

Owner: Alex van Kraaij [*Principal Investigator*]

Subject information for participation in a scientific study

Assessment of Snacking behaviour with the SnackBox

Introduction

Dear volunteer,

You are being asked to take part in a scientific study. Participation is voluntary. In order to participate your written consent is required.

Before you decide whether you want to take part in this study, you will be given an explanation about what the study involves. Please take your time to read this information and ask the investigator if you have any questions. You can also discuss it with your partner, friends or family.

1. General information

The protocol will be executed under the supervision of imec-NL. The measurements will mostly take place at your home. The intake session and end of experiment will either take place at the Holst Centre (Eindhoven) or One-Planet (Nijmegen/Wageningen) upon your choice. The Sponsor of the study is IMEC-NL.

2. Purpose of the study

The purpose of this study is to validate the SnackBox as an automated dietary assessment method for snacking behaviour when compared to a dietary recall method and in relation to physiological and mood state aspects, assessed with, respectively, a wearable sensor and ecological momentary assessments.

3. Background of the study

Measurements of food intake usually consist of self-reports, with or without the help of a smartphone application (Ofei et al., 2014). Either way, these measurements are seen as lacking objectivity and a burden for the participant (Vu et al., 2017). With the Snackbox, we could get rid of subjectivity and manual work in registration of food intake (RoFI) for snacks. Monitoring snacks consumption is of particular interest in studying emotional eating behaviour. In literature, the relationship between snacking and mental wellbeing is well documented, however highly dependent on laboratory studies (Aucott, 2014; Hong & Peltzer, 2017). This has to do with the challenges of measuring snack consumption in ambulatory settings, as described above.

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Similarly, mental wellbeing is hard to measure in ambulatory settings as well and is often dependent on self-reporting, using either questionnaires or ecological momentary assessments (EMAs). These tools have proven to capture the perceived mental wellbeing and related mood states very well (Cohen et al., 1983; Schwarz & Stone, 1998). However, filling out these questionnaires and EMAs can be quite a burden to the user. For this reason, many wearables are introduced in literature that capture physiological signals and use these to predict mental wellbeing and mood state scores (Can et al., 2019). Physiological data such as heart rate, skin conductance and skin temperature can be collected in an automated, objective and continuous way (Smets et al., 2018). This could provide a better understanding of mental wellbeing, and its effects on for example snacking behaviour.

This triangulated information, the snacking data, EMAs on mental wellbeing and mood states, and physiological data, are necessary and sufficient to inform studies into the interplay of snacking behaviour, mental wellbeing and physiology. In this study, we hypothesize that the snacking data from the SnackBox and the mental wellbeing data from the EMA surveys are punctual enough to compare with physiological data obtained using wearable sensors. However, this statement is not validated and therefore this study aims to determine the accuracy of the SnackBox as automated dietary assessment method for snacking behaviour and to determine whether the information obtained with the SnackBox is valid to compare to physiological data obtained with a wearable device and mental wellbeing data obtained with questionnaires and EMAs.

References

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4. What participation involves

If you participate, your participation will consist of an intake session, 5 measurement days (divided over 14 days) and a hand-over session. You are asked to set-up the Snackbox at your desk at home or at the office for 5 days spread over 14 days at maximum. In the evenings you are asked to bring the SnackBox to your living room. You will also wear the Chill+ and the Garmin only on those 5 days. Please find a schematic overview of the full study design below in Figure 1.

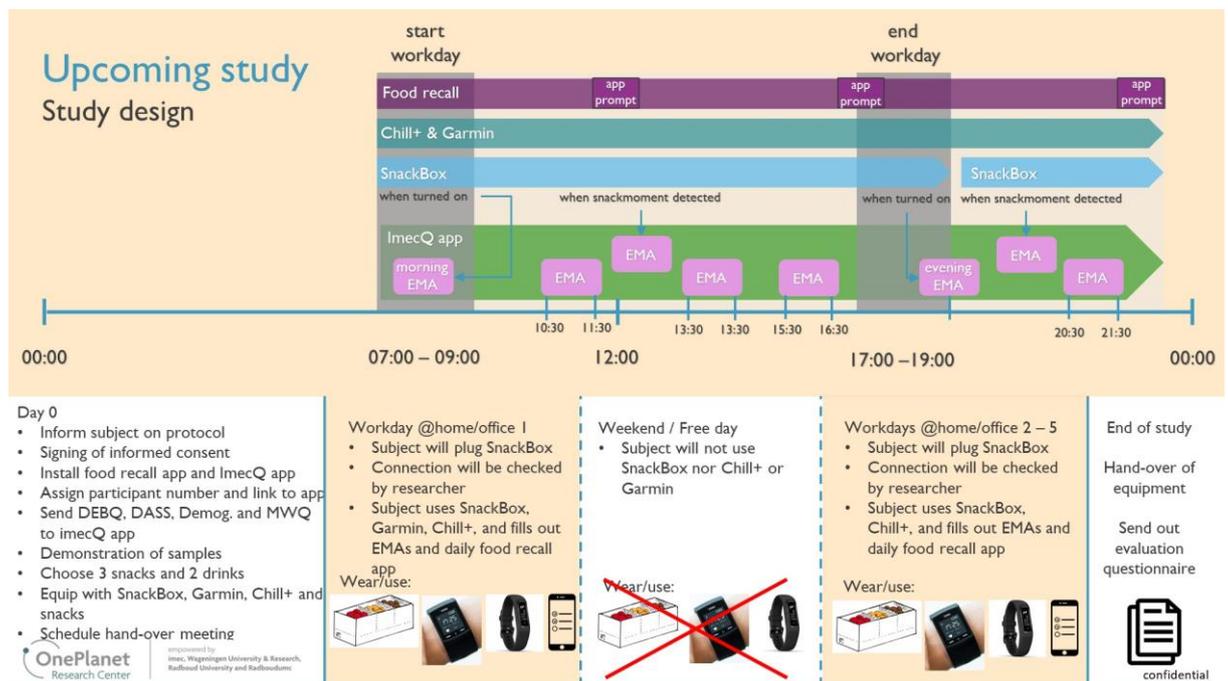


Figure 1. Schematic overview of study design.

