Perceived physical activity in adults with cardiovascular disease, during outpatient cardiac rehabilitation

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"ONDERGETEKENDE

Rutger Jesse Groothuis

bevestigt hierbij dat de onderhavige verhandeling mag worden geraadpleegd en vrij mag worden gefotokopieerd. Bij het citeren moet steeds de titel en de auteur van de verhandeling worden vermeld."

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ABSTRACT

Aim

Performing sufficient moderate to vigorous physical activity (MVPA) maintains health in adults with Coronary Artery Disease (CAD). However, adults with coronary artery disease generally overestimate the duration and intensity of their MVPA. It is currently unknown which variables are associated with the misperception of PA in adults with CAD. The aim of this study is to analyse if age, type of CAD, type of Cardiac Rehabilitation (CR), social support, self-efficacy and kinesiophobia are associated with the difference between measured and perceived MVPA levels in patients with CAD, during a CR program.

Methods

A two-centre observational cross-sectional study was conducted within the department of Rehabilitation Medicine of the University Medical Center Groningen between 8 January and 20 April 2018. Adults with CAD, following an outpatient CR program, were included. Perceived MVPA was assessed with the Short Questionnaire to Assess Health enhancing Physical Activity and compared with ActivPAL3^{tm} activity monitor outcomes. The difference between perceived and measured MVPA levels was analysed for associations with patient and disease characteristics.

Results

Participants significantly ($p < 0.001$) overestimated MVPA with a median of 839 [IQR: 232;1491] minutes per week. In the complete dataset (n=51), a multiple linear regression with the difference between perceived and measured MVPA as dependent variable showed that type of CAD significantly ($p = 0.013$) contributed to the regression equation.

Conclusion

Patients with CAD overestimate perceived MVPA. Type of CAD was the only variable associated with the difference between perceived and measured MVPA levels.

Clinical Relevance

Assessment of self-reported MVPA, such as questionnaires, should be handled with caution due to self-reported overestimation. A misperception of PA misleads the patient's beliefs of achieving exercise recommendations which obstructs behavioural change. More knowledge about the cause of misperception is necessary for maintaining long term physical fitness and health in adults with CAD.

Keywords: Coronary Artery Disease, Cardiac Rehabilitation, Overestimation perceived Moderate to vigorous Physical Activity.

INTRODUCTION

Coronary Artery Disease (CAD) is the leading cause of mortality of all chronic diseases worldwide (1). The improvement of physical activity (PA) is one of the key strategies to decrease cardiovascular mortality in adults with CAD(2). Performing moderate to vigorous aerobic physical activity (MVPA) for at least 30 minutes, on at least 5 days per week is recommended to maintain physical fitness and health (3,4).

Cardiac rehabilitation (CR) is a commonly used strategy aimed at improving adherence to these PA levels for patients with CAD (5,6). Despite positive physical effects of CR, most patients with CAD fails to achieve the recommended levels of MVPA during and after CR (7–9). Several factors are of influence to maintain adherence to PA. Low levels of self-efficacy and social support of peers negatively influence adherence to PA levels and attendance to CR (10–12). Many patients with CAD also avoiding MVPA because of fear of movement (i.e. kinesiophobia) (13,14). According to current CR guidelines, the achievement of recommended MVPA levels is one of main treatment objectives of CR (3,15,16). However, CR guidelines only recommend assessing aerobic capacity by cardiopulmonary exercise testing (CPET) to determine physical fitness(16). The assessment of MVPA levels is not a standard measurement procedure (16). Standard measurement of MVPA would be more in line with the stated treatment objective to improve MVPA levels. However, valid measurement of PA remains a challenge (17,18). A questionnaire is a common-used low-cost option, but questionnaire scores correlate weakly (r=0.25) with activity monitor data and direct observation(17). The reason for this weak correlation is that patients with CAD generally overestimate the duration and intensity of MVPA (17).

The weak correlation between self-reported outcomes and activity monitor data emphasize the need to determine which variables are associated with the difference ($MVPA_d$) between perceived MVPA ($MVPA_p$) and measured MVPA ($MVPA_m$) levels. The underlying cause of overestimating PA differs. Men, older age, social desirability and low-education levels increases the overestimation of PA (19,20). Self-efficacy, social support and kinesiophobia are associated with PA levels in patients with CAD, but their role on overestimating PA levels is currently unknown (10–13). Furthermore, performing PA under harder circumstances or with a longer duration also leads to an overestimation of PA (21). Based on these findings, differences in duration and intensity of CR programs, may lead to differences in $MVPA_d$.

Patients have incorrect believes about the achievement of current exercise recommendations which is an obstacle for behavioural change(22,23). More awareness of actual MVPA levels is necessary to achieve exercise recommendations and maintaining long term physical fitness in adults with CAD (21). Knowledge about the understanding of overestimating PA levels contribute to the development of strategies, for example education, to improve the patient's perception of performed PA levels.

We hypothesize that age, type of CAD, type of CR, social support, self-efficacy and kinesiophobia will be associated with $MVPA_d$. The primary objective of this study is to determine if age, type of CAD, type of CR, social support, self-efficacy and kinesiophobia are associated with $MVPA_d$ in patients with CAD during outpatient CR within the Department of Rehabilitation Medicine of the University Medical Center Groningen (UMCG).

METHODS

Design and Participants

A two-centre observational cross-sectional study was conducted on locations UMCG, Groningen (hospital) and UMCG Beatrixoord, Haren (rehabilitation centre) within the Department of Rehabilitation Medicine. Measurements were conducted between 8 January and 20 April 2018. Patients were included if they were; 1. ≥18 years old, 2. diagnosed with CAD by a cardiologist, 3. referred to outpatient CR and 4. able to understand, speak and read the Dutch language. Adults with valve reconstructions, congenital heart disease, (previous) heart transplantation or heart failure were excluded.

Data collection

1. MVPA. MVPA was defined as PA with an absolute intensity level of ≥ 3 Metabolic Equivalents (3). The level of $MVPA_p$ was assessed by means of a questionnaire and $MVPA_m$ was measured with an activity monitor:

Perceived MVPA. The Short Questionnaire to Assess Health enhancing Physical Activity questionnaire (SQUASH) was used to assess the amount of time participants perceived to spend on domain-related activities for the last 7 days (Appendix 1). The questionnaire contains the following domains: Commuting activities, activities at work and school, household activities and leisure time activities. These activities are classified in light, moderate and vigorous intensity using MET values (3,24). The SQUASH has a reproducibility of r=0.58 (spearman's rho) and a criterion validity of r=0.45 (spearman's rho), using the Computer Science And Applications activity monitor as reference (25).

Measured MVPA. $MVPA_m$ was measured using the ActivPAL3^{tm} micro activity monitor (PAL technologies Ltd., Glasgow, UK). The duration, intensity levels and postural positions of MVPA were obtained by accelerometer derived data which correlates strong (r=0.96) with direct observation (26,27). Participants wore the ActivPAL3^{tm} continuously (24 hours) for 7 days, which has been advised as a minimum to assess a reliable estimate of weekly performed MVPA (26). Excel IBM 2010, Matlab R2018 and ActivPAL3^{tm} software (version 7) were used to analyse raw accelerometer data (15 second epoch files, Excel IBM 2010). The total duration in minutes spend in MVPA and mean wear/non-wear time were calculated.

2. Kinesiophobia. Kinesiophobia was assessed using an adapted version of the original Dutch Tampa Scale for Kinesiophobia (TSK). The TSK contains 17 items and a score of >37 points reflects a high score for kinesiophobia. The original Dutch version is a valid questionnaire to determine kinesiophobia, however many TSK items are not applicable for patients with CAD (28). The TSK was adapted to make it applicable for patients with CAD by two researchers (prof. dr. P.U. Dijkstra and R.J. Groothuis, BSc). The Dutch TSK of Vlaeyen et. al. 1995 and the TSK-Heart developed by Bäck et. al. 2013 were starting point for the adaptation (14,28). A concept version of the Dutch TSK-HART (Appendix 2) was critically evaluated for content validity in two focus groups. The focus groups consisted of 4 experts in the domains of physical therapy (cardiac rehabilitation), cardiology, rehabilitation psychology and chronic pain. The focus group members rated the 17 items of the TSK-HART on a 5-point Likert scale. They answered the question: 'To what extent do you agree with the current phrasing of the item?' on each item. The content was adapted until 80% of the focus group members agreed (4) or fully agreed (5) with the content of the item, as assessed on a consensus rating document (Appendix 3).

