Sit down 7 times, Get up 8
The correlation between fatigue, vitality and prolonged sitting

Steffen Hillmer

Student number: 1830562

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Faculty of Behavioral, Management and Social Sciences

University of Twente

Supervisors: Dr. C. Bode (1st), Marileen Kouijzer, MSc. (2nd)

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Abstract

Although detrimental health effects have long been associated with sedentary behavior, academic literature only provides limited information on the correlation between prolonged sitting and psychosomatic symptoms. This quantitative study explored the sedentary behavior of the employees of the company Takeaway.com in order to investigate the relationship between sitting time and the psychosomatic symptoms of fatigue and vitality. A moderation analysis was furthermore conducted to find out if participant's physical activity and BMI moderate this relationship. Data were collected through a survey questionnaire, including the brief questionnaire on occupational sitting (BQOS), the Checklist Individual Strength (CIS) and the Vitality questionnaire (VITA-16). Participants (N=72) reported sitting for an average of 11 hours 41 minutes per day, of which 6 hours 42 minutes were spent during working hours. No significant correlation was found between sitting time at work and scores of fatigue and vitality. Results of the moderation analysis showed that the relationship between prolonged sitting and the psychosomatic symptoms of vitality and fatigue were moderated by physical activity, but not by BMI. This research contributes to existing literature by providing insights into the correlations of sedentary behavior on psychosomatic symptoms and serves as an informational purpose about their sitting behavior for employees of the company.

Keywords: prolonged sitting, fatigue, vitality, physical activity, BMI

Introduction

Today's global economy and technological advances have increased employee's hours of sedentary behavior during occupational activities (Katzmarzyk, 2010). Sedentary behavior is identified by activities that do not require more energy than normal resting periods. For activities to be characterized as sedentary, an energy expenditure of ≤ 1.5 metabolic equivalents (METs) is not exceeded (Tremblay, 2012). It is furthermore characterized by an either normal or reclined sitting posture, and is thus oftentimes associated with watching TV, playing video games and prolonged sitting at work (Tremblay, 2012). The shift from standing or regular moderate physical activity jobs to sedentary work environments that mainly revolve around prolonged sitting has a decreasing effect on our general energy expenditure, increasing the chances for health problems (Buckley et al., 2015). Cardiovascular diseases, type 2 diabetes and all-cause mortality are all associated health risks of prolonged sitting (Katzmarzyk, 2010). Sitting for longer periods of time leads to a decreased muscle lipoprotein lipase (LPL) activity in parts of the legs and back, which affects the cholesterol levels (Bey & Hamilton, 2003) and may lead to various other detrimental health outcomes (Thorp, Owen, Neuhaus, & Dunstan 2011). While these negative health outcomes are mostly of relevance to the individual employee, more and more companies are also interested in these effects on psychosomatic symptoms of their employees. Studies have, for example, shown that higher sedentary behavior of employees was significantly associated with lower presentism in a study that controlled for other lifestyle behaviors (Guertler et al., 2015).

Although numerous studies have been conducted on sedentary behavior and physical risks, little is known about the effects of prolonged sitting and the associated psychosomatic consequences. Studies about mental health and sedentary behavior mainly revolve around children and mental health disorders caused by watching television. For adults, some studies have dealt with depressive symptoms of people following sedentary lifestyles (Rezende, Lopes, Rey-Lopez, Matsudo, & Luiz, 2014). Ding, Gebel, Phongsavan, Bauman and Merom (2014) conducted one of the few studies about the relationship between sitting time and perceived level of tiredness. Their research showed a positive relation between sitting time and respondents' level of tiredness, indicating a first link between sitting time and psychosomatic symptoms.

While many of these studies on the psychological effects of prolonged sitting have focused on aspects of mental health, few studies have investigated the relationship between prolonged

sitting and psychosomatic symptoms that might affect employees. The word "psychosomatic" describes the connection between 'mind' and 'body'(Shorter, 1994). Psychological stressors in a person's environment may result in physical as well as psychological symptoms, such as higher fatigue and a decrease in vitality (Nixon, Mazzola, Bauer, Krueger, & Spector, 2011). Vitality is defined as the "physical or intellectual strength or energy: the state of being full of enthusiasm and drive about continual activities" (Pam, 2013). A study by Munir, Houdmont, Clemes, Wilson, Kerr and Addley (2015) showed that office workers who scored high on vitality were likely to score low on occupational sitting times. Furthermore, a study by Hendriksen, Bernaards, Steijn and Hildebrandt (2016) reported similar findings. They found that, although marginal, decreased sedentary behavior such as sitting was "significantly related to higher vitality scores". A possible explanation provided by the authors was that the measured employees sitting time was already "very high at baseline" and therefore provided enough room for decreasing their sitting behavior.

The psychosomatic symptom of fatigue describes a feeling of being tired and exhausted. It not only includes physical, but also psychological symptoms (Shahid, Shen, & Shapiro, 2010). The subjective experience of fatigue is oftentimes described as "extreme and persistent tiredness, weakness and exhaustion" (Dittner, Wessely, & Brown, 2004). In various environments, signs of fatigue are related to a lack of concentration and attention capabilities (Coulombe, Reid, Boyle, & Racine, 2010), thus having a direct effect on employees at work.

Although differently defined, the concepts of fatigue and vitality are oftentimes overlapping and academics struggle to define a more certain way of measurement. Two studies serve as indicators for the lacking distinctiveness and common overlap of fatigue and vitality. Firstly, in a study by Brown, Kroenke, Theobald and Wu (2011), both the SF-36 vitality scale and the Fatigue Symptom Inventory (FSI) were assessed in terms of validity and sensitivity. They came to the conclusion that both scales were valid measures of cancer-related fatigue (CRF), although the vitality scale was of better usage in quick measurements and the FSI gave more insights into the different dimensions of fatigue (Brown, Kroenke, & Theobald, 2011). Secondly, in a study by Roos-Anne Pieterson at the University of Twente, the attentional bias towards fatigue and vitality words for people who score low or high on fatigue was investigated. It was found that people with severe fatigue complains have a stronger attentional bias for both fatigue and vitality words (Pieterson, 2016). Despite these two studies, the differentiation between fatigue and vitality

cannot be clearly stated. There is still a lack of knowledge about the relationship between the concepts of fatigue and vitality, especially with regards to sources.

