Ethical Review Application (ER/JX205/1) Jing Xu

Project Title	Exploring the link between Interoception and Primal Beliefs
Status	Approved
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Applicant Status	UG
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Project Start Date	23-Jun-2023
Project End Date	01-Aug-2023
External Funding in place	No
External Collaborators	No
Funder/Project Title	
Name of Funder	

Ethical Review Application ER/JX205/1 (continued)

Project Description

The goal of this junior research associate project is to explore the potential link between our ability to sense the internal state of our bodies (interoception) and our fundamental beliefs about the world (primal world beliefs).

Interoception involves being aware of changes happening inside our bodies, both physiological (our heart rate) and emotional, and it plays a crucial role in how we perceive and experience the world around us. It has been related to emotion regulation, self-awareness and overall mental well-being. Primal world beliefs are our fundamental beliefs about the world, such as whether it is good or bad, safe or dangerous, alive or mechanistic. Although the importance of interoception and primal world beliefs has been studied independently, their direct connection remains unclear. Understanding the relationship between interoception and primal world beliefs can provide valuable insights into how our bodily sensations shape both our cognitive experiences and our beliefs about the world.

To investigate this potential connection, we aim to recruit 60 adult participants from the student population. Participants will complete 3 questionnaires to assess their primal world beliefs (PI-99) and interoception (MAIA-2, IAS). These measures involve participants rating their beliefs about the world, as well as providing self-reported assessments of their interoceptive awareness and accuracy.

Additionally, participants will perform 3 tasks, during which we will record participants' cardiac activity using an electrocardiogram (ECG), namely a resting state (an 8-minute-long resting session to allow the participants to enter a calm state), heartbeat counting (HBC) and heartbeat discrimination (HBD) tasks to obtain objective measurements of interoceptive ability. For the HBC task, the number of heartbeats that occurred during a specific period (depending on the length of the randomised trial order) will be collected and compared with the number of heartbeats participants counted (without taking the pulse). For the HBD task, participants will be presented with multiple sound stimuli of different frequencies and to judge if the frequency of the stimulus is slower/same/faster than their current heart rate (beats per minute). During these tasks, the raw ECG signal will be collected, from which the number of beats (R-peaks) and heart rate will be computed and used for data analysis.

Participants' names and demographic information will only be used for obtaining consent and will be replaced with meaningless pseudonyms when the dataset becomes open access to ensure confidentiality.

The findings of this study will enhance our understanding of the intricate relationship between bodily sensations and our cognitive experiences. By investigating the link between interoception and primal world beliefs, we can gain valuable insights into the role of our physical processes in shaping our beliefs about the world.

Ethical Review Form Section A (ER/JX205/1)	
Question	**Response**
>> Checklist	
A1. Will your study involve participants who are currently or potentially vulnerable or unable to give informed consent or in a dependent position (e.g. people under 18, people with learning difficulties, over-researched groups or people in care facilities)?	No
A2. Will participants be required to take part in the study without their consent or knowledge at the time (e.g. covert observation of people in non-public places), and / or will deception of any sort be used? Please refer to the British Psychological Society Code of Ethics and Conduct (or similar guidelines) for further information.	No
A3. Unless specifically and clearly consented (e.g. a media release form), will it be possible, through a research output, to identify participants in any way? (This does not include taking email details for participant prize draws or identifying participants from signed consent forms or holding identity encryption spreadsheets that are stored securely separate from the research data).	No
A4. Might the study induce psychological stress or anxiety, or produce humiliation or cause harm or negative consequences beyond the risks likely to be encountered in the everyday life of the participants?	No
A5. Is there a risk that the research topic might lead to disclosures from the participant concerning their beliefs, involvement in illegal actions or any other activities that may represent a threat to themselves or others?	No
A6. Will the study involve collecting any personal special category information* in a form that could allow the participant/ participants to be identified? [* identifiers relating to race, ethnic origin, politics, religion, trade union membership, philosophical beliefs, genetics, biometrics, health, sex life or sexual orientation]	No
A7. Will any drugs, placebos or other substances (such as food substances or vitamins) be administered as part of this study and will any invasive or potentially harmful procedures of any kind will be used?	No
A8. Will your project involve working with any substances and / or equipment which may be considered hazardous?	No
A9. Will your study involve the taking and/or storage of human tissue that falls under the Human Tissue Act (HTA)? http://www.sussex.ac.uk/staff/research/governance/erp_overview/humantissue	No
>> Risk Assessment	
A10. If you have answered Yes to ANY of the above questions, your application may be considered as HIGH risk. If, however you wish to make a case that your application should be considered as LOW risk please enter the reasons here. Researchers should note that SREOs or C-RECs may decide NOT to agree with the case that you have made.	

Ethical Review Form Section B (ER/JX205/1)	
Question	**Response**
>> Data Collection and Analysis (Please provide full details)	
B1. PARTICIPANTS: How many people do you envisage will participate, who are they, and how will they be selected?	60 participants of 18 or above from the student population of any gender or ethnicity will be recruited for this experiment.
B2. RECRUITMENT: How will participants be approached and recruited?	Recruitment posters will be used across campus, mainly at the library for better exposure, and social media. It is possible to participate by scanning the QR code on the poster to book a time and date or by contacting the researcher's university email address directly.
B3. METHOD: What research method(s) do you plan to use; e.g. interview, questionnaire/self-completion questionnaire, field observation, audio/audio-visual recording?	A total of six tasks will be completed by each participant in a single session that lasts approximately one hour long, with all tasks being quantitative measures and in random order. Three of the tasks are self-completion questionnaires that measure primal world belief (99 Item Primals Inventory) and subjective interoceptive ability (Multidimensional Assessment of Interoceptive Awareness Version 2 with 37 items, Interoceptive Accuracy Scale with 21 items). The other 3 tasks involve a resting-state recording, and measuring the interoceptive ability objectively, in which participants will complete the heartbeat counting task (HBC) and heartbeat discrimination task (HBD) wearing an electrocardiogram (ECG) device. In addition, standard generic demographic information will be collected on a voluntary basis (age, gender). Cardiac activity will be collected through a BITalino device via ECG, with disposable electrodes (PluX biosignals brand, https://www.pluxbiosignals.com/collections/electrodes/products/gelled-self-adhesive-disposable-ag-agcl-electrodes-pack-of-200) placed on the collarbones and above the hipbone (or PPG a fingertip sensor if the former is impossible), which are non-invasive surface physiological measures. The researchers will receive the proper training to handle the equipment as well as ensure participants' comfort and safety during the setup and recording. Participants will be instructed beforehand about the setup (the fact that electrodes will be placed on their collarbones and above the hip) and to wear loose and comfortable clothes. Upon placement of the first electrode, researchers will ask and look up for signs of potential allergic reaction (redness and discomfort), in which case the device will be removed, and alternative measures will be done (pulse via finger-tip PPG). All manufacturer instructions will be meticulously followed during data collection. Brand-new electrodes will be used on each participant for accurate signal quality. Post-session, the electrodes will be promptly disposed of per the recommended guidelines, ensuring participant safety and upholding stringent hygiene standards.
B4. LOCATION: Where will the project be carried out e.g. public place, in researcher's office, in private office at organisation?	The experiment will be done in the psychology testing rooms provided by the university in Pevensey I

B5. PARTICIPANT WELLBEING: Will the study involve engaging participants in the discussion of potentially distressing or sensitive topics? (e.g. sexual activity, drug use, ethnicity, political behaviour, potentially illegal activities). If so, please set out how you will manage the well-being of participants.	No distressing or sensitive topics will be involved during the experiment. If signs of distress are observed in participants, the study will be paused or cancelled after communication.
>> Confidentiality and Anonymity	
B6. Will questionnaires be completed anonymously and returned indirectly?	Yes
B7. Will research data only be identifiable by a unique identifier (e.g. code/pseudonym)? If Yes, please explain how this will be attributed in B11a below.	Yes
B8. Will lists of identity numbers or pseudonyms linked to names and/or addresses be stored securely and separately from the research data? If Yes, explain how this will occur in B11a below.	Yes
B9. Will all place names and institutions which could lead to the identification of individuals or organisations be changed unless this is consented to explicitly in the consent form?	Yes
B10. Will all personal information gathered be treated in strict confidence and never disclosed to any third parties?	Yes
B11. Can you confirm that your research records will be held in accordance with data protection regulations? (http://www.sussex.ac.uk/ogs/policies/information/dpa)	Yes
B11a. Please explain how ANY identifiable personal and/or research data will be managed and securely stored ensuring that participants have given appropriate informed consent for this.	Since participants need to enter their names to sign the information and consent form, the names and participant IDs we assigned will be stored in an Excel document protected by password, in case they want to withdraw their data. All data collected during the study will be completely anonymized, and stored in the University of Sussex OneDrive account.
B12. Do you intend to use the research data for any purpose other than that for which consent is explicitly given? If so, please explain below	Yes
B12a. If you answered NO to any of the above in this section (or think more information could be useful to the reviewer) please explain here:	The anonymized and unidentified data will be made available open-source on a dedicated repository (e.g., OSF)
>> Informed Consent and Recruitment of Participants	
B13. Will all respondents be given an Information Sheet and be given adequate time to read it before being asked to agree to participate?	Yes

