer for wider people! Advice on itching needed."

"As said, my only problem was not being confident that the app was collecting and transmitting the data. I rang the helpline and [PCT] was very helpful and supportive."

Participant Communications Team issue log

The Participant Communications Team (PCT) is the point of contact for *Understanding Society* study participants if they have any queries or issues with the study. The PCT systematically logs all issues that participants contact them about. Table 5 contains the log of all issues reported by the first batch of participants, Table 6 contains the log for the second batch.

Table 5: Issues and solutions reported by Participant Communications Team for batch 1 of participants

Issue	Solution
There were incorrect *Understanding Society* website and PCT contact details on letter heading for the "Garmin kit cover letter" which we did not notice until after initial packing. As a result, we had to edit the letter template provided, reprint and repackage.	Edited template and saved for use next time.
After drop-off of packages to post room we sent the dispatch emails to participants according to process timeline, a participant replied to ask if we had sent watch to their 'new address'. Luckily packages hadn't been collected by DHL so could be retrieved and repacked to new address**.**	When sending second batch an additional email should be sent a few days before planned dispatch to check participants' address and contact details.
DHL Instructions provided recommended that we use PCT email and phone number as parcel contact. This created issues regarding delivery if participant was out and needed to reschedule.	When sending second batch use participant contact details.
On delivery there was an issue with the 3-word access codes for the Avicenna app not working. For the Innovation Panel implementation we need to ensure all the 3-word access codes are uploaded to the app by Avicenna ahead of sending kits to participants.	PCT emailed participants to let them know this, and again once the issue was resolved.

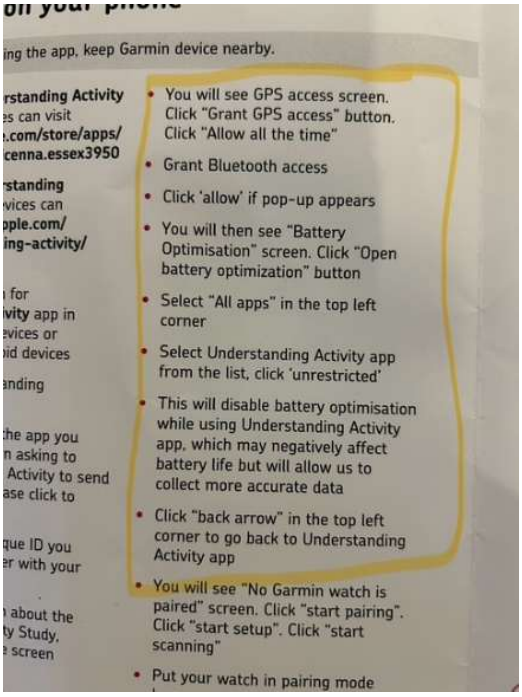
<u>Batch 1 questions from participants</u>

Most of these related to set-up and issues with the leaflet:

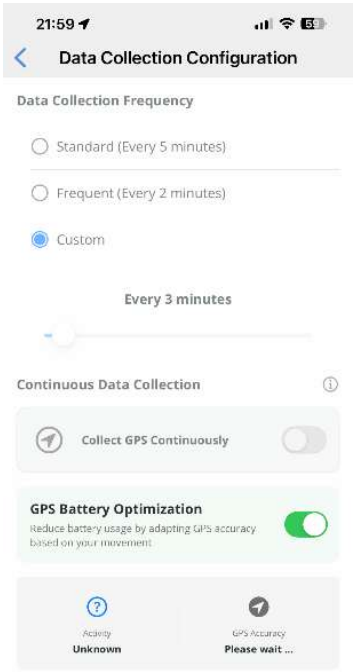
- "*I've just installed the Understanding Activity App and paired to the Garmin watch. The actual experience deviated slightly from the instructions, so I hope I did it correctly. There was one part that I think I definitely got wrong, however, and want to check whether it matters or whether I need to reset the watch and start again. It was the very last step in*

section 2. I think it was about allowing notifications on the Garmin watch. I accidentally clicked allow rather than don't allow. Is that an issue at all?"

- "*Sorry. In addition to the below, the part that didn't match the instructions at all was this section in yellow*:



- *I believe I managed to grant GPS access at all times and Bluetooth access (although wasn't quite like the instructions). The part I was not presented with at all and couldn't find was the battery optimisation screen. Looking in the app, the only part I can find is this. I've clicked the GPS Battery Optimisation but not sure if this is what you were referring to. Any advice gratefully received!:"*



We supported step by step set-up via phone for one participant but did not feel confident with the advice we were able to give (due to limited knowledge). It would have been useful to have someone more familiar with the setup process on campus to support. Our go-to contact person at Avicenna was contactable (and very helpful) via email, but it was agreed a video call could be set up if necessary. We suggest revising the instructions for the battery optimisation setup.

- One participant had issues using their 3-word-code on their phone (perhaps issue with type of phone?): "*Thanks for your email. I am afraid I am still having the same issue. I have a Samsung S6 with up to date Android 7. I have tried uninstalling and reinstalling the Understanding Activity app. I still says there have been too many attempts and to wait 1 minute. I have only tried this after 9pm as I work until 9pm*." They were given a new code: "*Hello, this new code still didn't work on my phone but I have managed to get it to work but installing the app on my tablet."*

Other types of queries from participants:

- What is the range between the watch and tracker for it to work?
- How does it calculate steps as participant did 100 paces and it registered 160 on the tracker.

Table 6: Issues and solutions reported by Participant Communications Team for batch 1 of participants

Issue	Solution
1 participant had issues with initial registration of interest – after invite letter.	
Despite repeated attempts, 4 participants from the same household did not respond to pre-dispatch email and confirm address (3 of these people had no email or phone number on record).	We included a note with Garmin sent to this household advising others to contact us if wanting to take part but had no response.

Overall, Batch 2 went much smoother, as changes were implemented following experience from Batch 1. For example, contacting the 9 participants a week in advance of dispatch to check contact details. For Batch 2, PCT received no set-up queries from participants.

4. Summary of suggested changes for implementation in the Innovation Panel

- Have PCT proofread participant documents ahead of further ethics submissions. Several mistakes were noticed and corrected e.g. PCT contact details, spelling, flow etc.
- Emphasise in sign-up survey and reiterate in instruction leaflet that participants must not use a tablet device and must use their smartphone in order to collect the GPS data.
- Process in place to check addresses before distributing Garmin kits to respondents. Some address details were outdated for the pilot, so we would want to avoid sending out kits to incorrect addresses as much as possible. As an additional safeguard, have an additional participant document e.g. a pre-dispatch email that can be sent a few adays ahead of actually

sending the kit to allow time for respondents to raise queries if needed. For the pilot there was a significant window of time between when they first signed up and when they were sent the kit and circumstances can change e.g. a participant moved addresses. For IP19, Verian will have the most up-to-date address from the interview, and we can make sure that kits are sent out in weekly batches.

- Ask for contact details like email address/ phone number as part of the annual IP interview to confirm a method of contact for technical issues.
- Participants contact details should be included in DHL deliveries rather than PCT/ ISER details, so respondents get the delivery notifications instead.
- Instruction leaflet needs further refinement e.g. alternative layout, improved flow, grammar corrections etc.
- Participant instructions will also need to be translated into Welsh.
- Comms team / university Media Centre to assist with production of a video tutorial to support participant instructions.
- Further testing the usability of the setup instructions within-house e.g. PCT, family/ friends before implementation in the Innovation Panel.
- Clearer instructions for battery optimisation via the Understanding Activity app e.g. instructions directing participants toward using the 'search' function in their phone settings rather than mapping the specific pathways leading to these settings, as they are subject to changes from operating system updates.
- Better within app setup instructions to guide participants through the process rather than having to rely on a lengthy instruction leaflet.
- More embedded technical support for participants e.g. direct technical support helpline provided by Avicenna.
- Live issue tracker shared across PCT, Avicenna and the research team to track setup progress etc.
- Include a member of the project team in the Innovation Panel sample, if possible.
- Ensure the daily survey ends after 10 days.
- We may want to make the terms of device ownership clearer at sign-up. For example, we can guarantee support and troubleshooting during the study, but after the study ends, technical maintenance would be the participant's responsibility.
- Because we purchased the devices, it may be difficult for participants to access warranty support directly from Garmin without proof of purchase. We could address this by either

providing those details outright or noting in the debrief letter that they are available on request.

5. Conclusion

Overall, the results from the activity tracker pilot study are promising. The data suggest good compliance from participants and responses to the debrief survey are positive. There are a number of refinements to be made to the fieldwork protocols and participant communications. Identifying these areas for improvement was precisely the purpose of conducting the pilot.

References

McCrorie, P. and Caryl, F. (2025) *Garmin Vivoactive 5 – GPS and health data quality.* MRC/CSO Social and Public Health Sciences Unit, University of Glasgow. Available at https://www.iser.essex.ac.uk/research/projects/collecting-activity-sleep-and-geolocation-data.