3. Self-efficacy and social support. Self-efficacy and social support were measured using the Self-Management Screening (SeMaS) (Appendix 4). A score of ≥4 points on the domain self-efficacy indicates that the patient has sufficient self-efficacy and internal locus of control. A score of ≥3 points on the domain social support indicates that the patient has sufficient support of peers during CR. Criterion validity of the SeMaS is considered to be moderate (r=0.42) on the domain self-efficacy and strong (r=0.63) on the domain of social support, validated with the Patient Activation Measure (PAM) and the Short Scale of Social Support (SSSS) (29).

4. Age, gender, type of CAD. Age, gender and type of CAD were obtained from the medical file of each participant.

5.Type of CR. Patients were participating in one of the following outpatient CR programs:
1. CR program 1: Program of 6 weeks, frequency of 1 training session per week (UMCG, Groningen). Each session consisted of 30 minutes cycling on an ergometer and 45 minutes of general gymnastics, fitness, sport activities or a relaxation session.
2. CR program 2: Program of 6 weeks, frequency of 2 training sessions per week, 60 minutes per session (UMCG, Groningen). Each session consisted of 30 minutes cycling on an ergometer and 30 minutes of general gymnastics, fitness, sport activities or a relaxation session.
3. CR program 3: Program of 12 weeks, frequency of 2 training sessions per week, 135 minutes per session (Beatrixoord UMCG, Haren). Each session consisted of 45 minutes cycling on an ergometer, 45 minutes fitness and 45 minutes swimming or sport activities.

The intensity level of each cycling session was gradually increased from 50 to 80% of the patient's maximal aerobic performance (VO_2peak) during the CR period(15). The VO_2peak was measured at baseline of the CR program.

Ethical considerations

This study was conducted according to the principles of the Declaration of Helsinki (October 2013). The study protocol was assessed by the Medical Ethics Committee of the UMCG (METc-2017-575) and the research does not fall under the Medical Research Involving Human Subjects Act. Participants were recruited after filling informed consent and were able to voluntary terminate study participation at any time.

Study Procedures

Patients participating in outpatient CR within the Department of Rehabilitation Medicine of the UMCG were asked for study participation by their physical therapist (PT). After written informed consent, researcher R.J. Groothuis attached the ActivPAL3^{tm} on the right thigh of the participant with medical adhesive dressing (Tegaderm3M). Secondly, he informed the participant about necessary wear, attachment and replacement procedures according to the protocol (Appendix 5). After 7 days the participant returned the ActivPAL3^{tm}. The assessment of $MVPA_p$ (SQUASH), self-efficacy (SeMaS), social support (SeMaS) and kinesiophobia (TSK-HART) were obtained directly thereafter in a quiet and private room. Participants completed these questionnaires in presence of the researcher.

Sample size

According to the statistical rules of Green et. al. 1991 the minimum sample size to perform a multiple linear regression analysis is 50 patients + (8 x number of variables in the equation) (30). According to this rule the minimum required sample size is 98 participants.

Statistical analysis

Data was analysed using IBM SPSS Statistics for Windows, Version 23.0. (Armonk, NY: IBM Corp.). Descriptive analysis was used to present participants characteristics and to check data for normal distribution. Missing values for ActivPAL3^{tm} outcomes, self-efficacy and kinesiophobia were individually imputed by the mean sum scores on ActivPAL3^{tm} outcomes, self-efficacy and kinesiophobia of other participants (31). Outliers and missing data of the SQUASH outcomes were separately obtained by a SPSS syntax, developed by Wendel and Vos (2003) (24). Missing values were imputed by the median duration of other participants spend on similar activities. The original syntax was further adapted for this study (Appendix 2). Absolute MET values were used to calculate the self-reported duration (in minutes) spend to MVPA (≥3 MET's) (Appendix 6) (32).

$MVPA_m$ was calculated twice adjusted and not adjusted for the number of CR sessions per week. The total amount of MVPA (minutes per week) minus the minutes spend in MVPA during CR was defined as adjusted MVPA. $MVPA_d$ was calculated as the duration in minutes of $MVPA_p$ (SQUASH) minus the duration in minutes $MVPA_m$ (ActivPAL3). The significance of

$MVPA_d$ was analysed using a Wilcoxon signed rank test due to skew data.

Univariate associations between age, social support, self-efficacy, kinesiophobia and $MVPA_d$ were calculated using Spearman's rho correlation due to skew data. Differences between type of CAD, type of CR and $MVPA_d$ were analysed using a Mann Whitney U test due to skewness of data. Type of CAD and type of CR were transformed into dummy variables. Type of CAD was coded as 0= no myocardial infarction (Angina Pectoris, Atherosclerosis or other types of CAD) and 1= myocardial infarction. Type of CR is coded as 0= CR program 3 (UMCG Beatrixoord, Haren) and 1= CR programs 1 and 2 (UMCG Groningen). Univariate analysis were executed without extreme outliers. Variables with a significant univariate association of $p < 0.20$ with $MVPA_d$ were entered (block wise) in linear regression analysis, with $MVPA_d$ as dependent variable. Regression models were checked on multicollinearity and goodness of fit and residuals on normality and homoscedasticity. Bootstrapping with a bias corrected and accelerated 95% confidence interval was executed (used number of samples = 1000) during the regression analysis due to skewness of the residuals. Influence of outliers on the regression model were explored by performing analyses with and without outliers.

At last, internal consistency (Cronbach's alpha) within patient's ratings on the 17 adapted items of the TSK-HART was determined. This analysis was not part of the primary study objective but was needed to determine content validity of the TSK-HART.

RESULTS

Patient characteristics

In total 51 patients (43 males) with CAD were enrolled (Figure 1). Mean (sd) age of the study sample was 59±7 years. Myocardial infarction was the most frequent (n=39) diagnosis. Forty-four (86%) participants were referred to CR programs 1 and 2, located in the UMCG Groningen (Table 1). Ten participants (19%) reported kinesiophobia (>37 points) on the TSK-HART. One patient (2%) scored low (<4 points) on self-efficacy and all patients experienced sufficient social support (≥3 points).

Missing data and outliers

In three participants missing values were present in the sum scores of $MVPA_m$, $MVPA_p$ and self-efficacy. These missing values were the result of technical problems or incomplete filled in questionnaires. The total percentage of missing values was 0.08% and all obtained missing values are completely at random and equally spread. One outlier (case 31) reported an $MVPA_d$ of 3352 minutes. This outlier was of extreme influence on associations between $MVPA_d$ and age, type of CAD, type of CR, social support, self-efficacy and kinesiophobia.

