Fontys Paramedische Hogeschool

Opleiding Fysiotherapie

Are First-Year Physiotherapy Students Physically Active Enough?

Mies van den Biggelaar

Supervisor: Steven Onkelinx

- January 2016 -

Preface

The bachelor thesis in front of you is the result of a four-month period, as a part of my graduation at Fontys University of Applied Science, Physiotherapy.
The study described in this thesis was part of an overarching study performed in a group of four students, with a study-focus on the health and fitness of first-year physiotherapy students. The project group consisted of Marius van Roosmalen, Renáta Rácz, Judith van de Lockand and myself.

This subject was chosen voluntary from a predetermined list from Fontys University of Applied Science. I have chosen this subject with existent interest in the subject of physical activity. Sedentary time and behaviour being a subject of growing importance it seemed like a logical connected issue to investigate.

In the first phase of this bachelor thesis, I found that there are a lot of different opinions about sedentary behaviour and sedentary time. Therefore, the real challenge in the first phase was to find evidence-based literature about sedentary time and its consequences.
Likewise, I found that working with technology can be challenging and can ask a lot from your ability to adapt and improvise.
In conclusion, it has been a challenging but mostly informative project and a process of growth on a personal and a professional level.

At last, I would like to thank everyone who supported and motivated me during the conduction of this study. A special thanks is directed to my supervisor Steven Onkelinx for his directions and feedback. Also, I would like to thank the project group for the cooperation and thank you to all the students who participated in the study.

Mies van den Biggelaar

Eindhoven, January 2nd 2016

Version 1.0

Abstract

Background

This study aims to measure the physical activity and sedentary time within first-year physiotherapy students. It aims to find the answer on to what extent first-year physiotherapy students meet the standards on physical activity and to what extent the results found with an accelerometer are similar to the students self-reported level of physical activity and sedentary time.

Method

Descriptive study of physical activity and sedentary time, involving 34 (12 females and 22 males) first-year physiotherapy students, measured by the International Physical Activity Questionnaire (IPAQ) and a 7-day accelerometer measurement. Physical activity (scaled into low, moderate and vigorous) and sedentary time are measured and sufficient physical activity is calculated according to the World Health Organisation's recommendation for physical activity (150 minutes of moderate activity per week). Results from both IPAQ and accelerometer measurement are compared with each other.

Results

Accelerometer-derived results show that the participants have a median of 25,9 minutes of moderate activity per day (181,3 minutes per week). 31,3% (N=10) from the total test population (N=32) does not meet the standard of 150 min/week of moderate activity, measured by an accelerometer. Measured by IPAQ, 96,9% of the participants meet the standard of the World Health Organisation Global Recommendations on Physical Activity for Health (Adults 18-64 years old).

Conclusion

The results of this research show that 68,8% of the participants meet the standards of PA, measured by an accelerometer. Big differences are seen between the results of the IPAQ and accelerometer. IPAQ-reported measures show an overestimation of moderate and vigorous activity and an underestimation of low activity and SED, in comparison to accelerometer-derived results.

Samenvatting

Achtergrond

Deze studie heeft als doel het meten van fysieke activiteit en sedentaire tijd bij eerstejaars fysiotherapie studenten. De focus ligt bij het antwoorden tot op welke hoogte eerstejaars fysiotherapie studenten voldoen aan de standaard voor fysieke activiteit en tot op welke hoogte de resultaten gevonden met accelerometrie gelijk zijn aan zelf geregistreerde fysieke activiteit en sedentaire tijd.

Methode

Beschrijvende studie van fysieke activiteit en sedentaire tijd, uitgevoerd bij 34 (12 vrouwen en 22 mannen) eerstejaars fysiotherapie studenten, gemeten met de International Physical Activity Questionnaire (IPAQ) en een 7-daagse accelerometrie meting. Fysieke activiteit (verdeeld in lage, matige, zware intensiteit) en sedentaire tijd zijn gemeten en voldoende fysieke activiteit is bepaald met behulp van de World Health Organisation's aanbevelingen voor fysieke activiteit (150 minuten matige activiteit per week). De resultaten van de IPAQ en accelerometrie zijn met elkaar vergeleken.

Resultaten

De resultaten van de accelerometrie laten een mediaan van 25,9 minuten matige activiteit per dag (181,3 minuten per week) zien. 31,3% (N=10) van de totale test populatie (N=32) voldoet niet aan de standaard van 150 minuten matige fysieke activiteit per week, gemeten door accelerometrie. Gemeten door de IPAQ, voldoet 96,9% van de participanten aan de standaard van de World Health Organisation Global Recommendations on Physical Activity for Health (Adults 18-64 years old).

Conclusie

De resultaten van deze studie laten zien dat 68,8% van de participanten voldoet aan de standaard voor fysieke activiteit gemeten met accelerometrie. Ook zijn er grote verschillen te zien tussen de resultaten van de IPAQ en accelerometrie. De zelfregistratie van de IPAQ laat in vergelijking met de accelerometrie resultaten een overschatting van matige en zware activiteit zien en een onderschatting van lage activiteit en sedentaire tijd.

Table of content

Introduction

Activity levels are decreasing more and more, accompanied with the fact that physical inactivity is classified as the fourth leading risk factor for global mortality with 6% of deaths globally (World Health Organization, 2010). But this risk factor for cardiovascular disease and other chronic diseases is not one that cannot be changed, unlike risk factors such as gender and age; physical activity (PA) can change the degree of potential risk and might even lead to health benefits (Warburton, Nicol, & Bredin, 2006).

Activities with a low level of energy use, such as sitting and laying are called sedentary activities. To be called sedentary the World Health Organisation (WHO) proposed ≤1,5 MET as the cut of point (Nederlands Instituut voor Sport en Bewegen (NISB), 2015). Sedentary time (SED) should not be confused with physical inactivity; as physical active people can still have a too high amount of sedentary time. For children between 4-17 years old it is recommended to keep time spent on activities, such as, watching TV and playing games at a maximum of two hours a day. However, there are no guidelines yet for sedentary time in adults (World Health Organization, 2010).
Previous research has shown that PA levels decrease from childhood to adolescence and decrease even more from adolescence to adulthood. As known, PA and SED behaviours are modifiable and the earlier these positive changes occur, the bigger the health benefits are. Identifying PA and SED patterns and discovering behaviours of PA and SED can help to come to further research and recommendations to prevent future health risks and problems (Arias-Palencia, et al., 2015).

According to a study from Deliens et al. the transition from secondary school to university college or university can involve some unhealthy behaviour changes, such as increasing sedentary behaviour and decreasing physical activity (40-50% of physically inactive students within university college) (Deliens, Deforche, De Bourdeaudhuij, & Clarys, 2015).
A study in the United Kingdom showed that students at university spent eight hours per day on activities such as studying, working behind a computer or laptop, gaming, watching television etc., which are all sedentary activities (Rouse & Biddle, 2010).
The American College Health Association-National College Health Assessment investigated levels of PA in college students by using a national sample, with as its main findings that the majority of college students do not meet recent guidelines and recommendations for PA (American College Health Association, 2015).

