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Determinants of physical activity among patients with type 2 diabetes: The role of perceived autonomy support, autonomous motivation and self-care competence

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Determinants of physical activity among patients with type 2 diabetes: The role of perceived autonomy support, autonomous motivation and self-care competence

Based on self-determination theory (SDT), this study investigated, whether the three central SDT variables (perceived autonomy support, autonomous motivation and self-care competence), were associated with engagement in physical activity (PA) among patients with type 2 diabetes when the effect of a wide variety of other important life-context factors (perceived health, medication, duration of diabetes, mental health, stress and social support) was controlled for. Patients from five municipalities in Finland with registry-based entitlement to a special reimbursement for medicines used in the treatment of type 2 diabetes (n=2866, mean age 63 years, 56% men) participated in this mail survey in 2011. Of all measured explanatory factors, autonomous motivation was most strongly associated with engagement in PA. Autonomous motivation mediated the effect of perceived autonomy support on patients' PA. Thus, perceived autonomy support (from one's physician) was associated with the patient's PA through autonomous motivation. This result is in line with SDT. Interventions for improved diabetes care should concentrate on supporting patients' autonomous motivation for PA. Internalizing the importance of good self-care seems to give sufficient energy to maintain a physically active lifestyle.

Key words: Diabetes, physical activity, autonomy support, health care climate, motivation

Introduction

Type 2 diabetes is an important and increasing public health problem all over the world (Guariguata et al., 2014; Whiting, Guariguata, Weil, & Shaw, 2011). Aging of the population, unhealthy nutrition, lack of physical exercise and overweight, increase the incidence of this chronic disease (Unwin, Whiting, & Roglic, 2010). The main target in diabetes care is to maintain blood glucose levels in a healthy range. This is essential in order to avoid long-term diabetes complications. Glycemic control is best achieved by good self-management that includes healthy diet, regular physical exercise, weight loss, and pharmacologic therapy when needed (American Diabetes Association, 2011; 2014). Therefore, it is important to know how health care professionals can support patients to engage in long-term health behavior change.

Self-determination theory (SDT) is a theoretical approach that has been increasingly used in studies aiming to understand how health care professionals can support patients to adopt and maintain a healthy lifestyle (Fortier, Duda, Guerin, & Teixeira, 2012; Ng et al., 2012; Teixeira, Carraça, Markland, Silva, & Ryan, 2012). SDT is a general theory of human motivation that emphasizes the extent to which behaviors are relatively autonomous (originating from the self) versus relatively controlled (pressured or coerced by intrapsychic or interpersonal forces), (Patrick & Williams, 2012.)

SDT explains the social psychological mechanism on how the behavior of health care personnel influences the patient's motivation for self-care, e.g. physical activity (PA). According to the SDT, people are oriented toward physical and psychological health, and also have psychological needs for autonomy, competence, and relatedness. Health care professionals can enhance patients' motivation for self-care by satisfying these basic needs (Ryan & Deci, 2000). Autonomy is supported by acknowledging patients' perspectives and emotions before recommendations, by offering choices and options and a rationale for a given advice, and mini-

mizing control and judgment. Competence is enhanced by supporting patients' belief for success, by skills building and problem solving, and by giving feedback in a non-judgmental manner. Relatedness support includes providing an emphatic and warm interpersonal environment (Patrick & Williams, 2012).

Social environments that satisfy these basic needs are assumed to foster autonomous motivation and self-care competence which further foster adaption and maintenance of a healthy lifestyle (Deci & Ryan, 1985). Feelings of autonomy are supposed to give an experience that the person him-/herself is initiating behaviors, and feelings of competence are supposed to give experience of achieving the outcome (Williams, McGregor, Zeldman, Freedman, & Deci, 2004). Thus, SDT suggests that people are likely to have long-term psychological energy for making and maintaining a healthy change when they perceive themselves to be the initiator of their behavior and they perceive mastering the skills necessary to make and maintain the change. Motivation and energy for change is stronger than in the situations where people feel that they are pressured to change by another person, e.g. a doctor or a family member, or by guilt about not carrying out self-care activities as advised (Williams, McGregor, Zeldman, Freedman, & Deci, 2004).