Appendix 1: Summary of timelines and actions for the pilot fieldwork

Time period	Action
30/06/2025	Research Assistant – Innovations generated 3-word access codes and implemented sign-up survey in Qualtrics. Associate Director - Data received 3-word access codes to attach to pilot sample.
20/08/2025	Survey Data Manager prepared sample file for PCT Participant Comms Team consisting of Name, ADDR1-5 + POST CODE, Unique IDNO (3 word access code), email and PID. Also produced mailing file for CDS consisting of Name, ADDR1-5 + POST CODE, Unique IDNO (3 word access code) only.
Batch 1 (aim for 20 participants)	
28/08/2020	Associate Director - Communications and Engagement liaised with Joy Designs and CDS regarding the design, printing and distribution of the participant documents. CDS began sending out invitation letters.
01/09/2025 – 16/09/2025	Participants signed up via Qualtrics survey using their unique 3-word access codes.
	Web Application Developer updated project webpage with FAQs, privacy notice and updated download links for understanding activity app etc. Project webpage: Understanding Activity Study - Understanding Society
19/08/2025	Events Coordinator – ISER demonstrated DHL Express system to PCT.
	DELAY progressing to the next stage until Project Lead confirmed both the Understanding Activity app and the daily questionnaire notifications work as intended.
	The participant instruction leaflet provided by CDS. Research Assistant – Innovations prepared Garmin kits and stored in IT store room.

	Research Assistant – Innovations has access to the Qualtrics and will confirm to PCT which 3-word access codes have been used so they can identify the relevant address details in order to send out the Garmin kits. Research Assistant – Innovations confirm sign-ups to project lead so Avicenna can check data collection issues. Project lead checks Avicenna dashboard daily to confirm which of the 19 we get data back from.
15/09/2025	Research Assistant – Innovations to setup session with PCT to cover smartwatch/app setup in case they receive questions from participants.
17/09/2025	PCT to print Garmin Packet cover letter respondent specific address, names & 3 word access code then add to each Garmin kit. PCT print and apply DHL address labels on pre-packaged Garmin kits along with arranging the DHL orders. PCT dispatched first wave of Garmin kits to 19 participants via DHL and sent *Garmin Watch Dispatched Confirmation Emails*.
	Avicenna to resolve access code issue with the Understanding Society app. Project Lead to confirm with PCT once this has been resolved so participants can complete setup. Project Lead to check communication channels between Avicenna and PCT regarding future technical issue reporting.
19/09/2025	Participants start receiving Garmin kits and will take part for 4 weeks from the point they setup their smartwatch. They also complete a daily questionnaire for the first 10 days.
	Project lead has been monitoring the Avicenna dashboard to confirm which of the 19 we were getting data back from. PCT have supported participants and sent *Garmin Configuration Reminder Emails* to those participants who had not yet begun using their smartwatches.
22/10/2025	Most Batch 1 participants finished
22/10/2025	PCT to send out thank you letters to first batch of Garmin users.
	Participants to complete debrief survey via Qualtrics using their 3 word access code to sign-in here:

https://tinyurl.com/understandingactivitydebrief

Batch 2 (aim for 10 participants)	
08/09/2025	Research Assistant – Innovations sends 3 word access codes that have signed up to Survey Data Manager. Survey Data Manager edits sample file and reshares with CDS.
24/09/2025 – 29/09/2025	September 9 more participants signed-up following CDS sending reminders.
30/09/2025	Research Assistant – Innovations closed the sign-up survey
	Purchase of additional Garmins
08/10/2025	Research Assistant – Innovations prepped new kits
14/10/2025	PCT to send *Garmin Watch Dispatched Confirmation Emails*. PCT to arrange DHL deliveries for final batch of Garmin kits to be sent.
	Project lead to check access codes with Avicenna for these 9 participants to ensure they are correctly setup
	Participants receive Garmin kits and begin setup
	Project lead to monitor the Avicenna dashboard to confirm which of the 9 we are getting data back from PCT to support participants & send *Garmin Configuration Reminder Emails* to those participants who have not yet begun using their smartwatches (if any)
	For Batch 2, we were supposed to have 9 participants in total, with 4 of them being from the same household. For these 4, as we only had contact details for 1 of them, we agreed to send 1 kit to the participant we had details for with an additional note in their kit prompting them to ask the other 3 participants to make contact with PCT. In the end, I believe no contact was made so we didn't up sending the other 3 kits. Therefore, this reduces our sample to 6 potentially 'active' participants for Batch 2.
19/11/2025	PCT dispatched thank you letters to Batch 2 participants.

	Allotted time for Batch 2 participants to complete the debrief survey via Qualtrics
27/11/2025	Research Assistant – Innovations closed the Qualtrics debrief survey.
	Pilot ends.

Appendix 2: Participant communication documents

Invitation Letter

Understanding Society

UNDERSTANDING Activity STUDY

Contact us:

Freephone 0800 252 853

www.understandingsociety.ac.uk/participants

contact@understandingsociety.ac.uk

{title} {forename} {surname}
{address1}
{address2}
{address3}
{address4}
{address5}
{postcode}

Postal_Date

Dear **{title} {forename} {surname},**

Thank you for your continued support on Understanding Society. We greatly value your contribution.

As part of our study, we aim to better understand how daily life impacts health and wellbeing. We are excited to invite you to take part in the ***Understanding Society*** **Activity Tracker Study**. This new and separate study tests a way of collecting information about our daily routines using smartwatches. This innovative approach makes it easier to take part and helps us find out how everyday activities and where we are influence our health, work, and relationships.

For this study, we would like to send you a smartwatch to be worn on your non-dominant wrist for 4 weeks. You can keep the watch at the end of the study. This smartwatch will collect information about your sleep (duration, sleep phases, time awake), and physical activity levels (intensity, heart rate, accelerometer). You will also be asked to download an app onto your smartphone. This app will be used together with the smartwatch for GPS tracking and to send you a brief questionnaire to answer at the end of each day. The daily questionnaire will take around 2 minutes. You will only need to complete the daily questionnaire for the first 10 days of the study.

How to take part

To participate in this new study, please visit the website, either by entering the URL or scanning the QR code below. You will then be asked to enter your unique code which is {Unique IDNO}. You will then be asked a few quick questions which will help us to determine your eligibility. If you do not want to take part in the study, you do not need to do anything.

Survey URL: **https://tinyurl.com/activitytrackerstudy**

Scan QR code below:

At the end of the study, to thank you for your help, you will be able to keep the smartwatch (worth approximately £229 at time of purchase). We will let you know how to reset the device back to the original factory settings. No further data will be collected by us from that point, and there will be no more daily questionnaires.

Keeping your information safe

This survey is entirely confidential and anonymous. The research findings will not identify you. Your personal details will not be shared with anyone other than the two partner organisations for this project. CDS do the printing and mailouts of letters for this study, and so we will send them your name and address for this purpose. Avicenna created the smartphone app for this study.

If you choose to participate and provide your email in the signup survey, we will securely transfer that to Avicenna so that they can send you reminders to complete the daily surveys. *Understanding Society* is being conducted in accordance with the Data Protection Act. This means your personal details will be kept strictly confidential and you and your household will not be identifiable from the data. Your personal details or survey answers will never be used for marketing purposes. To view our privacy policy, see **https://www.understandingsociety.ac.uk/participants/privacy-2/**

For more information, please see the FAQ at
https://www.understandingsociety.ac.uk/participants/projects/activitytracker

Thank you,

Michaela Benzeval

Professor Michaela Benzeval
Institute for Social and Economic Research
University of Essex

Participant Information Leaflet

Why?

We are interested in understanding how information from smartwatches such as **sleep**, **activity levels**, and your **location** relate to aspects of our **health**, **work** and **relationships**. Collecting this information over an extended period (4 weeks) will help to answer questions about how these things vary or change over time and what impact they have on aspects of our daily lives.

What kind of information is being collected?

The smartwatch will collect information about your **sleep** (duration, sleep phases, time awake), and **physical activity levels** (intensity, heart rate, accelerometer).

You will also be asked to download an app on your smartphone. This app will be used together with the smartwatch for GPS tracking and to send you a questionnaire to answer at the end of each day. The daily questionnaire will take around 2 minutes and ask about your mood, exercise, stress and social interactions. You will only need to complete the daily questionnaire for the first 10 days of the study.

We would like you to take part in a new way of collecting information about our daily routines using smartwatches and a bespoke smartphone application.

For this study we'll send you a Garmin smartwatch to wear on your non-dominant wrist day and night for 4 consecutive weeks (excluding charge time).

You'll also be asked to download a smartphone application called **"Understanding Activity"** which will send you a short (~2 minute) questionnaire to answer at the end of each day. You will only need to complete the daily questionnaire for the first 10 days of the study.

Please note that you'll need to have a smartphone to take part in this study.

What if I change my mind about taking part?

Taking part is **completely voluntary**. You have the right to change your mind about taking part in this study or can withdraw from the study at any time without explanation.

If you contact us and ask that we remove your data, we can remove any data you have given us.

What if I have concerns about the way the study was carried out?

If you have any concerns about any aspect of the study, or you have a complaint, in the first instance please contact us on Freephone **0800 252 853** or by email at: **contact@understandingsociety.ac.uk**.

If you are still not satisfied, please contact the University of Essex REO Research Integrity Manager (**reo-integrity@essex.ac.uk**). Please include the ERAMS reference ETH2425-0700.