Using the World Health Organization's (WHO) Global Recommendations on Physical Activity for Health (Adults 18-64 years old) as the golden standard, risks on metabolic related diseases such as diabetes and metabolic syndrome could be decreased significantly with 150 minutes of moderate- to vigorous-intensity PA per week. Scientific evidence shows not only the lower risk on metabolic diseases but for an increasing number of disabling medical conditions, such as cardiovascular diseases (World Health Organization, 2010).
Moreover, an individual will benefit from the physical and mental health advantages that occur if they

are physical active enough (preferably with as less SED as possible). One is less likely to strive to change their PA and SED behaviour when they believe they meet the desirable behaviour and therefore overestimate their own PA. Because of this, accurate measurement and research of PA and SED behaviour in young adults should be issued to health professionals (Downs, Van Hoomissen, Lafrenz, & Julka, 2014).

As clients visit a physiotherapist, they expect the physiotherapist to be physically active up to a certain extend. Therefore, new physiotherapy students are expected to be aware of what health and PA is and that they are preferably physically active as well. It has not yet been investigated if first-year physiotherapy students are as physically active as they should according to the World Health Organization's (WHO) Global Recommendations on Physical Activity for Health.

Celis-Morales et al. have found that sedentary time and PA are reported in a more positive way (more PA, less sedentary time) with use of the International Physical Activity Questionnaire (IPAQ) compared to the objective accelerometer measurements (Celis-Morales, Perez-Bravo, Ibañez, Salas, Bailey, & Gill, 2012). There is no other literature found yet on similarities between results of accelerometer and self-reported measurements of PA and sedentary time.

This study aims to measure the PA and sedentary time within first-year physiotherapy students.
To what extent do first-year physiotherapy students meet the standards on physical activity? And to what extent are the results found with an accelerometer similar to the students self-reported level of physical activity and sedentary time?

Method

Study design

This study was part of an overarching project with multiple researchers and with various research questions. This particular study has a quantitative research design, performed with use of the wide used International Physical Activity Questionnaire (IPAQ) questionnaire and the Activ8 professional accelerometer. Results will be used in a descriptive way.

The research was focused on first-year physiotherapy students and their daily physical activity, results used in a descriptive way. The outcome measure of this study is time of physical activity and sedentary time in minutes, measured by an accelerometer and through self-report.

Ethics statement

All the participants were informed about the tests and research and had to give a signed informed consent before their participation in this study (Appendix I). The study did not involve any risks for participants.

Participants

The aim was to generate 30 participants (aged 18-25 years old) randomly (per class) drawn from the overarching study involving all first-year physiotherapy students. Prior to participation in the bigger project, participants were informed about the possibility to be drawn to participate in this study. Inclusion and exclusion criteria have been mentioned through verbal information.

To be eligible for inclusion, the participants had to be Fontys first-year physiotherapy students, aged between 18 and 25 years old. Males and females were both included.

Participants with (very) severe injuries or the inability to move in a (normal) free way (due to crutches, wheelchairs, plaster casts etc.) during the test period have been excluded from participation.

Moreover, to be able to generate reliable measurements, students who swam on competition level or professional level were excluded from the study, due to inability of measurement with the accelerometer during swim activities.

Measurement of physical activity by IPAQ

Self-reported physical activity (PA) and sedentary time were measured by using the IPAQ (www.ipaq.ki.se) (Craig, et al., 2003) questionnaire. The IPAQ has a variable test-retest reliability (coefficients between 0.32 to 0.88) that is in generally accepted and a criterion-related validity with an average correlation coefficient of 0.30, when compared with accelerometer-derived PA (Downs, Van Hoomissen, Lafrenz, & Julka, 2014).

The Dutch translation was used for the Dutch students and the English version for the international students. Both these versions of the IPAQ (Appendix II & III) are split into several parts, to name, job-related, transportation, domestic, gardening and care taking, and leisure time. All the questions to be answered with the time spent on a certain activity in the last seven days.

The IPAQ had to be completed before the accelerometer wear of the participants. To not influence the test results, the participants have not been told about the relevance of the questionnaire to this study.

Scoring of the IPAQ has been done following the scoring protocol of the IPAQ long-form, which is to be found in appendix IV.

Measurement of physical activity by accelerometer

Participants have been wearing the Activ8 accelerometer (VitaMove. Activ8 – A8005) (Activ8, 2015) for a period of seven days, the whole day (at least 10 hours per day) except for the time spent sleeping, showering or swimming (Celis-Morales, Perez-Bravo, Ibañez, Salas, Bailey, & Gill, 2012). Participants were instructed on the use of the accelerometer prior to the testing period. They have been instructed to wear the accelerometer on the front of their left upper leg -in the pocket of their trousers or (only during sport activities) with the help of the legstrap- at all times.

The accelerometers were all installed with the same settings, recommended by the recording tool of the accelerometer with a measurement interval of 5 minutes and with the configuration of measurement at MET/Sec (Activ8, 2015). Device LED's were installed to be off during the seven-day test period.

Only the data of participants who have worn the accelerometer for at least 4 days and 10 hours per day were included (Tudor-Locke, Burkett, Reis, Ainsworth, Macera, & Wilson , 2005). The Activ8 device defines lying as no movement for 5 minutes or more, due to the fact that this no-movement also occurs in non-wear time the Activ8 system has combined lying and non-wear in one category (Erasmus MC University Medical Center Rotterdam, 2013). In all analyses, successive periods of 1 hour or more with no counts have been designated as non-wear time (≤ 2 minutes of counting being allowed within this period). These non-wear times have been excluded from the results before analysis (Aadland & Ylvisåker, 2015).

Outcome measures

Data generated from the IPAQ have been scored by using the scoring protocol of the IPAQ long-form (Appendix IV). The scores were modified into average spent on low, moderate and vigorous activities (in minutes) per day. As well as average sedentary time (in minutes) per day.

Data collected from the Activ8 accelerometer have been divided into low, moderate, vigorous and sedentary activity. The activities measured by the Activ8 accelerometer were scaled with the use of the Compendium of Physical Activities (CPA) (Ainsworth, et al., 2011) and with the same cut off points as used in the scoring protocol of the IPAQ long-form (Appendix IV). Table 1 shows how the activities measured by accelerometer were scaled.

Table 1. Scaled accelerometer measures

Activity (Activ8)	MET (CPA)	Scale / Level of activity
Walking	3.3 MET	Low
Standing	1.5 MET	Low
Lying	1.0 - 1.3 MET	Non-wear time
Sitting	1.3 MET	Sedentary
Running	≥ 8 MET	Vigorous
Cycling	6.0 MET	Moderate

Activities measured by Activ8 were scaled into low, moderate and vigorous activity level and sedentary time.
CPA = Compendium of Physical Activities
MET = Metabolic Equivalent of Task

The WHO Global Recommendations on Physical Activity for Health (Adults 18-64 years old) have been used as the golden standard to compare the level of PA of participants. According to this guideline people aged between 18-64 years old should perform 150 minutes of moderate- to vigorous-intensity PA per week (World Health Organization, 2010).