Inclusion criteria

In order to be eligible to participate in this study, a subject must meet all the following criteria:

- Between 18 years to 49 years old.
- The subject should have five days in which he/she works from a stationary location within a maximum period of 14 days. This can be either a complete working day from a desk at home or a complete working day from a desk at a work location.
- The subject does not have Covid-19 and does not experience any remaining symptoms from previous exposure to Covid-19, such as loss of taste or smell.
- The subject has no interfering dietary restrictions, such as being on a diet.
- The subject is not allergic to stainless steel or Ag/AgCl electrodes.
- The subject is not pregnant (unknown potential effect of Chill+ device on the child).
- The subject has no acute and/or chronic cardiovascular and metabolic conditions (including e.g. diabetes mellitus).
- The subject has no broken skin, cuts, or wounds at the sensor placement sites (wrist, upper arm).
- The subject is not using medication with phototoxic side effects: tetracyclines, doxycycline, phenothiazines, dacarbazine, ketoprofen, lomefloxacin; to exclude the possibility of local skin irritation from prolonged irradiation by LED-light.

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- The subject is not wearing any other medical devices (e.g., Holter).
- The subject does not have an implanted active device (e.g., device containing a battery).
- The subject does not have any mental disorders.

Exclusion criteria

A potential subject who meets any of the following criteria will be excluded from participation in this study, if the subject does not like the snacks and/or drinks provided in the study (there is an option to taste samples during the intake session) or is allergic to the snacks and/or drinks provided in the study (the list of ingredients will be available for all snacks and drinks at all times).

Intake session

If you fulfil the inclusion criteria, and are willing to participate, you will be informed about the protocol and asked to sign the informed consent. After signing the informed consent, and checking exclusion criteria, you can be included in the study and will be assigned a participant number to identify all data. you are allowed to taste the snacks or drinks if needed for deciding whether to participate. You will be asked to fill out the Dutch Eating Behaviour Questionnaire (DEBQ), Depression Anxiety Stress Scale (DASS), the Perceived Stress Scale (PSS) and a questionnaire specifically designed for measuring mental wellbeing, the Mental Well-being Questionnaire (MWQ) in Castor EDC. Please find the questionnaires attached in respectively Appendix C, D and E. Then you will be equipped with a Snackbox, the chosen snacks and drinks, a Chill+ band, a Garmin wearable and charger cables. Please find the options for snacks below. You will be asked to download three applications on your smartphone (Traqq, ImecQ and Garmin Connect) which will be linked to your subject number. The imecQ application only function on an Android smartphone. If you do not own this type of smartphone, a suitable phone will be lent to you. You will be further informed on the daily use of the Snackbox (power up, refill snacks, etc.), the Ecological Momentary Assessments (EMAs) that will end up in your application (ImecQ), the usage of the Chill+ and Garmin and the food recall application (Traqq) that you are asked to fill out. Please find the EMAs and the intake questionnaires in respectively Appendix C, D, E, F and G.

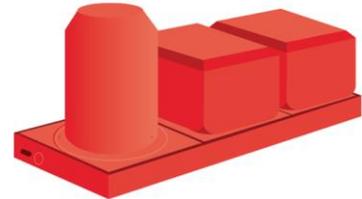
At the end of the intake session, we will schedule the five days you would like to use the SnackBox, Garmin and Chill+ and we schedule a hand-over of the devices and moment to fill out the evaluation questionnaire in two weeks time.

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Devices

Snackbox

The Snackbox, will be used to record the snacking behaviour of the participant during the five study days. The SnackBox exists of three weight stations allowing the weighting of snacks (in boxes) or drinks. The SnackBox can provide the user with visual feedback if weight stations are empty when they should not, and it can prompt the ImecQ app to send an EMA when a snack or drink is consumed. A Raspberry Pi collects and stores the weight and log data.



Chill+

The Chill+, will be used to record activity and stress levels. The Chill+ can record galvanic skin response (GSR), skin temperature, photoplethysmogram (PPG), acceleration and gyroscopic motion.



Garmin VivoSmart 4

The Garmin VivoSmart 4 watch will provide heart rate estimations based on PPG data (no raw data will be available). Data will be downloaded through the Garmin Connect app. Data will only be stored with a participant number, no name or other personal details will be stored with the data.



Snacks options

You are asked to select three snacks from a list of eighteen snack options, shown below, to ensure you like the provided snacks. For the caloric drinks you can choose two drinks from four options shown below. The options are selected based on the ability to stay fresh over a period of two weeks (assuming the box will be closed after a snack is taken and the drinks will be stored closed). The ingredients of all snacks and drinks are shown in appendix H.