B14. Will all participants taking part in an interview, focus group, observation (or other activity which is not questionnaire based) be asked to sign a consent form? If you are obtaining consent another way (such as verbally), please explain under B17 below.	Yes
B15. Will all participants self-completing a questionnaire be asked to show consent to participate by a specific and identifiable action? (Give details in B17 below)	Yes
B16. Will all participants be told that they can withdraw their participation at any time during the research and can ask for their data to be destroyed and/or removed from the project until it is no longer practical to do so?	Yes
B17. If you answered NO to any of the above in this section (or think more information will be useful to the reviewer) please explain here:	All participants will sign the information & consent form at the beginning of the session, with all tasks explained in detail in the information section and by the researcher.
>> Context	
B18. Is DBS (Disclosure and Barring Service) clearance necessary for this project? If yes, please ensure you complete the next question.	No
B19. Are any other ethical clearances or permissions (internal or external) required? Please see the help text (i) for further details.	No
B19a. If yes, please give further details including the name and address of the organisation. If other ethical approval has already been received please attach evidence of approval, otherwise you will need to supply it when ready. (You do not need to provide evidence of a current DBS check at this point).	
B20. Does the research involve any fieldwork - Overseas or in the UK?	No
B20a. If yes, where will the fieldwork take place? If undertaken overseas you must attach an OTSSRA form. In the event that the Foreign and Commonwealth Office has specific travel warnings in place for the country (ies) to be visited you will also need to provide a detailed risk assessment. https://www.gov.uk/foreign-travel-advice	
B21. Will any researchers be in a lone working situation?	Yes
B21a. If yes, briefly describe the location, time of day and duration of the lone working. What precautionary measures will be taken to ensure safety of the researcher(s)?	The study will be conducted in the School of Psychology during working hours where there is access to staff and emergency equipment
>> Any further concerns	
B22. Are there any other ethical considerations relating to your project which have not been covered above?	No

B22a. If yes, please explain:	

Study Name: [Sensing the body and seeing the world]
Date: [date]
Version: [number]

University of Sussex

INFORMATION & CONSENT SHEET

INVITATION TO TAKE PART

You are being invited to take part in a research study to understand the relationship between physiological processes (how you experience your body) and how you perceive the world. Thank you for carefully reading this information sheet, a copy of which you can keep for your records. This study is being conducted by Jingxiong Xu and Dr Dominique Makowski from the School of psychology, University of Sussex, who are happy to be contacted (jx205@sussex.ac.uk/D.Makowski@sussex.ac.uk) if you have any questions.

WHY HAVE I BEEN INVITED TO TAKE PART AND WHAT WILL I DO?

We are testing 60 adults from the student population; the tasks will take approximately one hour to complete. You will have to complete different questionnaires (asking about your connection to your body, as well as general questions about how you view the world) and different tasks that will require you to focus on your heart beats while having it recorded via electrocardiogram (ECG).

ABOUT ECG

The ECG is a simple procedure where sensors are attached to the skin to detect the electrical signals produced by your heart each time it beats. The biosignalsplux ECG machine we use is intended for use in life science education and research and is not a medical device. The study is being undertaken for research purposes only and the researchers will not be able to provide any feedback regarding your ECG following participation. If you have any concerns about your heart and/or related health issues you should contact your GP. Further information about ECG is available on the NHS website: https://www.nhs.uk/conditions/electrocardiogram/

PARTICIPANT ADVISORY: SKIN SENSITIVITY TO ELECTRODE MATERIALS

We kindly request that participants refrain from volunteering for the study if they are aware of having sensitive skin to adhesives or the materials used in the electrodes. The electrodes used in the study are primarily composed of silver and silver chloride. If you have experienced skin reactions or allergies to these materials in the past, we advise against participation. Your comfort and well-being are our top priorities, and we appreciate your understanding in ensuring a safe and suitable research environment.

WHAT WILL HAPPEN TO THE RESULTS AND MY PERSONAL INFORMATION?

The results of this research will be used to deepen our scientific understanding of the role of the body in psychology, and might be used for scientific dissemination, including a scientific poster presented at the junior research exhibition hosted in October 2023. We anticipate being able to provide a summary of our findings on request from 01/09/2023 (jx205@sussex.ac.uk). Your anonymity will be ensured in the way described in the consent information below. Please read this information carefully and then, if you wish to take part, please sign to show *y*ou have fully understood this sheet, and that you consent to take part inthe study as it is described here.

CONSENT

- I understand that by signing below I am agreeing to take part in the University of Sussex research described here, and that I have read and understood this information sheet.

- I understand that my participation is entirely voluntary, that I can choose not to participate in part or all of the study, and that I can withdraw at any stage without having to give a reason and without being penalised in any way.

For further information about this research please contact Jingxiong Xu (jx205@sussex.ac.uk) or the project supervisor Dominique Makowski (D.Makowski@sussex.ac.uk). This research has been approved ([reference number]) by the Sciences & Technology Cross-Schools Research Ethics Committee (C-REC) (crecscitec@sussex.ac.uk). The University of Sussex has insurance in place to cover its legal liabilities in respect of this study.

University of Sussex

- I understand I can request without penalty that my data be withdrawn and deleted even after the data collection is complete, any time up until the results are analysed ([date]).

- I understand that my personal data will be used for the purposes of this research study and will be handled in accordance with Data Protection legislation. I understand that the University's Privacy Notice provides further information on how the University uses personal data in its research.

- I understand that my collected data will be stored in a de-identified way and kept separate from other details about. Anonymized and de-identified data may be made available on scientific online data repositories to other researchers.

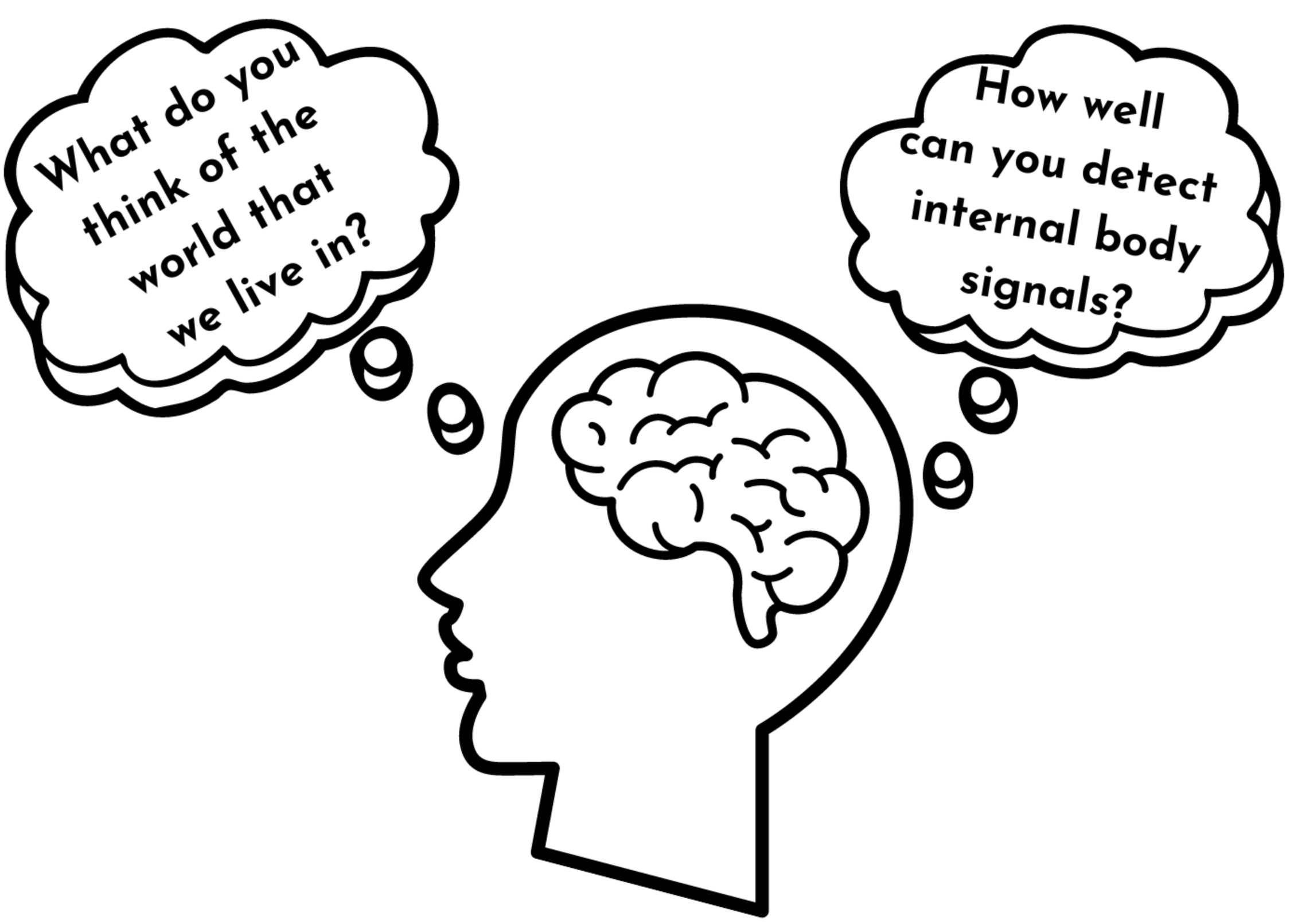
- I understand that my identity will remain confidential in any written reports of this research, and that no information I disclose will lead to the identification in those reports of any individual either by the researchers or by any other party, without first obtaining my written permission.

_____	_____	_____
Name of Participant	Date	Signature

For further information about this research please contact Jingxiong Xu (jx205@sussex.ac.uk) or the project supervisor Dominique Makowski (D.Makowski@sussex.ac.uk). This research has been approved ([reference number]) by the Sciences & Technology Cross-Schools Research Ethics Committee (C-REC) (crecscitec@sussex.ac.uk). The University of Sussex has insurance in place to cover its legal liabilities in respect of this study.

Exploring the Mind:

What Is Your Relationship With Your Heart?



Help us to understand how the intimate connection between the body and the brain shapes our experience of the world

UNIVERSITY OF SUSSEX

For more detail, please contact **jx205@sussex.ac.uk** or **scan the QR code** to participate

Below are several statements regarding how accurately you can perceive specific bodily sensations. Please rate on the scale how well you believe you can perceive each specific signal. For example, if you often feel you need to urinate and then realise you do not need to when you go to the toilet you would rate your accuracy perceiving this bodily signal as low.

Please only rate how well you can perceive these signals without using external cues, for example, if you can only perceive how fast your heart is beating when you measure it by taking your pulse this would not count as accurate internal perception.

