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The Effect of Long Covid Syndrome on Physical Activity

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The Effect of Long Covid Syndrome on Physical Activity

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Abstract

Long covid syndrome is a condition where individuals experience persistent symptoms and functional limitations that can last about three months to two years after the initial Covid-19 infection. While long-term health consequences of Covid-19 have garnered significant attention, the impact of long covid syndrome symptoms is poorly understood.

The purpose of the study is to explore the effect of long covid syndrome symptoms to an individual's physical activity. Furthermore, this research aims to provide an overview of the existing literature on the effect of long covid syndrome symptoms on physical activity. The research would invite participants to answer two surveys that will outline their covid-19 medical history and their current physical activity using a long covid survey made by the researcher and the International Physical Activity Questionnaire (Long Version). The participants will be invited through social media (e.g., WhatsApp, Facebook, LinkedIn, and the professional network of the researcher) with a target sample size of 10% of the survey population. With fatigue and dyspnea as the main symptoms of long covid syndrome, the study hypothesizes that long covid syndrome symptoms have a negative impact on the amount of physical activity engaged by an individual. The researcher recommends further investigation of the post-pandemic effect that can affect activities of daily living as well as quality of life.

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Chapter 1: Introduction

Since the coronavirus, more commonly known as Covid-19, emerged in 2019, there have been more than 767 million confirmed cases worldwide as of May 31, 2023, according to the World Health Organization (WHO, 2023). Due to the contagious nature of Covid-19, the WHO recommended limiting exposure in public places and staying at home to prevent transmission of the coronavirus. This directly impacted the physical activity of most of the population (Sojka et al., 2022). According to the WHO (2020), physical activity is defined as "any bodily movement produced by skeletal muscles that require energy expenditure". Engaging in regular physical activity has been shown to improve overall cardiovascular health and contributes to other various health benefits such as improved mental health (Amatriain-Fernandez et al., 2020), and reduced risk of different cardiovascular and metabolic diseases including hypertension and diabetes (Philipps & Joyner, 2019). Studies have shown that with the prolonged limitation of physical activity, such as the isolation and/or quarantine to control the spread of Covid-19, stress is increased and quality of life decreases (Ferreira et. al., 2021; Hermassi et al., 2021). This reduction in physical activity has been proven to be linked with various negative consequences such as decreased cardiovascular fitness and increased risk for a multitude of diseases. Furthermore, studies have also shown prolonged limitations of physical activity contribute to the development of chronic health diseases such as anxiety, depression, and sleep disruption (Hermassi et al., 2021). The recommendation to quarantine during the pandemic impacted the quality of life of individuals and caused distress to many.

In addition to the pandemic regulations, getting infected with Covid-19 has a significant effect on one's wellbeing with some individuals experiencing long-lasting effects after the initial

Covid-19 infection (Asadi-Pooya et al., 2021; Baker et al., 2021; Compagno et al., 2022; Crook et al., 2021; Kersten et al., 2022; Mahase, 2020; Sudre et al., 2021; Taribagil et al., 2021; Venkatesan, 2021; Von Gruenewaldt et al., 2022). These long-lasting effects have been termed as "long covid syndrome" (U.S. Department of Health and Human Services, 2021). Long covid syndrome has been defined as continuing symptoms of Covid-19 for approximately 4-12 weeks after the initial infection and/or persistent Covid-19 symptoms present for 12 weeks after the initial infection (Venkatesan, 2021). According to Baker et al. (2021), 10-30% of individuals infected with Covid-19 will present with the long-covid syndrome. It was also noted by Prasannan et al. (2022) that in the United Kingdom, there are approximately 1.1 million individuals who are suffering from the long covid syndrome. As of July 2021, long covid syndrome has been recognized as a disability if it limits an individual's major life activities (U.S. Department of Health and Human Services, 2021). Furthermore, long covid syndrome symptoms are now recognized to be debilitating if they directly impact major life activities including physical activity.