Snacks

- Celebrations mini chocolate bars (Celebrations)
- Cheese biscuits, puff pastry (Albert Heijn)
- Dried apricots (Albert Heijn)
- Raisins (Albert Heijn)
- Muesli bars (Albert Heijn)
- M&Ms (blue) chocolate (M&M)
- M&Ms (yellow) chocolate (M&M)
- M&Ms (brown) chocolate (M&M)
- Unsalted peanuts (Albert Heijn)
- Salted peanuts (Albert Heijn)
- Nut mix (Albert Heijn)
- Savoury biscuits – cheese and tomato (Sultana)

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- Wine-gum & liquorice mix (Red Band)
- Rice snack mix (Albert Heijn)
- Cocktail nut mix (Albert Heijn)

Drinks

- Aquarius Beyond Hydration Lemon
- Chaudfontaine Sparkling Fusion flavoured water Lemon
- Fanta Orange
- Fanta Orange Zero
- Fuze Tea Green Tea Mango Chamomile
- Fuze Tea Black Tea Peach Hibiscus
- Minute Maid Orange
- Minute Maid Apple
- Sprite
- Sprite Zero

Measurement days at home

You will start your first selected measurement day after the intake session with setting-up the Snackbox on your work desk and start wearing the Chill+ and Garmin wearable on your wrist. The researcher will have this time booked in the agenda to be available for support over a video-call. You will have information available describing the required actions if needed. After you have set-up the SnackBox, the researcher will automatically receive a check if the Snackbox works correctly and only contact you if there are any issues.

From this moment forward you are asked to:

- Only snack from the Snackbox and refrain from other snacks and caloric drinks on the measurement days until the end of the day.
- take **at least 1 snack and 1 caloric drink** from the SnackBox every measurement day.
- **Only you** are allowed to take snacks and drinks from the SnackBox, no other people.
- Wear the Chill+ and Garmin on the measurement days. You can charge the Chill+ and Garmin at night during sleeping time.
- Fill out the EMAs. You will receive a short questionnaire (EMA) for every snack moment with a few questions on your mood state in your application (ImecQ) on your smartphone. Please find the EMA in Appendix C.
- At 11:30, 16:30 and 21:30 you will be asked to fill out the food recall application (Traqq) on your smartphone. In this recall you will note down all food and drinks consumed during respectively the morning, afternoon and evening, including the snacks and drinks from the SnackBox.

In total there will be 5 measurement days divided over two weeks. We will schedule the measurement days in the intake session.

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Hand-over session

In the hand-over session that is scheduled during the intake session, we will collect the Snackbox, Chill+, Garmin and charging cables again. You will be asked to fill out the final evaluation questionnaire about the user experience of the SnackBox and the Traqq application. Please find the evaluation questionnaire in Appendix I.

5. What will be expected of you

For the study to run smoothly and for your own safety, it is important that you follow the following agreements:

- Bring a mouth and nose mask to the intake session and hand-over session.
- Perform the protocol as explained above.

It is important that you contact the investigator:

- If you suddenly experience health symptoms that might be related to your participation in the study.
- If you no longer wish to participate in the study.
- If you have any questions on the devices or the protocol.

6. Possible discomforts

In this study no discomforts or side effects are expected. If you do experience such issues, immediately contact the principal investigator. The main burden for the participant is expected to be the refrainment from other snacks on measurement days and the numerous questionnaires that need to be filled out.

7. Possible advantages and disadvantages

It is important that you properly consider the possible advantages and disadvantages before you decide to participate.

You will not personally receive any advantage from taking part in this study. Your participation may contribute to more knowledge about the SnackBox.

Disadvantages of participation in the study may be:

- Possible discomforts of the measurements in the study, as described in 6.
- You will lose some time when participating in the study.

8. If you do not want to participate, or would like to stop participating in the study

You decide for yourself whether you want to participate in the study. Participation is voluntary.

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If you do participate, you can always change your mind and stop, even during the study. You will be asked the reason for terminating the study, but you are not obliged to answer this. However, you should immediately inform the investigator. The data obtained thus far will be used for the study.

9. End of the study

Your participation in the study ends when:

- The hand-over session is finished.
- You personally choose to stop.
- The investigator finds that it is better for you to stop.
- Signs of major skin irritation, allergic reactions, or other problems appear
- The INMEC/METC decides to stop the study.

The entire study ends when all participants are finished.

10. Use and storage of your data

For this study, your personal data will be collected and stored in Castor EDC. For the collection of all other data, use and storage of your data is required to answer the questions asked in this study. We ask your consent for the use of your data.

Confidentiality of your data

To protect your privacy, your data will receive a code. Your name and other information that could directly identify you are therefore omitted. The key linking your personal information (name and contact details) to the code will be stored securely in Castor EDC. Access to the Castor EDC will be limited to the Principal Investigator. After the study is finished the link between your personal information and the code will be deleted. The data that is sent to the sponsor only contains a code, but not your name or other data that can identify you. In reports or publications about the study, the data will also not be identifiable.

The coded data will be shared with the second PI, Femke de Gooijer, PhD student from Wageningen University.

Access to your data for review

Some individuals may have full access to your data at the study site, again, to the data without a code. This is needed to check whether the study is performed properly and reliably. Individuals who have access to your data for review are the INMEC and the (principal) investigators of the study. They will keep your data confidential. We ask your consent for this access.

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Retention period of data

Your data must be stored for 15 years after the study.

Storage and use of data for other studies

Your data may still be of interest after the end of this study for other research in the area of the SnackBox. For this purpose, your data will be stored for 15 years. You can indicate on the consent form if you do or do not agree with this. If you do not consent to this, you can still participate in the current study.

Information about incidental findings

During this study, there may be incidental findings that are not relevant for the study, but are for you. If this is important for your health, you will be notified by the company physician. You can then discuss with your general practitioner or specialist what needs to be done. You will also consent to this.

Withdrawal of consent

You can withdraw your consent to the use of your personal data at any time. This applies to this study and also to storage and use for future research. The study data collected until the moment you withdraw your consent will still be used in the study.

More information about your rights concerning the processing of data

For general information about your rights concerning the processing of your personal data, please consult the website of the Dutch Data Protection Authority.