In order to further understand the underlying mechanisms between the relationship of prolonged sitting and psychosomatic symptoms, sedentary behavior of employees in an occupational setting will first be explored. This research aims to examine the sitting behavior of call-center employees from the company Takeaway.com, as their working environment is especially prone to high sedentary behavior. Similar studies about sedentary behavior in an occupational setting have shown that longer sitting periods were reported by women, indicating differences in sedentary behavior with regards to gender (Burton, Haynes, Uffelen, Brown, & Turrell, 2012). Additionally, longer sitting times were noted by participants in this study with a body-mass index (BMI) higher than 30. In one of the few studies about sitting time and BMI among employees, positive associations between sitting time and BMI was confirmed in an Australian study (Bennie, Pedisic, Timperio, Crawford, Dunstan, Bauman, & Salmon, 2014). Higher age was found to be associated with increased sitting time and a negative association was found between total sitting time and physical activity. Therefore, the demographics age, gender, BMI, working hours and physical activity will be used to compare differences in occupational sitting time. Additionally, the correlation between fatigue, vitality and employee's sitting hours will then be investigated, along with the previously reported overlap between the two symptoms. Based on the scarcity of studies and limited information about the effect of physical activity and BMI on the relationship of occupational sitting time and the psychosomatic symptoms of fatigue and vitality, these demographics were selected, to investigate whether they moderate the relationship between prolonged sitting and psychosomatic symptoms. On the basis of the abovementioned subject matter, three research questions were formulated:

Research Question 1: What kind of sitting behavior is reported by call-center employees?
Research Question 2: What are the correlations between fatigue, vitality and prolonged sitting hours?
Research Question 3: Does participants physical activity or BMI moderate the relationship between fatigue, vitality and prolonged sitting?

As previously mentioned, a study by Hendriksen investigated how changes in sitting behavior can affect a person's vitality, work performance and sickness absence. It was found that, although marginal, an association between sitting hours and vitality exists. Their results showed, that "workers who were less sedentary felt more vital" (Hendriksen et al., 2016). Furthermore, in a study by Park, Kim, Chung and Hisanage (2001), it was concluded that working long hours is associated with higher subjective feelings of fatigue. Therefore, the following hypothesis are formulated:

Hypothesis 1: It was predicted that a positive correlation exists between fatigue and sitting hours.
Hypothesis 2: It was predicted that a negative correlation between vitality and sitting hours is predicted.

According to a study about the effect of using a sit-stand desk and the ratings of discomfort in overweight adults, Roemmich discovered that, among others, one of the determining factors for fatigue and discomfort was the weight of the participants (Roemmisch, 2016). Furthermore, a negative relationship was found between physical activity and sitting time (Bennie et al., 2014). Based on these findings, the following hypothesis was formulated:

Hypothesis 3: It is hypothesized that the relationship between fatigue, vitality and sitting hours is moderated by physical activity.
Hypothesis 4: It is hypothesized that the relationship between fatigue, vitality and sitting hours is moderated by BMI.

Method

Study Design

The present study is a quantitative exploratory research based on an online questionnaire survey design. It first provided insights into the subjective sitting behavior of participants, which was then used as a basis for the analysis. The correlational design included the sitting time in minutes at work as the independent variable and scores of fatigue and vitality as the dependent variables. It

was conducted by a Psychology Bachelor student in his third year at the University of Twente, Enschede, at the faculty of Behavioral, Management and Social Sciences.

Participants

The study was conducted at the headquarters of Takeaway.com in Enschede, NL with the permission of the general manager. Takeaway.com is an international food delivery firm, where participating employees work in the customer service sector in a call-center environment. Employees work almost exclusively on sitting desks in front of a computer screen, but have the opportunity to adjust the height of their desk up to a standing position. Participants of this study were above the age of 18, of German citizenship and were recruited using a purposive sampling method. An invitation to fill in an online questionnaire was sent to all employees via Email. Although all employees at this company work at the same type of desk and chair, the number of working hours and length of shifts differed, depending on their contract. While many people that work in the lower range of weekly working hours (up to 30 hours per week) work in 6.5 hour shifts, employees with full time schedules (40 hours per week) work 8.5 hours per shift. The study included a total of 85 participants, from which 13 cases were excluded due to non-completion of the questionnaire, resulting in a sample size of N=72. In total, 45 women and 27 men completed the study. The mean age of the sample was 30 years (SD=10.57), with a mean BMI of 24.2 (min=16.90; max= 52.24; SD=5.37) and an average duration of 183 minutes (3 hours 3 minutes) of physical activity per week (min=0; max=900: SD=182.35).

Materials and Procedure

This study was conducted using a combination of 3 different questionnaires, namely the Brief Questionnaire on Occupational Sitting (BQOS), the Checklist Individual Strength (CIS) and the Vita-16. These questionnaires were used to assess the number of sitting hours, measure the level of fatigue, as well as the vitality of participants. Prior to the start of the study, participants signed the informed consent form, which included information about the aim and methods of the study and that their data will be treated confidentially. They were furthermore informed that they can stop at any point and do not have to give reasons for terminating the study. All questionnaires were translated from English or Dutch into German (see appendix). The then combined survey was

distributed via Qualtrics and sent by email to all German speaking employees of the call-center of Takeaway.com. This environment is most suitable for this study because of the little to no physical activity at work that could interfere with the study results and because the longest amount of sedentary behavior of employees mainly occurs around their workplace. Prior to the study, a pilot test was conducted with a total of 5 participants to check for any misunderstandings and to assess the general procedure. Before starting the data collection, the study was approved by the ethical committee of the University of Twente (Number: 190210).

Demographics. The first part of the questionnaire revolves around the demographics of the participants for descriptive purposes of the sample. Participant's weight, height and physical activity per week were collected in order to be able to determine how BMI and physical activity might moderate the relationship between fatigue, vitality and sitting hours. Items about the demographics included participants age, gender, weight, height, working hours and physical activity per week and were asked through questions, such as "What is your gender?".

BQOS. The first questionnaire of the survey is the BQOS which was designed by Femke van de Lagemaat for her master's thesis at the University of Twente. This 14-item questionnaire was used to analyze participant's occupational, as well as general sitting behavior during both a normal workday and a normal day off. Depending on the type of question, participants indicate either a time span (blue questions) or a specific time during the day (green questions) in which sitting behavior occurs. These time indications are then summed up and provide information about the participants sitting behavior, for example the total sitting time of the day. The questionnaire included statements such as "What time do you usually get home from work" and "What time do you leave for work" in order to not only be able to determine the total amount of sitting time, but also to calculate the ratio between work and sedentary sitting time. Furthermore, questions concerning additional sitting times were asked with regards to travel to work, sitting on the couch and leisure time. In terms of reliability and validity, this newly developed questionnaire still needs to be assessed.

CIS. The Checklist Individual Strength is a measurement of fatigue, which includes 20 items. It was developed by Vercoulen, Alberts and Bleijenberg in 1999. With the use of a 7-item Likert Scale, participants respond to statement such as "I feel relaxed" with indications ranging from "Yes, I agree" to "No I don't agree". The questionnaire was originally developed for clinical use,

but has also shown great validity among participants in working populations (Beurskens, 2000). This questionnaire was assessed in terms of its' validity and reliability. The study by Worm-Smeitink, Gielissen, Bloot, Laarhoven, Engelen, Riel and Knoop (2017) found the questionnaire to be a "valid and reliable tool for the assessment of fatigue". For the CIS, scores were calculated based on the Likert-scale items. For questions 2, 5, 6, 7, 8, 11, 12, 15, and 20, scores range from one to seven points, meaning that one point is given for the indication "Yes, that is true" and seven points to "No, that is not true". As the Likert-scale included seven items, more points are being given for each indication further to the "No, that is not true" side. For items 1, 3, 4, 9, 10, 13, 14, 16, 17, 18, and 19, the scores were reversed in SPSS. Statements that were indicated by "Yes, that is true" counted as seven points and items indicated as "No, that is not true" were counted as one point. Indication in between these statements were again counted based on the Likert-scale. Higher total scores on the CIS indicate a higher level of fatigue among participants. Cronbach's alpha was calculated to test the internal consistency of the 20 items in this sample, resulting in a score of α=.91.