There is growing evidence that patients' motivation for effective self-management may be enhanced by an autonomy supportive health care climate (Fortier et al., 2012; Ng et al., 2012). Studies, based on SDT, have shown that an autonomy supportive health care climate is associated with patients' self-management behavior regarding medical adherence (Williams, Freedman, & Deci, 1998; Williams et al., 2009) and PA (Fortier, Sweet, O'Sullivan, & Williams, 2007). Exercise intervention trials among patients with type 2 diabetes have demonstrated the importance of autonomous or self-determined motivation for PA: Sweet et al. (2009) showed that autonomous motivation mediated the relationship between barrier self-efficacy (confidence in ability to overcome barriers) and PA, and Fortier et al. (2011) found

that self-determined exercise motivation significantly increased as patients progressed through the stages of exercise change from pre-action to maintenance. However, further evidence to support predictions of SDT in the context of diabetes care is needed.

Besides an autonomy supportive health care climate, autonomous motivation and self-care competence, also patients' larger life-context may affect their ability and motivation for good self-care, and should be taken into account in studies. Poor physical health and stressful life situations may hinder PA. Depression, which is common among patients with diabetes (Ali, Stone, Peters, Davies, & Khunti, 2006; Pirkola et al., 2005), has been shown to be associated with poor self-management of diabetes including physical exercise (Dirmaier et al., 2010; Egede & Ellis, 2010; Gonzalez et al., 2007; 2008a;b). On the other hand, a strong sense of coherence and autonomy supportive significant others may enhance patients' ability to cope with diabetes (Antonovsky, 1987; Williams et al., 1998).

This study adds to previous research by examining whether the three central SDT variables (perceived autonomy support, autonomous motivation and self-care competence) are associated with engagement in PA among patients with type 2 diabetes when the effect of a wide variety of other important life-context factors (perceived health, medication, duration of diabetes, mental health, stress and social support) are controlled for. In addition, a possible mediating role of autonomous motivation and self-care competence between perceived autonomy support and PA is investigated.

We hypothesize that 1) perceived autonomy support (from one's physician), autonomous motivation and self-care competence are positively associated with patients' engagement in PA even after the effect of the other important life-context factors is controlled for, and 2) the effect of perceived autonomy support on PA is mediated by autonomous motivation and self-care competence.

Methods

Data collection

The sample of the study was collected in 2011 from the register of the Social Insurance Institution of Finland (SII). SII is a Finnish government agency (funded directly from taxation) in charge of settling benefits under national social security programs. SII keeps the register of those persons who have entitlement to a special reimbursement for medicines because of chronic diseases such as diabetes. The sample to the present study was collected among persons who fulfilled the following inclusion criteria:

a) had entitlement to a special reimbursement for medicines used in the treatment of type 2 diabetes (ICD-10 code, E11) in 2000-2010, and the right was valid in September 2011 and onward,
b) born in 1936-1991 (20-75 years), alive and had no safety prohibition at the time of the data collection,
c) Finnish as native language,
d) one of the five study municipalities as place of residence.

A total of 7 575 persons fulfilled the inclusion criteria. Based on power-analysis, a sample of 5167 persons was collected: 2000 persons from the two large municipalities and all persons from the three small municipalities. There were 2 962 (57%) men and 2205 women (43%) in the sample, corresponding the rate of sex in the total population of patients with type 2 diabetes in the study municipalities.

The questionnaire was tested by a pilot study (n=50) in May 2011, and after some revisions the questionnaire was mailed to respondents in September 2011. A reminder to non-respondents was sent out in October, and another reminder with a new copy of the question-

naire was sent out in November. The final response rate was 56% (range 54-59%, n=2866). Women responded slightly more often (57%) than men (54%). The response rate was highest (63%) in the oldest age group (65-75 years), lower (55%) in the age group of 55-64 years, and lowest (36%) in the age group of 20-54 years.

Ethical issues

The research plan was accepted by the Ethical Committee of the Hjelt Institute, University of Helsinki, and the permission to conduct the study was received from the SII. The sample was collected by the contact person who worked at the SII, and the questionnaires were posted from there. Respondents returned filled questionnaires, provided only by an identification number, directly to the researchers by mail. An identification number was needed in order to check for nonresponse. Identity of respondents was not revealed to the researchers at any stage of the sample or data collection, nor was the content of the questionnaires revealed to anybody else except the researchers.