If you have any questions about your rights, please contact the person responsible for the processing of your personal data.

For this study the sponsor is:

Imec-NL (OnePlanet Research Center), Chris van Hoof, chris.vanhoof@imec.nl

The (principle) investigator is:

Alex van Kraaij (Alex.vankraaij@imec.nl) working at OnePlanet Research Center.

If you have any questions or complaints regarding the processing of your personal information, we recommend that you contact the study site. You can also contact the Data Protection Officer for the institution Rik van de Wiel (Rik.vandeWiel@imec.nl) or the Dutch Data Protection Authority.

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11. Insurance for subjects

Everyone who participates in this study has access to insurance. The insurance covers damage resulting from the study. Not all damage is covered. In Appendix A you can find more information about the insurance and the exceptions. It also states who you should report damages to.

12. Compensation for participation

In total, participating in the study requires 4 hours of active participation, leading to a Bol.com voucher of €40,-, which will be awarded as an expression of our thanks after the completion of the experiment. This is based on that you will receive an incentive of €10,- in Bol.com vouchers per hour for active participation. Active participation includes joining the intake session of approximately 1 hour, filling out the EMAs and food recalls in the applications, which takes at maximum 30 minutes per day and joining the hand-over session, which will take around 30 minutes. In addition, if additional commuting is needed because of the study, you will be fully reimbursed for these travel costs.

13. Do you have any questions?

If you have any questions, please contact the principal investigator Alex van Kraaij, Alex.vankraaij@imec.nl.

If you have any complaints or other remarks regarding the study, you can discuss this with the investigator, the INMEC (inmec@imec.nl) or the confidential councillor (Morela.Lathouwers-Bor@imec.nl).

14. Signing of informed consent form

When you have had a sufficient reflection period, you will be asked to decide about participation in this study. If you consent, you will be asked to confirm this on the corresponding consent form, in writing. With your written consent, you indicate that you have understood the information and agree to participate in the study.

Both you and the investigator will receive a signed version of this consent form.

Thank you for your attention.

Alex van Kraaij
Alex.vankraaij@imec.nl

Appendices with this information:

- A. Information about the insurance
- B. Informed Consent

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Appendix A: information about the insurance

Everyone participating in this study has access to insurance arranged by Stichting imec Netherlands. The insurance covers damage resulting from participation in the study. This applies to damage incurred during the study or within four years after the end of your participation in the study. You must have reported damage to the insurer within these four years.

The insurance does not cover all damage. The bottom of this text explains briefly what damage is not covered.

These provisions are in the Medical Research Involving Human Subjects Act. This decree is on www.ccmo.nl, the website of the Central Committee on Research Involving Human Subjects (see 'Library' and then 'Laws and regulations').

In case of damage, you can contact the insurance company directly.

The insurer of the study is:

Name:	HDI-Gerling Industrie Versicherung AG directie for the Netherlands
Address:	Westblaak 14, 3012 KL Rotterdam
Telephone number:	+31 10 4036 100
Policy number:	632865400

The insurance offers a coverage of € 650,000 per subject and € 5,000,000 for the entire study € 7,500,000 per year for all the studies of the same sponsor.

The insurance will **not** cover the following damage:

- damage due to a risk about which you were informed in the written information. This does not apply if the risk is more serious than anticipated or if the risk was very unlikely;
- damage to your health that would also have occurred if you had not taken part in the study;
- damage due to not (completely) following directions or instructions;
- damage to your offspring, due to a negative effect of the study on you or your offspring;
- damage due to an existing treatment method when studying existing treatment methods.

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Appendix B: consent form subject

Assessment of snacking behaviour with the SnackBox

- I have read the information letter. I was also able to ask questions. My questions have been answered sufficiently. I have had enough time to decide whether or not to participate.
- I understand that participation is voluntary. I also know that I may decide at any time to not participate or to stop participating in the study. Without having to provide any reason.
- I give consent to collect and use my data for answering the research question in this study.
- I know that for study monitoring purposes some individuals could have access to all my data. Those people are listed in this information letter. I consent to that access by these persons.

give

do not give

consent for the further storage of my personal data and retention for future research into the area of the SnackBox.

- I am willing to eat at least 1 snack and drink at least 1 drink from the SnackBox on the five measurement days.
- I am willing to refrain from other snacks and caloric drinks during the five measurement days.
- I am willing to wear the Chill+ wearable during the five measurement days.
- I am willing to fill out the questionnaires (intake and evaluation) and applications (EMAs and Traqq food recall) as part of this study.
- I want to participate in this study.

Name of subject:

Signature: _____ Date : __ / __ / __

I certify that I have fully informed this subject about the said study.

If information becomes known during the study that could influence the consent of the subject, I will inform him/her of this on time.

Name of investigator (or his/her representative):.....

Signature: _____ Date: __ / __ / __

The subject will receive a complete information letter, together with a signed version of the informed consent form.

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Appendix C: EMA Questionnaire

These questionnaires will be answered in the ImecQ app.

General EMA:

EMA Questionnaire

Please indicate for all questions what state is the most applicable to you now.

In the past 30 minutes I have taken a snack/drink from the SnackBox:

Yes
 No
 I don't know

What snack/drink did you take from the SnackBox in the past 30 minutes?

Korte antwoordtekst

Right now, I feel: *

	1	2	3	4	5	
Sad	<input type="radio"/>	Cheerful				

Right now, I feel: *

	1	2	3	4	5	
Bored	<input type="radio"/>	Interested				

Right now, I feel: *

	1	2	3	4	5	
Relaxed	<input type="radio"/>	Stressed				

Right now, I feel: *

	1	2	3	4	5	
Fatigued	<input type="radio"/>	Energized				

In the past 30 minutes I have been physically: *

	1	2	3	4	5	
Inactive	<input type="radio"/>	Active				

Right now, I feel: *

	1	2	3	4	5	
Hungry	<input type="radio"/>	Satiated				

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Morning EMA (extra questions)

morning EMA Questionnaire

Please indicate for all questions what state is the most applicable to you now.