1. I can always accurately perceive when my heart is beating fast
2. I can always accurately perceive when I am hungry
3. I can always accurately perceive when I am breathing fast
4. I can always accurately perceive when I am thirsty
5. I can always accurately perceive when I need to urinate
6. I can always accurately perceive when I need to defecate
7. I can always accurately perceive when I encounter different tastes
8. I can always accurately perceive when I am going to vomit
9. I can always accurately perceive when I am going to sneeze
10. I can always accurately perceive when I am going to cough
11. I can always accurately perceive when I am hot/cold
12. I can always accurately perceive when I am sexually aroused
13. I can always accurately perceive when I am going to pass wind
14. I can always accurately perceive when I am going to burp
15. I can always accurately perceive when my muscles are tired/sore
16. I can always accurately perceive when I am going to get a bruise
17. I can always accurately perceive when I am in pain
18. I can always accurately perceive when my blood sugar is low
19. I can always accurately perceive when someone is touching me affectionately rather than non-affectionately
20. I can always accurately perceive when something is going to be ticklish
21. I can always accurately perceive when something is going to be itchy

Scale: Strongly Agree (5), Agree (4), Neither agree nor disagree (3), Disagree (2), Disagree Strongly (1).

Multidimensional Assessment of Interoceptive Awareness

Version 2
(MAIA-2)
(2018)

Contact: Wolf E. Mehling, MD
Osher Center for Integrative Medicine
University of California, San Francisco
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http://www.osher.ucsf.edu/maia/

Multidimensional Assessment of Interoceptive Awareness (Version 2)

Permission and Copyright

Scoring Instructions

Take the average of the items on each scale.
Note: (R): reverse-score (5 – x) items 5, 6, 7, 8, 9 and 10 on Not-Distracting, and items 11, 12 and 15 on Not-Worrying.

1. **Noticing:** Awareness of uncomfortable, comfortable, and neutral body sensations
   Q1_____ + Q2_____ + Q3_____ + Q4_____ / 4 = _____

2. **Not-Distracting:** Tendency not to ignore or distract oneself from sensations of pain or discomfort
   Q5(**R**)____ + Q6(**R**)____+ Q7(**R**)____+ Q8(**R**)____+Q9(**R**)____+Q10(**R**) / 6 = _____

3. **Not-Worrying:** Tendency not to worry or experience emotional distress with sensations of pain or discomfort
   Q11(**R**)_____ + Q12(**R**)_____ + Q13_____ + Q14_____ + Q15 (**R**) / 5 = _____

4. **Attention Regulation:** Ability to sustain and control attention to body sensations
   Q16_____ + Q17_____ + Q18_____ + Q19_____ + Q20_____ + Q21_____ + Q22_____ / 7 = _____

5. **Emotional Awareness:** Awareness of the connection between body sensations and emotional states
   Q23_____ + Q24_____ + Q25_____ + Q26_____ + Q27_____ / 5 = _____

6. **Self-Regulation:** Ability to regulate distress by attention to body sensations
   Q28_____ + Q29_____ + Q30_____ + Q31_____ / 4= _____

7. **Body Listening:** Active listening to the body for insight
   Q32_____ + Q33_____ + Q34_____ / 3= _____

8. **Trusting:** Experience of one's body as safe and trustworthy
   Q35_____ + Q36_____ + Q37_____ / 3= _____

Below you will find a list of statements. Please indicate how often each statement applies to you generally in daily life.

.	Circle one number on each line					
	Never					Always
1. When I am tense I notice where the tension is located in my body.	0	1	2	3	4	5
2. I notice when I am uncomfortable in my body.	0	1	2	3	4	5
3. I notice where in my body I am comfortable.	0	1	2	3	4	5
4. I notice changes in my breathing, such as whether it slows down or speeds up.	0	1	2	3	4	5
5. I ignore physical tension or discomfort until they become more severe.	0	1	2	3	4	5
6. I distract myself from sensations of discomfort.	0	1	2	3	4	5
7. When I feel pain or discomfort, I try to power through it.	0	1	2	3	4	5
8. I try to ignore pain	0	1	2	3	4	5
9. I push feelings of discomfort away by focusing on something	0	1	2	3	4	5
10. When I feel unpleasant body sensations, I occupy myself with something else so I don't have to feel them.	0	1	2	3	4	5
11. When I feel physical pain, I become upset.	0	1	2	3	4	5
12. I start to worry that something is wrong if I feel any discomfort.	0	1	2	3	4	5
13. I can notice an unpleasant body sensation without worrying about it.	0	1	2	3	4	5
14. I can stay calm and not worry when I have feelings of discomfort or pain.	0	1	2	3	4	5
15. When I am in discomfort or pain I can't get it out of my mind	0	1	2	3	4	5
16. I can pay attention to my breath without being distracted by things happening around me.	0	1	2	3	4	5
17. I can maintain awareness of my inner bodily sensations even when there is a lot going on around me.	0	1	2	3	4	5
18. When I am in conversation with someone, I can pay attention to my posture.	0	1	2	3	4	5

How often does each statement apply to you generally in daily life? Circle one number on each line

	Never					Always
19. I can return awareness to my body if I am distracted.	0	1	2	3	4	5
20. I can refocus my attention from thinking to sensing my body.	0	1	2	3	4	5
21. I can maintain awareness of my whole body even when a part of me is in pain or discomfort.	0	1	2	3	4	5
22. I am able to consciously focus on my body as a whole.	0	1	2	3	4	5
23. I notice how my body changes when I am angry.	0	1	2	3	4	5
24. When something is wrong in my life I can feel it in my body.	0	1	2	3	4	5
25. I notice that my body feels different after a peaceful experience.	0	1	2	3	4	5
26. I notice that my breathing becomes free and easy when I feel comfortable.	0	1	2	3	4	5
27. I notice how my body changes when I feel happy / joyful.	0	1	2	3	4	5
28. When I feel overwhelmed I can find a calm place inside.	0	1	2	3	4	5
29. When I bring awareness to my body I feel a sense of calm.	0	1	2	3	4	5
30. I can use my breath to reduce tension.	0	1	2	3	4	5
31. When I am caught up in thoughts, I can calm my mind by focusing on my body/breathing.	0	1	2	3	4	5
32. I listen for information from my body about my emotional state.	0	1	2	3	4	5
33. When I am upset, I take time to explore how my body feels.	0	1	2	3	4	5
34. I listen to my body to inform me about what to do.	0	1	2	3	4	5
35. I am at home in my body.	0	1	2	3	4	5
36. I feel my body is a safe place.	0	1	2	3	4	5
37. I trust my body sensations.	0	1	2	3	4	5

Instructions: Below are very general statements about the world—not the world we wish we lived in, but the actual world as it is now. Please share your sense of agreement or disagreement. When in doubt, go with what initially **feels true of the real world**. There are no wrong answers. There's no need to overthink. [Item order was randomized for each participant. Response options were *strongly agree*, *agree*, *slightly agree*, *slightly disagree*, *disagree*, and *strongly disagree*.]

About Me vs. not about me
- Whatever is happening around me often feels related to me or something I've done.[A]
- Much of what happens around me feels like it's because of me or related to me somehow.[A]
- My first instinct about events happening around me is that they're unrelated to me or anything I've done.*[A]
- When unsure why something is happening, I often suspect it's got something to do with me.
- My first instinct about things happening around me is that they have to do with me or something I've done.[A]

Abundant vs. barren
- The world is an abundant place.[GE]
- Life overflows with opportunity and abundance.[GE]
- The world feels like a barren place with few opportunities.*[GE]
- The world is an abundant place with tons and tons to offer.[GE]

Acceptable vs. unacceptable
- The world needs to be continually improved rather than accepted.*
- Rather than accepting things as they are, the world needs to be improved as much as possible.*
- It's usually better to accept a situation than try to change it.
- Most situations in life need to be improved, not accepted.*

Beautiful vs. ugly
- Nearly everything in the world is beautiful.[GE]
- Though some things are incredibly beautiful, they're few and far between.*[GE]
- There is beauty everywhere, no matter where we look.[GE]
- In life, there's way more beauty than ugliness.[GE]

Changing vs. static
- Everything feels like it's shifting and changing.
- Everything feels like it's constantly moving, changing, and up in the air.
- Everything feels like a whirl of constant change.
- I feel like everything changes all the time.
- The world is a place where most things stay pretty much the same.*

Cooperative vs. competitive
- Instead of being cooperative, life is a brutal contest where you got to do whatever it takes to survive.*[GS]
- For all life—from the smallest organisms, to plants, animals, and for people too—everything is a cut-throat competition.*[GS]
- Instead of being cooperative, the world is a cut-throat and competitive place.*[GS]
- The world runs on trust and cooperation way more than suspicion and competition.[GS]

Funny vs. not funny
- The world is hilarious; if we aren't laughing, we aren't paying attention.[GE]
- Laughing a ton makes sense because life is hilarious and humor is everywhere.[GE]
- While some things are humorous, most of the time the world is not that funny.*[G]
- There's humor in everything.[GE]

Harmless vs. dangerous
- On the whole, the world is a safe place.[GS]
- Real danger is everywhere; even if we don't notice it.*[GS]
- Most things and situations are harmless and totally safe.[GS]
- I tend to see the world as pretty safe.[GS]
- On the whole, the world is a dangerous place.*[GS]

Hierarchical vs. nonhierarchical
- Most things can be organized into hierarchies, rankings, or pecking orders that reflect true differences among things.
- Humans, animals, plants, and pretty much everything else can be organized by how important or good they are.
- Most things aren't better or worse. It's hard to organize the world into hierarchies, rankings, or pecking orders that reflect true differences.*
- Most things in the world could be ranked in order of importance.
- Things are rarely equal. Most plants and animals, and even people, are better or worse than one another.