Respondents

The mean age of respondents was 63 years (standard deviation (SD) 8 years, range 27-75 years), and 56% of them were men. Over half (56%) of the respondents were retired because of old age, 60% were married, and 59% had less than higher professional education. The majority (83%) of the respondents had a municipal primary care health center as their primary care place in diabetes care, and 74% used tablets only for diabetes therapy. (Table 1.)

Insert Table 1 here.

Measures

158 Measures used in the study are presented in Table 2. Averaged sum scales for perceived au-
159 tonomy support, autonomous motivation, self-care competence, energy, emotional well-being,
160 sense of coherence, life stress and social support in diabetes were calculated. The respondent
161 was included in the analysis, if she/he had answered at least to 70% of the scale items. The
162 PA sum scale was calculated by summing standardized z-scores of four variables differing in
163 scale length (Metsämuuronen, 2003). A higher z score indicates more PA. Occupational PA
164 was included into the PA sum scale because PA at work may have effect on spare time activi-
165 ty, e.g. physically strenuous work may decrease physical exercise in spare time.

166 Insert Table 2 here.

167 *Statistical procedures*

168 Descriptive statistics were estimated and the baseline associations between independent vari-
169 ables, covariates and dependent variables were tested with Pearson chi²-tests, t-tests or one-
170 way analysis of variance depending on the measurement scale of the variable of interest. In
171 the final analyses, multivariate linear regression analysis was used. The correlations between
172 study variables were explored before the analyses by Pearson correlations. The variables to
173 the regression models were chosen on theoretical and statistical basis. Independent variables
174 that correlated strongly with each other, such as variables measuring mental health or positive
175 personality orientation (energy, emotional well-being, diagnosed depression, sense of coher-
176 ence), were omitted from the regression analyses. Only the variable that correlated most
177 strongly with the dependent variable was chosen to the models.

178

179 In the mediation analyses between perceived autonomy support, autonomous motivation, self-
180 care competence and PA, the instructions reported by Baron & Kenny (1986) were followed.
181 First, the mediator was regressed on the independent variable. Second, the dependent variable
182 was regressed on the independent variable. Third, the dependent variable was regressed on

both the independent variable and on the mediator. A mediation exists if the predicted associations hold on each step of the analysis and if the effect of the independent variable on the dependent variable is less in the third step than in the second step. The mediation is perfect, if the independent variable has no effect when the mediator is controlled. Statistical significance of the mediation was calculated by the Sobel test (Preacher & Leonardelli, 2003).

Statistical analyses were performed using complex samples –procedure, which allows the use of weight coefficients in order to correct bias caused by the different sample collection method in the small (all patients with type 2 diabetes) and big municipalities (a sample). SPSS version 22 was used.

Results

Almost all (90%) of the respondents reported that they had been advised to exercise regularly. A total of 36% had performed physical exercise at least on five days during the last week, and a total of 27% exercised, on average, four or more times a week at least 30 minutes on each occasion to the extent that they at least slightly lost their breath and perspired.

The four variables measuring mental health or positive personality orientation correlated strongly with each other, that is, energy correlated with emotional well-being (0.78, $p<.001$), sense of coherence (0.58, $p<.001$) and depression (-0.38, $p<.001$). Of these four variables, energy correlated most strongly with PA (0.26, $p<.001$). Pearson correlations between emotional well-being, sense of coherence, diagnosed depression and PA were 0.15 ($p<.001$), 0.14 ($p<.001$) and -0.10 ($p<.001$), respectively. Therefore, energy was included as an independent variable to the multivariate linear regression analysis.

The three variables measuring physical health correlated with each other, that is, perceived health correlated with the number of chronic diseases (0.29, $p<.001$) and diabetes complications (0.23, $p<.001$). Of these three variables, perceived health correlated most strongly with

PA (-0.24, p<.001). Correlations between the number of chronic diseases and diabetes complications with PA were -0.13 (p<.001) and -0.10 (p<.001), respectively. Therefore, perceived health was included as an independent variable to the multivariate linear regression analysis.

Table 3 shows that autonomous motivation correlated strongly with PA (0.36), but perceived autonomy support, and self-care competence only moderately (0.09 and 0.14 respectively). In addition, energy and perceived health correlated quite strongly with PA (0.26 and -0.24 respectively).