Vita-16. The Vita-16 questionnaire was developed by Strijk, Wendel-Vos, Picavet, Hofstetter and Hildebrandt to assess the vitality of respondents. This 16-item questionnaire measures three dimensions of vitality, namely energy (items 1-5), motivation (items 6-11) and resilience (items 12-16). The questionnaire includes statements such as "I make plans for the future", which participants can indicate through a 7-item Likert-scale. The scale revolves around the frequency of occurrences, ranging from "Rarely" to "Always". The questionnaire was originally developed for Dutch participants, but was translated for this study into German. A table with the translations can be found in the Appendix. The Vita-16 proved to be a reliable and valid measure of vitality, which can be easily answered by respondents (Strijk, 2013). With this questionnaire, one point was given to the indication "Rarely" and seven points were given for the indication "Always" for each of the 16 items. Indications for statements that ranged between "Rarely" and "Always" were again awarded with points ranging from one to seven, depending on how frequent participants indicated the behavior from the statement. For the Vita-16 questionnaire, scores were calculated based on the Likert-scale items and the following formula:

Vitality score = Mean (0.4*Energy + 0.3* Motivation + 0.3* Resilience)

Higher scores on this questionnaire indicate higher scores of subjective vitality. Cronbach's alpha was calculated to test the internal consistency of the 16 items in this sample, resulting in a score of α=.93.

Data Analysis

The data were collected through the online platform Qualtrics.com. Of the initial 85 participants, 13 cases had to be excluded from the dataset, because participants did not complete the questionnaire entirely. Furthermore, the collected data was corrected for cases in which it was strikingly clear that participants accidentally entered wrong time indications (for example when participants entered 20 hours instead of 20 minutes for driving home from work). All calculations were made by using SPSS 23. The explanation of the analysis of the data will be done with regards to each of the three research questions:

Research Question 1: What kind of sitting behavior is reported by call center employees?

The sitting behavior of participants was calculated in minutes for each participant. Sitting behavior revolved around several measures that were asked in the first part of the survey. Means and standard deviations were calculated for total wake time, total sitting time, percentage of sitting time on total day, total work time, total sitting time at work, sit-work ratio and percentage of work-related sitting time of total daily sitting time. In order to further analyze the sitting behavior, independent samples t-tests were used to compare sitting time at work, daily working hours and sit-work ratios between men and women. Furthermore, participants were assigned to one of three groups, depending on their age (group 1 age $\leq$ 25, group 2 age 26-40 and group 3 age $\geq$ 41). A one-way ANOVA was used to analyze these age groups and their differences with regards to sit-work ratios and ratios of work related sitting to total daily sitting time.

Research Question 2: What are the correlations between fatigue, vitality and prolonged sitting hours?

The calculations from the BQOS in the first part of the analysis about the total minutes of prolonged sitting were used as the variable that both fatigue and vitality were related to. In order to find the correlations between these concepts and the number of minutes of sitting at work, the results of both the Checklist Individual Strength (CIS) and the Vita-16 were calculated. The scores from these questionnaires were used to understand the correlation between the concepts of vitality,

fatigue and the hours of prolonged sitting. With the results of the hours of prolonged sitting and the calculated scores from the questionnaires, the Pearson correlations between fatigue, vitality and prolonged sitting were analyzed. SPSS software was used to first check if the data is normally distributed through the usage of the Shapiro-Wilk test. Criteria for the normal distribution are that the test is non-significant ($p>.05$), therefore indicating a normal distribution of the data. To further illustrate the correlation, scores on both scales in relation to sitting hours were presented in a scatterplot, in which the x-axis represented the hours of prolonged sitting and the y-axis either the scores of fatigue or the scores of vitality.

Research Question 3: Does participants physical activity or BMI moderate the relationship between fatigue, vitality and sitting hours?

In order to determine if physical activity or BMI moderate the relationship between fatigue, vitality and sitting hours, a moderated multiple linear regression analyses was conducted. Hours of physical activity was first converted into minutes and BMI calculated by using participants demographics of height and weight (formula: weight (kg)/height(cm)^2). The regression analysis was conducted for each of the four variations (BMI on fatigue and vitality scores; physical activity on fatigue and vitality scores) to see if the variables had a moderation effect. In order to do so, the moderation analysis compared two models, one containing only the independent and dependent variable and the second model containing both of these variables and an interaction effect. The interaction effect was calculated by multiplying the independent variable (sitting time at work) with the variable (either physical activity or BMI) that we suspect to moderate the relationship between sitting time and psychosomatic symptoms. Both models are then compared to see if the second model, which includes the interaction effect, accounts for significantly more variance than the first model. If it does account for more variance, we can conclude that there is potentially significant moderation of the variable chosen for the interaction effect.

Results

The sitting behavior of call-center employees

Participants (*N*=72) of Takeaway.com reported working an average of 427.2 minutes (7 hours 7minutes) per day, with a standard deviation of 77.4 minutes (1hour 17minutes). On an average working day, employees sit a total of 701 minutes (11 hours 41 minutes) including leisure time, such as watching TV. While at work, employee's sit-work ratio (percentage of total sitting time and total working time) was 92%. Furthermore, their percentage of sitting time at work in relation to their total sitting time of a working days was 57.3%. Participants reported being awake for an average of 963 minutes (16 hours 3 minutes) per day, from which 701 minutes were spent sitting, resulting in a ratio of almost 73% (all statistics can be found in Table 1).

Through an independent samples t-test, no significant differences in sitting time at work between men and women were found: $t(72) = 0.01$, $p=0.992$. Additionally, a further t-test compared the daily working hours between men and women and did not find a significant difference: $t(72) = -0.237$, $p = 0.814$. Comparing the sit-work ratios with regards to gender also did not find a statistically significant difference: $t(72)=1.261$, $p = 0.211$. Furthermore, a one-way ANOVA was used to analyze sit-work ratios between various age groups. Results showed no significant difference between one or more groups: [$F(2,71)=0.68$, $p>0.05$]. For the same age-groups, a further analysis was conducted to analyze the differences in the percentages of work related sitting to total daily sitting. Results showed to be non-significant [$F(2,71)=0.52$, $p>0.05$], indicating that there is no difference between age groups with regards to how much sitting occurs during work in comparison to total daily sitting time.