Outcomes

Measured MVPA during CR

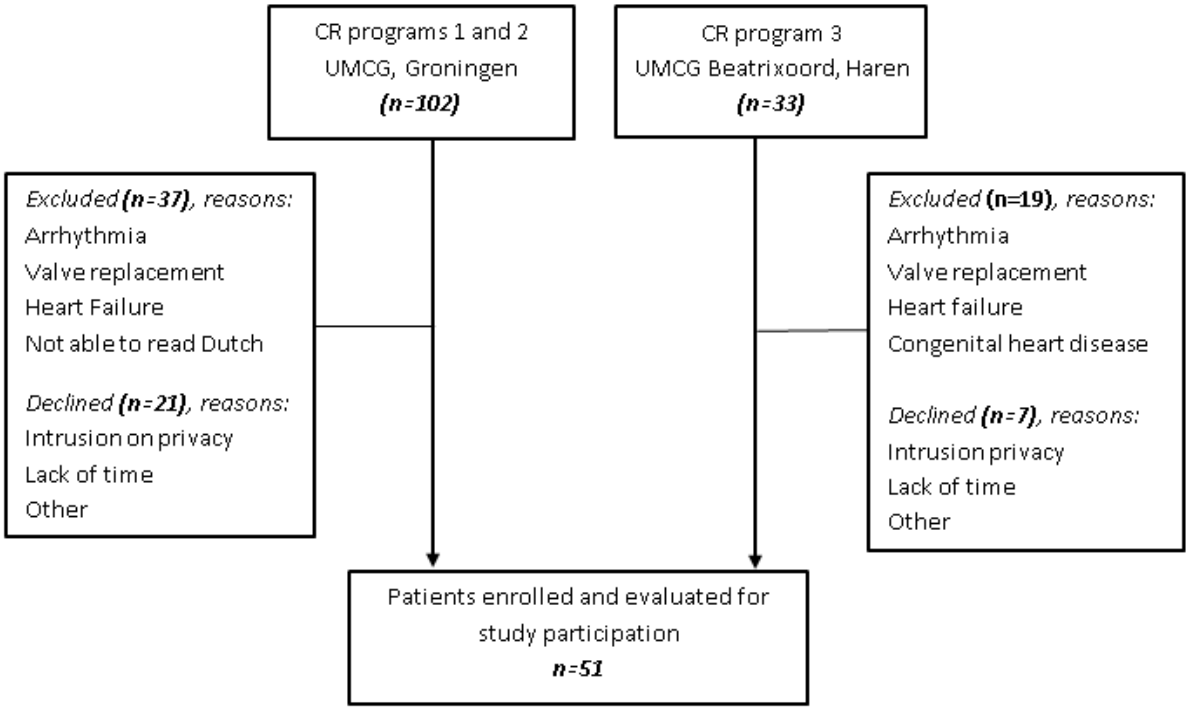
The mean wear time (sd) of the ActivPAL3^{tm} was 168 $\pm$0.11 hours (approximately 7 days). Not adjusted for CR sessions per week, 47 patients (92%) achieved the recommended level of ≥150 minutes MVPA per week (3). Adjusted for CR sessions per week, 35 patients (69%) achieved the recommended level of 150 minutes MVPA per week (3). There was no significant difference (Mann Whitney U=211,5; p=0.617) of $MVPA_m$ between type of CAD subgroups (0=no myocardial infarction or 1=myocardial infarction).

Difference between measured MVPA and perceived MVPA levels ($MVPA_d$)

The ActivPAL3^{tm} activity monitor measured a median of 326 [IQR: 222;492] minutes MVPA per week. Participants reported a median of 1230 [IQR: 600;1940] minutes MVPA per week by the SQUASH. Participants significantly overestimated MVPA with a median of 839 [IQR: 232;1491] minutes ($p < 0.001$) per week. This corresponds to a median overestimation of 2 hours MVPA per day. The correlation (spearman's rho) between $MVPA_m$ and $MVPA_p$ outcomes was r_s=0.23, p=0.113 (2-tailed).

Figure 1

Flowchart of the study enrolment



Note. CR: Cardiac rehabilitation, non-CAD: non-Coronary Artery Disease

Table 1

Characteristics of the study population (n=51)

Characteristics	Mean± sd /median [IQR]/ n (%)
Age	59.41 ± 7.1
BMI	27.97 ± 4.4
MVPA not adjusted for CR	326 [IQR 222;492][a]
MVPA adjusted for CR	226 [IQR: 109;406][a]
Kinesiophobia	32 [IQR: 26;36][a]
Social support	5 [IQR: 4;7][a]
Self-efficacy	6 [IQR: 4;6][a]
Gender, female	8 (16%)
Comorbidities	21 (41%)
Currently employed	19 (37%)
Partnered	45 (88%)
Type of CAD	
Atherosclerosis	4 (8%)
Myocardial Infarction	39 (77%)
Stable Angina Pectoris	5 (10%)
Unstable Angina Pectoris	2 (4%)
Other	1 (2%)
Type of medical intervention	
Medication only	2 (4%)
PCI	36 (71%)
CABG	8 (16%)
PCI + CABG	5 (10%)
Type of CR	
CR program 1	12 (24%)
CR program 2	32 (63%)
CR program 3	7 (14%)
Location of CR	
UMCG, Groningen	44 (86%)
Beatrixoord UMCG, Haren	7 (14%)

Note. CR: Cardiac Rehabilitation, CAD: Coronary Artery Disease, PCI: Percutaneous Coronary Intervention, CABG: Coronary Artery Bypass Grafting. MVPA: Moderate to Vigorous Physical activity (in minutes per week measured with the ActivPAL3^{tm} activity monitor) sd: standard deviation.

[a] Not normally distributed: expressed in median and interquartile range [IQR].

Univariate analysis of age, type of CAD, type of CR, social support, self-efficacy, kinesiophobia on $MVPA_d$

Table 2 shows the univariate association between age, social support, self-efficacy, kinesiophobia and $MVPA_d$. Lower age, social support and self-efficacy leads to less $MVPA_d$. However, univariate associations between age, social support, self-efficacy and $MVPA_d$ were very weak. And almost no association was found between kinesiophobia and $MVPA_d$. Age was entered in a regression analysis based on a significance of $p<0.20$ (Table 2).

Table 3 shows the differences between $MVPA_d$ within the subgroups type of CAD and type of CR. Participants without myocardial infarction (MI) overestimated $MVPA_p$ by a median of 1491 [IQR: 333;1906] minutes and participants with MI overestimated $MVPA_p$ by a median of 779 [IQR: 204;1351] minutes. The overestimation in minutes ($MVPA_d$) was not significantly ($p=0.12$) different between the subgroups type of CAD. However, type of CAD was entered in a regression analysis based on a significance of $p<0.20$ (2-tailed) (Table 3).

Participants referred to CR programs 1 and 2 (UMCG Groningen) overestimated $MVPA_p$ by a median of 915 [IQR: 255;1459] minutes and participants referred to CR program 3 (UMCG Beatrixoord Haren) overestimated $MVPA_p$ by a median of 495 [IQR: 85;1436] minutes (Table 3). The overestimation in minutes ($MVPA_d$) between the CR programs was not significantly different ($p=0.36$).

Table 2

Associations (Spearman's rho) between $MVPA_d$ and age, social support, self-efficacy and kinesiophobia.

$MVPA_d$	**Age**	**Social Support**	**Self-efficacy**	**Kinesiophobia**
Spearman's rho correlation coefficient (Significance, 2-tailed)	-0.27 (0.06)	-0.05 (0.74)	-0.09 (0.54)	0.01 (0.97)

Note. $MVPA_d$: Difference between perceived and measured Moderate to Vigorous Physical Activity.
Social support and self-efficacy expressed as sum scores of the Self-Management Screening.
Kinesiophobia expressed as sum score of the Tampa scale for Kinesiophobia.

Table 3

Differences between $MVPA_d$ and type of CAD, type of CR

$MVPA_d$	Mdn [IQR]	Mdn [IQR]	Mann-Whitney U	P (2-tailed)[c]
	MI	***No MI***		
Type of CAD[a]	778.6 [IQR: 204;1351]	1491.0 [IQR: 333-1906]	148.00	0.12
	CR program 1 and 2	***CR program 3***		
Type of CR[b]	914.9 [IQR: 255;1459]	494.5 [IQR: 85;1436]	101.00	0.36

Note. $MVPA_d$: Difference between perceived and measured Moderate to Vigorous Physical Activity. CAD: Coronary Artery Disease, CR: Cardiac Rehabilitation. MI: Myocardial Infarction

[a]Type of CAD is coded as 0 = no myocardial infarction and 1 = myocardial infarction.

bType of CR is coded as 0 = CR program 3 (Beatrixoord UMCG, Haren) and 1= CR program 1 and 2 (UMCG, Groningen).