Insert table 3 here

Table 4 shows that autonomous motivation was strongly associated with PA even after the effect of other important life-context factors was controlled for, but the other SDT variables (perceived autonomy support and self-care competence) were not. Energy, good perceived health and using tablets only as diabetes medication were positively, and higher age negatively associated with PA. The associations between independent variables and the dependent variable were similar, but somewhat weaker, when PA across the 7 days prior to completion of the questionnaire was used as the dependent variable (data not shown). When only pensioners were included into the analysis, and the item of occupational PA omitted, the results were similar to those in the whole data (data not shown).

Table 5 shows that the association between autonomous motivation and PA did not diminish after the effect of self-care competence was controlled for. Thus, self-care competence did not mediate the effect of autonomous motivation on PA. Perceived autonomy support was associated with autonomous motivation. Perceived autonomy support was associated also with PA but this association disappeared after the effect of autonomous motivation was controlled for

which indicates perfect mediation: perceived autonomy support was associated with PA through autonomous motivation.

Insert tables 4 and 5 here

Discussion

This study investigated associations between the three central SDT variables (perceived autonomy support, autonomous motivation and self-care competence), other important life-context factors, and PA among patients with type 2 diabetes. Finding determinants of PA is an important research question because the results of the study showed, in line with the previous studies by Broadbent, Donkin, & Stroh (2011) and Lin et al. (2004) that only a minority of the respondents performed PA according to the general recommendations given to patients with type 2 diabetes.

Of all measured explanatory factors, autonomous motivation was most strongly associated with engagement in PA. Other life-context factors also played a role. Younger patients and those with oral medication were physically more active than older patients and those with insulin therapy. In addition, energy and good perceived health were positively associated with PA. Previous studies have shown negative association between depression and PA (Dirmaier et al., 2010; Egede & Ellis, 2010; Gonzalez et al., 2007; 2008a;b). However, in this study energy was a stronger predictor of PA than diagnosed depression. This result is in line with the study by Gonzalez et al. (2007) which showed that continuous depressive symptom severity scores were better predictors of non-adherence to exercise than categorically defined probable major depression.

Associations between independent variables and the dependent variable were stronger when we used the sum scale of average PA as a dependent variable instead of the measure of PA during one week before survey (Toobert, Hampson, & Glasgow, 2000). Average PA may give a more reliable picture of self-management than PA during one week.

Contrary to our predictions, perceived autonomy support and self-care competence were not associated with PA after controlling for the effect of other explanatory variables. However, perceived autonomy support was associated with autonomous motivation which mediated the effect of perceived autonomy support on PA. Thus, autonomy support was associated with patients' PA through autonomous motivation. This result is in line with the previous studies which emphasize the importance of autonomous motivation for health-related behaviors (Ng et al., 2012) and PA, specifically (Fortier et al, 2007; Teixeira et al., 2012). Self-care competence did not mediate the effect of autonomous motivation on PA. The effect of autonomous motivation on PA was direct. The results of this study support the idea of SDT that internalization of the value of good health behavior is necessary for engagement in physically active lifestyle. Health care practitioners can promote patients' PA by supporting their autonomous motivation.

Strengths and limitations of the study

We found the basic information (diagnosis age, duration of diabetes, medication, HbA1c-values, BMI), reported by the patients in this study, highly reliable when compared with register data from the whole country (Valle at al., 2010) and with the electronic medical records from the municipal primary-care health centers in the study municipalities (Koponen et al., 2013a; 2013b). Another strength of our study was that in the analyses we were able to control the effect of many important confounding factors.

One limitation of the study was that the cross-sectional nature of the data does not allow for directional or causal inferences. However, 84% of the respondents had been over two years in care in their current and principal primary care health center, and a total of 75% had a family doctor or a "regular" doctor. Thus, it is highly likely that care provided in the health center had influenced patients' motivation for self-care. Strengths and limitations of the study are discussed further in Koponen et al. (2015). In future, longitudinal intervention studies are needed.

Conclusion

The results of this study emphasize the importance of autonomous motivation for adoption of a physically active lifestyle. Of all measured life-context factors, autonomous motivation was most strongly associated with PA among patients with type 2 diabetes. Health care practitioners can promote patients' PA by supporting their autonomous motivation and general well-being.