Table 1

Working hours, sitting hours and percentages of occupational sitting

Variable	*M*	*SD*	Women	Men	Age 1	Age 2	Age 3
Working hours (p/day)	7.12	1.29	424.00m	428.89m			
Total wake time (mins/day) [hrs/day]	963[16h3m]	73.92 [1h13m]	958.00	973.80			
Total sitting time (mins/day) [hrs/day]	701.11[11h41m]	109.20 [1h49m]	687.6	723.5			
Percentage of sitting time on total day	72.80%	10.7%	71.9%	74.4%			
Presence at work	427m [7h7m]	77.4m [1h17m]	424.0	428.8			
Sitting at work (mins/day) [hrs/day]	402.36 [6h42m]	83.51 [1h23m]	402.4	402.2			
Percentage of sitting time during work (sit-work ratio)	91.9%	15.4%	93.7%	89%	93.6%	92.2%	87.4%
Percentage of work-related sitting time of total daily sitting time	56.3%	14.3%	57.7%	54.4%	54.1%	57.8%	56.9%
Physical activity (mins/day)	183.33m	182.35	202.6	151.1	212.14	168.75	155.00
Body-mass index (BMI)	24.18	5.36	21.68	30.26	21.60	24.16	30.26

The correlations between fatigue, vitality and prolonged sitting

A correlation analysis was used to determine the correlation between fatigue, vitality and prolonged sitting. For interpretation and comparison purposes of the scores of both questionnaires, several descriptive statistics were calculated.

The sample has a mean fatigue score of 68.25 (*SD*= 21.15), with scores ranging from 22 to 125. This mean is significantly higher than the average score of 47 in the study of Beurskens (2000), who compared fatigue scores among various working environments. With regards to gender, female participants had a mean score of 69.77 (*SD*= 21.29), while male participants scored a mean of 65.70, (*SD*= 21.06). For the different age groups, the following means and standard deviations were derived from the sample: Age group 1 (*M*= 64.29, *SD*= 23.80) Age group 2 (*M*=73.59, *SD* =18.36) and Age group 3 (*M*= 63.25, *SD* = 19.93).

Due to the novelty of the questionnaire, no cut-off scores have yet been determined for the Vita-16 questionnaire. However, results from this questionnaire can be compared to a Dutch study of 8015 adults, revolving around vitality and societal costs (Steenbergen, Dongen, Wendel-Vos, Hildebrandt, & Strijk (2015). The sample mean was 3.59 with a standard deviation of 0.84 and scores ranging from 1.06 to 5.21. The study of Steenbergen reported vitality scores with a mean of 4.43 and a standard deviation of 1.06, which, in comparison, were significantly higher than in the current sample. Female participants scored an average of 3.62 (*SD*= 0.74), while male participants had a mean of 3.56 (*SD*= 1.01). For the various age groups, descriptives were as followed: Age group 1 (*M*= 3.80, *SD*= 0.83), Age group 2 (*M*= 3.29, *SD*= 0.85) and age group 3 (*M*= 3.95, *SD*= 0.57).

Table 2

Pearson correlations between total sitting time, sitting at work and scores of fatigue and vitality.

	Total sitting time	Sitting at work	Vita-16 score	CIS-score
Total sitting time	1	.347**	-.009	.045
Sitting at work		1	-.165	.166
Vita-16 score			1	-.723**
CIS-score				1

Note. **: Correlation significant at the 0.01 level (2-tailed).

Analysis of the data showed a normal distribution for both the Checklist Individual Strength questionnaire and the Vita-16 questionnaire. Results of the Pearson correlation of the variable sitatwork (time of sitting at work in minutes) and the scores from the Checklist Individual Strength (CIS) showed that there was no significant correlation between sitting time and scores of fatigue: $r(72) = 0.166$, $p = 0.163$ (see Table 2 for complete correlations). Although not statistically significant, the coefficient of 0.166 indicates a weak positive correlation between the time spent sitting and the fatigue score. To test the correlation between sitting time and vitality, scores from the Vita-16 questionnaire were used. Results of the Pearson correlation indicated that there was no significant correlation between the two variables: $r(72) = -0.165$, $p = 0.166$. Although the correlation was again not statistically significant, the coefficient -0.165 between the time spent sitting at work and participants vitality scores shows a weak negative correlation. Furthermore, the correlation analysis showed a statistically significant correlation between the scores of the CIS and Vita-16 questionnaire ($r(72) = -.723$, $p = .001$.

The moderation of physical activity and BMI on the relationship of fatigue, vitality and sitting at work

Moderated multiple linear regression analyses were used to determine if physical activity or BMI moderate the relationship between sitting times at work and scores of fatigue (CIS) or vitality (Vita-16). Descriptive statistics were calculated for both physical activity and participants BMI for comparison purposes. For physical activity, participants reported an average of 183.33 minutes per week (3hours 3minutes), ranging from 0 minutes to 900 minutes. Female participants reported spending on average 202.6 minutes on physical activity, while male participants averaged 151.1 minutes per week. With regards to the three age groups, group 1 (age ≤ 25) reported a mean of 212.14 (SD = 224.79), group 2 (age 26-40) a mean of 168.75 (SD = 147.31) and group 3 (age ≥ 41) a mean of 155.00 (SD = 160.71). For BMI, the sample mean was 24.18 (SD = 5.36), ranging from 16.90 to 52.24. In this study, females reported a mean BMI of 21.68 (SD =2.02) while males BMI was 30.26 (SD = 6.11). For the differences in age groups, BMI of group 1 was 21.60 (SD =2.13), group 2 a mean of 24.16 (SD = 3.53) and group 3 a mean of 30.26 (SD = 9.07).

The first regression analysis determined if physical activity moderated the relationship between sitting at work and scores of fatigue (CIS). In order to see if moderation between the 2

variables occurred through the variable physical activity, 2 models were established and compared. Model 1 included the variables sitatwork and the CIS-score, whereas model 2 also included the interaction between sitting at work and physical activity (sitatwork_x_physactivity). The increase in variance in the second model ($R^2change$=0.095) with the interaction was statistically significant (p = 0.008), indicating that there is significant moderation of physical activity on the relationship between sitting at work and scores of fatigue (see Table 3).

The second analysis tested for a moderation effect of physical activity on the relationship between sitting at work and vitality scores (Vita-16). The increase in variance ($R^2change$ = 0.060) in model 2 that included the interaction (sitatwork_x_physactivity) was statistically significant (p = 0.037), indicating that there is significant moderation of physical activity on the relationship between sitting at work and scores of vitality (see Table 4).

Table 3

Summaries of the moderation analysis of physical activity on the relationship between sitting at work and scores of fatigue

Model	R	R Square	R Square Change	F Change	Sig. F Change
1[a]	.166	.028	.028	1.990	.163
2[b]	.350	.122	.095	7.432	.008

Note. Models of Moderation analysis: [a] : Sitting at work, scores of fatigue, [b] : Sitting at work, Scores of fatigue, Sitatwork_x_Physicalactivity. *N*= 72.

Table 4

Summaries of the moderation analysis of physical activity on the relationship between sitting at work and scores of vitality

Model	R	R Square	R Square Change	F Change	Sig. F Change
1[a]	.165	.027	.027	1.962	.166
2[b]	.295	.087	.060	4.525	.037

Note. Models of Moderation analysis: [a] :Sitting at work, scores of vitality, [b] : Sitting at work, Scores of vitality, Sitatwork_x_Physicalactivity. *N*=72.

In order to test for a moderation effect of BMI (body-mass index) on the relationship between sitting at work and scores on fatigue and vitality, another moderated multiple linear regression analysis was conducted. The increase in variance in both models that included the interaction (sitatwork_x_BMI) was not statistically significant: ($R^2change$ =0.015, p=0.305) for fatigue scores and ($R^2change$ = 0.001, p = 0.784) for vitality scores (see Table 5 and Table 6). These results indicate that there is no significant moderation of BMI on the relationship between sitting at work and scores of fatigue and vitality.