[c] Differences between both groups were assessed by Mann-Whitney U tests with two-tailed P values (*, P < 0.05;).

Multivariate regression analysis: Age and type of CAD on $MVPA_d$

The assumptions of linearity and homoscedasticity of the residuals and multicollinearity were met. One extreme outlier (case 31) influenced the regression coefficients, so the influence of age and type of CAD on $MVPA_d$ was analysed with and without this outlier. The residuals remained non normally distributed after bootstrapping.

Table 4 shows the multivariate analysis for the complete dataset. Table 5 shows the multivariate analysis excluded for the most extreme outlier (case 31). In the complete dataset, type of CAD significantly (B=-669.00, p=0.013) contributed to $MVPA_d$. The entered variables age and type of CAD explained 13% (R^2 = 0.130) of $MVPA_d$ in model 1 (Table 4). Excluded for the most extreme outlier, age (B=-19.1, p=0.207) and type of CAD (B=-471.6, p=0.064) did not significantly contributed to $MVPA_d$. Age and type of CAD explained 10.9% (R^2 = 0.109) of $MVPA_d$ in model 2 (Table 5). Entered as single variable, type of CAD (B=-501.00, p=0.093) also did not significantly contributed to $MVPA_d$ (Table 5). In general, directions of the regression coefficients showed that older age and presence of MI may lead to lower $MVPA_d$,but the influence of age was not significant (Table 4 and 5).

Table 4

Model 1: Multivariate regression analysis of age and type of CAD on $MVPA_d$

		$MVPA_d$		
Independent variable	**Regression coefficient**	**Standard error**	**Significance (2-tailed)**	**95% CI**
(Constant)	1977.2	953.2	0.043[a]	60.6;3893.8
Age	-8.9	15.7	0.574	-40.5;22.7
Type of CAD	-669.0	257.8	0.013[a]	-1187.22;150.6

Note. MVPA: Moderate to vigorous physical activity. CAD: Coronary artery disease. CI: Confidence interval.
Model 1 is based on the complete dataset, including outliers (n=51).

[a] Level of significance at $p<0.05$ (2-tailed).

Table 5

Model 2: Multivariate regression analysis of age and type of CAD on $MVPA_d$

		$MVPA_d$		
Independent variable	**Regression coefficient**	**Standard error**	**Significance (2-tailed)**	**95% CI**
(Constant)	2389.8	895.3	0.010[a]	588.8;4190.8
Age	-19.1	15.0	0.207	-49.26;11.0
Type of CAD	-471.6	248.3	0.064	-971.0;27.9
Independent[b] variable				
(Constant)	1279.6	273.0	0.001	753.8;1836.9
Type of CAD	-501.0	293.9	0.093	-1020.3;31.1

Note. MVPA: Moderate to vigorous physical activity. CAD: Coronary artery disease. CI: Confidence interval.
Model 2 excluded case 31 as extreme outlier (n=50).

[a] Level of significance at $p<0.05$ (2-tailed).

[b] Type of CAD entered as single variable in the model.

Internal consistency Dutch TSK-HART

A Cronbach's alpha of $\alpha=0.80$ was determined within patient ratings, which can be considered as good internal consistency on the adapted content of the TSK-HART.

DISCUSSION

Adults with CAD, participating in an outpatient CR program overestimate the duration of weekly performed MVPA. In the complete dataset (n=51), type of CAD significantly contributed to $MVPA_d$ in a multivariate regression analysis. Excluded for one extreme outlier (n=50), the variables age and type of CAD did not significantly contribute to $MVPA_d$. Most of the participants (92%) achieved the current exercise recommendations when performed $MVPA_m$ during CR sessions were included and 67% of the participants achieved exercise recommendations without included CR sessions (3,4).

Based on the results, it is hard to explain why only type of CAD significantly contributes to $MVPA_d$. Previous literature mentioned several causes for overestimating PA (19–21). Length and environmental conditions of performed PA could be of influence (21). Based on this knowledge, $MVPA_d$ should have increased in patients with increased MVPA levels. However, longer performed MVPA was not significantly associated with $MVPA_d$. Differences in performed MVPA were also not significantly different between the subgroups of CAD (presence or no presence of MI).

The amount of $MVPA_d$ in minutes per week is high in relation to previously reported $MVPA_d$ (17,20,33). The use of different types of activity trackers and self-reported questionnaires within the studies to determine PA levels could explain differences in reported $MVPA_d$ (17). The direction of disagreement (over- or underestimating PA) also differs within current studies (34). The direction of disagreement may be associated with the intended measured intensity of PA (34). Patients generally overestimate MVPA but underestimate sedentary PA out of social desirability (21,34). By filling in higher amounts of performed MVPA, patients try to please the researcher or physical therapist during assessment (34), which results in a higher level of disagreement.

The study results indicate that the achievement to weekly recommended MVPA is partly the result of the performed CR sessions. Previous studies already mentioned that patients are more active on CR days compared with non-CR days and found CR not effective for long term adherence to PA (8,9,35). Self-efficacy is an important motivator for long term adherence to PA (35,36) and kinesiophobia is mentioned as an important barrier for (long-term) adherence to PA (13, 28). It is hard to explain why less kinesiophobia and higher self-efficacy did not lead to a lower $MVPA_d$ in this study. We hypothesized that fear during exercise could lead to a longer perceived duration of performed MVPA. However, the association between $MVPA_d$ and kinesiophobia was almost zero. Previous findings showed that kinesiophobia leads to the avoidance of performing PA with higher intensity levels (13, 28). Compared to other studies, the prevalence of kinesiophobia in this sample was relatively high, but most of the participants achieved the recommended MVPA levels (13).

This study has some limitations. The current sample size (n=51) did not meet the recommended sample size of 98 participants to perform a multiple linear regression analysis (37). The regression coefficients showed a direction of the entered variables, but the overall generalisability of the model remains limited. Especially the heterogeneity of the residuals and the small sample size violated the model. Findings in reported MVPA may also be less generalizable to other activity trackers or questionnaires (17).

Non-corrected MET-values of standard compendia were used to determine the intensity of MVPA (32). The individual metabolic energy expenditure is influenced by age, gender, body weight and physical fitness and MET values should be corrected for these variables (38). By using non-corrected MET values, MVPA could have partly been misclassified in the study sample (38). The determined MET-values of the SQUASH were high compared to ActivPAL3^{tm} outcomes. For example, the given MET-value for bicycling (ergometer) by the SQUASH is seven. According to the ActivPAL3^{tm} outcomes, none of the participants reached this MET-value while all CR sessions contained a cycling session. The SQUASH uses non-corrected MET-values to determine the amount of MVPA. By using a MET cut-off point for MVPA (≥3MET's) activities with almost the same intensity may also fall in or outside MVPA (39). Furthermore, it is known that the ActivPAL3^{tm} slightly underestimates actual MVPA levels (26,39). Over a period of 90 minutes performed MVPA, the ActivPAL3^{tm} underestimates the actual level of MVPA by 4.3 minutes (39). The attachment location of the ActivPAL3^{tm} makes it harder to detect upper body activities which could be an explanation for this underestimation (20). Based on abovementioned knowledge, $MVPA_d$ could have been increased by measurement errors in MET values but also by a small underestimation of the ActivPAL3^{tm}.

The assessment of PA is currently not part of standard measurement procedures, which makes it more difficult for physiotherapists to evaluate and improve PA levels in patients with CAD (16). Recent literature recommends the use of activity monitors for assessing PA because the use of questionnaires is criticised due the phenomenon of overestimating PA (17,18). However, self-report is still a common-used strategy by physiotherapists to assess PA (18). A better understanding of psychological factors associated with $MVPA_d$ is needed because $MVPA_d$ misleads the patient's and physiotherapist's perception of achieving exercise recommendations during CR, which obstructs behavioural change (22,40). Secondly, the intended construct of psychological factors as social support (including overprotectiveness), kinesiophobia, social desirability and self-efficacy remain hard to quantify. Qualitative research should further investigate the construct psychological factors associated with adherence to PA levels. This could lead to a better explanation of their influence on $MVPA_d$ in patients with CAD. More knowledge about the understanding of $MVPA_d$ may improve the patient's behavioural change and provides physiotherapists to evaluate and improve the perception of weekly achieved MVPA during CR. Increasing the patient's perception of MVPA is also needed for long-term adherence to recommended MVPA in adults with CAD.

