Information for students participating in the student study titled Physically active academic lessons in general upper secondary school

You have been invited to participate in a study. Your participation in the study is voluntary. You can withdraw from the study at any time. If you withdraw from the study, you will not have any negative consequences. However, any data collected from you up to that point can be used for research purposes.

1 Topic of the study

Physical activity can promote learning, academic success and well-being in many different ways. In particular, physical activity appears to promote attention, executive functioning and the student's engagement, which are important prerequisites for learning. Current research evidence supports the benefits of adding more physical activity in school days and especially in lessons. However, less is known about the acute effects of physical activity during lessons in secondary education, or teachers' and students' experiences during physically active lessons.

The aim of the student study titled Physically active academic lessons in general upper secondary school is to increase understanding of students' experiences and engagement during physically active lessons in academic subjects in general upper secondary school. The study will also examine the acute effects of physically active lessons on students' cognitive prerequisites of learning and situational engagement.

2 Conduct of the study in practice

As part of instruction delivered in compliance with the National core curriculum for general upper secondary education, the students will participate in three different lessons in a random order. These lessons are

1) a physically active lesson containing approx. 20 minutes of physically active learning, in which physical activity is integrated into learning goals,
2) a physically active lesson that includes two physically active breaks of approx. five minutes,
3) a conventional lesson that does not include physical activity.

The following measurements will be conducted as part of the study:

1) Initial measurements: a background questionnaire, measurement of mathematical, linguistic and cognitive skills, measurements of physical activity and load, and a questionnaire measuring alertness.
2) Measurements during the lessons: initial questionnaire, measurement of executive function, questionnaire about alertness, final questionnaire, and measurements of physical activity and load.
3) Interviews with students.

The study will not interfere with the achievement of the lessons' objectives. Decisions on the contents of the lessons for those students who do not participate in the study will be made by the subject teacher. While all students will participate in the lesson during which the measurements are made, the data concerning non-participating students will not be saved. They will also not fill in the background questionnaire or participate in the measurements of physical activity and load.

Detailed methods of the study:

Initial measurements:

1) Background questionnaire. The students will fill in an online questionnaire about their background factors and general well-being, including their current perceived study burnout and engagement, perceived physical and academic competence, socio-economic status and learning difficulties. The questionnaire will take around 20 minutes to complete.

2) Measurement of mathematical, linguistic and cognitive skills. The students will participate in tests measuring the initial level of their mathematical and linguistic skills. They will also participate in measurements of their cognitive function, including their perception and working memory. They will take these tests online in the ViLLE system as part of the lesson. The tests will take around 30 minutes.

3) Measurement of physical activity. Physical activity will be measured using an Axivity AX3 accelerometer. The measurement will produce data on physical activity at different levels of intensity, sitting and sedentary activities, and sleeping. The students will be using an accelerometer (Figure 1) for two measurement periods of around four days.

Figure 1. Axivity AX3 accelerometer is attached to the thigh with medical tape.

4) Measurement of physical load. Physical load such as stress, recovery, sleep and physical activity will be measured with a Firstbeat Bodyguard 3 monitoring device based on heart rate variability. Electrodes and the Firstbeat Life application will be used for these measurements. The measurements of heart rate variability will provide data on the responses of the nervous system. These responses give an indication of the status of the body. The students will be given the device (Figure 1) for two measurement periods of around four days. The device is attached to the skin of the chest using electrodes (Figure 2). Measurements are initiated using the Firstbeat Life application.

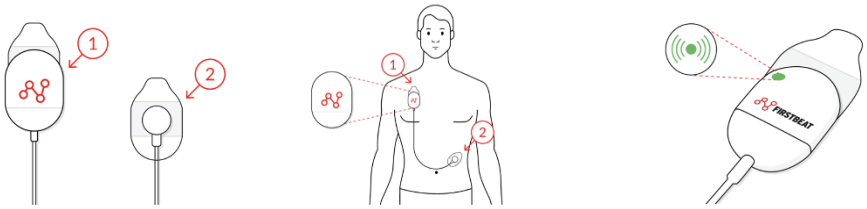

Figure 2. The electrodes are connected to the Firstbeat Bodyguard 3 device. Using its adhesive electrodes, the measuring device is attached to dry and clean skin from which hairs have been removed. The device is attached under the right clavicle, and the smaller component is attached to the left side of the ribcage.

In addition to using the measuring devices, the students will keep a diary (including of the times when they go to bed and wake up, time spent studying, physical activity and the times of the lessons to be measured). Keeping the diary will take less than 5 minutes a day. After the measurements, the students will receive feedback on stress during the measurements, recovery, light activity and exercise.

5) Measurement of alertness. The students will assess their level of alertness four times during the school day (9:00, 11:00, 13:00, 15:00) using the 9-step questionnaire of the Karolinska Sleepiness Scale. The questionnaire will take around 1 minute to complete.

Measurements during the lessons:

1) Initial questionnaire. At the beginning of the lesson, the students will complete an initial questionnaire online that focuses on factors describing their preceding day, night and morning that may affect their current alertness and load. The questionnaire will take around 2 minutes to complete.