The repercussion of this persistence of post covid symptoms is a growing health concern due to the multiple organ involvement of the symptoms to both the cardiopulmonary and nervous systems. Cardiopulmonary ailments associated with long covid include chronic cough, shortness of breath, fatigue, and decreased endurance (Venkatesan, 2021), while nervous system involvement is through decreased or loss of senses such as smell or taste (Andrade et al., 2021). Other pieces of research documented the wide array of symptoms of long covid syndrome. This included fatigue (Venkatesan, 2021; Von Gruenewaldt et al., 2022), shortness of breath (Venkatesan, 2021; Von Gruenewaldt et al., 2022), weakness (Ambrosino, 2022), cognitive impairment, and brain fog. These symptoms have significantly affected an individual's capacity

to engage in physical activity leading to a decreased exercise capacity and a sedentary lifestyle. Furthermore, according to Von Gruenewaldt et al. (2022), fatigue and dyspnea are commonly reported in long covid syndrome patients. This is further supported by Ambrosino (2022) stating that there is a decline in the physical performance of an individual with long covid syndrome. Moreover, individuals who experience long covid syndrome may have prolonged symptoms of muscle weakness and sleep difficulties (Ambrosino, 2022).

The long-term impact of Covid-19 has been debilitating to those who suffer weeks and/or months after the initial infection. The decreased quality of life (Hermassi et al., 2021), mental health issues (e.g., depression, anxiety) (Hermassi et al., 2021), and chronic fatigue (Von Gruenewaldt, Nylander, & Hedman, 2022; Ambrosino, 2022), and other symptoms have appeared to have made a direct impact on the physical performance of those individuals suffering from it. As such, the relationship between long covid syndrome and physical activity must be explored to fully understand the demanding nature of the long covid syndrome and its devastating effect on an individual's physical activity. Current literature does not provide a wide range of evidence to correlate the effects of long-covid syndrome to the daily amount of physical activity of an individual. Since the pandemic is still a relatively new phenomenon in society, there are many unknowns and little scientific literature available to understand the severity and impact as well as understanding the debilitating effect of post covid infection.

This study aims to investigate the relationship between long covid syndrome symptoms and physical activity. It is hypothesized that individuals who suffer from longer covid syndrome symptoms will have decreased amount of physical activity engaged. Furthermore, physical activity is a key factor to decrease stress, lower chances of varying medical conditions, and

improving quality of life. Therefore, if physical activity is decreased, this can pose a negative impact on the overall well-being of an individual. By examining the relationship between long covid syndrome symptoms and physical activity, this study aims to contribute to existing literature that will help clinicians provide better long-term care to Covid -19 patients.

Chapter 2: Methodology

A. Participants

The retrospective study will include individuals who have gotten a Covid-19 infection, with a positive test result, at least one to three months before the study with an age range from 18 to 65 years old. The participants who will be recruited will be coming from diverse ages, physical activity, backgrounds, severity of the initial Covid-19 infection, and medical history (e.g., comorbidities and/or multiple Covid-19 infections). The inclusion criteria are: (1) had gotten a diagnosis of Covid-19, with a positive test result (Venkatesan, 2021), (2) persistent Covid-19 symptoms for more than 12 weeks (Venkatesan, 2021), and (3) age between 18-65 years old. The exclusion criteria are (1) Covid-19 infection, with a positive test result, of less than three months, (2) initial Covid-19 infection of more than two years, (3) special populations such as pregnant women, and (4) significant comorbidities such as uncontrolled cardiovascular diseases and uncontrolled metabolic syndromes.

The target sample size is expected to be around 10% of the survey population which is expected to be between 50 to 100 individuals. The participant recruitment will be through social media (e.g., WhatsApp, Facebook, LinkedIn, and the professional network of the researcher). Written informed consent will be collected from the participants before having the participants answer the survey part of the link.

B. Instrumentation

The researcher will create a general Covid-19 survey and do pilot testing to ensure the reliability and validity of the survey, which will be included in the appendix. Furthermore, the International Physical Activity Questionnaire (IPAQ) will be used in the study to determine the

amount of physical activity the participants are doing within the last seven days to establish the post- covid physical activity they are doing.