CONCLUSION

Patients with CAD overestimate $MVPA_p$. Only type of CAD was associated with $MVPA_d$. A misperception of PA misleads the patient's beliefs of achieving exercise recommendations which obstructs behavioural change. More knowledge about the cause of $MVPA_d$ is necessary for maintaining long term physical fitness and health in adults with CAD.

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APPENDIX 1: Short Questionnaire to Assess Health enhancing physical activity (SQUASH) - RIVM version (Dutch)

De RIVM-versie van de SQUASH

Neem in uw gedachten een normale week in de afgelopen maanden. Wilt u aangeven **hoeveel dagen per week** u de onderstaande activiteiten verrichte, hoeveel minuten u daar dan **gemiddeld** op zo'n dag mee bezig was en hoe inspannend deze activiteit was?

WOON-WERK/SCHOOL VERKEER (heen en terug)	**aantal dagen per *week***	**gemiddelde tijd per *dag***	**inspanning (omcirkelen a.u.b.)**
Lopen van/naar werk of school	☐ dagen	☐ uur ☐☐ minuten	langzaam/gemiddeld/snel
Fietsen van/naar werk of school	☐ dagen	☐ uur ☐☐ minuten	langzaam/gemiddeld/snel
Niet van toepassing	☐		

LICHAMELIJKE ACTIVITEIT OP WERK EN SCHOOL	**gemiddelde tijd per week**
Licht en matig inspannend werk (zittend/staand werk, met af en toe lopen, zoals bureauwerk of lopend werk met lichte lasten)	☐☐ uur ☐☐ minuten
Zwaar inspannend werk (lopend werk, waarbij regelmatig zware dingen moeten worden opgetild)	☐☐ uur ☐☐ minuten
Niet van toepassing ☐	

HUISHOUDELIJKE ACTIVITEITEN	**aantal dagen per *week***	**gemiddelde tijd per *dag***
Licht en matig inspannend huishoudelijk werk (staand werk, zoals koken, afwassen, strijken, kind eten geven/in bad doen en lopend werk, zoals stofzuigen, boodschappen doen)	☐ dagen	☐ uur ☐☐ minuten
Zwaar inspannend huishoudelijk werk (vloer schrobben, tapijt uitkloppen, met zware boodschappen lopen)	☐ dagen	☐ uur ☐☐ minuten
Niet van toepassing ☐		

VRIJE TIJD	**aantal dagen per *week***	**gemiddelde tijd per *dag***	**inspanning (omcirkel a.u.b.)**
Wandelen	☐ dagen	☐ uur ☐☐ minuten	Langzaam/gemiddeld/snel
Fietsen	☐ dagen	☐ uur ☐☐ minuten	Langzaam/gemiddeld/snel
Tuinieren	☐ dagen	☐ uur ☐☐ minuten	Licht/gemiddeld/zwaar
Klussen/Doe-het-zelven	☐ dagen	☐ uur ☐☐ minuten	Licht/gemiddeld/zwaar
Sporten (Hier maximaal 4 opschrijven) *bijv.: tennis, handbal, gymnastiek, fitness, schaatsen, zwemmen*			
1.	☐ dagen	☐ uur ☐☐ minuten	Licht/gemiddeld/zwaar
2.	☐ dagen	☐ uur ☐☐ minuten	Licht/gemiddeld/zwaar
3.	☐ dagen	☐ uur ☐☐ minuten	licht/gemiddeld/zwaar
4.	☐ dagen	☐ uur ☐☐ minuten	licht/gemiddeld/zwaar

TOTAAL	
Op gemiddeld hoeveel dagen per week bent u, alles bijelkaar opgeteld, tenminste een half uur bezig met fietsen, klussen, tuinieren of sporten?	☐ dagen per week

APPENDIX 2: Dutch Tampa Scale for Kinesiophobia (Hart) – Adapted version (Dutch)

Tampa Schaal voor Kinesiofobie
Aangepaste versie (Nederlands) voor hartpatiënten. 2017.

Instructie

Met deze lijst willen wij onderzoeken op welke wijze u tegen uw hartklachten aankijkt en hoe u deze ervaart. Het is de bedoeling dat u met behulp van de cijfers 1 t/m 4 aangeeft in welke mate u het eens of oneens bent met elke bewering. Het is van essentieel belang dat u bij de beoordeling uitgaat van uw eigen gevoelens, wat anderen denken is hierbij niet relevant. Het is ook niet de bedoeling uw medische kennis te testen. Waar het om gaat is dat u aangeeft hoe u uw hartklachten ervaart.

Geef van onderstaande beweringen door middel van een cijfer tussen 1 en 4 aan in welke mate u het eens of oneens bent met deze bewering. Omcirkel daarbij het juiste cijfer. De betekenis van de cijfers is als volgt:

1 = in hoge mate mee oneens
2 = enigszins mee oneens
3 = enigszins mee eens
4 = in hoge mate mee eens

1. Ik ben bang om bij lichamelijke inspanning hartklachten te krijgen	1	2	3	4
2. Als ik me inspan zullen mijn hartklachten erger worden	1	2	3	4
3. Mijn lichaam zegt me dat er iets ernstigs mis is	1	2	3	4
4. Mijn hartklachten zouden waarschijnlijk afnemen als ik me lichamelijk inspan	1	2	3	4
5. Mijn gezondheidstoestand wordt door anderen niet serieus genoeg genomen	1	2	3	4
6. Door mijn hartprobleem loop ik de rest van mijn leven gevaar	1	2	3	4
7. Mijn hartklachten betekenen dat er sprake is van schade aan het hart	1	2	3	4
8. Als mijn hartklachten erger worden door iets, betekent dat nog niet dat dat gevaarlijk is	1	2	3	4

9. Ik ben bang om zomaar schade aan mijn hart op te lopen	1	2	3	4
10.De beste manier om te voorkomen dat mijn hartklachten erger worden is dat ik mij niet teveel lichamelijk inspan	1	2	3	4
11.Ik zou minder hartklachten hebben, als er niet iets gevaarlijks aan de hand zou zijn	1	2	3	4
12.Hoewel ik hartklachten heb, is het voor mij beter om lichamelijk actief te zijn	1	2	3	4
13.Mijn hartklachten zijn een signaal dat ik moet stoppen met lichamelijke inspanning, om geen schade aan mijn hart op te lopen	1	2	3	4
14.Voor mij als hartpatiënt is het echt af te raden om lichamelijk actief te zijn	1	2	3	4
15.Ik kan niet alles doen wat anderen doen, omdat ik gemakkelijk schade aan mijn hart oploop	1	2	3	4
16.Zelfs als ik ergens veel hartklachten door krijg, geloof ik niet dat het gevaarlijk is	1	2	3	4
17.Ik zou me niet lichamelijk hoeven inspannen, als ik hartklachten heb	1	2	3	4

APPENDIX 3: Focus group – consensus rating document (Dutch)

Toelichting score:

Geef aan in hoeverre u het met de vraagstelling eens bent. Omcirkel het cijfer wat het beste bij uw oordeel past. Doet dit nogmaals na de aanpassing die is besproken in de groep.

1= totaal mee oneens, 2=mee oneens, 3= neutraal, 4= eens, 5= totaal mee eens.