2) Executive function measurement. At the beginning of the lesson, the students participate in a measurement of their attention and executive functions. ViLLE system will be used for this measurement that takes about 3 minutes.

3) Measurement of alertness. During the lesson, the students will assess their level of alertness four times using the 9-step questionnaire of the Karolinska Sleepiness Scale (which they will be familiar with during initial measurements). The questionnaire will take around 1 minute to complete.

4) Final questionnaire (InSitu). At the end of the lesson, the students will fill in an InSitu questionnaire to measure their engagement during the lesson, such as behavioral and cognitive engagement, emotional engagement, disaffection, competence experiences and help-seeking. The questionnaire will take around 2 to 3 minutes to complete.

5) Measurement of physical activity and physical load. The students will use both an Axivity AX3 accelerometer and a Firstbeat Bodyguard 3 device on the lessons during which the measurement are conducted.

Interviews with students:

After the measurements, around 20 students will be invited to have individual interviews. The purpose of the individual interviews is to examine the students' experiences of the physically active lessons, including their engagement during the lessons and opinions of their usefulness. They will be conducted as semi-structured individual interviews and take about 20 minutes. The interviews will be stored as audio files.

3 Benefits, potential risks and discomfort to the subjects, and insurance cover

This multidisciplinary study project will increase understanding of students' experiences and engagement during physically active academic lessons in general upper secondary school. The study will also examine the acute effects of physically active lessons on students' cognitive prerequisites of learning and situational engagement. Based on the findings, recommendations will be created for physically active classroom practices for teachers and teacher educators with the aim of supporting the competence of subject teachers and, above all, promoting students' learning and well-being. The students will receive personal feedback on the measurements. If a participant purchased the measurements included in the study as a service, their value would be around EUR 200/person.

No particular risks are associated with participating in the measurements conducted during the study. The participants will not have any costs for their participation.

The physically active lessons will include physical assignments that are part of students' normal life and do not increase the risk of accidents as such. In addition, the lessons will follow the National core curriculum for general upper secondary education. Consequently, participation in the instruction will not involve a risk that differs from that to which students are exposed to on normal school days.

The students' physical activity will be measured using an Axivity AX3 accelerometer, which will be attached to the student's thigh with medical tape. Physical load will additionally be measured with a Firstbeat Bodyguard 3 device attached to the skin with electrodes. The tapes used to attach the Axivity AX3 device and use of electrodes in connection with Firstbeat Life measurements may cause skin irritation. This irritation may be reduced by attaching the electrodes/tapes onto clean and dry skin and by replacing the electrodes/tapes daily. The position of the electrodes may also

be changed slightly when they are replaced. Experiences of using the device have mainly been neutral or positive.

The study will be carried out as part of normal upper secondary school lessons, and the students will consequently be covered by the school's insurance policy.

4 Results and information on research findings

The students will receive personal feedback on the measurements of their physical load. Among other things, they will receive information on their stress levels, their recovery during sleep, and about their physical activity. Once the research findings have been completed, a feedback seminar will be organised for upper secondary school teachers and students in Oulu region, where the findings of the study will be discussed in detail.

Finnish-language and international articles will be written on the findings, and they will be presented at Finnish and international conferences. The data will also be used in theses.

5 Why and on what basis will your personal data be processed during the study?

The processing of personal data will be based on the student's consent (EU 679/2016 6.1 a). The data collected in the study and the findings will be processed confidentially as required under data protection legislation.

The personal data collected for the study will include the student's name, date of birth, gender and country of birth, email address, telephone number and voice (in interviews). The student's name, email address and phone number are needed for contacting them during the study. The other personal data are needed as background variables for the study.

6 Who will process your personal data?

The personal data will only be processed by members of the Physically active academic lessons in general upper secondary school research group for whom this is essential: the coordinator of measurements, researchers and research assistants who collect the data; the responsible researchers of the study who are accountable for the data; and the statistical expert who will combine data from different measurements. The personal data concerning the subjects will be removed from the data set to be created, and the researchers will process the data without identifiers.

7 Data transfers to non-EU countries

Research data containing personal data will not be transferred to countries outside the EU/EEA.

8 What action will be taken to protect your data?

The study meets the following prerequisites, which protect your rights:

☒ A research plan has been created for the study

☒ The person responsible for the study is:

Tuija Tammelin, Principal Researcher, Jyväskylä University of Applied Sciences, LIKES, Jyväskylä. tuija.tammelin@jamk.fi, tel. +358 400 247998

☒ Personal data will only be used and disclosed for the purposes mentioned in section 4 above, and in other respects, it will be ensured that no data pertaining to any specific individuals will be disclosed to third parties.

☐ A data protection impact assessment has been carried out for the study.

☒ Ethical review has been carried out for the study. The Ethics Committee of Jamk University of Applied Sciences issued a statement on its ethical review on 21 December 2023.

9 Storage and anonymisation of personal data

Direct and strong indirect identifiers (participants' names, email addresses, phone numbers) will be removed as the data set is created (pseudonymised data set in which identification can be restored by using the research subject numbers, making it possible to combine new data to the set).