Improvable vs. too hard to improve
- It's possible to significantly improve basically anything encountered in life.[G]
- Most situations seem really difficult if not impossible to improve.*[G]
- No matter who you are, you can significantly improve the world you live in.[GE]
- In most situations, making things way better is absolutely possible.[GE]
- Most things and situations are responsive, workable, and totally possible to improve.[GE]

Intentional vs. unintentional
- Events happen according to a broader purpose.[A]
- What happens in the world is meant to happen.[A]
- Everything happens for a reason and on purpose.[A]
- Events seem to lack any cosmic or bigger purpose.*[A]
- The universe doesn't care if events happen one way or another.*[A]

Interconnected vs. atomistic
- Every single thing is connected to everything else.
- Most things are basically unconnected and independent from each other.*
- Though things can appear separate and independent, they really aren't. Instead, all is one.
- The world is a place where everything is completely interconnected.

Interesting vs. boring
- The world is a somewhat dull place where plenty of things are not that interesting.*[GE]
- Most things in life are kind of boring.*[GE]
- It feels like interesting and exciting things surround us all the time.[GE]
- While some things are interesting, most things are pretty dull.*[GE]

Just vs. unjust
- On the whole, the world is a place where we get what we deserve.[G]
- Life will find ways to reward those who do good and punish those who do bad.[GA]
- The world is a place where working hard and being nice pays off.[GS]
- If someone is generous and kind, the world will be kind back.[GS]
- The world is a place where we rarely deserve what we get.*[GS]

Meaningful vs. meaningless
- The world is a place where most everything matters.[GE]
- Nothing really matters all that much.*[GE]
- Most things are pointless and meaningless.*[GE]
- The world is a place where things just don't matter.*[GE]

Needs Me vs. doesn't need me
- The universe needs me for something important.[GA]
- Life has an important part for me to play.[GA]
- It feels like the world doesn't really need me for anything.*[GA]
- The world needs me and my efforts.[GA]

Pleasurable vs. miserable
- Life offers more pain than pleasure.*[GS]
- On the whole, the world is a good place.[GS]
- Life in this world is usually pain and suffering.*[GS]
- Life offers way more pleasure than pain.[GS]
- Most things in the world are good.[GS]

Table 4 (*continued*)

Progressing vs. declining
- On the whole, the world is getting worse.*[GS]
- It feels like the world is going downhill.*[GS]
- Though the world has problems, on the whole things are definitely improving.[GS]
- It feels like the world is getting better and better.[GS]

Regenerative vs. degenerative
- Though sometimes situations get worse, usually they get better.[GS]
- Most things have a habit of getting worse.*[GS]
- The usual tendency of most things and situations is to get better, not worse.[GS]
- Over time, most situations naturally tend to get worse, not better.*[GS]

Stable vs. fragile
- The world is a place where things are fragile and easily ruined.*[GS]
- It takes a lot for things to fall apart.[GS]
- Most things and situations are delicate and easily destroyed.*[GS]
- Most situations are delicate. Though they may be fine now, things could easily unravel.*[GS]

Understandable vs. too hard to understand
- Most everything is easy enough to understand.[G]
- The world is a confusing place where many skills and subjects are too hard to figure out.*[G]
- Lots of things in the world are too confusing and difficult to understand.*[G]
- The world is easy enough to understand.[G]

Worth Exploring vs. not worth exploring
- I feel everything is worth trying, learning about, or exploring further.[GE]
- To be honest, though some things are worth trying and exploring, most things aren't.*[GE]
- Everything deserves to be explored.[GE]
- Unfamiliar things and places are usually worth trying or checking out.[GE]

Enticing additional items
- No matter where we are or what the topic might be, the world is fascinating.[GE]
- No matter where we are, incredible beauty is always around us.[GE]

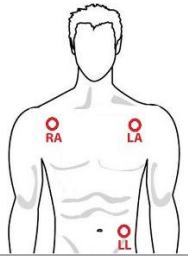
Good additional item
- On the whole, the world is an uncomfortable and unpleasant place.*[G]

Note.
[G] 71 *Good* items. [S] 29 *Safe* items. [E] 28 *Enticing* items. [A] 14 *Alive* items. * 39 reverse-scored items.

University of Sussex

General Risk Assessment Template

For Guidance & examples on how to complete this form please refer to HS FG 069 Risk assessment guidance on the Health & Safety Website.
This form should only be used for general hazards that are not covered by a specific risk assessment template.
A list of templates can be found on the Health & Safety Website

Section 1 General Information						
A	**School / Department:**	School of Psychology				
B	**Brief description of the activity:** *Start to finish, step by step*	Three Ag/AgCl electrodes will be placed (on the collar bones and above the hip bone) for each participant to collect their ECG (from which the heart rate and the number of heartbeats that occurred during a specific period will be extracted).  				
C	**Location(s) covered by this risk assessment:** *Include building and room number if applicable*	Testing room offered by the university in Pevensey building				
D	**Equipment and materials used:**	Electrocardiography (ECG) electrodes https://www.pluxbiosignals.com/collections/electrodes/products/gelled-self-adhesive-disposable-ag-agcl-electrodes-pack-of-200				
E	**Name(s) / Group(s) involved in the activity:** *Consider Staff, Students, Visitors, Contractors and members of the public*	Jingxiong Xu (researcher), Dominique Makowski (supervisor), and participants in the study				
F	**Name of person completing this risk assessment:** *Students and PhD students should only complete risk assessments for their projects. Sign off for all student projects should be by the student's supervisor.*	Jingxiong Xu	Signature		Date:	23/06/2023
G	**Risk assessment approved by:** *The individual approving the risk assessment should be familiar with the work being undertaken. This should in most cases be the assessor's supervisor, line manager or the principle investigator.*	Dominique Makowski	Signature		Date:	23/06/2023

Document Control					
H&S Document No	HS F001	**Version**	6.1	**Date Issued**	September 2022
Author	Seimon Barton-Jones	**Reviewed by**	Angelina Janus	**Department ID code**	

H	**Send a copy to School/Department Safety Coordinator**					

Section 2 Hazards & Controls *See the accompanying guidance document on the safety section website for further information on how to complete this form.*												
		Risk with current control measures				Risk after additional control measures						
Potential hazards	Who might be harmed and how?	What current controls are in place to avoid harm?	Likelihood 1-5	Severity 1-5	Risk (L✕ R)	What further control measures are required to reduce risk?	Likelihood 1-5	Severity 1-5	Risk (L✕ R)	Who will do this?	When must this be done?	Completed on:
Allergic to electrodes	Participants Dermatitis caused by the allergic reaction from the electrodes	Participants will be asked before the placement of the electrodes if they had negative experience in the past with similar equipment. Additionally, the researcher will monitor potential discomfort or skin redness after the placement of the first electrode and remove everything if any suspicion arises.	1	1	1		1	1	1	Researcher And participants	During the study	

Section 3 Risk Matrix

Risk Matrix - Likelihood x Severity (L x S)

LIKELIHOOD									
	Will undoubtedly happen/recur, possibly frequently **Expected to occur at least weekly**	>50%	**Almost certain**	**5**	5	10	15	20	25
	Will probably happen/recur but it is not a persisting issue **Expected to occur at least monthly**	10-50%	**Likely**	**4**	4	8	12	16	20
	Might happen or recur occasionally **Expected to occur at least yearly**	1-10%	**Possible**	**3**	3	6	9	12	15
	Do not expect it to happen/recur but it is possible it may do so **Expected to occur once in 5 years**	0.1-1.0%	**Unlikely**	**2**	2	4	6	8	10
	This will probably never happen/recur **Not expected to occur for 10 years**	<0.1%	**Rare**	**1**	1	2	3	4	5
					1	**2**	**3**	**4**	**5**
					Minor	**Moderate**	**Significant**	**Major**	**Severe**
			Injury to person(s)		Minimal injury requiring no/minimal first aid. No time off required	Minor injury. First aid required. Less than 3 days off	Moderate injuries. First aid. Attend A&E. Over 7 days off. RIDDOR	Major injury. Professional medical aid. Long-term incapacity. RIDDOR	Death or multiple permanent injuries. RIDDOR
			Ill health to person(s)		Minimal/ Transitory effects requiring no/minimal intervention	Short-term irritation or effects. Occupational health. Less than 3 days off	Occupational Health. Over 7 days off. RIDDOR	Long-term incapacity but with recovery. RIDDOR	Permanent ill health & incapacity. RIDDOR
			Environmental effect(s)		Minimal or no impact on the environment	Minor impact on the local environment	Moderate impact on the local environment	Major impact on the wider environment	Severe impact on the wider environment
					SEVERITY				

Risk Rating	Score	Action
Low	**1 to 4**	Low risk identified - Control measures to be adopted and monitored
Medium	**5 to 10**	Medium risk identified - Ensure that the risk assessment is reviewed, further controls may be necessary
High	**12 to 16**	High risk identified - Re-evaluate risk assessment and develop/determine greater controls
Extreme	20 to 25	Extreme risk identified - **Stop work immediately** - Re-evaluate risk assessment and develop/determine greater controls

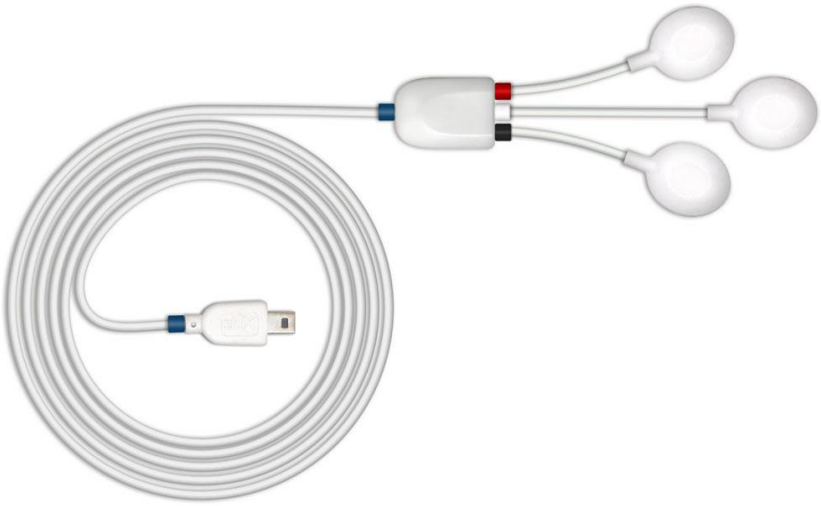
Section 4 Communication of Risk Assessment to Users
This assessment can either be communicated to groups or Individuals as part of a School or Divisional process or signed off by individual users.
School or Divisional Process
The contents of this risk assessment will be communicated to builder users in the University training programmes.
Sign off by users *All individuals carrying out activities covered under this risk assessment should sign below after reading it.* *By signing this document you confirm that; you have read and understood this risk assessment and that it is an accurate representation of work practice*