Table 5

Summaries of the moderation analysis of BMI on the relationship between sitting at work and scores of fatigue

Model	R	R Square	R Square Change	F Change	Sig. F Change
1[a]	.166	.028	.028	1.990	.163
2[b]	.206	.043	.015	1.072	.304

Note. Models of Moderation analysis: [a] :Sitting at work, scores of fatigue, [b] : Sitting at work, Scores of fatigue, Sitatwork_x_BMI. *N*=72.

Table 6

Summaries of the moderation analysis of BMI on the relationship between sitting at work and scores of vitality

Model	R	R Square	R Square Change	F Change	Sig. F Change
1[a]	.165	.027	.027	1.962	.166
2[b]	.168	.028	.001	.076	.784

Note. Models of Moderation analysis: [a] :Sitting at work, scores of vitality, [b] : Sitting at work, Scores of vitality, Sitatwork_x_Physicalactivity. *N*=72.

Post-hoc analysis:

Based on the surprising results of the previous analysis, a post-hoc analysis was conducted. The analysis for the above-mentioned research questions revolved around the variable sitatwork (the total sitting time of employees at work). Since no statistically significant relations between vitality, fatigue and prolonged sitting at work have been found, an explorative analysis was conducted. It was investigated whether the correlations between fatigue, vitality and prolonged sitting change, if the measure of sedentary behavior not only revolves around the variable sitting at work (sitatwork), but also includes sedentary leisure time activity outside of work. Therefore, the correlation would be environmentally deterministic, indicating that there is generally a correlation between sedentary behavior and participant's fatigue and vitality, just not during occupational hours. In order to do so, the total sitting time throughout the day was calculated from the BQOS questionnaire and then used to investigate the correlation. Furthermore, another analysis was conducted to explore the correlation between the two sitting variables.

Results of the Pearson correlation between the Checklist Individual Strength and the total daily sitting time of participants showed, that there was again no statistically significant result, indicating that fatigue and total daily sitting are not correlated: $r(72) = 0.045$, $p = 0.706$ (see Figure 1).

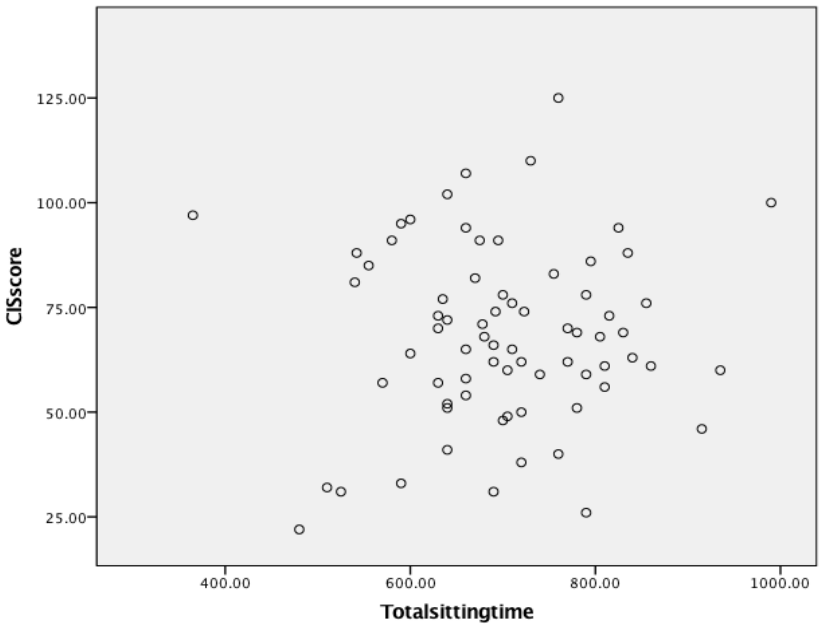

Figure 1: *Correlation between total daily sitting time and Checklist Individual Strength scores*

Similar to the analysis above, the Pearson correlation between the Vita-16 scores and the total daily sitting time of participants showed no statistically significant result: $r(72) = 0.09$, $p = 0.937$ (see Figure 2), indicating that vitality and daily sitting time are not correlated.

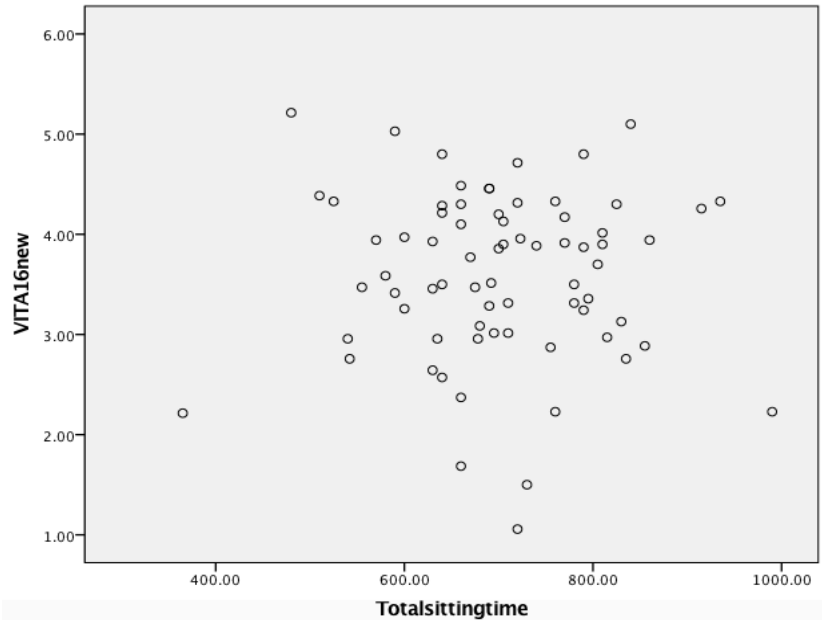

Figure 2: *Correlation between total daily sitting time and Vita-16 scores*

Discussion

This study aimed at discovering the sitting behavior of call-center employees at the company Takeaway.com. Furthermore, its' purpose was to find out if the psychosomatic symptoms of fatigue and vitality correlated with the hours of prolonged sitting, as well as if hours of physical activity or participants BMI moderated this relationship. This explorative study was among a few associational studies the first to investigate the effect of prolonged sitting on these psychosomatic symptoms and aimed to add to the existing literature of sedentary behavior. Additionally, this study will serve an informational purpose for employees of the company Takeaway about their sitting behavior. For structural purposes, each research question will first be discussed separately, including the interpretation of its results and, if applicable, the discussion of the hypothesis. Lastly, strengths and limitations of this study will be considered, as well as options for future research and practical aspects for the company Takeaway.com.

Research Question 1: What kind of sitting behavior is reported by call-center employees?