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411 Table 1. Sociodemographic background factors of respondents (corrected by rescaled sam-

412 pling weight)

	N (estimate)	%
Sex		
Man	1590	55.7
Woman	1266	44.3
Total	2856	100
Age		
27-54 years	353	12.6
55-64 years	1057	37.7
65-75 years	1396	49.7
Total	2806	100
Marital status		
Single	278	9.8
Married	1688	59.5
Cohabiting	190	6.7
Divorced	428	15.1
Widowed	253	8.9
Total	2837	100
Professional education		
Upper secondary education (vocational school) or less	1636	58.8
Higher education (college, polytechnic, university)	1148	41.2
Total	2784	100
Principal activity		
Working	674	24,0
Retired because of chronic illness	383	13.6
Retired because of old age	1567	55.9
Other	181	6.5
Total	2805	100
Diabetes medication		
Tablets	2052	74.3
Insulin	142	5.1
Tablets + insulin	500	18.1
Other	67	2.4
Total	2761	100
Service provider		
Municipal	2236	82.8
Private	464	17.2
Total	2700	100

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415 Table 2. Measures used in the study

Perceived autonomy support (from one's physician)	The short 6-item form of health care climate questionnaire (HCCQ, n.d.), (range 1=fully disagree, 5=fully agree, Cronbach's alpha reliability *r*=0.95). Example item: I feel that my physician has provided me choices and options. (http://www.selfdeterminationtheory.org/)
Autonomous motivation	Autonomous regulation (motivation) scale B. Five items from the treatment self-regulation questionnaire (TSRQ, n.d.), (range 1=not at all true, 7=very true, *r*=0.83). Example item: The reason I follow my diet and exercise regularly is that I personally believe that these are important in remaining healthy. (http://www.selfdeterminationtheory.org/)
Self-care competence	The 4-item perceived competence for diabetes scale (PCS, n.d.), (range 1=fully disagree, 5=fully agree, *r* =0.93). Example item: I feel confident in my ability to manage my diabetes. (http://www.selfdeterminationtheory.org/)
Energy	The 4-item scale measuring energy during the last four weeks from the RAND-36-Item Survey, 1.0 (range 0-100%, *r*=0.85). Example item: How much of the time during the **past 4 weeks** did you have a lot of energy? (Hays, Sherbourne, & Mazel, 1993.)
Emotional well-being	The 5-item RAND-36 scale measuring emotional well-being during the last four weeks (range 0-100%, *r*=0.84). Example item: How much of the time during the **past 4 weeks** have you felt so down in the dumps that nothing could cheer you up? (Hays et al., 1993.)
Sense of coherence	The short 13-item scale (range 1=weak, 7=strong, *r*=.80, five items reversed). Example item: Do you have feeling that you don't really care about what goes on around you? (1=very often, 7=very seldom or never), (Antonovsky, 1987.)
Depression	Diagnosed depression (1=no, 2=yes).
Life stress	Experienced stress during the last year (12 months) in the 10 life areas e.g. own health and economic situation (range 1=not at all, 4=very much). Based on the Living with Diabetes Study. School of Population Health. University of Queensland. (Donald et al., 2012).
Social support in diabetes	A 12-item scale measuring support and help received from friends, relatives and health care personnel (range 1=fully disagree, 5=fully agree, *r*=.75). Example item: When I feel bored, depressed or desparate, my friends and family are ready to listen to me. (Toljamo, 1999). The scale is based on social support scales by Brandt & Weinert (1981), Goodenow, Reisine, & Grady (1990), Norbeck, Lindsay, & Carrieri (1981; 1983), Stewart &Tilden (1995) and Weinert (1987).
Perceived health	A single-item scale, range 1=very good, 5=poor.
Complications	At least one of the twelve diabetes related complications (e.g. kidney disease or neuropathy) mentioned, 1=yes, 2=no. The list of the complications was based on the Living with Diabetes Study. School of Population Health. University of Queensland (Donald et al., 2012) and Finnish Diabetes Association (n.d.) (http://www.diabetes.fi)
Occupational physical activity (included in the PA sum scale)	How physically strenuous do you consider your work to be on average? range 1=not working, 5=physically strenuous work e.g. including lifting or carrying heavy objects. (Health Behavior and Health Among the Finnish Adult Population, Spring 2012 (HBHAF-questionnaire) http://urn.fi/URN:ISBN:978-952-245-931-2
Commuting physical activity (included in the PA sum scale)	How many minutes, during a typical day, do you spend walking or cycling to work and other places? range 1=not at all, 5=60