Vraag	Concept	Aanpassing
1. Ik ben bang om bij lichamelijke inspanning letsel op te lopen	1 2 3 4 5	1 2 3 4 5
2. Als ik me over mijn hartklachten heen zou zetten dan zouden ze erger worden	1 2 3 4 5	1 2 3 4 5
3. Mijn lichaam zegt me dat er iets gevaarlijk mis mee is	1 2 3 4 5	1 2 3 4 5
4. Mijn hartklachten zouden waarschijnlijk afnemen als ik me lichamelijk inspan	1 2 3 4 5	1 2 3 4 5
5. Mijn gezondheidstoestand wordt door anderen niet serieus genomen	1 2 3 4 5	1 2 3 4 5

6. Door mijn hartklachten loop ik de rest van mijn leven gevaar	**1 2 3 4 5**	**1 2 3 4 5**
7. Mijn hartklachten betekenen dat er sprake is van letsel	**1 2 3 4 5**	**1 2 3 4 5**
8. Als mijn hartklachten erger worden door iets, betekent dat nog niet dat dat gevaarlijk is	**1 2 3 4 5**	**1 2 3 4 5**
9. Ik ben bang om per ongeluk letsel op te lopen	**1 2 3 4 5**	**1 2 3 4 5**
10. De veiligste manier om te voorkomen dat mijn hartklachten erger worden is gewoon oppassen dat ik mij niet onnodig lichamelijk inspan	**1 2 3 4 5**	**1 2 3 4 5**
11. Ik zou wellicht minder hartklachten hebben als er niets iets gevaarlijks aan de hand zou zijn met mijn lichaam	**1 2 3 4 5**	**1 2 3 4 5**
12. Hoewel ik hartklachten heb, zou ik er beter aan toe zijn als ik lichamelijk actief zou zijn	**1 2 3 4 5**	**1 2 3 4 5**

13. Mijn hartklachten zeggen mij wanneer ik moet stoppen met lichamelijke inspanning, om geen letsel op te lopen	**1 2 3 4 5**	**1 2 3 4 5**
14. Voor iemand in mijn toestand is het echt af te raden om lichamelijk actief te zijn	**1 2 3 4 5**	**1 2 3 4 5**
15. Ik kan niet alles doen wat gewone mensen doen, omdat ik te gemakkelijk letsel oploop	**1 2 3 4 5**	**1 2 3 4 5**
16. Zelfs als ik ergens hartklachten door krijg, geloof ik niet dat dat gevaarlijk is	**1 2 3 4 5**	**1 2 3 4 5**
17. Ik zou geen lichamelijke inspanning moeten doen wanneer ik hartklachten heb	**1 2 3 4 5**	**1 2 3 4 5**

APPENDIX 4: Self-Management Screening (SeMaS)

Patiënt HIS-nummer:

Scientific Institute for Quality of Healthcare

Radboud University Nijmegen Medical Centre

SeMaS: Self Management Screening

Invuldatum .....-.....-..... (dd-mm-jjjj)

Geboortedatum .....-.....-..... (dd-mm-jjjj)

Geslacht

- ☐ Man
- ☐ Vrouw

1. Wat is uw hoogst voltooide opleiding? (een opleiding afgerond met diploma of voldoende getuigenschrift)

- ☐ L Geen opleiding (voltooid)
- ☐ L Lagere school/basisonderwijs
- ☐ L Lager beroepsonderwijs (bijv. LTS, LEAO, LHNO)
- ☐ M (M)ulo, MAVO
- ☐ M Middelbaar beroepsonderwijs (bijv. MTS, MEAO, MDS, MBO)
- ☐ H Havo, HBS, VWO, Atheneum, Gymnasium, MMS, Lyceum
- ☐ H Hoger beroeps onderwijs (HBO) of wetenschappelijk onderwijs (universiteit)
- ☐ Anders, nl _____

2. Geef met een kruisje op onderstaande lijn antwoord op de volgende vraag:

Hoeveel last ervaart u meestal van uw ziekte(n)?

0 1 2 3 4 5 6 7 8 9 10

Helemaal geen last — Ondraaglijk veel last

Totaal FS	

Kruis hieronder per vraag het hokje aan dat staat voor het meest passende antwoord.

		Helemaal niet mee eens	Niet mee eens	Mee eens	Helemaal mee eens	Item Score
3.	Ik heb goede computervaardigheden (bijv. zoeken op google, e-mail)	☐0	☐1	☐2	☐3	
4.	Ik functioneer goed in groepen (collega's, andere patiënten etc.)	☐0	☐1	☐2	☐3	
5.	Ik ben bereid om aan zelfzorg te doen (bloeddruk meten, wegen, etc.)	☐0	☐1	☐2	☐3	

		Helemaal niet mee eens	Niet mee eens	Mee eens	Helemaal mee eens	
6.	Mijn gezondheid wordt in de eerste plaats bepaald door wat ik zelf doe.	☐0	☐1	☐2	☐3	
7.	Wat betreft mijn gezondheid, kan ik alleen maar doen wat de dokter zegt.	☐3	☐2	☐1	☐0	
8.	Of ik gezond blijf is een kwestie van toevallige gebeurtenissen.	☐3	☐2	☐1	☐0	
					Totaal LOC	

		Helemaal niet mee eens	Niet mee eens	Mee eens	Helemaal mee eens	
9.	Ik denk dat ik in staat ben om op een gezonde manier te leven (bijv. gezond eten, voldoende bewegen, niet roken)	☐0	☐1	☐2	☐3	
10.	Als ik mij daarvoor inzet, lukt het mij om op een gezonde manier te leven (bijv. gezond eten, voldoende bewegen, niet roken)	☐0	☐1	☐2	☐3	
					Totaal EE	

11.	Ik heb de volgende personen in mijn omgeving:		Deze personen zijn behulpzaam wanneer ik gezondheidsproblemen heb				
				Volledig onjuist	Enigszins onjuist	Enigszins juist	Volledig juist	
	Echtgenoot/partner	☐Nee	Ja ->	☐0	☐0	☐1	☐2	
	Kinderen	☐Nee	Ja ->	☐0	☐0	☐1	☐2	
	Andere familieleden	☐Nee	Ja ->	☐0	☐0	☐1	☐2	
	Buren	☐Nee	Ja ->	☐0	☐0	☐1	☐2	
	Vrienden/kennissen	☐Nee	Ja ->	☐0	☐0	☐1	☐2	
	Collega's	☐Nee	Ja ->	☐0	☐0	☐1	☐2	
							Totaal SS	

Appendix 5: Attachment and wear protocol ActivPAL3^{tm} activity monitor (Dutch)

Front page:

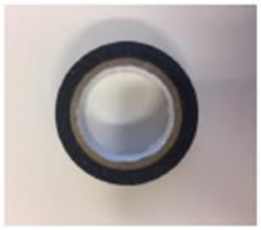
Bevestiging ActivPAL3^{tm} activiteitenmeter

Wij vragen u om de ActivPAL3^{tm} activiteitenmeter 7 dagen continu (dag en nacht) te dragen. Deze activiteitenmeter zal de eerste keer door uw fysiotherapeut of een onderzoeker op uw been worden bevestigd. Wij vragen u de plakstrip om de 3 dagen te vervangen. Indien de plakstrip eerder loslaat moet u het eerder vervangen. Het risico op huidirritatie is heel klein. Het kan zijn dat de plakstrip af en toe wat jeukt, dit is normaal. Indien er sprake is van roodheid en/of bultjes, of er ontstaan blaasjes op de huid, neem dan contact op met onderzoeker Rutger Groothuis (telefoon 050-3612737).

U krijgt het volgende materiaal mee in het bijgevoegde pakketje:

5 plakstrips (Tegaderm 3M 10x10cm)

Afdektape (rol)



2 rubberen condooms

Het opnieuw bevestigen van de activiteitenmeter kan met behulp van het stappenplan op de achterzijde van dit formulier. Mochten er problemen zijn bij het opnieuw bevestigen van de activiteitenmeter bel dan zo snel mogelijk met onderzoeker Rutger Groothuis (telefoon: 050-3612737) om verloren draagtijd te voorkomen. **U kan 7 dagen per week tussen 9.00 en 22.00 contact opnemen.** U kan daarnaast eventuele problemen ook doorgeven aan uw fysiotherapeut bij de hartrevalidatie. **Gooi de activiteitenmonitor nooit weg! Lever het altijd weer in bij uw fysiotherapeut.** De materialen die u niet heeft gebruikt levert u ook weer in bij uw fysiotherapeut bij de hartrevalidatie

Hartelijk dank voor deelname aan het onderzoek.