Data analysis

All data were analysed by using IBM SPSS Statistics v. 23 (IBM SPSS Statistics for Mac, Armonk, NY: IBM Corporation, USA).

After testing the results for normality the use of median, minimum and maximum was chosen, due to the fact that most results were not normally distributed.

Both the data generated (as described in the paragraph, outcome measures) from the IPAQ and accelerometer (in average amount of minutes spent on an activity level per day) have been interpreted and compared with each other and the WHO guideline (World Health Organization, 2010) in a descriptive way. In explanation, the following steps were performed, results of IPAQ were generated, followed by generating the accelerometer results, notable results were discussed. After that results of moderate activity of both IPAQ and accelerometer were put next to each other and next to the WHO recommendation, the results of both measurement methods were compared to the WHO on sufficient PA. Finally, the results of IPAQ and accelerometer were put next to each other and notable differences were discussed.

Results

After applying the inclusion and exclusion criteria 34 (12 females and 22 males) participants were included in this study. Two participants (both male) were excluded from the study after the testing period, because they didn't meet the conditions of minimal wear-time.
The participants had a median age of 20 years old. Four participants (12,5%) were smokers. 6,3% of the participants (N=2) did not do any sports. 28,1% (N=9) of the participants performed sports on recreational level and 65,6% (N=21) on competition level.

Table 2. Demographics of the participants

	Median	Minimum	Maximum
Age (years) (N=32)	20	17	24
Height (cm) (N=30)	176,1	155,1	190,0
Weight (kg) (N=30)	66,8	54,3	95,8
BMI (kg/m^2)(N=30)	22,4	19,4	28,6

Table 3 shows the results of the IPAQ, by the use of median, mode and range expressed in time (minutes) spent on intensity-categorized activities per day. Table 3 also shows the wide range of PA and SED between the participants.

Table 3. Results of the IPAQ (N=32)

	Median	Minimum	Maximum
Low intensity (min/day)	37,9	0,0	488,6
Moderate intensity (min/day)	85,7	1,4	328,6
Vigorous intensity (min/day)	45,1	0,0	771,4
Sedentary time (min/day)	456,5	188,6	1208,6

Table 4 shows the accelerometer-derived median, mode and range, in time (minutes) spent on intensity-categorized activities per day. In slight contrast with table 3, table 4 shows a smaller range of PA and SED between participants, mainly within the categories: moderate intensity, vigorous intensity and sedentary time.

Table 4. Results of accelerometer measure (N=32)

	Median	Minimum	Maximum
Low intensity (min/day)	216,1	100,5	443,0
Moderate intensity (min/day)	25,9	5,6	116,3
Vigorous intensity (min/day)	4,6	0,3	25,0
Sedentary time (min/day)	573,3	376,6	810,9

The accelerometer-derived results show that the participants had a median of 25,9 minutes of moderate activity per day (181,3 minutes per week), which is 31,3 minutes more than the 150 minutes per week recommended by the WHO Global Recommendations on Physical Activity for Health (Adults 18-64 years old).
31,3% (N=10) from the total test population (N=32) did not meet the golden standard of 150 min/week of moderate activity, used in this study, measured by an accelerometer (table 5).

Table 5. Results of moderate activity next to the golden standard

	IPAQ	Accelerometer	Golden standard
Moderate intensity (min/week)	599,9	181,3	150
Participants meeting criteria (%)	96,9	68,8	

Golden standard = World Health Organisation Global Recommendations on Physical Activity for Health (Adults 18-64 years old).

Discussion & conclusion

This study was part of an overarching project with multiple researchers and with various research questions focussed on first-year physiotherapy student's health and fitness.

In this particular study it was aimed to find the answer on to what extent first-year physiotherapy students meet the standards on physical activity and to what extent the results found with an accelerometer are similar to the students self-reported level of physical activity and sedentary time.

As shown in the result section, measured by IPAQ 96,9% of the participants met the golden standard, of the World Health Organisation Global Recommendations on Physical Activity for Health (Adults 18-64 years old), used in this study. But results taken from the more objective measurement of the accelerometer show that only 68,8% of the participants met this same golden standard.

In this study the World Health Organisation Global Recommendations on Physical Activity for Health (Adults 18-64 years old) of 150 minutes of moderate activity per week was used as the golden standard. More guidelines and recommendations were found, both with similar standards. The 2008 Physical Activity Guidelines for Americans from the US Department of Health and Human Services recommends 150 minutes of moderate activity per week or 75 minutes of vigorous activity per week, an equivalent combination of both fits within the recommendation as well (US Department of Health and Human Services, 2008).
Another found guideline, Physical Activity and Public Health: Updated Recommendations for Adults from the American College of Sports Medicine and the American Heart Association, recommends moderate activity for at least 30 minutes at 5-7 days and at least 20 minutes of vigorous activity during 3-7 days (Haskell, et al., 2007).
Recommendations from both guidelines are similar to the recommendations from the WHO, all three guidelines have a recommendation of at least 150 minutes of moderate activity per week.

Results taken from IPAQ show that only one participant reported less than 150 min/week of moderate activity.
The data found suggest that, compared to the accelerometer-derived results, using only the results reported through the IPAQ to determine whether or not the first-year physiotherapy students meet the PA criteria of the WHO, would lead to a faulty conclusion. This implies the importance of objective measurement tools, such as accelerometers, for research purposes (Celis-Morales, Perez-Bravo, Ibañez, Salas, Bailey, & Gill, 2012).
In a study by Celis-Morales et al. performed with 317 adult participants (18-73 years old) from different ethnicities (163 European and 154 Mapuche origin) IPAQ-reported SED was around 13% lower than accelerometer-derived SED. Whereas, results found for moderate and vigorous activity were 54,8 min/day and 7,8 min/day higher, measured by IPAQ compared to accelerometer measurement (Celis-Morales, Perez-Bravo, Ibañez, Salas, Bailey, & Gill, 2012).

The differences between the IPAQ-reported and accelerometer-derived results are clearly visible when table 2 and table 3 are compared. Accelerometer-derived measures of moderate- and vigorous activity were respectively 69,8% (59,8 min/day) and 89,8% (40,5 min/day) lower than the corresponding IPAQ- reported estimates. Whereas the results of the accelerometer on low activity level and SED were 470,2% (178,2 min/day) and 25,6% (116,8 min/day) higher in comparison to the IPAQ-reported results.
Therefore, the IPAQ mainly led to overestimation of PA and underestimation of SED, compared to the objective measurement of the accelerometer.
A research performed with 77 undergraduates at a private university in the Pacific Northwest found an overestimation in self-reported moderate-vigorous activity of, on average, 46,2 minutes per day, which similar to the overestimation of both moderate and vigorous activity found in this study (Downs, Van Hoomissen, Lafrenz, & Julka, 2014).
These data suggest that great caution with the use of the IPAQ-reported results is needed, because one minute of accelerometer-derived PA is not equivalent to one minute of IPAQ-reported PA (Celis-Morales, Perez-Bravo, Ibañez, Salas, Bailey, & Gill, 2012).