Results showed that employees in this call-center environment spend the majority of their sitting time in their workplace environment, namely an average of 6 hours 42 minutes out of 11hours 41 minutes of their total daily sitting time. In comparison to other research, the sample exceeded the average of the Dutch working population. In a study by Jans, Proper and Hildebrandt (2007), it was found that employees sit on average 7 hours per day, of which about one third was at their occupational setting. The ratio of sitting at work and total daily sitting time in this sample is 56.3% in comparison to the Dutch average of 33% in the study of Jans, Proper and Hildebrandt. The above-average sit-to-work ratio can partly be explained by environmental aspects of the workplace. Employees are required to be at their desk for the majority of their working time to answer phone calls, which leaves little room for moving around the office to decrease sedentary behavior. However, employees still have the opportunity to make use of sitting alternatives, such as standing desks, which would decrease their overall sitting time.

With regards to sitting behavior after work and the total daily sitting time, the sample again exceeded the Dutch average. This is in line with another study by Proper and Hildebrandt, who found that high sedentary behavior at work was not compensated with less sitting during the rest of the day (Proper, & Hildebrandt, 2006). By comparing the mean sitting behavior of this sample

with other research, it is apparent that employees are significantly more sedentary and spend more time sitting during the day than other participants in comparable studies. While some of these findings may be due to the above-mentioned environmental aspects of the call-center, it can be assumed that the high sedentary behavior at their workplace may also lead employees to adapt a rather sedentary lifestyle in general. This behavior may also be an explanation for the very high scores of fatigue and low scores of vitality, which will be discussed in research question two.

Additionally, no differences were found between age groups and their sitting behavior throughout the day. This is contrary to the recent findings of a Dutch study, who investigated sedentary time in different age groups and found significant differences, indicating that higher age was related to higher sedentary time (Bernaards, Hildebrandt, & Hendriksen (2016). Overall, the sample differed in most of the above-mentioned aspects from recent other studies. Measures of sedentary behavior at an occupational setting could most likely be explained by the working environment itself and the tasks that employees need to perform, which does not allow workers to leave their workplace often. In summary, call-center employees at the company Takeaway.com display very high sedentary behavior, both at their workplace and during leisure time.

Research Question 2: What are the correlations between fatigue, vitality and prolonged sitting?
After analyzing the general sitting behavior of participants, the second research question revolved around possible correlations between psychosomatic symptoms and sitting behavior of participants. On the basis of this, fatigue and vitality were chosen as symptoms, which would be assessed through the usage of the Checklist Individual Strength for fatigue and the Vita-16 questionnaire for the assessment of vitality.

Based on previous literature presented in the introduction about the psychosomatic symptoms of fatigue and vitality, two hypotheses were presented. Against expectations, both hypotheses need to be rejected. Neither the correlation between fatigue and prolonged sitting, nor the correlation between vitality and prolonged sitting were found to be statistically significant. In comparison to the study results of Hendriksen, this is contrary to their findings that workers scoring lower on sedentary behavior workers felt more vital (Hendriksen et al., 2016).

It is especially striking that neither the scores of fatigue nor the scores of vitality correlate with prolonged sitting hours, as both sample means were considerably worse with regards to

psychosomatic symptoms of comparable studies. In this sample, a mean score of 68 was reported by participants for measures of fatigue, which in relation to other studies is very high. In a study by Beurskens (2000), scores of fatigue among working people were also compared. The total mean score of 68 of this sample is significantly higher than the mean score of 47 in the study of Beurskens, using the same measurement instrument. However, in comparison to the chronic fatigue cutoff score of 76, participants in this sample do however score relatively low (score mean chronic fatigue patients=113), indicating that participants score high in relation to other working populations, but do not reach a severe level that would indicate a chronic fatigue syndrome (Bültmann et al., 2000). Additionally, scores of vitality in this sample are lower than the above-mentioned study of Steenbergen (2015), which compared the vitality scores of 8015 adults, due to missing cut-off scores for the Vita-16 questionnaire. Similar to the scores of the fatigue questionnaire, employees of Takeaway.com scored significantly lower (M = 3.59 in comparison to M = 4.43).

A possible explanation for the high scores of fatigue and low scores of vitality may be employee's general unhappiness about the workplace due to the simplicity of tasks or unfriendly customers. As these questionnaires are personal indications about the presented statements in the questionnaire, they are however entirely subjective. An employee feeling particularly unhappy about their workplace at the time of completing the questionnaires, may potentially use these measures as a way to present employers that they are not content with their current position or occupational tasks. In addition to the possible unhappiness, the time of completion of the questionnaires needs to be considered. Usual worktimes for call-center employees range from 9am to 12pm on an average workday, depending on their daily shifts. As some participants may have completed the questionnaires during normal hours, some may have also completed them particularly late, due to the decreased workload during evening hours. This may have potentially had an effect on participants scores. While the scores of fatigue and vitality may not correlate with sitting time at work, these scores are however an indication that the working environment may contribute to increased scores of psychosomatic symptoms. The results of the analysis are likely to be explained by these factors and not by measurement problems, as the internal consistency was excellent, as shown in the results section.

Based on the results of the correlation analysis, scores from both questionnaires are strongly negative correlated $r(72) = -.723$. This indicates that when scores of one variable increase, scores of the other variable decrease. In this case, the strong negative correlation indicates that the higher participants scored on the CIS questionnaire, the lower they scored on the Vita-16. With regards to the distinction between these variables, it can be noted that, although negative, the high correlation between these variables supports the above-mentioned overlap of the concepts in academic literature.

Research Question 3: Does participants physical activity or BMI moderate the relationship between fatigue, vitality and sitting hours?

A moderation analysis was conducted to see if either physical activity or BMI moderated the relationship between the psychosomatic symptoms and sitting hours. It was hypothesized that the relationship was moderated by both physical activity and BMI. Based on the conducted moderation analysis, the first hypothesis about the moderation of physical activity is accepted. Physical activity moderates both the relationship of sitting at work and scores of fatigue and the relationship between sitting at work and scores of vitality. The second hypothesis needs to be rejected, since no moderation of BMI and the relationships between sitting at work and scores of fatigue and vitality was found.

Although, to my knowledge, no prior studies have been conducted that investigated the moderation of physical activity or BMI on the above-mentioned relationships, other studies have however found significant associations between sitting time and increased BMI (Lin, Courtney, Lombardi, & Verma, 2015). Furthermore, positive associations have been found in which participants reported feeling less fatigued when participating in regular physical activity (O'connor, & Puetz, 2005). On the basis of these findings, it has come as a surprise that only physical activity moderates the relationships between sitting and psychosomatic symptoms, but not BMI. However, this finding shows the importance of regular physical activity and the effect it has on psychosomatic symptoms. It furthermore suggests that regular physical activity may improve psychosomatic symptoms, even when working in an environment that is prone to high sedentary behavior such as a call-center. This is supported by research about the improvement of mental well-being when exercising regularly (Penedo, & Dahn, 2005).