Met vriendelijke groet,

Rutger Groothuis
Fysiotherapeut/onderzoeker
Universitair Medisch Centrum Groningen, Afdeling Revalidatiegeneeskunde
Mail r.j.groothuis@umcg.nl
Telefoon 050-361273

Rear page:

Bevestiging ActivPAL3^{tm} activiteitenmeter

umcg

Is het condoom intact en waterdicht afgesloten met tape?

JA

NEE

Plaats de meter midden op de voorzijde van uw linker bovenbeen, met de **pijl omhoog** (naar uw hoofd) gericht.

Knippert het groene licht op de meter 1x per 3 seconden?

JA

NEE

Condoom beschadigd? Haal de tape en de bovenste condoom eraf. Laat de onderste condoom zitten indien deze intact is. Schuif de meter in een nieuw condoom en plak dit af met tape. Het is van belang dat er altijd twee condooms om de meter zitten. Bel bij problemen: 050-3612737

Bel 050-3612737

Trek de witte (achterste) zijde van de plakstrip. Plaats de plakzijde over de meter. Trek de uiteinden glad over het been, en wrijf met de vinger de plakstrip goed tegen de huid. Plaats vervolgens nog een stuk plakstrip over de andere plakstrip (op dezelfde manier).

De activiteitenmeter is weer klaar voor waterdicht gebruik. Controleer nog wel even tijdens douchen en zwemmen of er geen water tussen uw huid en de plakstrip gaat zitten.

APPENDIX 6: SQUASH SPSS IBM Statistics syntax.