All of the above is contrary to the early hypothesis of the research, where it was expected that first-year physiotherapy students would be aware of their own PA and SED. Whereas the results of the IPAQ in comparison with the results of the accelerometer possibly imply that first-year physiotherapy students are less capable of estimating their own PA and SED then expected prior to the research.

It might be possible to explain this difference between IPAQ-reported and accelerometer-derived results with the small limitations of both IPAQ and Activ8 accelerometer. A few of the participants (N=4) reported double time spent on activity (e.g. total work-time of 9 hours on a day, but both in vigorous and in moderate activity level 9 hours were reported), mainly because of difficulties with ascertaining the intensity level of the performed activity. In addition, the wear-position of the Activ8 in the pocket of the trouser is beneficial for the participant, but different trousers with different types of pockets might lead to some slight differences in results between measurements, testing days and participants (Erasmus MC University Medical Center Rotterdam, 2013).

Recently sedentary time has been the subject of a growing health concern, but despite this status, little is known -in detail- about it yet. What is known yet is that decreasing sedentary time and -behaviour may result in beneficial health outcomes, not related to PA (Sugiyama, Healy, Dunstan, Salmon, & Owen, 2008) (Rouse & Biddle, 2010). In this study a median value of 573,3 min/day (9,6 hours/day) SED was found within the participants. An UK study among university students found that students spent approximately 8 hours on SED (Rouse & Biddle, 2010). In a study with students from the University of Castilla-La Mancha in Spain, the mean SED time found, differed from 594 min/day on weekdays and 618 min/day at weekends. Which is respectively between 3,6% and 7,8% higher, then the time spent on SED in this study. A possible explanation for this little difference is the fact that it has been tested on Spanish students, whereas small cultural differences are present. Furthermore, the different wear-position (right leg, with help of a leg-strap at all times) and the fact that a different brand of accelerometer was used might be a possible explanation as well (Arias-Palencia, et al., 2015).

Strengths and limitations

Several limitations should be taken into consideration when interpreting the findings of this research. The testing population was too small to represent the whole population of young adults, because the study was performed at one university of applied science and only with participants from the first year of physiotherapy studies.

Furthermore, the IPAQ was not reported on the same week as the accelerometer, this because participant had to fill in the IPAQ before participation in the overarching study from which the participants were drawn. As well as, that the IPAQ PA and SED measures of the past seven days, therefore, slight differences between the test periods might be present. Nevertheless, a similar kind of week was chosen for accelerometer measurement, to name a regular school week with classes, during exam-weeks and holidays no tests were performed.

For the participants comfort it was chosen to have the participants wear the accelerometer in their trousers pocket, during sport activities participants were instructed to wear the accelerometer with help of the leg-strap, therefore small discrepancies in measurements may have occurred (Erasmus MC University Medical Center Rotterdam, 2013).

As explained earlier accelerometer-derived minutes and IPAQ-reported minutes are not always comparable, due to the fact that accelerometers are not able to (accurately) measure during swimming and load-bearing activities, whereas these activities for example might be reported in IPAQ as vigorous activity. This can result in minor underestimation of PA in an accelerometer measurement (Erasmus MC University Medical Center Rotterdam, 2013).

A strength of the study is that the research was done in the natural environment of the participants, where they might be less influenced by external factors and which might reduce the possible reactivity (Hawthorne effect) of the participants in wearing the accelerometer (Arias-Palencia, et al., 2015).

Recommendations for further research

Further research on PA and SED of students is recommended. This further research could include a follow up of the students tested, to investigate the changes within the four-year study period. Mainly sedentary time could be an important study aim.

It could also investigate students on a bigger scale, within different studies. To make results more generalizable and to possibly make a comparison between students of health-related studies and students from different (not health-related) studies.

If sedentary time and –behaviour in university students would be investigated deeper and on a bigger scale, it could lead to recommendations for students themselves and also for universities to take measure to decrease sedentary time and –behaviour. For example with implementing standing-classrooms (Reiff, Marlatt, & Dengel, 2012).

Conclusion

In conclusion, the results of this research show that 68,8% of the participants meet the standards of PA, measured by an accelerometer.

Also that big differences are seen between the results of the IPAQ and accelerometer. IPAQ-reported

measures show an overestimation of moderate and vigorous activity and an underestimation of low activity and SED, in comparison to accelerometer-derived results.

References

(2015). (VitaMove) Opgeroepen op 09 2015, van Activ8: https://www.activ8all.com/product/activ8-professional-activity-monitor/

Aadland, E., & Ylvisåker, E. (2015). Reliability of Objectively Measured Sedentary Time and Physical Activity in Adults. *PLOS ONE* (10), 14.

Ainsworth, B., Haskell, W., Herrmann, S., Meckes, N., Bassett, D., Tudor-Locke, C., et al. (2011). 2011 Compendium of Physical Activities: a second update of codes and MET values. *Medicine & Science in Sports & Exercise* (8).

American College Health Association. (2015). *American College Health Association-National College Health Assessment II: Undergraduate Student Reference Group Executive Summary Spring 2015.* American College Health Association. Hanover: American College Health Association.

Arias-Palencia, N., Solera-Martínez, M., Gracia-Marco, L., Silva, P., Martínez-Vizcaíno, V., Cañete-García-Prieto, J., et al. (2015). Levels and Patterns of Objectively Assessed Physical Activity and Compliance with Different Public Health Guidelines in University Students. *PLOS ONE* (11), 15.

Celis-Morales, C. a., Perez-Bravo, F., Ibañez, L., Salas, C., Bailey, M. E., & Gill, J. M. (2012). Objective vs. self-reported physical activity and sedentary time: Effects of measurement method on relationships with risk biomarkers. *PLOS ONE* (7), 10.

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., et al. (2003). International Physical Activity Questionnaire: 12-Country Reliability and Validity. *Medicine & Science in Sports & Exercise* (8), 1381-1395.

Deliens, T., Deforche, B., De Bourdeaudhuij, I., & Clarys, P. (2015). Determinants of physical activity and sedentary behaviour in university students: a qualitative study using focus group discussions. *BMC Public Health* (15), 9.

Downs, A., Van Hoomissen, J., Lafrenz, A., & Julka, D. L. (2014). Accelerometer-Measured Versus Self-reported Physical Activity in College Students: Implications for Research and Practice . *Journal of American College Health* (3), 204-212.

Erasmus MC University Medical Center Rotterdam. (2013). *Validation of the Active8 Activity Monitor: detection of body postures and movements.* Erasmus MC University Medical Center Rotterdam, Rotterdam.

Haskell, W., Lee, I., Pate, R., Powell, K., Blair, S., Franklin, B., et al. (2007). Physical Activity and Public Health: Updated Recommendations for Adults. *Medicine & Science in Sports & Exercise* (8), 1423-34.