Any questions?

Please get in touch. You can phone or email us.

Freephone: 0800 252 853

Email: contact@understandingsociety.ac.uk

Understanding Society

UNDERSTANDING ActiVity STUDY

Participant Information

Understanding Society

How do I take part?

You have been sent a letter that contains a link to an initial questionnaire to determine your eligibility. When you click on the link, you will be asked to enter **your unique code** which has also been sent to you in the same letter or email.

You'll then be asked several questions about your smartphone and current smartwatch use (~5 minutes).

Eligible participants will be contacted, and we'll arrange for the smartwatch with instructions to be posted to you.

You'll need to set up the smartwatch and download the "**Understanding Activity**" app using the instructions provided and then wear the smartwatch for 4 consecutive weeks (both day and night).

The app will also prompt you to answer **short daily questionnaires**. At the end of the study we'll also contact you to answer a 10-15 minute survey to provide feedback on the study.

How long will it take?

The set up of the Garmin watch and application should take no longer than 45 minutes and, in most cases, will take considerably less time. We're asking you to wear the watch day and night for 4 weeks (excluding charge time or any activities where you feel you would harm yourself if you were to fall).

For the first 10 days the app will invite you to answer a short survey of around **2 minutes**. You will also need to take time to charge the watch at regular intervals.

The feedback survey at the end of the study will take **no longer than 15 minutes.**

Thank you!

To thank you for taking part **you will be able to keep the smartwatch** (worth approximately £229 at time of purchase).

We will let you know how to reset the device back to the original factory settings. No further data will be collected from that point, you can uninstall the Understanding Activity application from your phone and there will be no more daily questionnaires.

Who is carrying out this research?

Researchers at the Institute for Social and Economic Research (ISER) at the University of Essex are running this study. Ethical approval for the study has been provided by the University of Essex Ethics Sub-Committee 1 (reference: ETH2425-0700).

Do I have to take part?

Like every other part of Understanding Society, this part of the project is completely voluntary. You do not need to take part if you do not wish to, but we hope you will agree.

Are there any risks involved in participating?

There are **no risks** associated with taking part in this project. We will be asking you to wear a device on your wrist as you go about your daily life, and so there are no risks beyond those that would usually be part of your established lifestyle.

The short daily questionnaire will ask you about how you are feeling. If this causes you to think about issues in your life, the online FAQ provides sources of guidance **https://www.understandingsociety.ac.uk/participants/projects/activitytracker**

How will we keep your information safe?

Everyone involved in this study will keep your data safe and secure. ISER is the data controller for the study. Identifiable data are stored on a separate secure server, with access limited only to those who require the information to maintain the integrity of the database.

Your personal details are only used so that we can send you information on how the survey is being used by researchers, and so that we can invite you to participate in the study. These details are never made available to researchers or to any other companies who might use them for marketing purposes.

The information collected is only used for research and will be dealt with according to the principles of the Data Protection Act and General Data Protection Regulation (GDPR). The responses you give in this study and the data collected from your smartphone and smartwatch are kept confidential and stored separately from identifiable data and on secure servers. You have the right at any time to withdraw from the study. If you contact us and ask that we remove your data, we can remove any data you have given us.

Sign-up Qualtrics Specification

Sign-up Qualtrics Specification

consent [Initial consent screen for activity trackers]

Text: Thank you for your interest in taking part in the Understanding Society Activity Tracker study. This important social science study is managed by the Institute for Social and Economic Research (ISER) at the University of Essex. ISER is the data controller for the study. Your personal details are only used so that we can send you information on how the survey is being used by researchers, and so that we can invite you to participate in the study. These details are never made available to researchers or to any other companies who might use them for marketing purposes. Your responses are kept confidential and you have the right at any time to withdraw from the survey.

1. Continue

[Bottom of screen: Ethics Reference: ETH2425-0700]

Login [Unique identification code]

Universe: Ask all

Please log in

Please enter the unique identification code provided to you in the invitation letter:

[Single line textbox]

intro [Information about the activity trackers]

Universe: Ask all:

Text: Thank for your interest in taking part in the ***Understanding Society*** **Activity Tracker Study**.

For this study, we would like to send you a smartwatch to be worn on your non-dominant wrist for 4 weeks. This smartwatch will collect information about your sleep (duration, sleep phases, time awake), physical activity levels (intensity, heart rate, accelerometer) and location (GPS tracking). You will also be asked to download an app on your smartphone. This app will be used together with the smartwatch for GPS tracking and to send you a questionnaire to answer at the end of each day. The daily questionnaire will take ~2 minutes. You will only need to complete the daily questionnaire for the first 10 days of the study.

As a thank you for your help, you will then be able to keep the smartwatch at the end of the study. No further data will be collected and we will let you know how to reset the device to factory settings.

There are only a limited number of smartwatches available. This means that if we have more people who want to take part than we expect, we will have to choose people at random to take part. To make sure you are eligible to take part in the study, we have a few questions we would like to ask you. Please click continue.

1. Continue

Question 1 [Smartphone owned]

Universe: Ask all. Skip to end [Ineligible] if 1 is not selected.

Question type: Single choice

Text: To collect the data, you will need to be able to link the smartwatch we send you with a smartphone. Do you own a smartphone?

*Smartphone: a mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, internet access, and an operating system capable of running downloaded apps.

Subtext: Please select one answer

1. Yes
2. No

end [Ineligible]

Universe: If Question 1 = 2

Text: We are sorry, unfortunately it appears you are not eligible for this study. To take part, we need our participants to have a smartphone to use our smartwatches. Thank you for taking the time to answer these questions.

Question 2 [Smartphone brand owned]

Universe: Ask if Question 1 = 1

Question type: Single choice

Text: What brand of smartphone do you currently use?

Subtext: Please select one answer

1. Apple
2. Samsung
3. Huawei
4. Google
5. Motorola
6. Nokia
7. Sony
8. Xiaomi
9. Other (please specify) [free text box]
10. Don’t know
11. Prefer not to say

end [Ineligible – Huawei smartphone]

Universe: If Question 2 = 3

Text: We are sorry, unfortunately it appears you are not eligible for this study. Huawei smartphones are not compatible with the app that you would need to install for this study. Thank you for taking the time to answer these questions.

Question 3 [Smartphone operating system]

Universe: Ask if Question 2 = 1

Question type: Single choice

Text: What operating system does your smartphone use?

Subtext: Please select one answer

1. Android
2. IOS (Apple)
3. Other (please specify) [free text box]
4. Don't know
5. Prefer not to say

Question 4 [Smartwatch already owned]

Universe: Ask all.

Question type: Single choice

Text: Do you currently own a smartwatch that you use regularly?

Subtext: Please select one answer

1. Yes
2. No

Question 5 [Smartwatch brand already owned]

Universe: Ask if Question 4 = 1

Question type: Single choice

Text: What brand of smartwatch do you currently use?

Subtext: Please select one answer

1. Fitbit
2. Garmin
3. Apple
4. Google
5. Samsung
6. Huawei
7. Amazfit
8. Polar
9. Other (please specify) [free text box]
10. Don't know

11. Prefer not to say

Question 6 [Hand dominance]

Universe: Ask all

Question type: Single choice

Text: For this study, we are asking you to wear a smartwatch on the wrist of your non-dominant hand. To determine this, which hand do you primarily use for tasks such as writing, eating, or throwing?

Subtext: Please select one answer

1. Right hand
2. Left hand
3. Both equally (ambidextrous)

Question 7 [Chronotype – morning vs evening]

Source: Horne and Östberg (1976) Morningness-Eveningness Questionnaire (MEQ)

Universe: Ask all

Question type: Single choice

Text: People talk about 'morning' and 'evening' types of people. Which ONE of these types do you consider yourself to be?

1. Definitely a 'morning' type
2. More a 'morning' type than an 'evening' type
3. More an 'evening' type than a 'morning' type
4. Definitely an 'evening' type

Reference:

- Horne, J. A., & Ostberg, O. (1976). A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. *International journal of chronobiology*, *4*(2), 97-110.

Question 8 [Consent]

Universe: Ask all

Question type: Single choice

Text: Please confirm that you are happy to participate in this study.

Subtext: Please select one answer

1. Yes
2. No

end [Thank you]

Universe: Ask if Question 1 = 1 AND Question 2 is not 3

Text: Thank you for taking the time to answer these questions. If you have agreed to participate, and we have enough smartwatches, we will be in touch with you shortly with further information about the next steps.

Sign-up Reminder Letter

Understanding Society

UNDERSTANDING Activity STUDY

Contact us:

Freephone 0800 252 853

www.understandingsociety.ac.uk/participants

contact@understandingsociety.ac.uk

{title} {forename} {surname}
{address1}
{address2}
{address3}
{address4}
{address5}
{postcode}

Postal_Date

Dear **{title} {forename} {surname},**

It's not too late to help us with the Understanding Society Activity Tracker Study!