Name	Signature	Date	Name	Signature	Date

Section 5 Record of Risk Assessment reviews *Risk assessments should be reviewed **every three years or earlier** if there is a significant change in the process or after an incident/near miss*					
Date of review:		Reviewed by:		Comments / date of next review:	
Date of review:		Reviewed by:		Comments / date of next review:	
Date of review:		Reviewed by:		Comments / date of next review:	

biosignal acquisition tool-kit for advanced research applications

Electrocardiography (ECG) Sensor User Manual



ATTENTION
Please read this datasheet before
using your biosignalsplux sensor

The information contained in this document has been carefully checked and were made every effort to ensure its quality. PLUX reserves the right to make changes and improvements to this manual and products referenced at any time without notice.

The word Bluetooth and its logo are trademarks of Bluetooth SIG Inc. and any use of such marks is under license. Other trademarks are the property of their respective own.

Please check your systems and sensors after receiving and before using it the first time to confirm if it contains all the ordered sensors, accessories and other components. Contact our support via e-mail at support@plux.info if there are any variations from your original order.

For regulatory information, please see the Regulatory Disclaimer at the end of this document.

PLUX – Wireless Biosignals, S.A.
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1050-059 Lisbon, Portugal
plux@plux.info
http://biosignalsplux.com/

v.1.0

TABLE OF CONTENTS

1. General Information

1.1. General Description

Our low-noise ECG local differential triode configuration enables fast application and unobtrusive single-lead ECG data acquisition (although custom electrode cable configurations are available). The state-of-the-art design of the analog frontend on this sensor is specifically targeted at analyzing minutiae in the data and provides medical-grade raw sensor data.

This sensor can be used to extract heart rate data and other ECG features, enabling its application in research fields such as biomedical, biofeedback, psychophysiology, and sports, among many others.

Together with the Heart Rate Variability (HRV) add-on for our OpenSignals (r)evolution software, one can easily record and extract meaningful temporal, spectral, and nonlinear signal parameters for further analysis of the acquired sensor data.

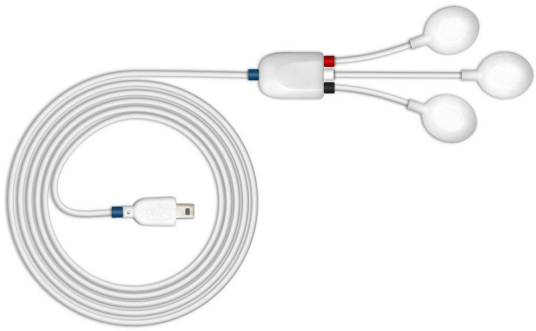

Figure 1: biosignalsplux Electrocardiography (ECG) sensor (standard version).

1.2. Typical Unfiltered Sensor Output

Figure 2 shows a typical unfiltered ECG sensor output acquired while at rest. The raw digital sensor values received from the **biosignalsplux** device ranged between 0 and 2^n - 1 (**n**=*sampling resolution*) were converted into the original unit of measurement of this sensor (mV) using the transfer function found in section Transfer Function (Conversion Formula).

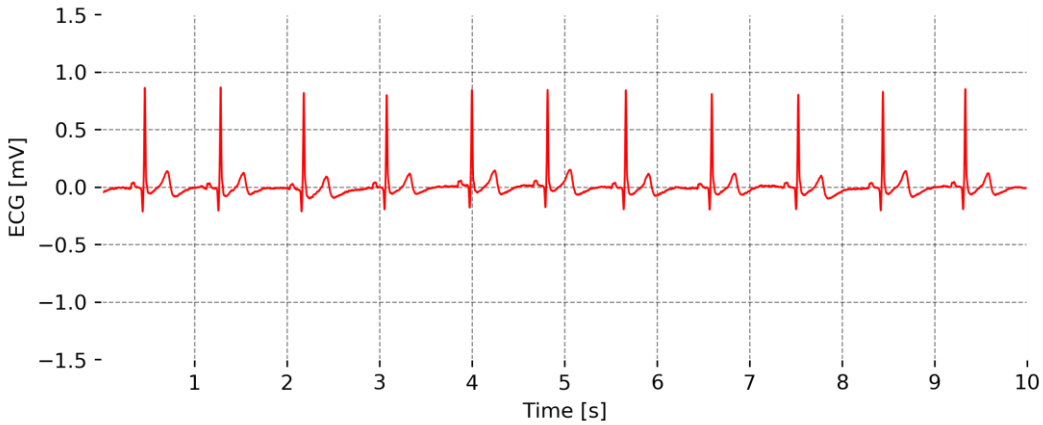

Figure 2: Typical unfiltered ECG sensor output (signal acquired while at rest).

1.3. Sensor Specifications

> Gain:	1019	**> Range:**	±1.47mV (@ VCC = 3V)
> Bandwidth:	0.5-100Hz	**> Consumption:**	~0.5mA
> Input Impedance[Typical]:	≥ 100GOhm	**> CMRR:**	100dB

1.4. Features

> Bipolar differential measurement
> Pre-conditioned analog output
> High signal-to-noise ratio
> Medical-grade raw data output
> Unobtrusive & lightweight sensor
> Pre-conditioned analog output
> Ready-to-use form factor

1.5. Applications

> Life sciences studies
> Heart rate & Heart rate variability
> Biometrics
> Physiology Studies
> Biofeedback
> Biomedical device prototyping
> Human-Computer Interaction
> Affective Computing
> Psychophysiology

1.6. Transfer Function (Conversion Formula)

The analog sensor signals acquired with **biosignalsplux** devices are converted into digital values ranged between 0 and 2^n - 1 (**n**=*sampling resolution*, usually 8-bit or 16-bit) and streamed in the raw digital format.

In most applications, the original physical unit of the acquired ECG signal is preferred or required. The raw digital sensor samples can be converted back into millivolt (mV) using the following formulas:

$$ECG(V) = \frac{\left(\frac{ADC}{2^n} - \frac{1}{2}\right) \times VCC}{G_{ECG}} \quad (1)$$

$$ECG(mV) = ECG(V) \times 1000 \quad (2)$$

Valid sensor range: [-1.47mV, 1.47mV]

with:

$ECG(V)$	ECG signal in Volt (V)
$ECG(mV)$	ECG signal in milli-Volt (mV)
ADC	Value samples from the sensor/channel (raw digital value)
n	Sampling resolution (**default:** 16-bit resolution (n=16), although 12-bit and 8-bit may also be found in older versions)
VCC	Operating voltage (3V when used with **biosignalsplux**)
G_{ECG}	Sensor gain (1019)

1.7. Electrode Connections & Sleeve Color Meanings

Sleeve Color	Red	Black	White
Electrode Cable	+	-	reference

See section 2 for more information on where to place the electrodes and to connect electrodes cables for ECG acquisitions.

1.8. Physical Characteristics

> W1 x L1 x H1:	1.5cm x 2.1cm x 0.4cm	**> W2 x L2 x H2:**	1.4cm x 1.7cm x 0.5cm
> A1:	105.0±0.5cm	**> A2:**	1.5±0.5cm
> A3:	3.0±0.5cm	**> D:**	0.4cm

> Available sleeve colors: White, Black, Blue, Green, Red, Yellow, Gray, and Brown

Sensor also available with A2 and A3 with 30cm cable lengths. Custom cable lengths for A1, A2, and A3 are possible. For custom lengths, please contact our operations team via orders@plux.info.

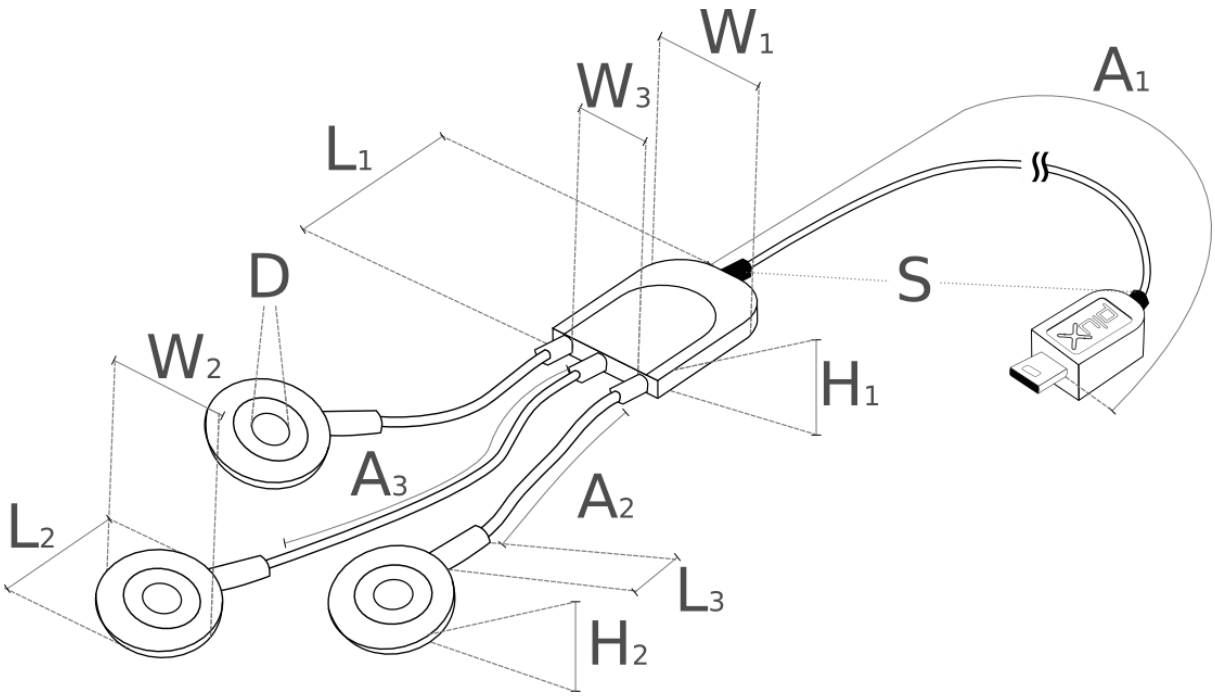

Figure 3: Physical characteristics of the standard Electrocardiography (ECG) sensor.