Nederlands Instituut voor Sport en Bewegen (NISB). (2015). *Wat is de definitie van sedentair gedrag?* Opgeroepen op 10 8, 2015, van nisb.nl

Reiff, C., Marlatt, K., & Dengel, D. R. (2012). Difference in Caloric Expenditure in Sitting Versus Standing Desks. *Journal of Physical Activity and Health* (9), 1009-1011.

Rouse, P., & Biddle, S. (2010). An ecological momentary assessment of the physical activity and sedentary behaviour patterns of university students. *Health Education Journal* (61), 116-125.

Sugiyama, T., Healy, G., Dunstan, D., Salmon, J., & Owen, N. (2008). Joint associations of multiple leisure-time sedentary behaviours and physical activity with obesity in Australian adults. *International Journal of Behavioral Nutrition and Physical Activity* (1), 35.

Tudor-Locke, C., Burkett, L., Reis, J., Ainsworth, B., Macera, C., & Wilson , D. (2005). How many days of pedometer monitoring predict weekly physical activity in adults? *Preventive Medicine* (40), 293-298.

US Department of Health and Human Services. (2008). *2008 Physical Activity Guidelines for Americans.* Guideline, Washington, D.C.

Warburton, D., Nicol, C., & Bredin, S. (2006). Health Benefits of Physical Activity: The Evidence. *CMAJ: Canadian Medical Association journal/journal de l'Association medicale Canadienne* (174), 801-809.

World Health Organization. (2010). *Global recommendations on physical activity for health.* Guidline, World Health Organization, Geneva.

Appendix I Information letter and informed consent (NL & EN)

Beste medestudent,

Als onderdeel van ons afstudeeronderzoek willen we jullie, eerstejaars studenten fysiotherapie, uitnodigen om deel te nemen aan een fysieke screening. In de bijlage vinden jullie een overzicht van de tijdsplanning wanneer je ingedeeld bent. We zullen een aantal metingen verrichten, de duur daarvan zal ongeveer 60 minuten in beslag nemen.

- BMI (lengte, gewicht, vetpercentage)
- Bloeddruk en hartslag
- Buikomvang
- Reactietijd, spronghoogte en balans test
- Handknijpkracht
- VO_2 Sub-maximaaltest op de fiets
- Rugspier kracht
- Lenigheid van de hamstrings en lage rug (Sit & Reach)
- Sit-ups
- Cholesterol en glucose gehalte in het bloed
- Side-step

Daarnaast dient er ook een vragenlijst ingevuld worden, deze kun je invullen als je klaar bent met de testen en kan dan meteen ingeleverd worden. Voor een correcte meting is het van belang een aantal voorwaarden te stellen. Het is niet toegestaan zware lichamelijke inspanning te verrichten in de 24 uur voorafgaand aan de test. Daarnaast dient in de twee uur voorafgaand aan het onderzoek niets genuttigd te worden wat de hartslag zou kunnen beïnvloeden, zoals koffie, energydranken etc. Ook mag een uur voor de test niets meer gedronken worden. Tijdens de meting zal er gezorgd worden voor wat te drinken mocht je daar behoefte aan hebben.
De resultaten van de tests en vragenlijsten zullen vertrouwelijk behandeld worden, en zullen automatisch verwerkt worden in een database voor statistische verwerking.
De tests zullen worden uitgevoerd in het inspanningslab van de Fontys Paramedische Hogeschool aan de Theodoor Fliednerstraat te Eindhoven. Het inspanningsslab bevindt zich bij binnenkomst direct rechts, voorbij de kapstokken.

Het is mogelijk dat je gevraagd wordt om een week lang een Activ8 te dragen, dit is een klein kastje wat je dagelijkse fysieke activiteit meet. Mocht je hiervoor worden uitgekozen, dan zal de nodige informatie uitvoer met je besproken worden.

Wat je nodig hebt:
- student nummer
- geschikte kleding: sportschoenen

Denk eraan:
- geen zware fysieke inspanning vanaf 24 uur voorafgaand aan de test
- niets nuttigen wat de hartslag zou kunnen beïnvloeden vanaf 2 uur voorafgaand aan de test
- niets drinken (ook geen water) vanaf een uur voorafgaand aan de test

Met vriendelijke groet,
Mies van den Biggelaar, Renáta Rácz, Marius van Roosmalen, Judith van de Lockand

Toestemmingsverklaring

Voor deelname aan het wetenschappelijk onderzoek:

- Ik ben over het onderzoek geïnformeerd.
- Ik heb de informatiebrief gelezen.
- Ik ben in de gelegenheid gesteld om vragen over het onderzoek te stellen, en heb het recht ook in de toekomst vragen te stellen over het onderzoek.
- Ik heb over mijn deelname aan het onderzoek kunnen nadenken.
- Ik heb het recht om mijn toestemming, zonder opgaaf van reden, op ieder moment weer in te trekken.
- Ik weet dat de over mij verzamelde gegevens alleen gebruikt zullen worden voor bovenstaand onderzoek en dat deze vertrouwelijk en volgens de geldende ethische normen zullen worden behandeld.
- Ik stem toe met deelname aan het onderzoek.

Naam:

Geboortedatum:

Handtekening: Datum:

Ondergetekende, verantwoordelijke onderzoeker, verklaart dat de hierboven genoemde persoon zowel schriftelijk als mondeling over het bovenvermelde onderzoek is geïnformeerd.

Naam:

Handtekening: Datum:

Dear 1st graders,

As part of our thesis, we require your participation in completing our projects. Fontys want to carry out a follow-up analysis of their physiotherapy students, and fortunately of us, we can use this information in our projects.

We will be carrying out a series of procedures, with a total run time of ~ 1 hour per student:

• BMI

• Bloodpressure and heartrate

• Circumference

• Reactiontime and jump hight

• Gripstrength

• VO2 Sub-maximaltest on bicycle

• Back strength

• Agility

• Sit-ups

• Cholesterol en glucose

As well as filling out a questionnaire. After which you can start with the measurements (please if your able to fill in and print the questionnaire before your appointment at the exercise lab.) In the event of participating in our project, it will be necessary to avoid any physical activity 24 hours prior to your scheduled appointment, and the consumption of food or drinks 2 hours prior to your appointment which may alter heart rate values, such as coffee, energy drinks etc. As well as not to drink anything 1 hour before the appointment. The results from your tests will be kept anonymous, and will be automatically updated into a software program for the use of statistical analyses. The tests will be carried out in Fontys University of Applied Sciences, Theodor Fleidnerstraat building (Room 0.106). Through the rotating doors, immediately on the right (past the coat hangers).

You might get asked to wear an Activ8 accelerometer for an week (this is a measurement tool which measures your daily physical activity), when you're chosen for this measurement you will be informed about the details.

You will need:
- fill out the questionnaire prior to appointment
- student number
- suitable attire: trainers

Remember not to:
- physically exert yourself 24 hours prior to appointment
- drink or eat 2 hours prior to appointment which may alter heart rate values
- drink at all 1 hour prior to appointment (including water!)