We recently wrote to you to invite you to take part in the ***Understanding Society*** **Activity Tracker Study**. This is a trial of a new way of collecting information about our participants' daily routines using smartwatches. At the end of the study, to thank you for your help, **you will be able to keep the smartwatch** (worth approximately £229 at time of purchase). After the end of the study, no further information will be collected and we will let you know how to reset the device to factory settings.

For the study, we would like to send you a smartwatch to be worn on your non-dominant wrist for 4 weeks. This smartwatch will collect information about your sleep (duration, sleep phases, time awake), physical activity levels (intensity, heart rate, accelerometer) and location (GPS tracking). You will also be asked to download an app on your smartphone. This app will be used together with the smartwatch for GPS tracking and to send you a questionnaire to answer at the end of each day. The daily questionnaire will take around 2 minutes. You will only need to complete the daily questionnaire for the first 10 days of the study.

How to take part

To participate in this new study, please visit the website by either entering the URL or scanning the QR code below. You will then be asked to enter your unique code which is {Unique IDNO}. You will then be asked a few quick questions which will help us to determine your eligibility. If you do not want to take part in the study, you do not need to do anything.

Survey URL: **https://tinyurl.com/activitytrackerstudy**

Scan QR code below:

Keeping your information safe

This survey is entirely confidential and anonymous. The research findings will not identify you. Your personal details will not be shared with anyone other than the two partner organisations for this project. CDS do the printing and mailouts of letters for this study, and so we will send them your name and address for this purpose. Avicenna created the smartphone app for this study.

If you choose to participate and provide your email in the signup survey, we will securely transfer that to Avicenna so that they can send you reminders to complete the daily surveys. *Understanding Society* is being conducted in accordance with the Data Protection Act. This means your personal details will be kept strictly confidential and you and your household will not be identifiable from the data. Your personal details or survey answers will never be used for marketing purposes. To view our privacy policy, see **https://www.understandingsociety.ac.uk/participants/privacy-2/**

For more information, please see the FAQ at
https://www.understandingsociety.ac.uk/participants/projects/activitytracker

Thank you,

Professor Michaela Benzeval
Institute for Social and Economic Research
University of Essex

Garmin Dispatch Confirmation Email

Subject: Your Smartwatch is On Its Way

Dear {title} {forename} {surname},

We are pleased to inform you that your smartwatch has been dispatched and is now on its way to you. You can expect to receive your smartwatch within the next **[insert expected delivery timeframe here**] days.

Your smartwatch has been sent via DHL Express. To track the status of your delivery and update any delivery instructions, please use the following link: [insert link here].

No further action is required from you at this time. Once your smartwatch arrives, all setup instructions and additional details about the study will be included in the package.

Thank you for your participation in our study!

If you have any questions or need assistance, please contact the Participant Communications Team on **0800 252 853** or email **contact@understandingsociety.ac.uk**

Thank you,

[Name]
[Position]
Understanding Society
Institute for Social and Economic Research
University of Essex

Garmin Kit Cover Letter

Contact us:
Freephone 0800 252 853
www.understandingsociety.ac.uk/participants
contact@understandingsociety.ac.uk

{title} {forename} {surname}
{address 1}
{address 2}
{address 3}
{address 4}
{address 5}
{postcode}

Postal_date

Dear {title} {forename} {surname},

Thank you for signing up to take part in the **Understanding Society Activity Tracker Study** – we're delighted to have you on board. Enclosed in this pack, you'll find everything you need to get started:

- Your **Garmin Vivoactive 5** watch
- A **charging cable**
- A **USB adaptor**
- A **smartphone holder**

You'll also find a set of **step-by-step instructions** to help you:

- Set up the **Garmin app**
- Install the **Understanding Activity** app on your smartphone

To log into the Understanding Activity app, you'll need your unique ID:

Your Unique ID: {Unique ID}

The first time you open the app, please click the button 'Reminder contact options', to tell us how you would like to receive notifications.

If you have any questions or need support at any point, please don't hesitate to get in touch with the **Participant Communications Team** by emailing **contact@understandingsociety.ac.uk** or by calling Freephone **0800 252 853.** We're here to help!

Thank you,

Michaela Benzeval

Professor Michaela Benzeval, University of Essex

Garmin Instruction Leaflet

- Set current day
- Tap to indicate whether you use a wheelchair daily
- You should see 'Setup complete'
- Optional – indicate whether you would like to 'Learn basics of watch'
- To exit 'Tips' screen – press bottom button on the side of the smartwatch

GARMIN smartwatch battery optimisations:

- From the watch face, swipe from the bottom to access the quick access page
- Hold down the bottom button on the side of the smartwatch to access the settings
- Select 'System'
- Select 'Display'
- Select 'Brightness'
- If not already selected, set to Auto Brightness by clicking on the Ⓐ in left side of the screen
- Return to 'Display' menu by clicking the bottom button on the side of the smartwatch
- Select 'During Activity'
- Make sure the *Always On* feature is turned **OFF**

Move to Step 2. described below overleaf.

1 Set up your GARMIN smartwatch

How to use your GARMIN smartwatch buttons:

- **Top button on the right hand side:** activities / apps menus
- **Bottom button on the right hand side:** return to previous screen

- Unbox the Garmin watch
- Connect Garmin watch to a USB-C power source such as a laptop using the cable from the box or use the USB adapter provided if you don't have USB-C power source
- Once the smartwatch has enough charge a blue triangle appears first, followed by intro screens on the watch – welcome screens with "hello" in different languages. Press the top button on the side of the smartwatch to enter the set-up screen
- Select 'English'
- Do not pair with phone instead click the 'x'
- Do not set a passcode instead click the 'x'
- Select gender by tapping on screen
- Select preferred units of measure
- Scroll to adjust birth year then confirm by clicking the top right button on the side of the smartwatch
- Scroll to adjust birth month then confirm by clicking the top right button on the side of the smartwatch
- Scroll to adjust birth day click then confirm by clicking the top right button on the side of the smartwatch
- Scroll to adjust height then confirm by clicking the top right button on the side of the smartwatch
- Scroll to adjust weight then confirm by clicking the top right button on the side of the smartwatch
- Select which hand the watch will be worn on
- Select time format
- Select usual bedtime then confirm by clicking the top right button on the side of the smartwatch
- Select wake-up time then confirm by clicking the top right button on the side of the smartwatch
- Enable do not disturb during sleep by clicking the 'tick'
- Do not enable auto set time/date with GPS instead 'x' for now
- Set local time
- Set current year
- Set current month

How to reset the GARMIN smartwatch to factory settings

✓ After completing the 4-week study

- Press and hold the lower of the two buttons on the side of the smartwatch
- Click 'Settings'
- Scroll down and click 'System'
- Scroll down and click 'Reset'
- Click 'Reset Default Settings'
- Click the tick after the warning message
- Allow time for the smartwatch to reboot
- You can now install the Garmin Connect app on your smartphone, to pair it with your Garmin and record your data

UNDERSTANDING ActiVity STUDY

Getting started

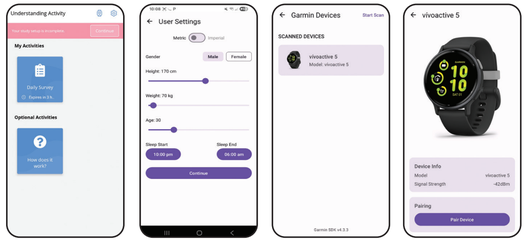
Step-by step Instructions

Understanding Society

2 Install Understanding Activity app on your phone

When installing the app, keep Garmin device nearby.

- To install the **Understanding Activity** app, Android devices can visit **https://play.google.com/store/apps/details?id=com.avicenna.essex3950**
- To install the **Understanding Activity** app, iOS devices can visit **https://apps.apple.com/us/app/understanding-activity/id6739947978**
- Alternatively, search for **Understanding Activity** app in App Store for iOS devices or Play Store for Android devices
- Launch the Understanding Activity app
- (On first opening of the app you may see a notification asking to allow Understanding Activity to send you notifications, please click to allow this)
- Log-in using the unique ID you were sent in the letter with your Garmin package
- Read the information about the Understanding Activity Study, which appears on the screen then click 'next'
- Read Before Consent statement -> click start
- You will see a pink bar on top of the screen saying "Your study setup is incomplete" (see picture below) -> click continue
- You will see GPS access screen. Click "Grant GPS access" button. Click "Allow all the time"
- Grant Bluetooth access
- Click 'allow' if pop-up appears
- You will then see "Battery Optimisation" screen. Click "Open battery optimization" button
- Select "All apps" in the top left corner
- Select Understanding Activity app from the list, click 'unrestricted'
- This will disable battery optimisation while using Understanding Activity app, which may negatively affect battery life but will allow us to collect more accurate data
- Click "back arrow" in the top left corner to go back to Understanding Activity app
- You will see "No Garmin watch is paired" screen. Click "start pairing". Click "start setup". Click "start scanning"
- Put your watch in pairing mode by press and holding the bottom right button-> going into settings-> system->connectivity->phone-> pair phone. A QR code should appear but please do not scan this
- Complete user settings by entering your physical attributes: height, weight, age; as well as 'sleep start' and 'sleep end'. Click continue
- You will see Garmin devices screen. Click "start scan"
- Vivoactive 5 watch picture should appear. Click on it
- Click "pair device"
- Your setup is now complete. Please follow the instructions below
- Check the code matches from phone and smartwatch
- A notification may appear to allow Understanding Activity to access Vivoactive 5, please click don't allow



STEP 1
Open Understanding Activity App

STEP 2
User physical attributes

STEP 3
Scanning for nearby devices

STEP 4
Pair the selected device

iOS/iPhone users:

Please **do not close/swipe away** Understanding Activity app during the study. Closing/swiping away the app will result in data collection being terminated!