As the data are archived, the code key of the pseudonymised data set will be destroyed, and direct and indirect strong identifying data and indirect identifiers will be removed from the data set, ensuring that identifiable personal data can no longer be recovered, and that new data cannot be linked to the data set (anonymised data set). The need for archiving will be reviewed every five years. For more information, see the Privacy Statement of the study: https://www.jamk.fi/sites/default/files/2024-02/PAAL-Tietosuojaseloste-Jamk-EN.pdf

The identifier in the interview data set is the interviewee's voice. The data set containing identifiable data (interviewee's voice) will be stored in OneDrive and GoogleDrive cloud services, protected by the University of Oulu's online service IDs until the conclusion of the study, at which time the voice recordings will be destroyed. The transcribed interviews will be stored without identifying data for five years after the conclusion of the study. For more information, see the Privacy Statement of the study: https://www.jamk.fi/sites/default/files/2024-02/PAAL-Tietosuojaseloste-Oulun%20yliopisto-EN.pdf

The data file stored in the ViLLE system will be maintained by the Turku Research Institute for Learning Analytics. The personal data will be stored in the service for five years after the last user login. Anonymised data intended for research purposes will not be deleted, as they cannot be linked to users' login data. For more information, see the Privacy Statement of ViLLE: https://www.oppimisanalytiikka.fi/tietosuojaseloste/

Firstbeat Technologies Oy stores personal data related to Firstbeat Life measurements for the purposes of monitoring measurements included in the service concept for 36 months after the last measurement or the last time you logged in to Firstbeat Life or otherwise used Firstbeat Life service, after which they will be deleted. For more information, see Firstbeat Life's Privacy Statement: https://www.firstbeat.com/fi/tietosuoja/hyvinvointianalyysi-palvelun-rekisteriseloste/

10 Rights of study participants in scientific research

The students' participation in the study will be completely voluntary. During the course of the study, you will be entitled to decline to take part in measurements and to withdraw from the study at any time without giving a reason and without any consequences. The study arrangements will be made and the results will be processed and reported confidentially. The subjects' personal data obtained during the study will only be made available to the subject and the persons for whom processing these data is essential (the person collecting the data, the responsible researcher and the statistical expert combining the measurement data sets). The findings will be published in research reports in a form where no individual subject can be identified. You will have the right to receive further information about the study from the research group members at any stage.

11 Additional information on the study and exercising your rights

The controllers in this study are Jamk, and the University of Oulu regarding the interview data.

To receive more information about the study or to give notification of declining to participate or withdrawing from the study, please get in touch with the contact person for the study:

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Please contact Jamk's Data Protection Officer if you have any questions or requests regarding the processing of personal data:

Data protection officer: Annukka Akselin
Email: tietosuoja@jamk.fi

If you find that personal data have been processed in violation of data protection legislation, you have the right to file a complaint with the supervising authority, which is the Data Protection Ombudsman (see https://tietosuoja.fi/en/home).

Tuija Tammelin
Principal Researcher
LIKES, Jamk University of Applied Sciences

Distribution Study participants

CONSENT TO PARTICIPATION IN THE PHYSICALLY ACTIVE ACADEMIC LESSONS IN GENERAL UPPER SECONDARY SCHOOL STUDENT STUDY

The aim of the student study titled Physically active academic lessons in general upper secondary school is to increase understanding of students' experiences and engagement to physically active lessons in academic subjects in general upper secondary school. The study will also examine the acute effects of physically active lessons on students' cognitive prerequisites for learning and situational engagement. The conduct of the study will not interfere with achieving the lessons' objectives.

I have familiarised myself with the purpose of the study and the measurements that will be carried out on the participating subjects, potential risks to the subjects, and the subjects' rights and insurance cover. The content of the study has also been explained to me orally, and I have received an adequate answer to all of my questions about the study. I know that participation is voluntary and that I will be able to decline to participate or withdraw from the study at any time without giving a reason and without consequences. If I withdraw from the study, the data collected by that time will be used as part of the research data set. My health is good at the time of participating in the measurements conducted for the study.

I consent to the use of the data collected on me for the purposes of the study that are described in the information sheet, and to the use and processing of the personal data collected from me as described in the Privacy Statement. The findings of the study and the collected data may be accessed and used in a form where individual subjects cannot be identified.

I will participate in the study titled Physically active academic lessons in general upper secondary school.

YES ☐ **NO** ☐

I consent to **being contacted about a possible interview.**

YES ☐ **NO** ☐

I consent to **the storage of the data in an open archive in compliance with the principles of open science at the end of the study** in a form where **I cannot be identified at any stage on the basis of the data.**

YES ☐ **NO** ☐

Details of the student participating in the study

Please fill up the details with care. Telephone number without country code, e.g. 0501234567.

First name _____

Last name_____

Telephone number_____

Email address _____

I confirm that I will participate in the study, that I consent voluntarily to being a subject of the study, and that I give my permission for the actions described above.

Date	The student's signature	Clarification of the name

Date	Researcher's signature	Clarification of the name