What time did you go to sleep yesterday?

Tijd

What time did you get up this morning?

Tijd

How would you rate your sleep quality of the past night?

1 2 3 4 5

very bad very good

Evening EMA

No extra questions, only reminders.

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Appendix D: Dutch Eating Behaviour Questionnaire (DEBQ)

This questionnaire will be filled out in CastorEDC.

Please provide one of the following answer options for the questions below: never (1), seldom (2), sometimes (3), often (4), and very often (5).

Restrained Eating

1. When you have put on weight, do you eat less than you usually do?
2. Do you try to eat less than you would like to eat at mealtimes?
3. How often do you refuse offered foods or drinks because you are concerned about your weight?
4. Do you watch exactly what you eat?
5. Do you deliberately eat foods that are slimming?
6. When you have eaten too much, do you eat less than usual the following day?
7. Do you deliberately eat less in order not to become heavier?
8. How often do you try not to eat between meals because you are watching your weight?
9. How often in the evenings do you try not to eat because you are watching your weight?
10. Do you take into account your weight with what you eat?

Emotional Eating (9-item version: clearly labeled emotions)

11. Do you have a desire to eat when you are irritated?
12. Do you have a desire to eat when you are depressed or discouraged?
13. Do you have a desire to eat when you are cross?
14. Do you have a desire to eat when you are approaching something unpleasant to happen?
15. Do you have a desire to eat when you are anxious, worried or tense?
16. Do you have a desire to eat when things are going against you or when things have gone wrong?
17. Do you have a desire to eat when you are frightened?
18. Do you have a desire to eat when you are disappointed?
19. Do you have a desire to eat when you are emotionally upset?

External Eating

20. If food tastes good to you, do you eat more than usual?
21. If food smells and looks good, do you eat more than usual?
22. If you see or smell something delicious, do you have a desire to eat it?
23. If you have something delicious to eat, do you eat it straight away?
24. If you walk past the baker do you have the desire to buy something delicious?

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- 25. If you walk past a snackbar or a cafe, do you have the desire to buy something delicious?
- 26. If you see others eating, do you also have the desire to eat?
- 27. Can you resist eating delicious foods?
- 28. Do you eat more than usual, when you see others eating?
- 29. When preparing a meal are you inclined to eat something?

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Appendix E: Depression, Anxiety, Stress Scale (DASS)

This questionnaire will be filled out in CastorEDC.



DASS 21 NAME _____ DATE _____

BLACK DOG INSTITUTE

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement. The rating scale is as follows:

- 0 Did not apply to me at all - NEVER
- 1 Applied to me to some degree, or some of the time - SOMETIMES
- 2 Applied to me to a considerable degree, or a good part of time - OFTEN
- 3 Applied to me very much, or most of the time - ALMOST ALWAYS

FOR OFFICE USE

	N	S	O	AA	D	A	S
1 I found it hard to wind down	0	1	2	3			
2 I was aware of dryness of my mouth	0	1	2	3			
3 I couldn't seem to experience any positive feeling at all	0	1	2	3			
4 I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3			
5 I found it difficult to work up the initiative to do things	0	1	2	3			
6 I tended to over-react to situations	0	1	2	3			
7 I experienced trembling (eg, in the hands)	0	1	2	3			
8 I felt that I was using a lot of nervous energy	0	1	2	3			
9 I was worried about situations in which I might panic and make a fool of myself	0	1	2	3			
10 I felt that I had nothing to look forward to	0	1	2	3			
11 I found myself getting agitated	0	1	2	3			
12 I found it difficult to relax	0	1	2	3			
13 I felt down-hearted and blue	0	1	2	3			
14 I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3			
15 I felt I was close to panic	0	1	2	3			
16 I was unable to become enthusiastic about anything	0	1	2	3			
17 I felt I wasn't worth much as a person	0	1	2	3			
18 I felt that I was rather touchy	0	1	2	3			
19 I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3			
20 I felt scared without any good reason	0	1	2	3			
21 I felt that life was meaningless	0	1	2	3			
TOTALS							

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DASS Severity Ratings

The DASS is a **quantitative** measure of distress along the 3 axes of depression, anxiety¹ and stress². It is not a categorical measure of clinical diagnoses.

Emotional syndromes like depression and anxiety are intrinsically dimensional - they vary along a continuum of severity (independent of the specific diagnosis). Hence the selection of a single cut-off score to represent clinical severity is necessarily arbitrary. A scale such as the DASS can lead to a useful assessment of **disturbance**, for example individuals who may fall short of a clinical cut-off for a specific diagnosis can be correctly recognised as experiencing considerable symptoms and as being at high risk of further problems.

However for clinical purposes it can be helpful to have 'labels' to characterise degree of severity relative to the population. Thus the following cut-off scores have been developed for defining mild/moderate/severe/extremely severe scores for each DASS scale.

Note: the severity labels are used to describe the full range of scores in the population, so 'mild' for example means that the person is above the population mean but probably still way below the typical severity of someone seeking help (ie it does not mean a mild level of disorder).

The individual DASS scores do not define appropriate interventions. They should be used in conjunction with all clinical information available to you in determining appropriate treatment for any individual.