All users:

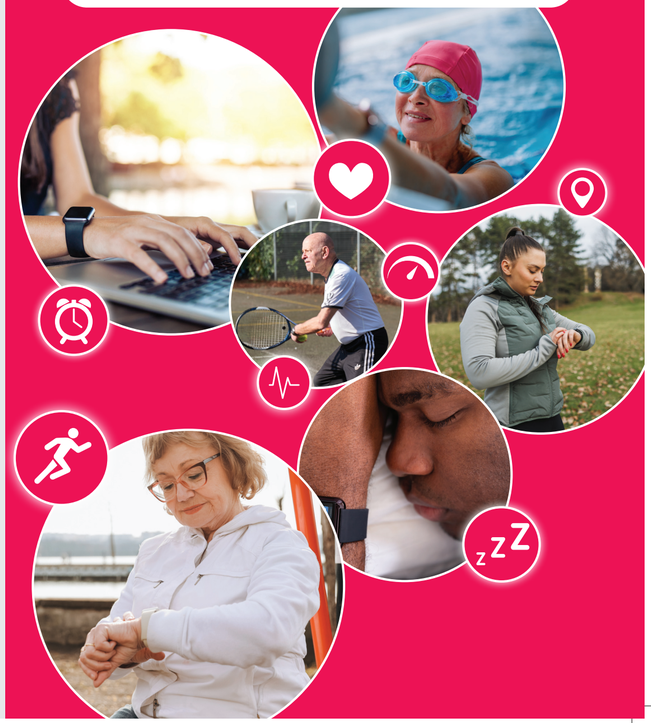
Please make sure the battery optimisation option is **turned off** or the Understanding Activity app is exempt. You can turn it back on after completing the study.

3 What to do next

- Please wear the Garmin smartwatch minimum **22 hours** a day on your **non-dominant** wrist.
- Please complete the daily **2-minute questionnaire every evening** for the first **10 days** of the study (You will get email and app notifications when the daily questionnaire is ready to be completed).
- Please keep your smartphone with you at all times (whenever feasible). Please try to use the smartphone holder provided if you go out to exercise instead of leaving your phone behind.
- Important note: for the purpose of this study **please do not** install the Garmin Connect app 9 on your smartphone.
- After 4 weeks (28 days), the study ends and you can reset the Garmin smartwatch to factory settings and use it in any way you want. Instructions on how to reset the Garmin smartwatch to factory settings are provided below.
- If you already have another smartwatch, you can continue using it; however, please bear in mind that we would like you to use the Garmin smartwatch provided by Understanding Society on your non-dominant wrist. You can use your own smartwatch on your other wrist.
- While wearing the watch, please maintain the same level of physical activity that you would normally do.
- The Garmin watch will need to be charged approximately every 5-7 days. Please charge your watch during the day so we can record your sleep at night. We suggest you start charging your watch when the battery level is around 10% or lower.
- The smartwatch can be worn while doing most activities, including swimming. You can take it off while taking a shower/bath or whenever you feel it is not comfortable or practical to wear it. However, please try to put it back as soon as you can.

If you have any questions, please contact the Participant Communications Team on **0800 252 853** or email **contact@understandingsociety.ac.uk**

FAQs about the Understanding Activity project are available at **https://www.understandingsociety.ac.uk/participants/projects/activitytracker**



FAQs

Understanding Society Activity Tracker Study FAQ

You may have recently received a letter from us, asking you to take part in a new study which involves wearing a smartwatch device to gather information on your sleep, physical activity levels and location. The purpose of this study is to help researchers look at how our daily routines influence our health, work, and relationships. Here is a list of FAQs [embed weblink], if your question is not here, please contact us [embed weblink].

- What is this study about?

This study aims to enhance the data from the annual Understanding Society interviews by passively collecting physical activity and sleep data using the Garmin Vivoactive 5 device, and by passively collecting geolocation data using the Understanding Activity smartphone app.

- What do you want me to do?

Firstly, we would like you to download the Understanding Activity app (see instructions here [embedded weblink]), which will allow us to track your location via your smartphone for the duration of the study (4 weeks). In order for us to do this effectively, we would like you to keep your smartphone with you at all times.

Secondly, we would like you to wear the Garmin Vivoactive 5 smartwatch for a minimum of 22 hours a day (excluding showering, bathing, and other activities during which wearing the smartwatch might not be feasible).
Thirdly, we would like you to answer a short (about 2-minute) daily questionnaire for 10 consecutive days at the beginning of the study. After the initial 10 days, you will stop receiving invitations to complete the daily questionnaire; however, we would still like you to continue wearing the Garmin Vivoactive 5 device and to continue enabling GPS data collection via the Understanding Activity app for the remaining 18 days of the study.

- How long will it take?

The study takes 4 weeks (28 days).

- Can I use the smartwatch I already own?

Yes, you can use the smartwatch you already have for your own purposes; however, you cannot use it to participate in the study, as we would not be able to retrieve the data To take part in the study, you need to use the Garmin device provided by Understanding Society. If you want to use both your own smartwatch and the device provided by Understanding Society at the same time, you are welcome to do so. Please remember that we strongly encourage all participants to wear the Garmin device provided by us on their non-dominant wrist.

- What's in it for me?

As a thank you, you will be able to keep the Garmin Vivoactive 5 smartwatch (RRP £229).

- Do I really get to keep the smartwatch?

Yes, you will be able to keep the Garmin Vivoactive 5 smartwatch. After completion of the study, the smartwatch is yours, and you can decide what you want to do with it.

- What happens to the smartwatch after the study?

After the completion of the study, the smartwatch becomes your property. You can decide what you want to do with it. You can reset it to factory settings and continue using it as you would normally use any smartwatch, or you can decide to do something else with it. After 28 days, there will be no more data collected by us from the smartwatch or the Understanding Activity app.

- Who should I contact if I need help?

If you need help, please call the Participant Communications Team on 0800 252 853 or email contact@understandingsociety.ac.uk.

- Where can I get the Understanding Activity app?

You can get the Understanding Activity app in the App Store [embedded link] if you are an iPhone user, or in the Play Store [embedded link] if you are an Android user.

- What if I cannot remember my login details/password for the Avicenna app and it logs me out?

If you forget your login details/password, please call the Participant Communications Team on 0800 252 853 or email contact@understandingsociety.ac.uk.

- When should I take the smartwatch off?

You can take the smartwatch off when you take a shower/bath or when you are doing other activities during which wearing a smartwatch might not be feasible. However, you should aim to wear the smartwatch for a minimum of 22 hours a day.

- Does it matter what arm I wear the watch on?

Yes, we ask all participants to wear the watch on their non-dominant hand. To determine this, which hand do you primarily use for tasks such as writing, eating, or throwing?

- How often do I need to charge the watch?

You will need to charge the watch approximately every 5–7 days. Please charge the watch when the battery level is 10% or less. The watch should be charged during the day so that we can record your sleep at night.

- What happens if I forget to put the smartwatch back on again after taking it off?

If you forget to put the smartwatch back on after taking it off, please put it back on as soon as you remember.

- What if I go abroad during the study?

That is fine. You can go abroad during the study, but in order to participate, you will need to have access to the internet and enable location access on your phone.

- What happens if I'm away from my phone while wearing the smartwatch?

Ideally, we would like you to keep both the smartwatch and your phone with you at all times. If you are away from your phone and doing some form of exercise (including walking), you can turn on an 'activity' on your Garmin watch to collect GPS data via the smartwatch instead. However, you are not obliged to do that. You can simply continue wearing the watch even if you are away from your phone.

- What will the daily questionnaire ask me about?

The 2-minute daily questionnaire will ask you about your mood, physical activity, sleep, and social interactions.

- What happens if I forget to answer the daily questionnaire?

Ideally, we would like you to answer the daily questionnaire every day for the first 10 days; however, if you forget to answer the questionnaire one day, just answer it the next day.

- Why are you tracking my location?

We would like to track your location for 4 weeks to understand your daily exposure to different environmental factors, such as exposure to green spaces, time spent indoors/outdoors, etc.

- What should I do if I want to opt out of the study?

If you want to opt out of the study, please uninstall the Understanding Activity app on your smartphone and contact the Participant Communications Team on 0800 252 853 or email contact@understandingsociety.ac.uk to arrange a return of the smartwatch.

- Does this study have ethical approval?

We have applied to the University of Essex Ethics Committee, who has approved all data collection in this study.

- Are my data confidential?

Yes, your data is strictly confidential.

- What is the GDPR?

The GDPR is the General Data Protection Regulation. It was approved by the European Parliament on 14th April 2016 and came into enforcement on 25th May 2018. The GDPR is enshrined in British law through the Data Protection Act 2018.