2. Sensor Application Notes

The **biosignalsplux** ECG is primarily designed for single-lead ECG acquisitions in the Einthoven configurations. The Einthoven triangle allows you to acquire 3 different ECG leads which only depend on the positioning of your electrode cables:

- Lead I: measures from RA (right arm) to LA (left arm)
- Lead II: measures from RA to LF (left foot)
- Lead III: measures from LA to LF

The illustrations shown in Figure 4 and Figure 5 show the recommended electrode placement for the acquisition of ECG signals in Einthoven configurations depending on the different standard ECG sensors with difference electrode cable lengths.

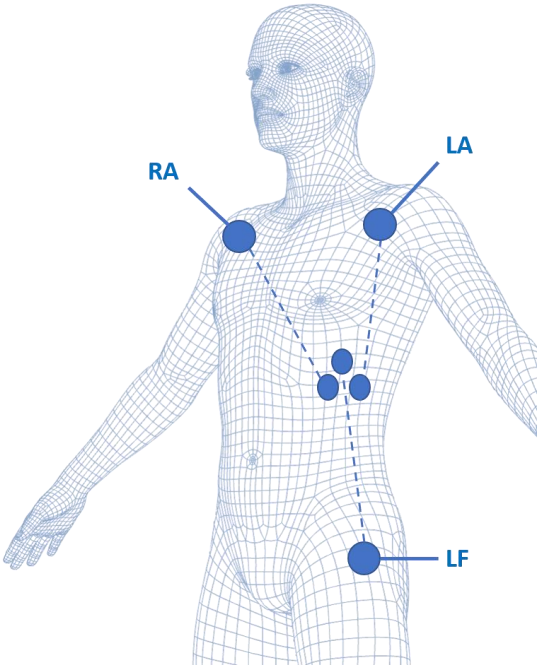

Figure 4: Electrode placements for ECG acquisitions in Einthoven configurations using the standard ECG sensor with electrode cable lenghts of 1.5cm (+ & -) and 3 cm (reference).

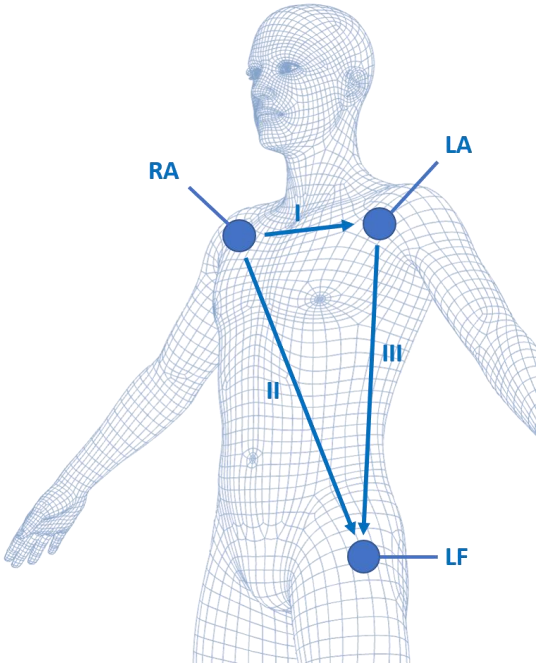

Figure 5: Electrode placements for ECG acquisitions in Einthoven configurations using the standard ECG sensor B with electrode cable lengths of 30cm (+, - & reference).

After placing the ECG electrodes correctly on the body, connect the electrode cables of the ECG sensor according to one of the following configurations:

Table 1: ECG sensor electrode and electrode placement connection.

	Positive Electrode (+) (red sleeve)	Negative Electrode (-) (black sleeve)	Reference Electrode (white sleeve)
Lead I	LA	RA	LF
Lead II	LF	RA	LA
Lead III	LF	LA	RA

It is also possible to use a sensor with only the + and – electrodes (must be custom ordered) without the use of an additional reference electrodes. Such sensors can lead to an increase in baseline noise due to the lack of a reference electrode but can be an alternative to the 3-electrode sensor for

applications in which a simplified ECG sensor can be useful (e.g. for the extraction of heart rate data only).

3. Using the Electrocardiography (ECG) Sensor with biosignalsplux & OpenSignals

3.1. Connecting the sensor to biosignalsplux Systems

3.1.1. biosignalsplux 4-Channel Hubs

The **biosignalsplux** ECG sensor is compatible with all 4 analog input channels of the 4-channel **biosignalsplux** hub, but incompatible with the reference/ground port. Connect the sensor to an analog input to use it with this device.

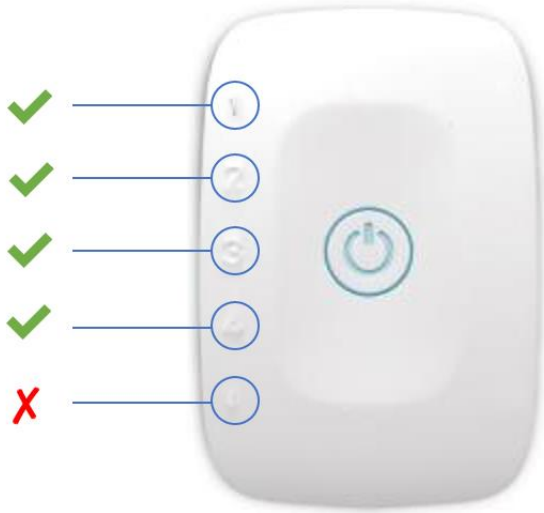

Figure 6: ECG compatible biosignalsplux channels (green checkmarks).

3.1.2. biosignalsplux 8-Channel Hubs

The **biosignalsplux** ECG sensor is compatible with all 8 analog input channels of the 8-channel **biosignalsplux** hub, but incompatible with the reference/ground and digital I/O ports. Connect the sensor to an analog input to use it with this device.

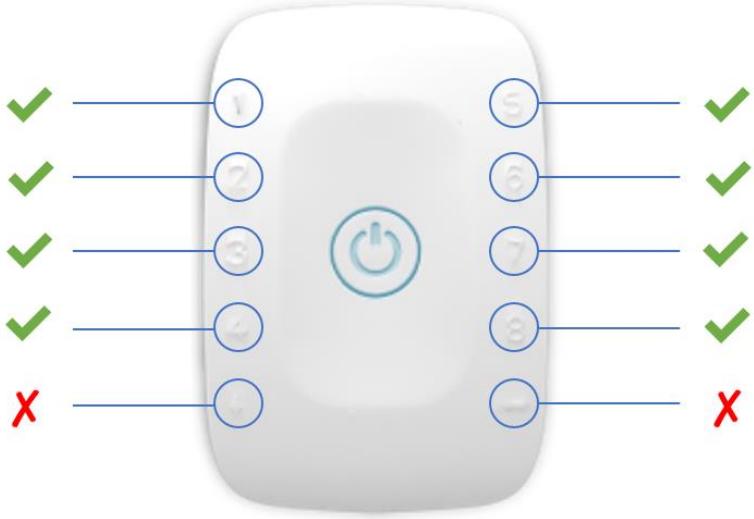

Figure 7: ECG compatible biosignalsplux channels (green checkmarks).

3.1.3. biosignalsplux Solo & Single-Channel openBAN Devices

The **biosignalsplux** ECG sensor is compatible with the analog input channel of the **biosignalsplux Solo** (openBAN) device. Connect the sensor to the analog input channel to use it with this device.

Figure 8: Connect the ECG to the analog input channel of the **biosignalsplux Solo** (openBAN).

3.2. Configuring the Sensor in OpenSignals (r)evolution

> **Note**
> Download OpenSignals (r)evolution here: https://biosignalsplux.com/index.php/software

Open the **OpenSignals (r)evolution** device manager to access and configure your **biosignalsplux** device.