¹Symptoms of psychological arousal

²The more cognitive, subjective symptoms of anxiety

DASS 21 SCORE

DEPRESSION SCORE ANXIETY SCORE STRESS SCORE

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	Depression	Anxiety	Stress
Normal	0 - 4	0 - 3	0 - 7
Mild	5 - 6	4 - 5	8 - 9
Moderate	7 - 10	6 - 7	10 - 12
Severe	11 - 13	8 - 9	13 - 16
Extremely Severe	14 +	10 +	17 +

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Appendix F: Perceived Stress Scale (PSS)

This questionnaire will be filled out in CastorEDC.

Perceived Stress Scale

A more precise measure of personal stress can be determined by using a variety of instruments that have been designed to help measure individual stress levels. The first of these is called the **Perceived Stress Scale**.

The Perceived Stress Scale (PSS) is a classic stress assessment instrument. The tool, while originally developed in 1983, remains a popular choice for helping us understand how different situations affect our feelings and our perceived stress. The questions in this scale ask about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. That is, don't try to count up the number of times you felt a particular way; rather indicate the alternative that seems like a reasonable estimate.

For each question choose from the following alternatives:
0 - never 1 - almost never 2 - sometimes 3 - fairly often 4 - very often

- _____ 1. In the last month, how often have you been upset because of something that happened unexpectedly?
- _____ 2. In the last month, how often have you felt that you were unable to control the important things in your life?
- _____ 3. In the last month, how often have you felt nervous and stressed?
- _____ 4. In the last month, how often have you felt confident about your ability to handle your personal problems?
- _____ 5. In the last month, how often have you felt that things were going your way?
- _____ 6. In the last month, how often have you found that you could not cope with all the things that you had to do?
- _____ 7. In the last month, how often have you been able to control irritations in your life?
- _____ 8. In the last month, how often have you felt that you were on top of things?
- _____ 9. In the last month, how often have you been angered because of things that happened that were outside of your control?
- _____ 10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

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Figuring Your PSS Score

You can determine your PSS score by following these directions:

- First, reverse your scores for questions 4, 5, 7, and 8. On these 4 questions, change the scores like this:
$$0 = 4, 1 = 3, 2 = 2, 3 = 1, 4 = 0.$$
- Now add up your scores for each item to get a total. **My total score is _____.**
- Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress.
 - ▶ Scores ranging from 0-13 would be considered low stress.
 - ▶ Scores ranging from 14-26 would be considered moderate stress.
 - ▶ Scores ranging from 27-40 would be considered high perceived stress.

The Perceived Stress Scale is interesting and important because your perception of what is happening in your life is most important. Consider the idea that two individuals could have the exact same events and experiences in their lives for the past month. Depending on their perception, total score could put one of those individuals in the low stress category and the total score could put the second person in the high stress category.

***Disclaimer:** The scores on the following self-assessment do not reflect any particular diagnosis or course of treatment. They are meant as a tool to help assess your level of stress. If you have any further concerns about your current well being, you may contact EAP and talk confidentially to one of our specialists.*

Owner: Alex van Kraaij [*Principal Investigator*]

Appendix G: Mental Well-being Questionnaire (MWQ)

This questionnaire will be filled out in CastorEDC.

Please answer the following questions on a scale from 1-7: “not at all” – “absolutely”.

1. I have been feeling optimistic about the future
2. I have been feeling useful
3. I have been feeling relaxed
4. I have been feeling interested in other people
5. I have been feeling challenged
6. I have found it easy to be at peace with my life circumstances
7. I have been able to live a full life
8. I have had energy to spare
9. I have been dealing with problems well
10. I have been thinking clearly
11. I have been feeling good about myself
12. I have been feeling stressed
13. I have been feeling close to other people
14. I have been feeling confident
15. I have been able to make up my own mind about things
16. I have been feeling loved
17. I have been interested in new things
18. I have been feeling cheerful
19. I think my life is meaningful
20. Others (partner, family members, close friends) have helped me deal with everyday life well
21. I have been feeling bored

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Appendix H: Ingredient list

The ingredients are stated for all snacks and drinks below. The most relevant ingredients for allergies are in capital letters. Below the ingredients the allergy information is summarized separately for “contains” and “may contain”.

Snacks

Celebrations mini chocolate bars (Celebrations)

- Ingredients: sugar, glucose syrup, cocoa butter, SKIMMED MILK POWDER, cocoa mass, butter fat (from MILK), LACTOSE, palm fat, PEANUTS, coconut, whey powder (from MILK), WHEAT FLOUR, sunflower oil, WHOLE MILK POWDER, emulsifiers (SOYA LECITHIN, E471), BARLEY MALT EXTRACT, skimmed cocoa, salt, humectant (glycerol), CHICKEN EGG PROTEIN POWDER, natural vanilla extract, raising agents (E341, E500, E501), MILK PROTEIN, WHEAT GLUTEN. (May contain: HAZELNUT, ALMONDS, OATS). Cocoa 25% minimum.
- Contains: Peanuts, Soy, Cereals containing gluten, Barley, Wheat, Eggs, Milk, Lactose.
- May contain: Nuts, Almond, Hazelnut, Oats.

Cheese biscuits, puff pastry (Albert Heijn)

- Ingredients: WHEAT FLOUR, 28% BUTTER, MILK, salt, SKIMMED MILK POWDER, water, pepper, rennet, starter culture, MUSTARD SEED, colorants (carotene [E160a]), preservative (sodium nitrate [E251]), potato starch. Of which added sugars 0.00g per 100 grams and of which added salt 2.21g per 100 grams.
- Contains: Milk, Cereals containing gluten, Mustard, Lactose, Wheat.
- May contain: Nuts, Peanuts, Sesame Seeds, Almond, Hazelnut, Pecan.