Adapted steps 'interpretation and analysis of PA intensity levels'. Coding steps are described in Dutch.

```
***
Activiteiten indelen aan de hand van de MET-waarde die er door  Barbara Ainsworth aan gegeven is

Alle activiteiten hebben een code die weer gekoppeld is aan een MET-waarde
***

ACTIVITEIT              CODE      MET-waarde --> 2011 version (Update intensity levels)

Wandelen                17250       3.5         --> 3.5

Fietsen     02010        5.0 --> 7.0

Fietsen van en naar werk 01011 --> 6.8

Tuinieren 08245         5.0 --> 3.0

Klussen     06040        3.0 --> 3.8

Huish licht             05040       2.5 --> 2.5

Huish zwaar             05020       4.5 --> 3.5

Werk licht              11600       2.5 --> 3.0

Werk zwaar              11630       4.0 --> 4.5

***

Voor de sporten hebben we een extra    codeerstap nodig. Hartrevalidatie sessies meegenomen.

***

Hartrevalidatie toegevoegd in coderen,en qua intensiteit (MET) onderverdeeld in drie categorieen:

1. 20011 HRV Fit kort, 1x pw, goed belastbaar : 7.5

2. 20022 HRV Fit kort, 2x pw, matig belastbaar: 6.5

3. 20033 HRV Fit plus, 2x pw, slecht belastbaar:5.5

***

 COMPUTE wwlmet   = 3.5.

 COMPUTE wwfmet   = 6.8.

 COMPUTE wanmet   = 3.5.

 COMPUTE fietmet  = 7.0.

 COMPUTE tuinmet  = 3.0.

 COMPUTE klusmet  = 3.8.

 COMPUTE hhlmet   = 2.5.
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COMPUTE hhzmet = 3.5.

COMPUTE werklmet = 3.0.

COMPUTE werkzmet = 4.5.

EXECUTE.

***

DEEL 14 voor sport1

***

IF (sport1 = 4030) sp1met = 2.0.

IF (sport1 = 2150 OR sport1 = 15080 OR sport1 = 15180) sp1met = 2.5.

IF (sport1 = 15090 OR sport1 = 15670 OR sport1 = 18120 OR sport1 = 15570) sp1met = 3.0.

IF (sport1 = 17250 OR sport1 = 18070) sp1met = 3.5.

IF (sport1 = 15300) sp1met = 3.8.

IF (sport1 = 15630 OR sport1 = 15470 OR sport1 = 15140) sp1met = 4.0.

IF (sport1 = 3025) sp1met = 4.5.

IF (sport1 = 15255) sp1met = 4.8.

IF (sport1 = 17302 OR sport1 = 15580) sp1met = 5.0.

IF (sport1 = 2060 OR sport1 = 15030 OR sport1 = 15370 OR sport1 = 3030 OR sport1 = 20033) sp1met = 5.5.

IF (sport1 = 2050 OR sport1 = 15050 OR sport1 = 18150 OR sport1 = 18310) sp1met = 6.0.

IF (sport1 = 2010 OR sport1 = 2072 OR sport1 = 15610 OR sport1 = 18200 OR sport1 = 15590 OR sport1 = 12020) sp1met = 7.0.

IF (sport1 = 3015 OR sport1 = 15675) sp1met = 7.3.

IF (sport1 = 12150 OR sport1 = 15330) sp1met = 8.0.

IF (sport1 = 18290) sp1met = 8.3.

IF (sport1 = 1009) sp1met = 8.5.

IF (sport1 = 1040) sp1met = 10.0.

IF (sport1 = 15430) sp1met = 10.3.

IF (sport1 = 15650) sp1met = 12.0.

IF (sport1 = 18060) sp1met = 12.5.

IF (sport1 = 20011) sp1met = 7.5.

IF (sport1 = 20022) sp1met = 6.5.

EXECUTE.

***

DEEL 15 voor sport2

***

IF (sport2 = 4030) sp2met = 2.0.

IF (sport2 = 2150 OR sport2 = 15080 OR sport2 = 15180) sp2met = 2.5.

IF (sport2 = 15090 OR sport2 = 15670 OR sport2 = 18120 OR sport2 = 15570) sp2met = 3.0.

IF (sport2 = 17250 OR sport2 = 18070) sp2met = 3.5.

IF (sport2 = 15300) sp2met = 3.8.

IF (sport2 = 15630 OR sport2 = 15470 OR sport2 = 15140) sp2met = 4.0.

IF (sport2 = 3025) sp2met = 4.5.

IF (sport2 = 15255) sp2met = 4.8.

IF (sport2 = 17302 OR sport2 = 15580) sp2met = 5.0.

IF (sport2 = 2060 OR sport2 = 15030 OR sport2 = 15370 OR sport2 = 3030 OR sport2 = 20033) sp2met = 5.5.

IF (sport2 = 2050 OR sport2 = 15050 OR sport2 = 18150 OR sport2 = 18310) sp2met = 6.0.

IF (sport2 = 2010 OR sport2 = 2072 OR sport2 = 15610 OR sport2 = 18200 OR sport2 = 15590 OR sport2 = 12020) sp2met = 7.0.

IF (sport2 = 3015 OR sport2 = 15675) sp2met = 7.3.

IF (sport2 = 12150 OR sport2 = 15330) sp2met = 8.0.

IF (sport2 = 18290) sp2met = 8.3.

IF (sport2 = 1009) sp2met = 8.5.

IF (sport2 = 1040) sp2met = 10.0.

IF (sport2 = 15430) sp2met = 10.3.

IF (sport2 = 15650) sp2met = 12.0.

IF (sport2 = 18060) sp2met = 12.5.

IF (sport2 = 20011) sp2met = 7.5.

IF (sport2 = 20022) sp2met = 6.5.

EXECUTE.

***

DEEL 16: voor sport3

***

IF (sport3 = 4030) sp3met = 2.0.

IF (sport3 = 2150 OR sport3 = 15080 OR sport3 = 15180) sp3met = 2.5.

IF (sport3 = 15090 OR sport3 = 15670 OR sport3 = 18120 OR sport3 = 15570) sp3met = 3.0.

IF (sport3 = 17250 OR sport3 = 18070) sp3met = 3.5.

IF (sport3 = 15300) sp3met = 3.8.

IF (sport3 = 15630 OR sport3 = 15470 OR sport3 = 15140) sp3met = 4.0.

IF (sport3 = 3025) sp3met = 4.5.

IF (sport3 = 15255) sp3met = 4.8.

IF (sport3 = 17302 OR sport3 = 15580) sp3met = 5.0.

IF (sport3 = 2060 OR sport3 = 15030 OR sport3 = 15370 OR sport3 = 3030 OR sport3 = 20033) sp3met = 5.5.

IF (sport3 = 2050 OR sport3 = 15050 OR sport3 = 18150 OR sport3 = 18310) sp3met = 6.0.

IF (sport3 = 2010 OR sport3 = 2072 OR sport3 = 15610 OR sport3 = 18200 OR sport3 = 15590 OR sport3 = 12020) sp3met = 7.0.

IF (sport3 = 3015 OR sport3 = 15675) sp3met = 7.3.

IF (sport3 = 12150 OR sport3 = 15330) sp3met = 8.0.

IF (sport3 = 18290) sp3met = 8.3.

IF (sport3 = 1009) sp3met = 8.5.

IF (sport3 = 1040) sp3met = 10.0.

IF (sport3 = 15430) sp3met = 10.3.

IF (sport3 = 15650) sp3met = 12.0.

IF (sport3 = 18060) sp3met = 12.5.

IF (sport3 = 20011) sp3met = 7.5.

IF (sport3 = 20022) sp3met = 6.5.

EXECUTE.

***

DEEL 17 voor sport4

***

IF (sport4 = 4030) sp4met = 2.0.

IF (sport4 = 2150 OR sport4 = 15080 OR sport4 = 15180) sp4met = 2.5.

IF (sport4 = 15090 OR sport4 = 15670 OR sport4 = 18120 OR sport4 = 15570) sp4met = 3.0.

IF (sport4 = 17250 OR sport4 = 18070) sp4met = 3.5.

IF (sport4 = 15300) sp4met = 3.8.

IF (sport4 = 15630 OR sport4 = 15470 OR sport4 = 15140) sp4met = 4.0.

IF (sport4 = 3025) sp4met = 4.5.

IF (sport4 = 15255) sp4met = 4.8.

IF (sport4 = 17302 OR sport4 = 15580) sp4met = 5.0.

IF (sport4 = 2060 OR sport4 = 15030 OR sport4 = 15370 OR sport4 = 3030 OR sport4 = 20033) sp4met = 5.5.

IF (sport4 = 2050 OR sport4 = 15050 OR sport4 = 18150 OR sport4 = 18310) sp4met = 6.0.

IF (sport4 = 2010 OR sport4 = 2072 OR sport4 = 15610 OR sport4 = 18200 OR sport4 = 15590 OR sport4 = 12020) sp4met = 7.0.

IF (sport4 = 3015 OR sport4 = 15675) sp4met = 7.3.

IF (sport4 = 12150 OR sport4 = 15330) sp4met = 8.0.

IF (sport4 = 18290) sp4met = 8.3.

IF (sport4 = 1009) sp4met = 8.5.

IF (sport4 = 1040) sp4met = 10.0.

IF (sport4 = 15430) sp4met = 10.3.

IF (sport4 = 15650) sp4met = 12.0.

IF (sport4 = 18060) sp4met = 12.5.

IF (sport4 = 20011) sp4met = 7.5.

IF (sport4 = 20022) sp4met = 6.5.

EXECUTE.

***

Nu gaan we de activiteiten indelen in in 3 categorieen: aantal minuten licht, matig, zwaar

Leeftijdcategorieen verwijderd. MET afkapwaarden aangepast. Light <3.00, Moderate 3.0-6.0 en Vigorous >6.00.

***

Nieuwe variabelen l_act, m_act en z_act om activiteiten in te delen in light, moderate and vigorous

***

Totaal aantal minuten activiteiten in light, moderate en vigorous berekenen op basis van MET afkwapwaarden

***

COMPUTE l_mwk = 0.

IF (wwlmet < 3.0) l_mwk = l_mwk + wwlmwk.

IF (wwfmet < 3.0) l_mwk = l_mwk + wwfmwk.

IF (wanmet < 3.0) l_mwk = l_mwk + wanmwk.

IF (fietmet < 3.0) l_mwk = l_mwk + fietmwk.

IF (tuinmet < 3.0) l_mwk = l_mwk + tuinmwk.

IF (klusmet < 3.0) l_mwk = l_mwk + klusmwk.

IF (sp1met < 3.0) l_mwk = l_mwk + sp1mwk.

IF (sp2met <3.0) l_mwk = l_mwk + sp2mwk.

IF (sp3met <3.0) l_mwk = l_mwk + sp3mwk.

IF (sp4met <3.0) l_mwk = l_mwk + sp4mwk.

IF (hhlmet <3.0) l_mwk = l_mwk + hhlmwk.

IF (hhzmet <3.0) l_mwk = l_mwk + hhzmwk.

IF (werklmet <3.0) l_mwk = l_mwk + werklmwk.

IF (werkzmet <3.0) l_mwk = l_mwk + werkzmwk.

EXECUTE.

COMPUTE m_mwk = 0.

IF (wwlmet ge 3.0 AND wwlmet le 6.0) m_mwk = m_mwk + wwlmwk.

IF (wwfmet ge 3.0 AND wwfmet le 6.0) m_mwk = m_mwk + wwfmwk.

IF (wanmet ge 3.0 AND wanmet le 6.0) m_mwk = m_mwk + wanmwk.

IF (fietmet ge 3.0 AND fietmet le 6.0) m_mwk = m_mwk + fietmwk.

IF (tuinmet ge 3.0 AND tuinmet le 6.0) m_mwk = m_mwk + tuinmwk.

IF (klusmet ge 3.0 AND klusmet le 6.0) m_mwk = m_mwk + klusmwk.

IF (sp1met ge 3.0 AND sp1met le 6.0) m_mwk = m_mwk + sp1mwk.

IF (sp2met ge 3.0 AND sp2met le 6.0) m_mwk = m_mwk + sp2mwk.

IF (sp3met ge 3.0 AND sp3met le 6.0) m_mwk = m_mwk + sp3mwk.

IF (sp4met ge 3.0 AND sp4met le 6.0) m_mwk = m_mwk + sp4mwk.

IF (hhlmet ge 3.0 AND hhlmet le 6.0) m_mwk = m_mwk + hhlmwk.

IF (hhzmet ge 3.0 AND hhzmet le 6.0) m_mwk = m_mwk + hhzmwk.

IF (werklmet ge 3.0 AND werklmet le 6.0) m_mwk = m_mwk + werklmwk.

IF (werkzmet ge 3.0 AND werkzmet le 6.0) m_mwk = m_mwk + werkzmwk.

EXECUTE.

COMPUTE z_mwk = 0.

IF (wwlmet > 6.0) z_mwk = z_mwk + wwlmwk.

IF (wwfmet > 6.0) z_mwk = z_mwk + wwfmwk.

IF (wanmet >6.0) z_mwk = z_mwk + wanmwk.

IF (fietmet > 6.0) z_mwk = z_mwk + fietmwk.

IF (tuinmet >6.0) z_mwk = z_mwk + tuinmwk.

IF (klusmet > 6.0) z_mwk = z_mwk + klusmwk.

IF (sp1met > 6.0) z_mwk = z_mwk + sp1mwk.

IF (sp2met > 6.0) z_mwk = z_mwk + sp2mwk.

IF (sp3met > 6.0) z_mwk = z_mwk + sp3mwk.

IF (sp4met > 6.0) z_mwk = z_mwk + sp4mwk.

IF (hhlmet >6.0) z_mwk = z_mwk + hhlmwk.

IF (hhzmet >6.0) z_mwk = z_mwk + hhzmwk.

IF (werklmet >6.0) z_mwk = z_mwk + werklmwk.

IF (werkzmet >6.0) z_mwk = z_mwk + werkzmwk.

EXECUTE.