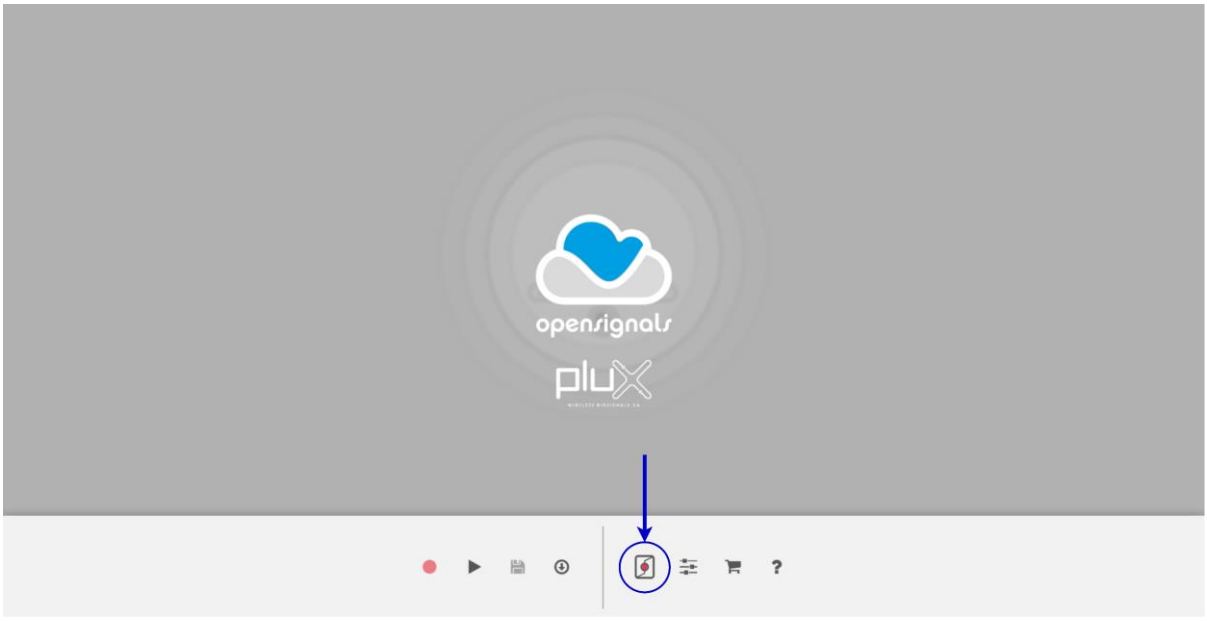

Figure 9: Access the OpenSignals (r)evolution device manager.

Select the device you intend to use for acquisition by clicking on *ENABLE button on* the device panel in the **OpenSignals** device manager. The device is activated for acquisition if the *ENABLE* button is blue.

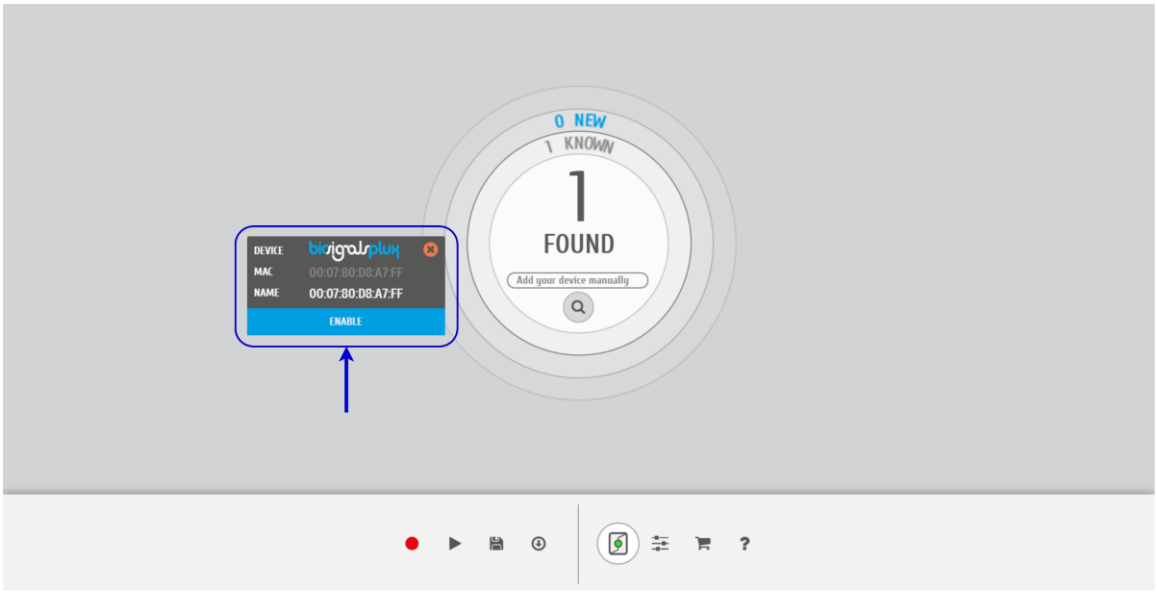

Figure 10: Enabling the device for acquisition.

Click on the **biosignalsplux** logo to access the available settings. Select the channel your sensor is connected to and select the *ECG* from the dropdown menu highlighted in the next screenshot.

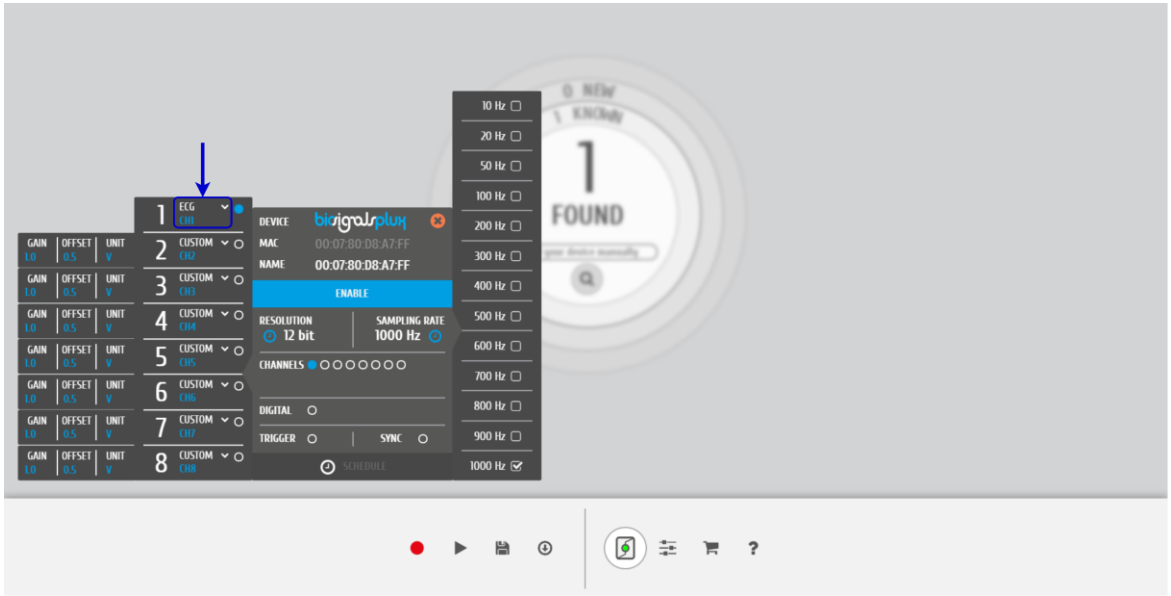

Figure 11: Set the channel type of the channel you have your ECG sensor connected to, to *ECG*.

Activate the channel for acquisition by clicking on the circle next to the channel type (must be blue). If not done before, follow the instruction available in section *2 Sensor Application* Notes to learn how to apply the sensors and *3.1 Connecting the sensor to biosignalsplux Systems* to learn how to connect your device to your **biosignalsplux** device. Click on the record button in the OpenSignals main interface whenever you're ready for your acquisition.

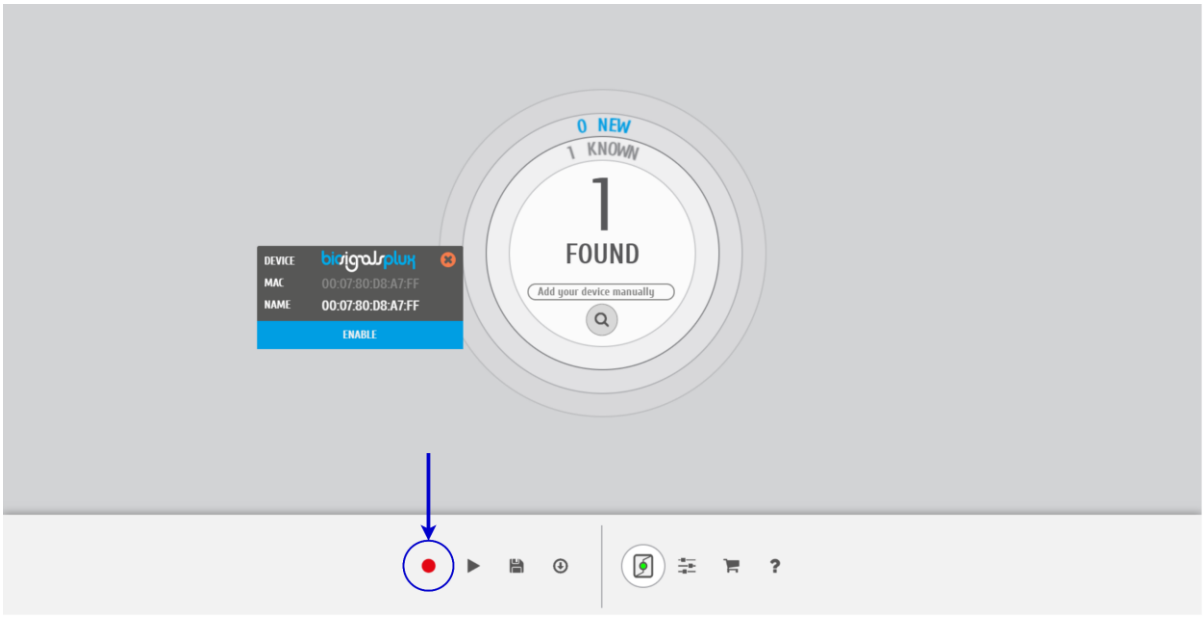

Figure 12: Start the acquisition whenever you're ready.

4. Technical Notes

The **biosignalsplux** technical notes aim to provide technical in-depth information about the different applications in which the ECG sensor can be applied. Find below more information about the available technical notes which you can download from the biosignalsplux website.

Download

biosignalsplux Technical Notes - ECG

4.1. ECG Acquisitions While at Rest

The purpose of this technical note is to show a typical acquisition of an electrocardiogram. For this application, an ECG with 6m39s was recorded with a subject in an upright standing position. To assess the quality of the signal, the Signal-to-Noise (SNR) was calculated.