Dried apricots (Albert Heijn)

- Ingredients: 90% dried apricot, water, preservative (sulphur dioxide [E220] (SULPHITE), potassium sorbate [E202]). Of which added sugars 0.00g per 100 grams and of which added salt 0.00g per 100 grams.
- Contains: Sulphites.

Raisins (Albert Heijn)

- Ingredients: raisin, sunflower oil. Of which added sugars 0.00g per 100 grams and of which added salt 0.00g per 100 grams.

Muesli bars (Albert Heijn)

- Ingredients: dietary fibre (inulin), 26% OAT FLAKE, raisin, rice, HAZELNUT, 4% WHOLE WHEAT FLAKE, sugar, stabilizer (glycerol [E422]), vegetable oil (palm, rapeseed, sunflower), WHEAT GLUTEN, molasses, SKIMMED MILK POWDER, WHEAT GERM, salt, BARLEY MALT EXTRACT, emulsifier (lecithin [E322]). Of which added sugars 5.5g per 100 grams and of which added salt 0.16g per 100 grams.
- Contains: Milk, Nuts, Cereals containing gluten, Barley, Oats, Lactose, Hazelnut, Wheat.
- May contain: Peanuts, Almond, Cashew Nut, Walnut.

M&Ms (blue) chocolate (M&M)

- Ingredients: sugar, cocoa mass, rice flour (9.5%), SKIMMED MILK POWDER, cocoa butter, palm kernel fat, LACTOSE, palm fat, starch, butterfat (from MILK), glucose syrup, BARLEY MALT EXTRACT, shea fat, stabilizer (gum Arabic), salt, emulsifier (SOYA LECITHIN), dextrin, dextrose, glazing agent (carnauba wax), colorants*,

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aromas, palm kernel oil. (May contain: PEANUT, HAZELNUT, ALMOND). *E100, E120, E133, E160a, E160e, E170.

- Contains: Barley, Cereals containing gluten, Lactose, Milk, Soy.
- May contain: Almond, Hazelnut, Nuts, Peanuts.

M&Ms (yellow) chocolate (M&M)

- Ingredients: sugar, PEANUTS, cocoa mass, WHOLE MILK POWDER, cocoa butter, starch, palm fat, glucose syrup, SKIMMED MILK POWDER, emulsifier (SOYA LECITHIN), LACTOSE, stabilizer (gum Arabic), shea fat, butter fat (from MILK), dextrin, glazing agent (carnauba wax), colorants (E100, E120, E133, E160a, E160e, E170), palm kernel oil, flavourings, salt. (May contain: HAZELNUT, ALMOND).
- Contains: Lactose, Milk, Peanuts, Soy.
- May contain: Almond, Hazelnut, Nuts.

M&Ms (brown) chocolate (M&M)

- Ingredients: sugar, cocoa mass, WHOLE MILK POWDER, LACTOSE, cocoa butter, starch, palm fat, glucose syrup, shea fat, stabilizer (gum Arabic), emulsifier (SOYA LECITHIN), colorants (E100, E133, E160a, E160e, E162, E170, E172), dextrin, glazing agent (carnauba wax), palm kernel oil, salt, vanilla extract, aroma. (May contain: PEANUT, ALMOND, HAZELNUT).
- Contains: Lactose, Milk, Soy.
- May contain: Almond, Hazelnut, Nuts, Peanuts.

Unsalted peanuts (Albert Heijn)

- Ingredients: 96% PEANUT, sunflower oil. Of which added sugars 0g per 100 grams and of which added salt 0g per 100 grams.
- Contains: Peanuts.
- May contain: Nuts, Almond, Cashew Nut, Hazelnut, Macadamia Nut, Pecan Nut, Brazil Nut, Pistachio Nut, Walnut.

Salted peanuts (Albert Heijn)

- Ingredients: 96% PEANUT, sunflower oil, salt. Of which added sugars 0g per 100 grams and of which added salt 0.68g per 100 grams.
- Contains: Peanuts.
- May contain: Nuts, Almond, Cashew Nut, Hazelnut, Macadamia Nut, Pecan Nut, Brazil Nut, Pistachio Nut, Walnut.

Nut mix (Albert Heijn)

- Ingredients: 43% ALMOND, 35% HAZELNUT, 15% WALNUT, 5% BRAZIL NUT, sunflower oil. Of which added sugars 0.00g per 100 grams and of which added salt 0.00g per 100 grams.
- Contains: Nuts, Almond, Hazelnut, Brazil Nut, Walnut.
- May contain: Peanuts, Cashew Nut, Macadamia Nut, Pecan Nut, Pistachio Nut.

Savoury biscuits – cheese and tomato (Sultana)

- Ingredients: WHEAT FLOUR, vegetable oils (sunflower, rapeseed), sugar, natural cheese flavour with other natural flavours (MILK), LACTOSE and MILK PROTEINS, rice flour, glucose syrup, OAT FIBRE, salt, dried Italian spice mix 1.1% (basil, oregano, parsley, thyme, chives), natural flavourings, raising agents (sodium carbonates, diphosphates, ammonium carbonates), dried potato flakes, yeast powder, WHEAT GLUTEN, dried leek, dietary fibre (inulin), OATS, SKIMMED MILK POWDER, barley malt extract, cream (MILK), dextrose, emulsifier (SOYA LECITHINS). May contain traces of NUTS, SESAME SEEDS, EGG and other GLUTEN CONTAINING GRAINS.

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- Contains: Barley, Cereals containing gluten, Lactose, Milk, Oats, Soy, Wheat.
- May contain: Eggs, Nuts, Sesame Seeds.