Post-hoc analysis

Due to the surprising results of the second research questions, a post-hoc analysis was conducted to find out if the results were environmentally deterministic. This would indicate that the working environment would serve as an important variable for prolonged sitting time and that employees would generally be less sedentary in their leisure time. As the analysis of the second research question showed, the variable sitatwork was not correlated with fatigue or vitality. Since the data was mainly homogenous with regards to employees sitting time at work, the variable of total daily sitting time was used to see if there are differences in occupational sitting time and total daily sitting time (including leisure activities) and the psychosomatic symptoms. Again, results showed no correlation. The interpretation of this may include that employees are more sedentary in general and that this behavior is not only represented in their prolonged sitting time at work, but also in their general sedentary behavior during leisure time. This assumption can furthermore be supported on the basis of the conducted correlation analysis between the two sitting variables, due to their significant correlation ($p = .003$).

Strengths and limitations

Strengths and limitations revolve, among others, around the usage of the BQOS questionnaire to assess the participants sitting behavior. Reliability of the measurement tool may be considered a limitation of the study, since the time assessment was entirely subjective. Although the questionnaire is structured in a way that makes it easy for participants to fill in the time slots, the data is entirely based on participants subjective estimations of their sitting behavior. While objective measurement might have improved the reliability of the data, differences to other sedentary measurement tools also show a strength of this newly developed tool. In comparison to the frequently used Marshall sitting questionnaire, the BQOS gives a better overview of sitting behavior throughout the entire day, as measurements more specifically revolve around leisure time activities as well (Marshall, Miller, Burton, & Brown, 2010).

Furthermore, filling out the questionnaire during work is a further limitation of the study that might affect the reliability of the measurement. Completing the survey during stressful working hours might have influenced the conciseness of the data, because participants may not have been able to regard their full attention to the completion of the survey at all times. This can

also explain the relatively high number of excluded cases (*N*=13), which was likely due to time constraints at work. While collecting the data during working hours, it was however assured that enough participants from the same working environment completed the questionnaire.

A further limitation revolves around the generalizability of the study results. Overall, the collected sample was homogenous, in the sense that no differences in working hours between age groups or gender were found. The data were collected from participants that all work in a call-center environment and only employees of Takeaway.com were selected. Due to this homogeneity and the limited size of the sample, results are not generalizable and further research is needed.

A strength of this study was the research on psychosomatic symptoms in relation to sitting hours. Although studies have been conducted to find correlations between vitality and sedentary behavior in working environment (such as Hendriksen et al., 2016), to the best of my knowledge there have been no prior studies that investigated the correlation between psychosomatic symptoms and prolonged sitting hours. This explorative research therefor investigated a novel approach to the study of sedentary behavior and can be used for guidance for future research of the effects of prolonged sitting on psychosomatic symptoms of any kind.

Future research

For this analysis, the demographics of physical activity and body-mass index were chosen. Due to the scale of this research, further tests for moderation effects with other variables were not conducted. Future research could investigate if there are moderation effects with variables such as levels of education. Additionally, the BQOS questionnaire needs to be further validated. Most important aspects to validate revolve around the comparison to objective measures of sitting behavior and other questionnaires. Due to the various time slots in this questionnaire that participants need to fill in for their sitting behavior, objective measures of physical activity such as step counters could also be included. This would eliminate the limitation of the preciseness of the measure of physical activity, as study results would be based on multiple measures. For reasons of generalizability, this research may be extended to other working environments that may not be as prone to high sedentary behavior as a call-center environment. Future research can also be extended in the field of other psychosomatic symptoms and discover effects that prolonged sitting may have on them. Lastly, recent debates on research in working environment have revolved

around the usage of standing work stations to reduce sitting time. Future research could investigate if the usage of these standing work stations has an effect on participant's vitality and fatigue in comparison to participants that do not make use of them.

Practical aspects

Various practical aspects can be considered for the company Takeaway.com. Due to participants high scores of fatigue, decreasing these scores would be beneficial. According to a suggestion of a recent study, reducing sitting time may increase productivity at work and improve employee's mental well-being (Puig-Ribera, Martinez-Lemos, Gine-Garigga, Gonzalez-Suarez, Bort-Roig, Fortuno, Monoz-Ortiz, McKenna, & Gilson, 2015). This may be achieved by the usage of standing working tables, that are available for all employees of the company. By using standing working tables, sitting time may be reduced (Karakolis, & Callaghan, 2014). Employees need to be motivated by educating them first about the health benefits such as reduced fatigue and better mental well-being. This could be achieved through an introductory coaching and handouts, provided by the human resources department. Once intrinsically motivated, daily reminders through alarms on their computer may remind employees to change to a standing position to decrease their overall sitting time.

Take home message

This research investigated the sitting behavior of call-center employees, as well as correlations between prolonged sitting time, fatigue and vitality and possible moderation effects of physical activity and BMI. Results showed that no correlation between prolonged sitting hours and fatigue and vitality exists and that this correlation is only moderated by participants physical activity, but not by BMI.

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Appendix

Fragebogen zum Sitzverhalten am Arbeitsplatz für Büroangestellte (BQOS)

Was ist Ihr Geschlecht?

- Frau
- Mann
- Andere
- Keine Angabe

Wie lautet Ihr Geburtsjahr?

Was ist Ihr höchster Bildungsabschluss?

- Grundschule
- Hauptschule
- Realschule
- Abitur
- Bachelor
- Master
- Andere

Wie viele Stunden verbringen Sie durchschnittlich am Tag bei dir Arbeit?

Wie viele Stunden verbringen Sie durchschnittlich mit Sportaktivitäten pro Woche?

Normaler Arbeitstag:
Bei den nächsten Fragen stellen Sie sich bitte einen normalen Arbeitstag vor.
Bei grünen Fragen geht es um einen Zeitpunkt.
Bei blauen Fragen geht es um eine Zeitspanne.

Beispielantworten für eine grüne Frage:

7:15 wird geschrieben als: Stunden '7' und Minuten '15'.
22 Uhr wird geschrieben als: Stunden '22' und Minuten '00'

Beispielantworten für eine blaue Frage:
Wenn Sie 2 Stunden saßen, schreiben Sie: Stunden '2' und Minuten '00'
Wenn Sie 12.5 Stunden saßen, schreiben Sie: Stunden '12' und Minuten'30'
Bitte geben Sie immer eine Antwort.

	Stunden	Minuten
Wann stehen Sie normalerweise an einem normalen Arbeitstag auf?		
Wann fahren Sie normalerweise los zur Arbeit?		
Wie viel Zeit verbringen Sie normalerweise bis Sie zur Arbeit losfahren? (Denken Sie an Frühstück, Fernsehen, etc.)		
Wann kommen Sie normalerweise bei der Arbeit an?		
Wie lange sind Sie durchschnittlich unterwegs zur Arbeit? (Denken Sie an Auto- oder Zugfahren, nicht an Fahrradfahren).		
Wie spät verlassen Sie normalerweise die Arbeit?		
Wie viel Zeit verbringen Sie durchschnittlich im Sitzen bei Ihrer Arbeit, von Ankunft bis Abreise? (Denken Sie an Pausen, Meetings, Mitarbeitergespräche etc.)		
Wie spät kommen Sie normalerweise von der Arbeit nach Hause?		
Wie lange sind Sie durchschnittlich unterwegs nach Hause? (Denken Sie an Auto- oder Zugfahren, nicht an Fahrradfahren).		
Wann gehen Sie normalerweise ins Bett nach einem normalen Arbeitstag?		
Wie viel Zeit verbringen sie durchschnittlich zwischen Ihrer Ankunft zuhause und Ihrer Schlafenszeit? (Denken Sie an Abendessen, Fernsehen, Computer, Couch, etc.)		