Kind Regards,
Mies van den Biggelaar, Renáta Rácz, Marius van Roosmalen, Judith van de Lockand

Informed Consent

For taking part in the scientific study:

- I have been informed about the study.
- I have read the information letter.
- I have been given the opportunity to ask questions about the study, and am also allowed to ask questions in the future.
- I have been able to think about taking part in the study.
- I have the right to withdraw my consent at any given time, without stating the reason for this withdrawal.
- I know that the data which will be collected will only be used for the purpose of this study and that they will be handled with confidentiality and according to current ethical standards.
- I consent to participation in this study.

Name:

Date of birth:

Signature: Date:

I, the researcher responsible for the study, hereby declare that the person named above has been informed both verbally and in writing about the study mentioned above.

Name:

Signature: Date:

Appendix II Questionnaire and IPAQ (Dutch version)

Vragenlijst voor aanvang van fysieke testen in het inspanningslab.

Deze vragenlijst bestaat uit twee onderdelen.

Het eerste onderdeel bevat een aantal vragen van algemene aard. Het tweede onderdeel bevat de IPAQ (International Physical Activity Questionnaire).
Lees de vragen aandachtig en geef eerlijk antwoord.

Onderdeel 1: Algemene vragen

Student nummer: _____
of
PCN: _____

Geboortedatum: _____

Geslacht: Man / Vrouw

Heb je ernstige blessures of ben je niet instaat om je (vrij) te bewegen (door bijv. krukken of rolstoel)?

- ☐ Ja, namelijk (door): _____
- ☐ Nee

Rook je?

- ☐ Ja. Aantal sigaretten per dag:_____
- ☐ Nee

Sport je?

- ☐ Ja, op recreatief niveau
- ☐ Ja, op wedstrijd niveau
- ☐ Ja, op topsport niveau
- ☐ Nee

Onderdeel 2: Internationale Vragenlijst in verband met Fysieke Activiteiten

[*NOTE*: EXAMPLES OF ACTIVITIES MAY BE REPLACED BY CULTURALLY RELEVANT EXAMPLES WITH THE SAME METS VALUES. (SEE AINSWORTH ET AL)]

Onthoudt dat de vragenlijst zich betrekt op de afgelopen 7 dagen!

Internationale Vragenlijst in verband met Fysieke Activiteiten

Wij willen onderzoeken welke lichaamsbeweging mensen doen in hun dagelijkse leven. Uw antwoorden zullen geanonimiseerd gebruikt worden voor ons onderzoek.

De vragen gaan over de fysieke activiteit die u in de **laatste zeven dagen** gedaan hebt. Er zitten vragen bij over de lichaamsbeweging op uw werk, over uw verplaatsingen, over uw werk in huis en in de tuin, en over uw vrije tijd in verband met ontspanning, lichaamsbeweging en sport.

Uw antwoorden zijn belangrijk. Probeer op alle vragen te antwoorden, zelfs als u vindt dat u niet erg actief bent.

Dank voor uw medewerking

Een toelichting bij het beantwoorden van de volgende vragen:
- **zware** fysieke activiteiten verwijzen naar activiteiten die een zware lichamelijke inspanning vereisen en waarbij u veel sneller en dieper ademt dan normaal.

- matige fysieke activiteiten verwijzen naar activiteiten die een matige lichamelijke inspanning vereisen en waarbij u iets sneller en dieper ademt dan normaal.

Deel 1: Fysieke activiteiten tijdens uw werk

Deel 1 gaat over uw werk. Onder werk verstaan we: betaald werk, werk op de boerderij, vrijwilligerswerk, studiewerk en ander onbetaald werk dat u buitenshuis verricht heeft. Thuiswerk zoals huishoudelijk werk, tuinieren, klusjes en gezinstaken horen hier niet bij. Dat komt aan bod in deel 3.

1a Hebt u momenteel een baan of doet u onbetaald werk buitenshuis?

☐ Ja

☐ Nee *(Ga naar Deel 2: Vervoer)*

De volgende vragen handelen over alle fysieke activiteiten die u gedaan heeft in de laatste zeven dagen als deel van uw betaald of onbetaald werk. De verplaatsing van en naar het werk hoort hier ***niet*** bij. Het gaat hier *alleen* om de fysieke activiteiten die u **gedurende minstens 10 minuten aan één stuk** gedaan heeft.

1b Op hoeveel dagen, in de laatste zeven dagen, heeft u **zware** fysieke activiteiten gedaan zoals zwaar tilwerk, spitten, bouwwerken of trappen oplopen *als deel van uw werk?*

_____ dagen per week

☐ Geen *(Ga naar vraag 1d.)*

1c Hoeveel tijd in totaal heeft u op zo'n dag besteedt aan **zware** fysieke activiteiten *als deel van uw werk?*

____ uur ___ minuten /dag

1d Op hoeveel dagen, in de laatste zeven dagen, heeft u **matige** fysieke activiteiten gedaan zoals het dragen van lichte lasten *als deel van uw werk?*

_____ dagen per week

☐ Geen *(Ga naar vraag 1f.)*

1e Hoeveel tijd in totaal heeft u op zo'n dag besteedt aan **matige** fysieke activiteiten *als deel van uw werk?*

____ uur ___ minuten /dag

1f Op hoeveel dagen, in de laatste zeven dagen, heeft u **gewandeld** gedurende minstens 10 minuten aan één stuk *als deel van uw werk* Opgelet, de verplaatsing te voet van en naar het werk hoort hier ***niet*** bij !

_____ dagen per week

☐ Geen (Ga naar Deel 2*: Vervoer)*

1g Hoeveel tijd in totaal heeft u op zo'n dag **gewandeld** *als deel van uw werk ?*

____ uur ___ minuten /dag

1h Indien u **gewandeld** heeft *als deel van uw werk*, in welk tempo was dat dan meestal ? Heeft u gewandeld u in :

- ☐ een **hoog** tempo?
- ☐ een **middelmatig** tempo?
- ☐ een **laag** tempo?

Deel 2: Fysieke activiteiten die verband houden met vervoer

Nu volgen enkele vragen over hoe u zich verplaatst heeft naar het werk, om boodschappen te doen, naar de film te gaan enzovoort.

2a Op hoeveel dagen, in de laatste zeven dagen, heeft u zich verplaatst met een motorvoertuig zoals de trein, de bus, de wagen of de tram?

_____ dagen per week

- ☐ Geen *(Ga naar vraag 2c)*

2b Hoeveel tijd in totaal heeft u op zo'n dag besteedt aan verplaatsingen *met de wagen, de bus, de trein of een ander motorvoertuig?*

____ uur ___ minuten / dag

Denk nu **alleen** aan het *fietsen en het wandelen* dat u gedaan heeft om naar het werk te gaan, te winkelen of gewoon om ergens heen te gaan.

2c Op hoeveel dagen, in de laatste zeven dagen, heeft u **gefietst** gedurende minstens 10 minuten aan één stuk *om ergens heen te gaan?*

_____ dagen per week.

☐ Geen *(Ga naar vraag 2f)*

2d Hoeveel tijd in totaal heeft u op zo'n dag **gefietst** *om ergens heen te gaan* ?