4.2. ECG Acquisitions During Physical Activity

One of the applications of the ECG sensor is to measure cardiac activity during physical activity. In this experiment, the subject performed an intensive exercise on an ergometer during a 10min acquisition.

During the first minute, the subject was in a resting state. After this period, the subject has progressively increased his effort until he reached the maximum effort between minutes 4 and 5, resting during the last 2m30s.

4.3. ECG Acquisitions During Mental Activity

The purpose of this technical note is to show how a mental task can influence the heartbeat of a subject. To that effect, a 5min paced visual serial addition test was performed by a test subject.

In this test, the subject is asked to sum two numbers that are shown on a screen, which is used to assess capacity, rate of information processing, and sustained/divided attention.

5. Scientific Publications Using the Electrocardiography (ECG) Sensor

The following scientific resource elements is only a small selection extracted from the list of available publications using **biosignalsplux**. Please visit the following website to access the entire up-to-date list.

biosignalsplux Publications
List of Publications

Publications Short List

C. Gerritsen, J. de Man, J. van der Meij, "Physiological and subjective response to injustice: The Effects of Unjust Evaluations on Physiological Responses and Subjective Experiences", in *Proc. of the IEE/WIC/ACM Int. Joint Conf. on Web Intelligence (WI) and Intelligent Agent Technologies (IAT)*, vol. 3, pp. 179-182, 2013

A. Reiss, I. Indlekofer, P. Schmidt, K. van Laerhoven, "Deep PPG: Large-Scale Heart Rate Estimation with Convolutional Neural Networks", in *Sensors*, vol. 19, no. 14:3079, pp. 1-27, 2019

A. Kamenz, V. Bibaeva, A. Bernin, S. Ghose, K. von Luck, F. Vogt, L. Müller, "Classification of Physiological Data in Affective Exergames", in *Proc. of the IEEE Symposium Series on Computational Intelligence (SSCI)*, pp. 2076-2081, 2018

G. Ramos, M. Alfaras, H. Gamboa, "Real-Time Approach to HRV Analysis", in *Proc. Of the 11th Joint Int. Conf. On Biomedical Engineering Systems and Technologies (BIOSTEC2018)*, vol. 4, pp. 208-215, 2018

M. Knierim, J. Dominik, V. Dorner, "Desgining Live Biofeedback for Groups to Support Emotion Managment in Digital Collaboration", in *Lecture Notes in Computer Science*, vol. 10243, pp. 479-484, 2017

A. Bernardino, C. Vismara, F. Baptista, F. Carnide, S. Oom, S. Bermudez i Badia, E. Gouveia, H. Gamboa, "A dataset for the automatic assessment of functional senior fitness tests using kinect and physiological sensors", in *Proc. of the 1st Int. Conf. on Technology and Innovation in Sports, Health and Wellbeing (TISHW)*, pp. 1-6, 2016

J. Pagán, J. L. Risco-Martín, J. M. Moya, J. L. Ayala, "Modeling methodology for the accurate and prompt prediction of symptomatic events in chronic diseases.", in *Journal of Biomedical Informatics*, vol. 62, pp. 136-147, 2016

M. Cheetham, C. Cepeda, H. Gamboa, "Automated Detection of Mind Wandering: A Mobile Application", in *Proc. of the 9th Int. Joint Conf. on Biomedical Engineering Systems and Technologies (BIOSTEC)*, vol. 4: BIOSIGNALS, pp. 198-205, 2016

J. Cusveller, C. Gerritsen, J. de Man, "Evoking and Measuring Arousal in Game Settings", in *Proc. of the Int. Conf. on Serious Games*, vol. 8395, pp. 165-174, 2014

6. Safety & Maintenance

6.1. Safety Instructions

Please read the following safety instructions **before** using your **biosignalsplux** system with the ECG sensor to prevent any damages or problems with the user, test persons and/or **biosignalsplux** devices. Violations of these instructions can lead to inferior signal quality and/or damages to the **biosignalsplux** system and user.

- ! The user should always keep the device and its accessories dry.
- ! The user must turn off the **biosignalsplux** device and contact Technical Support if the system or accessories reach uncomfortable temperatures.
- ! The user should not use the **biosignalsplux** device in noisy environments (environments with microwaves and other similar equipment). Doing so will lead to noise increase in the acquired signals and Bluetooth connectivity issues.
- ! The user must not use the device near the fire or in potentially explosive atmospheres, such as atmospheres with flammable gas.
- ! The user should only use the detection surfaces or other approved accessories purchased from PLUX or by a PLUX agent.
- ! The user should inspect the sensors on a regular basis to ensure that they remain in good working order.
- ! The user should stop using the **biosignalsplux** device if experience any kind of discomfort or skin irritation.
- ! Do not use the system on persons with allergies to silver.
- ! The user should dispose detection surfaces after using the **biosignalsplux** device. Detection surfaces are single-user and disposable. Reusable electrodes should be reused by the same user. Do not use reusable electrodes on several users.
- ! The user must not place the device in the microwave.
- ! The user must not insert objects into the holes of the device.
- ! The user should not open the **biosignalsplux** device or its accessories. The repair of the same should be only done by properly authorized PLUX personnel.
- ! The user should make sure the cables do not obstruct the passage of people.
- ! The user should use the sensor cables with extreme caution to avoid risk of strangulation.
- ! The user should keep a safe distance between the **biosignalsplux** device and other devices to ensure their proper functioning.
- ! The user should only send the device to repair to qualified PLUX personnel.

! The user should not immerse the sensors or the **biosignalsplux** device, nor clean with liquid or abrasives.

! The user should handle the **biosignalsplux** device with caution and not expose the device or accessories to high accelerations and vibrations.

! **biosignalsplux** devices should not be used in patients with implanted electronic devices of any kind, including pace-makers, electronic infusion pumps, stimulators, defibrillators or similar.

! Do not apply electrodes over damaged or irritated skin.

! Do not use your device while charging its internal battery.

6.2. Transportation and Storage

Please follow these recommendations to ensure safe transportation and storage of your **biosignalsplux** equipment and sensors to prevent any damaging of your system.

The **biosignalsplux** equipment and sensors should be stored in the original box in a dry place when those are not being used.

- Relative humidity: up to 95% with no condensation
- Ambient temperature: 10°C to 30°C
- Atmospheric pressure between 500hPa and 1060hPa

Whenever the equipment needs to be transported, it should be placed in the original box, since this was designed and tested to ensure the equipment and accessories are securely stored.

Take care while handling the transportation of the system and avoid dropping it, since the device is not shock-proof and should not be placed under stress or sudden acceleration.

6.3. Cleaning

Please follow these cleaning instructions to prevent any damage of the system or the user because of conducting cleaning methods that may cause any damage.

- The **biosignalsplux** and sensors should be visually checked before each use and cleaning process to ensure that no mechanical damage occurred.
- The **biosignalsplux** equipment and sensors (including the cables) should be cleaned with a slightly damp cloth or suitable absorbent paper, ensuring no liquid enters the equipment of sensors. Do not use detergent or any type of cleaning liquid as these may damage your equipment and/or sensor.
- Do not clean or re-use detection surfaces (electrodes). They are only suitable for single use and should be disposed of after usage except indicated otherwise.

7. Ordering Guides, Regulatory & Legal Information

7.1. Ordering Guide

Please follow the following ordering guide when submitting orders of ECG sensors to orders@plux.info. If no specification is provided, the standard version of the sensor will be delivered.

Electrocardiography (ECG) Sensor

SKU Reference	PLUX Code	UPC
SENSPRO-ECG1	820201203	642554231266
Description		
Electrocardiography (ECG) sensor with standard physical characteristics and a random cable sleeve color		

Electrodes & Accessories

For a full list of available and compatible electrodes, please visit the biosignalsplux store.

7.2. Guarantee of Quality & Warranty

biosignalsplux sensors have three months quality guarantee from the date of purchase. PLUX guarantees that the system, sensors and accessories will be free from material or manufacturing defects for the mentioned time periods following date of purchase.

If PLUX receives notification of any such defects within the guarantee period, it will repair or substitute with the same unit/model, any products with proven defects at no cost to the client. During the repair period PLUX promises to provide a temporary replacement under the same specification. Repairs will be carried out at PLUX's premises after the equipment has been received.

7.3. Warranty Voidance

Usage of the device that is not in accordance with the handling instructions indicated in the manual, or use with accessories other than those manufactured by PLUX will invalidate the warranty of your devices.

Be careful when connecting your **biosignalsplux** devices, sensors and/or accessories to any third party device including the usage of the 3rd party connection components that are available for **biosignalsplux** systems as **the usage of these components will void the electrical warranty of your biosignalsplux device and sensors and, if not indicated otherwise, the warranty of the 3rd party system you're connecting to the device**. Check the electrical specifications of both systems you want to connect to prevent any damage of the user(s) or the systems.

In the case of warranty voidance, the same applies that we expressly disclaim any liability whatsoever for any direct, indirect, consequential, incidental or special damages, including, without limitation, lost revenues, lost profits, losses resulting from business interruption or loss of data, regardless of the form of action or legal theory under which the liability may be asserted, even if advised of the possibility of such damages.

7.4. Contact & Support

Contact us if you are experiencing any problems that cannot be solved with the information given in the biosignalsplux documentation.

Please send us an e-mail with precise information about the error occurrence, device configuration, and, if possible, screenshots of the problem to support@plux.info.

7.5. Regulatory Disclaimer

biosignalsplux products are intended for use in life science education and research applications; they are not medical devices nor are they intended for medical diagnosis, cure, mitigation, treatment or prevention of disease. We expressly disclaim any liability whatsoever for any direct, indirect, consequential, incidental or special damages, including, without limitation, lost revenues, lost profits, losses resulting from business interruption or loss of data, regardless of the form of action or legal theory under which the liability may be asserted, even if advised of the possibility of such damages.

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