- How does *Understanding Society* currently keep data safe?

We are already governed by the current Data Protection Act and all of our procedures have data protection at the centre. In addition to the Data Protection Act, the Institute for Social and Economic Research, which hosts Understanding Society, has ISO-27001 certification. This is the international standard that describes best practice for an Information Security Management System. This requires the study to have a wide set of rules and regulations about how we manage data.

As well as having our information security management procedures documented, we are also independently audited annually and have to undergo re-certification every three years to make sure that we are following the requirements of the standard.

- What happens to my personal data?

Your personal details (name, address, telephone numbers, email addresses) are only used so that we can contact you during the year to send you information on how the survey is being used by researchers, and so that we can send an interviewer to you each year. These details are never made available to researchers or to any other companies who might use them for marketing purposes.

To preserve your anonymity, personal details (your name, date of birth, address, detailed geolocation data) are removed from the survey data and held securely in an encrypted database to which only a small number of people have access.

- What happens if I withdraw from the Study?

You are under no statutory or contractual obligation to provide us with your personal data. You have the right at any time to withdraw from the Study. If you do this, you will no longer be contacted by us. Any survey responses you have given us in the past, and which have already been made available from the UK Data Service will remain, but no additional information about you will be deposited. Your contact details will no longer be used, but will be kept archived to ensure that we do not contact you again on the occasion that there is an additional sample added to the study, or we start a new study.

- Is my information secure when I answer the survey online?

Yes, your survey answers are completely secure. You are issued with a unique, personal log-in for the survey and the information you enter in the interview is stored on secure servers

If you have any questions or comments for us, we encourage you to contact the Participant Communications Team by emailing contact@understandingsociety.ac.uk or by calling Freephone 0800 252 853.

Completing the daily survey may have caused you to think about issues in your life. If you would like to talk to someone, these free helplines may be useful:

Samaritans: 116 123

Mind: 0300 102 1234

Age UK: 0800 678 1602

Citizens Advice England: 0800 144 8848

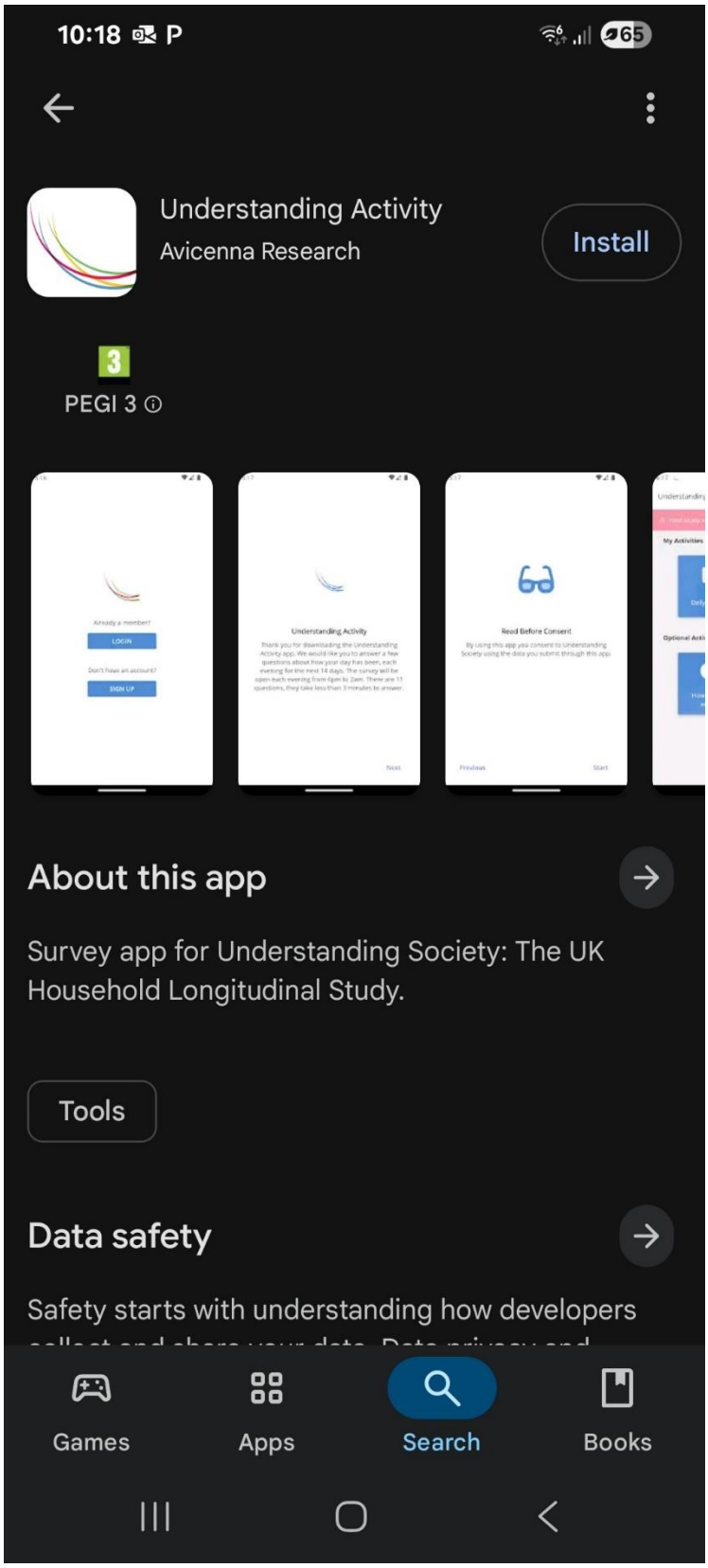
Citizens Advice Wales: 0800 702 2020

Citizens Advice Scotland: 0800 028 1456

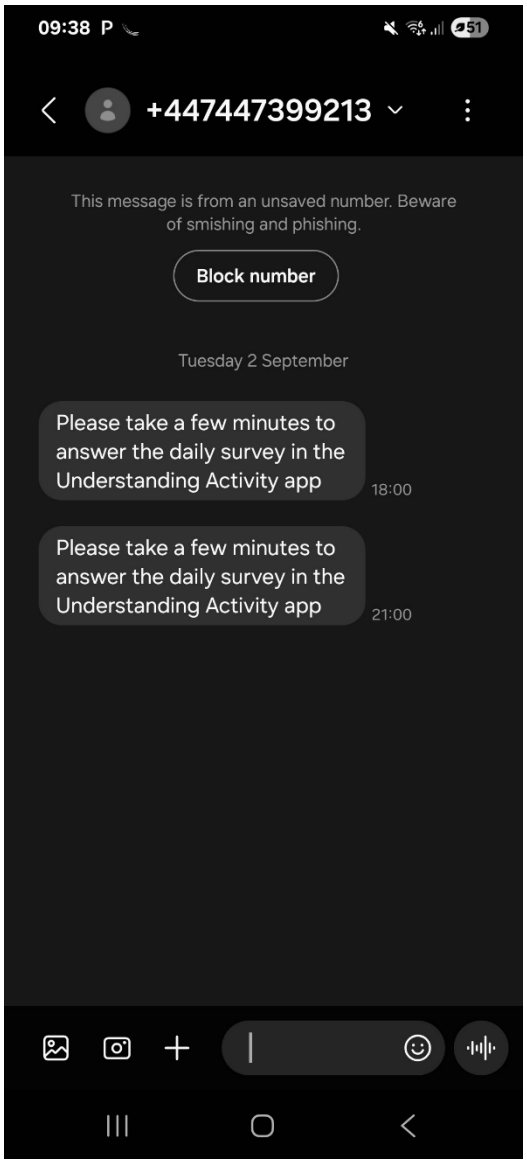
Citizens Advice Northern Ireland: 0800 915 4604