____ uur ___ minuten /dag

2e Als u *zich verplaatst heeft per **fiets**,* in welk tempo was dat dan meestal ? Heeft u gefietst in :

☐ een **hoog** tempo
☐ een **middelmatig** tempo of
☐ een **laag** tempo

2f Op hoeveel dagen, in de laatste zeven dagen, heeft u **gewandeld** gedurende minstens 10 minuten aan één stuk *om ergens heen te gaan ?*

_____ dagen per week

☐ Geen *(Ga naar Deel 3: Huishoudelijk Werk, Klusjes en Gezinstaken)*

2g Hoeveel tijd in totaal heeft u op zo'n dag **gewandeld** *om ergens heen te gaan ?*

____ uur ___ minuten /dag

2h Als u **gewandeld** heeft *om ergens heen te gaan,* in welk tempo was dat dan meestal ? Heeft u gewandeld in :

☐ een **hoog** tempo
☐ een **middelmatig** tempo of
☐ een **laag** tempo

Deel 3. Huishoudelijk werk, klusjes en gezinstaken

Dit deel gaat over de fysieke activiteiten die u in de laatste zeven dagen gedaan heeft *in en rond het huis,* bijvoorbeeld huishoudelijk werk, tuinieren, onderhoudswerk of voor het gezin zorgen. Nogmaals, denk *alleen* aan die fysieke activiteiten die u **gedurende minstens 10 minuten aan één stuk** verricht heeft.

3a Op hoeveel dagen, in de laatste zeven dagen, heeft u **zware** fysieke activiteiten gedaan zoals zwaar tilwerk, houthakken, sneeuwruimen of spitten ***in de tuin of moestuin*** ?

_____ dagen per week

☐ Geen *(Ga naar vraag 3c)*

3b Hoeveel tijd in totaal heeft u op zo'n dag besteedt aan **zware** fysieke activiteiten *in de tuin of moestuin ?*

____ uur ___ minuten /dag

3c Op hoeveel dagen, in de laatste zeven dagen, heeft u **matige** fysieke activiteiten gedaan zoals lichte lasten dragen, ruiten wassen, vegen of harken ***in de tuin of moestuin*** **?**

_____ dagen per week

☐ Geen *(Ga naar vraag 3e)*

3d Hoeveel tijd in totaal heeft u op zo'n dag besteedt aan **matige** fysieke activiteiten *in de tuin of moestuin ?*

____ uur ___ minuten /dag

3e Op hoeveel dagen, in de laatste zeven dagen, heeft u **matige** fysieke activiteiten gedaan zoals lichte lasten dragen, ruiten wassen, vloeren schrobben of vegen ***binnenshuis*** **?**

_____ dagen per week

☐ Geen *(Ga naar Deel 4: Fysieke Activiteiten die verband houden met Sport, Ontspanning en Vrije Tijd)*

3f Hoeveel tijd in totaal heeft u op zo'n dag besteedt aan **matige** fysieke activiteiten *binnenshuis?*

____ uur ___ minuten /dag

Deel 4: Fysieke activiteiten die verband houden met sport, ontspanning en vrije tijd

Dit deel gaat over alle fysieke activiteiten die u de laatste zeven dagen gedaan heeft, maar dan uitsluitend als recreatie, sport, training of vrijetijdsbesteding. Nogmaals, denk *alleen* aan die fysieke activiteiten die u **gedurende minstens 10 minuten aan één stuk** verricht heeft. Gelieve **geen** activiteiten mee te rekenen die u reeds vermeld hebt.

4a **Zonder het wandelen dat u reeds vermeld hebt**, op hoeveel dagen, in de laatste zeven dagen, heeft u ge**wandeld** gedurende minstens 10 minuten aan één stuk *in uw vrije tijd ?*

_____ dagen per week

☐ Geen *(Ga naar vraag 4d)*

4b Hoeveel tijd in totaal heeft u op zo'n dag **gewandeld** *in uw vrije tijd ?*

____ uur ___ minuten /dag

4c Als u **gewandeld heeft** *in uw vrije tijd*, in welk tempo was dat dan meestal? Heeft u gewandeld in :

☐ een **hoog** tempo

☐ een **middelmatig** tempo of

☐ een **laag** tempo

4d Op hoeveel dagen, in de laatste zeven dagen, heeft u **zware** fysieke activiteiten gedaan zoals bijvoorbeeld aerobics, lopen, snel fietsen, snel zwemmen of andere intense activiteiten, *in uw vrije tijd ?*

_____ dagen per week

☐ Geen *(Ga naar vraag 4f)*

4e Hoeveel tijd in totaal heeft u op zo'n dag besteedt aan **zware** fysieke activiteiten *in uw vrije tijd?*

____ uur ___ minuten /dag

4f Op hoeveel dagen, in de laatste zeven dagen, heeft u **matige** fysieke activiteiten gedaan zoals bijvoorbeeld fietsen aan een middelmatig tempo, zwemmen aan een middelmatig tempo, tennis dubbelspel of andere activiteiten aan een matige intensiteit, *in uw vrije tijd ?*

_____ dagen per week

☐ Geen *(Ga naar Deel 5: De tijd die u zittend doorbrengt)*

4g Hoeveel tijd in totaal heeft u op zo'n dag besteedt aan **matige** fysieke activiteiten *in uw vrije tijd?*

____ uur ___ minuten /dag

Deel 5: De tijd die u zittend doorbrengt

De laatste vragen gaan over de tijd die u de laatste zeven dagen zittend doorbracht op het werk, thuis, tijdens studiewerk of in uw vrije tijd. Hierbij hoort ook de tijd dat u achter een bureau zat, bezoek kreeg, zat te lezen, of naar televisie zat of lag te kijken. De tijd die u zittend doorbracht in een motorvoertuig, die u reeds vermeld hebt, komt hier **niet** in aanmerking.

5a Hoeveel tijd heeft u gemiddeld *gezeten* op een **weekdag,** in de laatste zeven dagen ?

____ uur ___ minuten /dag

5b Hoeveel tijd heeft u gemiddeld *gezeten* op een **weekenddag**, in de laatste zeven dagen ?

____ uur ___ minuten /dag

Appendix III Questionnaire and IPAQ (English version)

Questionnaire before participation on tests in exercise lab

This questionnaire is build out of two parts, two separate questionnaires.

The first questionnaire consists out of questions regarding basic information. The second questionnaire is the IPAQ (International Physical Activity Questionnaire).
Please read all the questions carefully and answer them honestly

Questionnaire 1: General questions

Student number: _____
or
PCN: _____

Date of Birth: _____

Gender: Male / Female

Do you have severe injuries or are you unable to move in a (free) normal way (due to crutches, cast, wheelchairs etc.)?

- ☐ Yes, namely (due to):_____
- ☐ No

Do you smoke?

- ☐ Yes. Amount of cigarettes per day:_____
- ☐ No

Do you sport?