International Physical Activity Questionnaire (Long Version). A 27-item open-ended questionnaire will be used to assess an individual's physical activity in the last seven days. The test itself has different domains that consider physical activity such as job-related, transportation, housework, recreation (e.g., sport and leisure), and time spent sitting. Scoring the IPAQ will be based on “metabolic equivalent (MET) minutes that represent the amount of energy expended during an activity”. Each activity will be categorized as high, moderate, or low. The high score will be equivalent to “vigorous-intensity activity for at least three days with a minimum total of physical activity of 1,500 MET minutes a week or seven or more days of walking and/or a moderate or vigorous intensity activity with a minimum of 3,000 MET minutes a week”. The moderate score will be equivalent to “3 or more days of vigorous activity and/or walking of at least 30 minutes per day or five or more of moderate activity and/or walking of at least 30 minutes per day or five or more days of walking and/or a moderate or vigorous intensity activity with a minimum of 600 MET minutes a week”. The low score is given when no criteria of the moderate score are achieved (Forde, n.d.).

The first initial pilot testing of the questionnaire was in 1998-1999 with eight versions. The eight versions included four short forms and four long forms. To further test the reliability and validity of the test, a study was done in 2000 that included 14 testing centers in 12 different countries. Test-retest reliability data for the IPAQ long version questionnaire ranged from 0.96 to 0.46 using the Spearman correlation coefficient. Furthermore, most of the centers reported a 0.8 coefficient that indicated good repeatability. The concurrent validity (inter-method) coefficient showed all three testing visits were above 0.65 for both the short and long-form questionnaires.

Furthermore, when compared with the computer science application (CSA) motion accelerometer it showed a fair to moderate agreement with 744 adults tested with a pooled ρ = 0.33, 95% CI 0.26-0.39 (Craig et al., 2003).

Covid-19 Survey. This survey will be made by the researcher, and pilot testing will be conducted to determine whether the survey is valid and reliable. This survey will include medical history related to the initial Covid-19 infection and vaccination (if any). The survey was made for the sole purpose of gathering information for the research paper and was made to include all relevant information necessary to the covid-19 medical history of the participant.

C. Procedures

Participants will be given written informed consent before the survey. Once the informed consent is signed, the participants will be given an IPAQ survey, and a Covid-19 survey. The consent and survey will be given at the same time and do not require the participant to come to any meeting. The surveys will be sent online via Google Forms for ease of access to the participants. During the testing, the participants will be given an instruction form to introduce the study and convey how to answer the questionnaire and survey. The IPAQ questionnaire will be given to be answered first then the Covid-19 survey. The instructions, written consent, survey, and questionnaire will be circulated via multiple channels such as WhatsApp Groups, and social media.

Furthermore, the study information will be distributed to different channels for one month and data collection will happen within two months from the first survey distribution to give the participants time to answer the survey.

D. Design and Analysis

The study design will be a simple survey testing using a convenience sampling technique to gather participants.

The variables in the study will be reported using descriptive statistics. The mean and standard deviation will be reported for the continuous variable. Pearson r correlation analysis will be used to determine the relationship between the independent variable (long covid syndrome symptoms) and dependent variable (amount of physical activity). The coefficient significance value or α-value used would be 0.05. Additionally, after using the correlation coefficient, regression analysis would be used to determine the predicted cause-effect relationship between long covid syndrome symptoms and the amount of physical activity. This will be done using the SPSS software.

E. Ethical Concerns

The main concern for the study will be the privacy of the participants. The study will be distributing surveys that will be collecting sensitive medical information. The researcher will maintain strict confidentiality during data collection and storage. The online survey data will be kept on an encrypted external hard disk. Furthermore, participants will not be required to disclose their names when answering the actual surveys. Additionally, the study will seek Institutional Review Board (IRB) approval and informed consent will be provided.