Daily Questionnaire Reminders

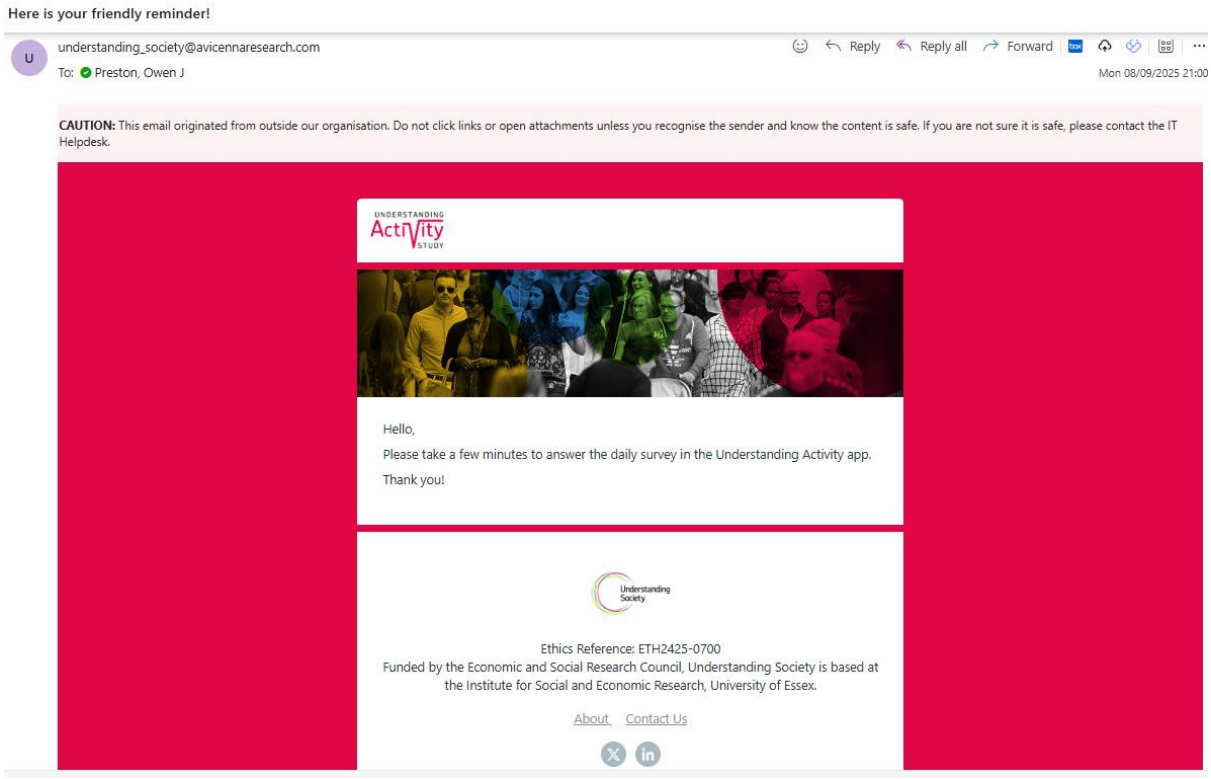
The ‘Understanding Activity’ app looks like this in the app store:



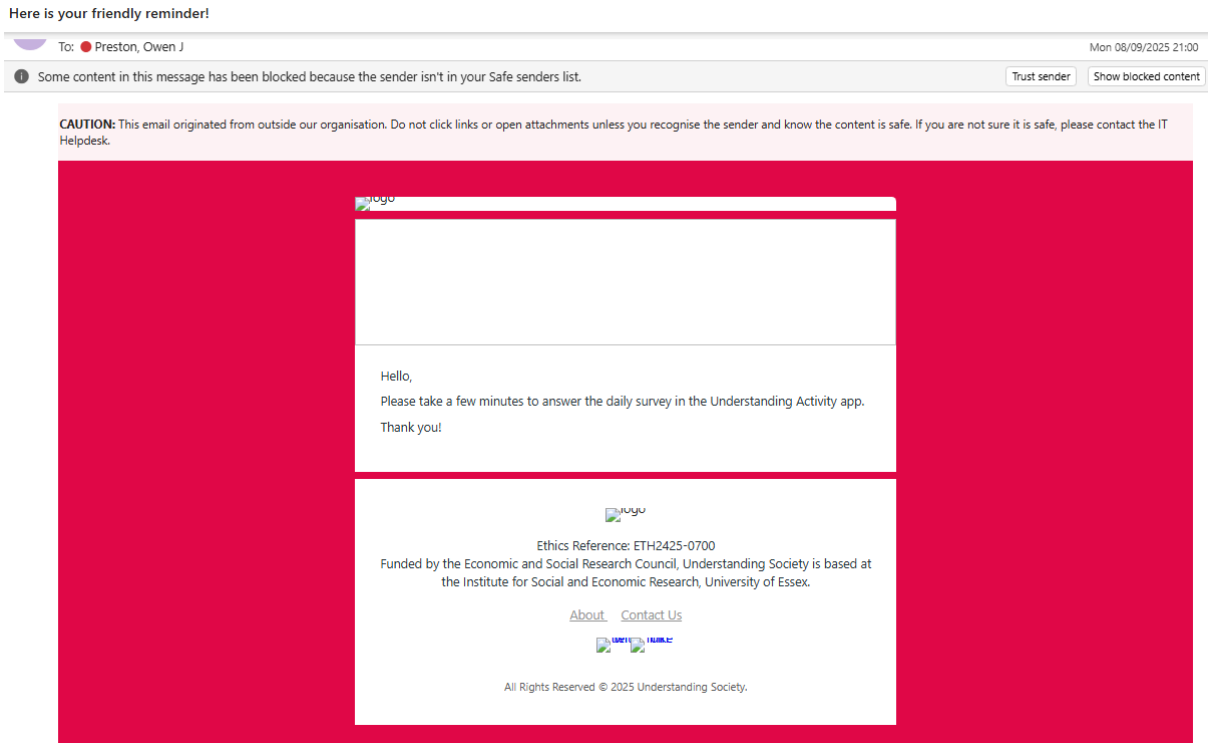
SMS/ Text messages reminders look like this (any may come from this contact number):



The email reminders look like this and come from this email address:



But might also look like this depending on if the graphics are blocked by their email providers security settings:



Daily Questionnaire Specification

Activity tracker study
Daily questionnaire

tired [Mood tiredness]

Source: Steyer et al (2004).

Universe: Ask all

Question type: Single choice, end point labelled scale displayed vertically.

Text: How have you felt today?

1 Very tired
2
3
4
5
6
7
8
9
10 Very awake

content [Mood contentedness]

Source: Steyer et al (2004).

Universe: Ask all

Question type: Single choice, end point labelled scale displayed vertically.

Text: How have you felt today?

1 Very content
2
3
4
5
6
7
8
9
10 Very discontent

calm [Mood calmness]

Source: Steyer et al (2004).

Universe: Ask all

Question type: Single choice, end point labelled scale displayed vertically.

Text: How have you felt today?

1 Very agitated
2
3
4
5
6
7
8
9
10 Very calm

well [Mood wellness]

Source: Steyer et al (2004).

Universe: Ask all

Question type: Single choice, end point labelled scale displayed vertically.

Text: How have you felt today?

1 Very unwell
2
3
4
5
6
7
8
9
10 Very well

relaxed [Mood relaxedness]

Source: Steyer et al (2004).

Universe: Ask all

Question type: Single choice, end point labelled scale displayed vertically.

Text: How have you felt today?

1 Very relaxed
2
3
4
5
6
7
8
9
10 Very tense

energy [Mood energy]

Source: Steyer et al (2004).

Universe: Ask all

Question type: Single choice, end point labelled scale displayed vertically.

Text: How have you felt today?

1 Very energised
2
3
4
5
6
7
8
9
10 Very drained

stress [Mood stress]

Source: Littman et al (2006).

Universe: Ask all

Question type: Single choice, end point labelled scale displayed vertically.

Text: How would you rate the amount of stress in your life (home and work) today?

1 No stress
2
3
4
5
6
7 Extreme stress

sleep [Sleep quality]

Source: Single item of perceived quality adapted from the Pittsburgh Sleep Quality Index (PSQI) for single night context.

Universe: Ask all

Question type: Single choice, display response options vertically.

Text: How would you rate the quality of your sleep last night?

1 Very poor
2 Poor
3 Fair
4 Good
5 Very good

interactpos [Social interactions positive]

Source: (developed within house)

Universe: Ask all

Question type: Single choice, display response options vertically.

Text: Did you have any positive experiences with other people today?

1 No
2 Yes, but minor
3 Yes, somewhat positive
4 Yes, very positive

interactneg [Social interactions negative]

Source: (developed within house)

Universe: Ask all

Question type: Single choice, display response options vertically.

Text: Did you have any negative experiences with other people today?

1 No
2 Yes, but minor
3 Yes, somewhat negative
4 Yes, very negative

exercise [Exercise]

Source: (developed within house)

Universe: Ask all

Question type: Single choice, display response options vertically.

Scripting note: If possible, the help text should not be displayed at first and should be accessed by clicking on "?" icon or similar to open a pop-up help box.

Help text: Think about the activities you do at work, as part of your house and gardening, to get from place to place, and in your spare time for recreation, exercise, or sport.

Text: Including walking, how physically active were you today?

1 Not very active
2 Somewhat active
3 Very active
4 Extremely active

end [Thank you]

Text: Thank you for taking the time to answer these questions today.

References:

- Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4
- Littman, A. J., White, E., Satia, J. A., Bowen, D. J., & Kristal, A. R. (2006). **Physical activity and mortality in a prospective study of older women: The Women's Health Initiative.** *American Journal of Preventive Medicine, 31*(3), 274–280. https://doi.org/10.1016/j.amepre.2006.05.007
- Steyer, R., Schwenkmezger, P., Notz, P., & Eid, M. (2004). Development of the Multidimensional Mood State Questionnaire (MDBF). Primary data. [Translated Title] (Version 1.0.0) [Data and

Documentation]. Trier: Center for Research Data in Psychology: PsychData of the Leibniz Institute for Psychology ZPID. **https://doi.org/10.5160/psychdata.srrf91en15**

Garmin Configuration Reminder Email

Dear {title} {forename} {surname},

Thank you for being part of *Understanding Society*.

We recently sent you a smartwatch device so you can take part in the **Understanding Activity Study**. Unfortunately, we don't seem to be receiving data from your smartwatch at this time.