Wine-gum & liquorice mix (Red Band)

- Ingredients: Glucose syrup, sugar, modified starch, starch, gelatine, melado, acid (lactic acid), licorice root extract, ammonium chloride, vegetable oils (coconut, rapeseed), caramelized sugar, flavourings, concentrate of (black carrot, spirulina, safflower, carrot, black currant), glazing agent (beeswax), colorants (sweet red pepper extract, curcumin).

Rice snack mix (Albert Heijn)

- Ingredients: 63% rice, modified starch (maize, tapioca), 6.1% PEANUT, WHEAT FLOUR, glucose syrup, cane sugar, water, SOYBEAN, sugar, salt, WHEAT, maltodextrin, spices (including SESAME), raising agent (ammonium carbonate [E503]), starch (tapioca, potato), colouring (caramel [E150a], paprika extract [E160c], copper complexes of chlorophyll and chlorophyllin [E141]), seaweed, yeast. Of which added sugars 8.3g per 100 grams and of which added salt 1.55g per 100 grams.
- Contains: Peanuts, Sesame Seeds, Grains Containing Gluten, Soy, Wheat.
- May contain: Nuts, Almond, Cashew Nut, Hazelnut, Macadamia Nut, Pecan Nut, Brazil Nut, Pistachio Nut, Walnut.

Cocktail nut mix (Albert Heijn)

- Ingredients: 50% PEANUT, starch (potato, WHEAT, corn), sunflower oil, sugar, salt, modified starch (potato, corn), WHEAT FLOUR, dextrose, spices, yeast extract, yeast powder, caramelized sugar, colorants (curcumin [E100], iron oxides and -hydroxides [E172]), maltodextrin, food acid (citric acid [E330], lactic acid [E270], calcium lactate [E327]). Of which added sugars 4.7g per 100 grams and of which added salt 1.56g per 100 grams.
- Contains: Peanuts, Gluten-Containing Cereals, Wheat.
- May contain: Nuts, Almond, Cashew Nut, Hazelnut, Macadamia Nut, Pecan Nut, Brazil Nut, Pistachio Nut, Walnut.

Drinks

Aquarius Beyond Hydration Lemon

Ingredients: Water; sugar; food acid: citric acid; sodium chloride; acidity regulators: sodium citrate, potassium phosphate and calcium phosphate; natural lemon flavour with other natural flavour; antioxidant: ascorbic acid; stabilizers: gum Arabic, glycerol esters of wood resin; vitamin B6.

Chaufontaine Sparkling Fusion flavoured water

Ingredients: Chaufontaine natural mineral water; lemon juice from concentrate (0.6%); natural lemon- and lime flavours

Fanta Orange

Ingredients: Sparkling water, sugar, orange juice from juice concentrate (6%), food acids: citric acid, malic acid, sodium citrate, preservative: potassium sorbate, natural orange flavours with other natural flavours, antioxidant: ascorbic acid, sweeteners: acesulfame-K, aspartame, stabilizer: guar gum, carrot concentrate, colorant: carotenes.

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Fanta Orange Zero

Ingredients: sparkling water; orange juice from concentrate (4%); food acids: citric acid, malic acid, sodium citrate; sweeteners: aspartame, acesulfame-K; preservative: potassium sorbate; antioxidant: ascorbic acid; natural orange flavours with other natural flavours; carrot concentrate; stabiliser: guar gum; colorant: carotenes.

Fuze Tea Green Tea Mango Chamomile

Ingredients: Brewed green tea 94% (water, concentrated green tea infusion), sugar, mango juice from concentrate (1%), food acids: citric acid, sodium citrate, antioxidant: ascorbic acid, natural flavourings, sweetener: steviol glycosides, chamomile extracts.

Fuze Tea Black Tea Peach Hibiscus

Ingredients: Brewed black tea 91% (water, concentrated black tea* infusion), peach juice from concentrate (5%), sugar, food acids: citric acid, sodium citrate, malic acid, natural peach aroma, natural flavours, antioxidant: ascorbic acid, hibiscus extract, sweetener: steviol glycosides, *Rainforest Alliance Certified™

Minute Maid Orange

Ingredients: pure filtered water, concentrated orange juice

Minute Maid Apple

Ingredients: pure filtered water, concentrated apple juice, vitamin C (ascorbic acid)

Sprite

Ingredients: Sparkling water; food acids: E330, E331; natural lemon-lime flavours; sweeteners: aspartame, acesulfame-K.

Sprite Zero

Ingrediënten: Sprankelend water; voedingszuren: E330, E331; natuurlijke citroen-limoen aroma's; zoetstoffen: aspartaam, acesulfaam-K.

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Appendix I: User Experience Questionnaire (short)

This questionnaire will be filled out in CastorEDC.

- How would you rate your user experience with the SnackBox according to the following values?

obstructive	o o o o o o o o	supportive
complicated	o o o o o o o o	easy
inefficient	o o o o o o o o	efficient
confusing	o o o o o o o o	clear
boring	o o o o o o o o	exciting
not interesting	o o o o o o o o	interesting
conventional	o o o o o o o o	inventive
usual	o o o o o o o o	leading edge

- Did the SnackBox and/or EMAs affect your snacking / drinking behaviour? And if yes, how?
- Do you have any feedback, tips or advice on the further development of the SnackBox?
- Did you taste any difference in the snacks / drinks over the days?
- How would you rate your user experience with the Traqq application according to the following values?

obstructive	o o o o o o o o	supportive
complicated	o o o o o o o o	easy
inefficient	o o o o o o o o	efficient
confusing	o o o o o o o o	clear
boring	o o o o o o o o	exciting
not interesting	o o o o o o o o	interesting
conventional	o o o o o o o o	inventive
usual	o o o o o o o o	leading edge