Chapter 3: Discussion

The 150 minutes of recommended physical activity (Center for Disease Control and Prevention, 2022) is necessary to lead a healthy lifestyle and maximize the benefits of exercise. However, long covid syndrome may pose a threat to this by limiting the amount of time spent on physical activity due to a wide array of symptoms. The most common symptoms of long covid are fatigue and dyspnea (Von Gruenewaldt et al., 2022). These two symptoms can directly impact the frequency, intensity, and duration of any type of exercise and thus can significantly change an individual's physical activity.

A decline in physical activity following Covid-19 is to be expected in the participants due to the various debilitating effects of long covid symptoms. This is similar to the findings of Wright et al., (2022) stating that there was a reduction in the physical activity of individuals with long covid. Furthermore, it was found that individuals with long covid had decreased independence in activities of daily living (ADLs).

It is believed that there is a substantial impact on the physical activity engaged by an individual who is drastically affected by long covid syndrome. The most common symptoms of long covid syndrome are fatigue, muscle weakness, and brain fog (Amatriain-Fernandez et al., 2020), which can make it extremely difficult for an individual to engage in physical activities that require prolonged exertion such as recreational sports, running, or jogging. Additionally, these symptoms can also influence those physically demanding occupations as well as the completion of activities of daily living such as stair climbing and lifting objects. Long covid syndrome affects both physical activity and one’s mental health (Hermassi et al., 2021). Therefore, it is crucial to understand the implications of long covid syndrome symptoms to the

reduction of physical activity to understand the long-term impact on it on an individual as well as the community.

A. Practical Applications

There are several practical applications of the research such as: (1) building rehabilitation programs and exercise guidelines that are appropriate for long covid syndrome that may include energy conservation techniques, activity pacing, and proper progression of strengthening exercises. These can also include breathing techniques, flexibility, mobility, and stability training that can help improve the symptoms as well as improve the quality of life of an individual. (2) education and awareness of the potential health issues associated with physical inactivity due to long covid syndrome. These would also improve the awareness of the existence of long covid syndrome and recognize such can significantly impact and change major milestones and activities in one's life. As well as directly recognize the impact and the disabling symptoms of long covid syndrome. (3) It can help determine the appropriate psychosocial support required by an individual suffering from long covid syndrome. Future research can explore the effect of long covid syndrome and physical inactivity on an individual's mental health and understand the implications and determine the best intervention such as counseling. This would also help improve the multidisciplinary care that an individual suffering long covid syndrome receives

While most research studies have focused on the clinical manifestations of long covid syndrome, there is a need to explore the implications of an individual's physical activity to explore possible interventions and strategies to support individuals with long covid syndrome. Hence, by understanding the complexity of the new pandemic, Covid-19, and its long-term consequences on different aspects of life, especially physical activity, we can manage the symptoms better and determine a successful rehabilitation or return-to-sport program to combat

the debilitating effects of the long covid syndrome. This would benefit the communities by providing an effective and safe protocol for addressing long covid syndrome. Hence, the understanding of the impact of long covid syndrome symptoms on physical activity should be emphasized and ongoing research is essential to evolve for more evidence to be available to increase the knowledge of the condition.

B. Recommendations

The researcher recommends future research to understand the severity of the impact of long covid syndromes on multiple health factors other than physical activity. Furthermore, the research can be done with a larger sample population with a better sampling technique since the current research will be done using convenience sampling. Another recommendation is to explore the participants' overall well-being in more aspects than just physical activity. Additionally, future research directions can also explore an intervention to build a safe and effective treatment regime to combat long covid symptoms.

These recommendations will help us investigate the underlying mechanisms through which long covid syndrome may influence physical activity and overall health. Additionally, it will help explore the potential effects on various other aspects of health that involve immune function, autonomic dysfunction, cardiovascular health, and other physiological processes. Not only will it be explaining the cause-and-effect relationship between long covid syndrome and physical health, but it can also potentially explore the cause-and-effect relationship between long covid syndrome and psychosocial well-being including mental health and cognitive function. These insights can lead to improved management of long covid syndrome and explore the long-term interventions that promote improvement in overall health and well-being.