~~You might have noticed a problem with the passwords for the mobile app on Friday 19th September. This has now been resolved.~~

Please could you check you have set up your smartwatch device correctly by referring to the information leaflet that came with the kit we sent you.

If you have any questions or need assistance, please contact the Participant Communications Team on **0800 252 853** or email **contact@understandingsociety.ac.uk**

For more information, please see the FAQ available at
https://www.understandingsociety.ac.uk/participants/projects/activitytracker/

Thank you,

[Name]
[Position]
Understanding Society
Institute for Social and Economic Research
University of Essex

Thank You Letter

Contact us:
Freephone 0800 252 853
www.understandingsociety.ac.uk/participants
contact@understandingsociety.ac.uk

{title} {forename} {surname}
{address 1}
{address 2}
{address 3}
{address 4}
{address 5}
{postcode}

Postal_date

Dear {title} {forename} {surname},

Thank you very much for your help with the **Understanding Society Activity Tracker Study.** We hope that you found taking part interesting. This part of the survey has come to an end now, but we would like to ask you a few questions about your experiences taking part in this – it is the first time we've done such a project and so would find your comments helpful.

To answer these debrief questions, please visit the website, either by entering the URL or scanning the QR code below. You will then be asked to enter your unique code which is {SignupID}.

Survey URL: **https://tinyurl.com/understandingactivitydebrief**
Scan QR code below:

Now that the study has ended, no further data will be collected from your smartwatch and this is yours to keep. Please see the instructions below on how to reset your smartwatch to factory settings.

Reset Instructions

1. Press and hold the lower of the two buttons on the side of the smartwatch
2. Click 'Settings'
3. Scroll down and click 'System'
4. Scroll down and click 'Reset'
5. Click 'Reset Default Settings'
6. Click the tick after the warning message
7. Allow time for the smartwatch to reboot

- Please now uninstall the Understanding Activity app from your smartphone.
- You can now install the Garmin Connect app on your smartphone, to pair it with your Garmin and record your data.

Thank you,

Professor Michaela Benzeval
Institute for Social and Economic Research
University of Essex

Debrief Qualtrics Specification

Debrief Qualtrics Specification

intro

Universe: Ask all

Text: Thank you for participating in the ***Understanding Society*** **Activity Tracker Study**. Now that the study has ended, we would like to ask you a few questions that will help us interpret the data from your smartwatch. We would also like to know about your experience participating in this study.

Please have your unique code ready so you can log into this survey.

You can find your unique code in the recent letter we sent you.

1. Continue

login [Unique identification code]

Universe: Ask all

Please log in

Please enter the unique identification code provided to you in the invitation letter:

Word 1 [Single line textbox]

Word 2 [Single line textbox]

Word 3 [Single line textbox]

Section 1: Using the Garmin smartwatch

holder_used [Smartphone holder used]

Universe: Ask all

Question Type: Single choice

Text: Did you use the smartphone holder during the study?

Subtext: *Please select one answer*

1. Yes
2. No

3. Don’t know
4. Prefer not to say

adaptor_used [USB adaptor used]

Universe: Ask all

Question Type: Single choice

Text: Did you use the charging cable with the USB-C adaptor attached or removed?

Subtext: *Please select one answer*

1. Always attached
2. Always removed
3. Sometimes attached, sometimes removed

4. Don’t know
5. Prefer not to say

watch_charge_prob [Smartwatch charging issues]

Universe: Ask all

Question Type: Single choice

Text: Did you have any problems with charging the Garmin smartwatch?

Subtext: *Please select one answer*

5. Yes

6. No

7. Don’t know
8. Prefer not to say

watch_tech_prob [Tech problems]

Universe: Ask all

Question Type: Single choice

Text: Did you experience any other technical problems with the Garmin smartwatch?

If yes, what were the technical problems you experienced?

(DO NOT provide any personal information that could be used to identify you)

[Multiple lines textbox]

charge_freq [Frequency of charging time]

Universe: Ask all

Question Type: Single choice

Text: How often did you charge the smartwatch during the study?

Subtext: *Please select one answer*

1. Every day
2. Every 2 – 3 days
3. Every 4 – 6 days
4. Once a week
5. Less than once a week

6. Don’t know
7. Prefer not to say

watch_flat_day [Device battery]

Universe: Ask all

Question Type: Single choice

Text: During the study, did the watch run out of charge on any day?

Subtext: *Please select one answer*

1. No, never ran out of charge
2. Yes, once or twice
3. Yes, three or more times

4. Don’t know
5. Prefer not to say

wear_night_freq [Adherence to wearing the device at night]

Universe: Ask all

Question type: Single choice

Text: How often did you wear the Garmin smartwatch while sleeping?

1. Every night
2. Sometimes
3. Never

4. Don’t know
5. Prefer not to say

wear_day_freq [Adherence to wearing the device during day]

Universe: Ask all

Question Type: Multiple choice

Text: How often did you wear the Garmin smartwatch during the day?

Subtext: *Please select one answer*

1. Every day
2. I missed some day
3. Never

4. Don’t know
5. Prefer not to say
6.

removal_reasons [Reasons for removal]

Universe: Ask if wear_night_freq = 2, 3 OR wear_day_freq = 2, 3

Text: Why did you miss some nights or days?

(DO NOT provide any personal information that could be used to identify you)

[Multiple lines textbox]

wear_comfort [Comfort wearing the device]

Universe: Ask all

Question Type: Single choice

Text: How comfortable was the Garmin smartwatch to wear?

Subtext: *Please select one answer*

1. Very comfortable
2. Somewhat comfortable
3. Somewhat uncomfortable
4. Very uncomfortable

5. Don't know
6. Prefer not to say

discomfort_reason [Comfort wearing the device follow-up]

Universe: Ask if wear_comfort = 2, 3 4

Question Type: Single choice

Text: What made it uncomfortable to wear the smartwatch?

(DO NOT provide any personal information that could be used to identify you)

[Multiple lines textbox]

Section 2: Study impact and data quality

check_feedback [Looked at feedback]

Universe: Ask all

Question Type: Single choice

Text: How often did you look at the information about your activity and sleep on your smartwatch?

Subtext: *Please select one answer*

1. Never
2. Some days
3. Every day

behav_change [Accuracy of data]

Universe: Ask all

Question Type: Single choice

Text: Did you change your behaviour while wearing the Garmin smartwatch (e.g., exercising or sleeping more or less than usual)?

Subtext: *Please select one answer*

1. Yes
2. No

3. Don't know
4. Prefer not to say

Section 3: Using the Understanding Activity app

app_prob [Setup of app]

Universe: Ask all

Question Type: Single choice

Text: Did you experience any issues with using the Understanding Activity app on your smartphone?

If yes, what issues did you experience with the app?

(DO NOT provide any personal information that could be used to identify you)

[Multiple lines textbox]

rem_helpful [Notifications and reminders]

Universe: Ask all

Question Type: Single choice

Text: Did you find the notifications or reminders to complete the daily questionnaires helpful?

Subtext: *Please select one answer*

1. Yes
2. No

3. Don't know
4. Prefer not to say

rem_modes [Reminder modes]

Universe: Ask all

Text: How did you receive the reminders for the daily survey?

Please select all that apply

Please select all that apply.

1. In app notifications
2. SMS messages
3. Emails
4. (make exclusive) I did not receive notifications for the daily survey

rem_suggest [Suggestions for reminders]

Universe: Ask all

Text: Do you have any suggestions for improving reminders (e.g., timing, frequency, or how they were sent)?

(DO NOT provide any personal information that could be used to identify you)

[Multiple lines textbox]

phone_charge_prob [Phone charge issues]

Universe: Ask all

Question Type: Single choice

Text: Did you have any problems with your phone charge during the study? For example, did the smartwatch or Understanding Activity app drain your phone battery faster than usual?

Subtext: *Please select one answer*

1. No
2. Yes, but it was not a problem
3. Yes, it was a problem
4. Don't know
5. Prefer not to say

Section 4: Completing the study

db_likely [Participation likelihood]

Universe: Ask all

Question Type: Single choice

Text: Based on your experience, how likely are you to take part in a similar study in the future?

Subtext: *Please select one answer*

1. Very likely
2. Somewhat likely
3. Somewhat unlikely
4. Very unlikely

5. Don't know
6. Prefer not to say

Section 5: Final feedback

db_longer [Willingness to continue]

Universe: Ask all

Question Type: Single choice

Text: We will **not** ask you to continuing wearing the smartwatch to collect any more data from you, but would like to know: If we had asked you to wear the smartwatch for longer what would you be willing to do?

Subtext: *Please select one answer*

1. I wouldn't continue at all
2. I would be happy to continue for 1 more month
3. I would be happy to continue for 3 more months
4. I would be happy to continue for 6 more months
5. I would be happy to continue for 1 year or longer

db_comment [Additional comments]

Universe: Ask all

Text: Do you have any additional comments on your experience of taking part in the activity trackers study? Is there anything else we could have done to make it easier to participate?

(DO NOT provide any personal information that could be used to identify you)

[Multiple lines textbox]

db_end

Universe: Ask all

Text: Many thanks for taking the time to answer these questions and for your contributions to the Understanding Society study.