Normaler freier Arbeitstag
Bei den nächsten Fragen stellen Sie sich bitte einen arbeitsfreien Tag vor.
Bei grünen Fragen geht es um einen speziellen Zeitpunkt.
Bei blauen Fragen geht es um eine Zeitspanne.

Beispielantworten für eine grüne Frage:
7:15 wird geschrieben als: Stunden '7' und Minuten '15'.
22 Uhr wird geschrieben als: Stunden '22' und Minuten '00'

Beispielantworten für eine blaue Frage:
Wenn Sie 2 Stunden saßen, schreiben Sie: Stunden '2' und Minuten '00'
Wenn Sie 12.5 Stunden saßen, schreiben Sie: Stunden '12' und Minuten'30'

Bitte geben Sie immer eine Antwort.

	Stunden	Minuten
Wann stehen Sie normalerweise an einem arbeitsfreien Tag auf?		

Wie lange schlafen Sie normalerweise an einem freien Tag?

Wie lange sitzen Sie durchschnittlich an einem arbeitsfreien Tag? (Denken Sie an Frühstück, Fernsehen, Essen, Kino, Reisen, etc.)

CIS20r_08_German

Auf der nächsten Seite finden Sie 20 Aussagen mit deren Hilfe wir einen Eindruck darüber bekommen möchten, wie Sie sich in den letzten zwei Wochen gefühlt haben. Ein Beispiel:

Ich fühle mich entspannt

Wenn Sie der Meinung sind, dass diese Aussage ganz und gar dazu passt, wie Sie sich in den letzten zwei Wochen gefühlt haben, kreuzen Sie bitte das Feld links außen an:

Ich fühle mich entspannt

Ja, stimmt							**Nein**, stimmt nicht
X							

Wenn Sie der Meinung sind, dass diese Aussage ganz und gar nicht übereinstimmt mit dem Gefühl, das Sie die letzten zwei Wochen gehabt haben, kreuzen Sie bitte das Feld rechts außen an:

Ich fühle mich entspannt

Ja, stimmt							**Nein**, stimmt nicht
						X	

Wenn Sie der Meinung sind, dass die Antwort weder "ja, stimmt" noch "nein, stimmt nicht" ist, kreuzen Sie das Feld an, das am besten mit Ihrem Gefühl übereinstimmt. Zum Beispiel, wenn Sie sich etwas, aber nicht besonders, entspannt gefühlt haben in den letzten zwei Wochen setzen Sie ihr Kreuz wie folgt:

Ich fühle mich entspannt

Ja, stimmt							**Nein**, stimmt nicht
		X					

Setzen Sie bitte bei jeder der 20 Aussagen genau je ein Kreuz. Vielen Dank.

1. Ich fühle mich müde	**Ja,** stimmt							**Nein,** stimmt
2. Ich bin voll Aktivität	**Ja,** stimmt							**Nein,** stimmt
3. Nachdenken strengt mich an	**Ja,** stimmt							**Nein,** stimmt
4. Körperlich fühle ich mich erschöpft	**Ja,** stimmt							**Nein,** stimmt
5. Ich habe Lust etwas Schönes zu unternehmen	**Ja,** stimmt							**Nein,** stimmt
6. Ich fühle mich fit	**Ja,** stimmt							**Nein,** stimmt
7. Ich bin körperlich sehr aktiv	**Ja,** stimmt							**Nein,** stimmt
8. Wenn ich mit irgendetwas beschäftigt bin, kann ich meine Aufmerksamkeit gut darauf richten	**Ja,** stimmt							**Nein,** stimmt
9. Ich fühle mich schlapp	**Ja,** stimmt							**Nein,** stimmt
10. Ich bin körperlich wenig aktiv	**Ja,** stimmt							**Nein,** stimmt
11. Ich kann mich gut konzentrieren	**Ja,** stimmt							**Nein,** stimmt
12. Ich fühle mich ausgeruht	**Ja,** stimmt							**Nein,** stimmt
13. Es kostet mich viel Anstrengung meine Aufmerksamkeit auf etwas zu richten	**Ja,** stimmt							**Nein,** stimmt
14. Körperlich fühle ich mich in einer schlechten Verfassung	**Ja,** stimmt							**Nein,** stimmt
15. Ich habe viele Pläne	**Ja,** stimmt							**Nein,** stimmt
16. Ich bin schnell müde	**Ja,** stimmt							**Nein,** stimmt
	Ja, stimmt							**Nein,** stimmt

17. Mein Niveau körperlicher Aktivitäten ist gering

18. Die Lust etwas zu unternehmen fehlt mir

19. Meine Gedanken schweifen leicht ab

20. Körperlich fühle ich mich in einer ausgezeichneten Verfassung

Ja, stimmt								**Nein,** stimmt

Vita 16 questionnaire:

Translation Vita-16 Dutch to German:

1	2	3	4	5	6	7
Zelden	Soms	Af en toe	Regelmatig	Meestal	Bijna altijd	Altijd
Selten	Manchmal	Ab und zu	Regelmäßig	Meistens	Fast immer	Immer

Ik heb genoeg energie om al mijn dagelijkse activiteiten te kunnen volbrengen	Ich habe genug Energie um alle täglichen Aktivitäten zu vollbringen
Ik bruis van de energie	Ich sprüh vor Energie
Mijn batterij is 100% opgeladen aan het begin van de dag	Zu Beginn meines Tages ist meine Batterie zu 100% aufgeladen
Na het avondeten zit ik nog vol energie	Nach dem Abendessen bin ich noch voller Energie
Ik verheug mij op elke nieuwe dag	Ich freue mich auf jeden neuen Tag
Ik maak plannen voor de toekomst	Ich mache Pläne für die Zukunft
Als ik een doel heb, maak ik direct plannen om dit doel te bereiken	Wenn ich ein Ziel habe, mache ich direkt Pläne wie ich dieses erreiche
Het behalen van mijn doelen maakt mij gelukkig	Das Erreichen meiner Ziele macht mich glücklich
Ik kriej energie van het maken van toekomstplannen	Das Planen meiner Zukunft gibt mir Energie
Ik vind het heel erg belangerijk om mijn doelen werkelijkheid te laten worden	Ich finde es sehr wichtig meine Ziele Realität zu werden
Ik ga meteen aan de slag met nieuwe uitdagingen	Mit neuen Herausforderungen fange ich direkt an
Ik kan heel goed omgaan met tegenslagen	Mit Rückschlägen kann ich gut umgehen
Ik kan heel goed oplossingen vinden in moeilijke situaties	In schwierigen Situationen kann ich sehr gut Lösungen finden
Na een moeilijke periode ben ik snel weer de oude	Nach einer schwierigen Zeit bin ich schnell wieder der Alte
Door mijn ervaring voel ik mij sterker in moeilijke tijden	Durch meine Erfahrung fühle ich mich stärker in schwierigen Zeiten
Elke ervaring in het leven maakt mij sterker	Jede Erfahrung im Leben macht mich stärker