Understanding the implications and addressing the problem to develop a well-tailored intervention program to support participation in physical activity is crucial in promoting overall health and well-being. Future research should focus on understanding the effects on an individual's overall health including psychological factors that may have been affected due to the symptoms. As well as focusing on identifying effective strategies for managing symptoms and providing the best intervention to continue promoting improvement in overall health and well-being in this population.

C. Limitations

Some potential limitations of this study include the sample size and the retrospective nature of the study. The study relies on the recall of symptoms and/or physical activity after Covid-19. This is especially true for participants who tested Covid-19 positive between six to 23 months ago. Furthermore, the sample population will be gathered through a convenience sampling technique which might not fully represent the general population. Additionally, although regression analysis can predict future outcomes, it does not consider other factors influencing physical activity. Therefore, it is not a true cause and effect but rather just a predicted outcome.

D. Conclusion

In conclusion, long covid syndrome can significantly alter multiple health factors in an individual's life, ranging from physical health to mental health implications and limitations. However, it is important that these symptoms can vary from person to person and that understanding the course and impact of long covid syndrome is a necessity to improve the care given to an individual suffering from long covid syndrome. Therefore, research that highlights

long covid syndrome, as well as its impact on an individual and community should be explored to fully understand the debilitating long-term effects of the symptoms.

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Appendix

A. Covid-19 Survey

Covid-19 Survey

Date:

Gender:

Age:

Please answer truthfully, in the best that you can recall.

1. When did you receive a positive covid-19 test? _____
2. What were the symptoms you had? (Please check all that applies)

Cough	
Shortness of Breath/ Catching of Breath	
Fever	
Weakness	
Fatigue	
Headache	
Loss of smell	
Loss of taste	
Runny Nose/ Congested Nose	
Sore throat	
Body pain/ aches	
Chest pain	
Others (please specify)	

3. Were you hospitalized? If yes, how long (in days)? Were you admitted to the ICU? What were the treatment/s provided (e.g., ventilatory support)

   _____

4. Have you gotten a positive Covid-19 test more than once? If yes, please specify. _____
5. Do you have any medical conditions other than Covid-19?

   _____

6. Have you ever received a Covid-19 vaccine? If yes, please tick the box.

Vaccine	Doses	
Pfizer		
Sinopharm/ Sinovac		
Sputnik		
Johnson and Johnson		
Oxford-Astrazeneca		
Moderna		
Others (please specify)		

B. International Physical Activity Questionnaire (Long Form)

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (October 2002)

LONG LAST 7 DAYS SELF-ADMINISTERED FORMAT

FOR USE WITH YOUNG AND MIDDLE-AGED ADULTS (15-69 years)

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health–related physical activity.

Background on IPAQ

The development of an international measure for physical activity commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken across 12 countries (14 sites) during 2000. The final results suggest that these measures have acceptable measurement properties for use in many settings and in different languages, and are suitable for national population-based prevalence studies of participation in physical activity.

Using IPAQ

Use of the IPAQ instruments for monitoring and research purposes is encouraged. It is recommended that no changes be made to the order or wording of the questions as this will affect the psychometric properties of the instruments.

Translation from English and Cultural Adaptation

Translation from English is encouraged to facilitate worldwide use of IPAQ. Information on the availability of IPAQ in different languages can be obtained at www.ipaq.ki.se. If a new translation is undertaken we highly recommend using the prescribed back translation methods available on the IPAQ website. If possible please consider making your translated version of IPAQ available to others by contributing it to the IPAQ website. Further details on translation and cultural adaptation can be downloaded from the website.

Further Developments of IPAQ

International collaboration on IPAQ is on-going and an ***International Physical Activity Prevalence Study*** is in progress. For further information see the IPAQ website.

More Information

More detailed information on the IPAQ process and the research methods used in the development of IPAQ instruments is available at www.ipaq.ki.se and Booth, M.L. (2000). *Assessment of Physical Activity: An International Perspective.* Research Quarterly for Exercise and Sport, 71 (2): s114-20. Other scientific publications and presentations on the use of IPAQ are summarized on the website.

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 traveled 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, shoveling 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.