- ☐ Yes, on recreational level
- ☐ Yes, on competition level
- ☐ Yes, on professional level
- ☐ No

Questionnaire 2: International Physical Activity Questionnaire

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous and moderate activities that you did in the last 7 days.

Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal.
Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

☐ Yes

☐ No. *Skip to PART 2: TRANSPORTATION*

The next questions are about all the physical activity you did in the last 7 days as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, heavy construction, or climbing up stairs as part of your work? Think about only those physical activities that you did for at least 10 minutes at a time.

_____ days per week

☐ No vigorous job-related physical activity. *Skip to question 4*

3. How much time did you usually spend on one of those days doing vigorous physical activities as part of your work?

_____ hours per day _____ minutes per day

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads as part of your work? Please do not include walking.

_____ days per week

☐ No moderate job-related physical activity. *Skip to question 6*

5. How much time did you usually spend on one of those days doing moderate physical activities as part of your work?

_____ hours per day _____ minutes per day

6. During the last 7 days, on how many days did you walk for at least 10 minutes at a time as part of your work? Please do not count any walking you did to travel to or from work.

_____ days per week

☐ No job-related walking. *Skip to PART 2: TRANSPORTATION*

7. How much time did you usually spend on one of those days walking as part of your work?

_____ hours per day _____ minutes per day

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you travelled from place to place, including to places like work, stores, movies, and so on.

8. During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, car, or tram?

_____ days per week

☐ No traveling in a motor vehicle. *Skip to question 10*

9. How much time did you usually spend on one of those days traveling in a train, bus, car, tram, or other kind of motor vehicle?

_____ hours per day _____ minutes per day

Now think only about the bicycling and walking you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the last 7 days, on how many days did you bicycle for at least 10 minutes at a time to go from place to place?

_____ days per week

☐ No bicycling from place to place. *Skip to question 12*

11. How much time did you usually spend on one of those days to bicycle from place to place?

_____ hours per day _____ minutes per day

12. During the last 7 days, on how many days did you walk for at least 10 minutes at a time to go from place to place?

_____ days per week

☐ No walking from place to place. *Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY*

13. How much time did you usually spend on one of those days walking from place to place?

_____ hours per day _____ minutes per day

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the last 7 days in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, chopping wood, shovelling snow, or digging in the garden or yard?

_____ days per week

☐ No vigorous activity in garden or yard. *Skip to question 16*

15. How much time did you usually spend on one of those days doing vigorous physical activities in the garden or yard?

_____ hours per day _____ minutes per day

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate activities like carrying light loads, sweeping, washing windows, and raking in the garden or yard?

_____ days per week

☐ No moderate activity in garden or yard. *Skip to question 18*

17. How much time did you usually spend on one of those days doing moderate physical activities in the garden or yard?

_____ hours per day _____ minutes per day

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate activities like carrying light loads, washing windows, scrubbing floors and sweeping inside your home?

_____ days per week

☐ No moderate activity inside home. *Skip to PART 4: RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY*

19. How much time did you usually spend on one of those days doing moderate physical activities inside your home?

_____ hours per day _____ minutes per day

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the last 7 days solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?

_____ days per week

☐ No walking in leisure time. *Skip to question 22.*

21. How much time did you usually spend on one of those days walking in your leisure time?

_____ hours per day _____ minutes per day

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?

_____ days per week

☐ No vigorous activity in leisure time. *Skip to question 24*

23. How much time did you usually spend on one of those days doing vigorous physical activities in your leisure time?

_____ hours per day _____ minutes per day

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time?

_____ days per week

☐ No moderate activity in leisure time. *Skip to PART 5: TIME SPENT SITTING*

25. How much time did you usually spend on one of those days doing moderate physical activities in your leisure time?

_____ hours per day _____ minutes per day

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the last 7 days, how much time did you usually spend sitting on a weekday?

_____ hours per day _____ minutes per day

27. During the last 7 days, how much time did you usually spend sitting on a weekend day?

_____ hours per day _____ minutes per day

This is the end of the questionnaire, thank you for participating.

Appendix IV IPAQ Scoring Protocol

IPAQ Scoring Protocol (Long Forms)
Expressed as MET-minutes per week: MET level x minutes of activity/day x days per week

Sample Calculation

MET levels
Walking at work= 3.3 METs
Cycling for transportation= 6.0 METs
Moderate yard work= 4.0 METs
Vigorous intensity in leisure= 8.0 METs

3.3*30*5 = 495 MET-minutes/week
6.0*30*5 = 900 MET-minutes/week
4.0*30*5 = 600 MET-minutes/week
8.0*30*5 = 1,200 MET-minutes/week
_____
TOTAL = 3,195 MET-minutes/week

MET-minutes/week for 30 min/day, 5 days

Domain Sub Scores
Total MET-minutes/week at **work** = Walk (METs*min*days) + Mod (METs*min*days) + Vig (METs*min*days) at work

Total MET-minutes/week for **transportation** = Walk (METs*min*days) + Cycle (METs*min*days) for transportation

Total MET-minutes/week from **domestic and garden** = Vig (METs*min*days) yard work + Mod (METs*min*days) yard work + Mod (METs*min*days) inside chores

Total MET-minutes/week in **leisure-time** = Walk (METs*min*days) + Mod (METs*min*days) + Vig (METs*min*days) in leisure-time

Walking, Moderate-Intensity and Vigorous-Intensity Sub Scores
Total **Walking** MET-minutes/week = Walk MET-minutes/week (at Work + for Transport + in Leisure)

Total **Moderate** MET-minutes/week = Cycle MET-minutes/week for Transport + Mod MET-minutes/week (Work + Yard chores + Inside chores + Leisure) + Vigorous Yard chores MET- minutes

Note: The above is a total moderate activities only score. If you require a total of all moderate-intensity physical activities you would sum Total Walking and Total Moderate

Total **Vigorous** MET-minutes/week = Vig MET-minutes/week (at Work + in Leisure)

Total Physical Activity Score **Total** Physical Activity MET-minutes/week = **Walking** MET-minutes/week + **Moderate** MET- minutes/week + Total **Vigorous** MET-minutes/week

Total Physical Activity MET-minutes/week = Total MET-minutes/week (at Work + for Transport + in Chores + in Leisure)

Categorical Score- three levels of physical activity are proposed

1. Low

No activity is reported **OR**
a. Some activity is reported but not enough to meet Categories 2 or 3.

2. Moderate

Either of the following 3 criteria
a**.** 3 or more days of vigorous-intensity activity of at least 20 minutes per day OR
b. 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day OR
c. 5 or more days of any combination of walking, moderate-intensity or vigorous- intensity activities achieving a minimum of at least 600 MET-min/week.

3. High

Any one of the following 2 criteria
a. Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week OR
b. 7 or more days of any combination of walking, moderate- or vigorous- intensity activities accumulating at least 3000 MET-minutes/week

Please review the full document "Guidelines for the data processing and analysis of the International Physical Activity Questionnaire" for more detailed description of IPAQ analysis and recommendations for data cleaning and processing [www.ipaq.ki.se].