	minutes or more. (HBHAF-questionnaire) http://urn.fi/URN:ISBN:978-952-245-931-2
Leisure time physical activity (included in the PA sum scale)	How much do you exercise and engage in vigorous-intensity activities during spare time? range 1=low-intensity activities only, 4=regular vigorous-intensity activity heading to competition. (HBHAF-questionnaire) http://urn.fi/URN:ISBN:978-952-245-931-2
Intensity of physical activity (included in the PA sum scale)	How often do you exercise physically in your spare time for at least 30 minutes to the extent that you at least slightly lose your breath and perspire?, range 1=I cannot perform exercise due to illness or handicap, 7=daily. (HBHAF-questionnaire) http://urn.fi/URN:ISBN:978-952-245-931-2
Physical activity during the last week	On how many of the last seven days did you participate in at least 30 minutes of physical activity? (Toobert, Hampson, & Glasgow, 2000).

Table 3. Correlations matrix between study variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Perceived autonomy support												
2. Autonomous motivation	.24***											
3. Self-care competence	.31***	.40***										
4. Sex (1=man, 2=woman)	-.08***	.11***	-.02									
5. Age	.03	.11***	.12***	.03								
6. Education (1=low, 2=high)	.00	-.03	-.03	-.02	-.09***							
7. Diabetes medication 1=tablets only, 2=other	-.03	-.03	-.03	-.06**	-.12***	-.01						
8. Duration of diabetes	-.02	-.03	-.01	-.02	.19***	-.02	.17***					
9.Perceived health (1=good, 2=poor)	-.22***	-.19***	-.25***	.03	.06**	-.11***	.11***	.09***				
10. Energy	.26***	.26***	.36***	-.09***	.12***	.01	-.12***	-.04	-.47***			
11. Stress	-.17**	-.08***	-.26***	.23***	-.35***	.06*	.09***	-.02	.23***	-.49***		
12. Social support	.41**	.34***	.33***	.02	.08***	-.05*	-.04*	-.06*	-.22***	.37***	-.28***	
13. Physical activity	.09***	.36***	.14***	.02	-.13***	.03	-.08***	-.07***	-.24***	.26***	-.02	.12***

**p<.01

***p<.001

Table 4. Multivariate linear regression models on the association of perceived autonomy support, autonomous motivation, self-care competence and other important life-context factors with physical activity. (Corrected with rescaled sampling weight)

	Model 1 Estimate (95% CI)	Model 2 Estimate (95% CI)	Model 3 Estimate (95% CI)	Model 4 Estimate (95% CI)
Perceived autonomy support	.01 ns. (-.07 - .08)	.01 ns. (-.07 - .08)	-.05 ns. (-.12 - .03)	-.05 ns. (-.14 - .04)
Autonomous motivation	.71*** (.64 - .78)	.75*** (.68 - .82)	.70*** (.63 - .78)	.71*** (.62 - .79)
Self-care competence	-.03 ns. (-.14 - .08)	.02 ns. (-.09 - .14)	-.07 ns. (-.19 - .05)	-.14 ns. (-.27 - -.00)
Sex (1=man, 2=woman)		-.08 ns. (-.24 - .08)	-.09 ns. (-.26 - .07)	-.10 ns. (-.28 -.09)
Age		-.05*** (-.07 - -.04)	-.05*** (-.06 - -.04)	-.05*** (-.07 - -.04)
Professional education (1=low 2=high)		.10 ns. (-.06 - .26)	-.02 ns. (-.18 - .15)	-.08 ns. (-.25 - .10)
Duration of diabetes			.00 ns. (-.01 - .02)	.00 ns. (-.01 - .02)
Medication (1=tablets only, 2=other)			-.38*** (-.58 - -.18)	-.36** (-.57 - -.15)
Perceived health (1=good, 2=poor)			-.80*** (-.97 - -.63)	-.46*** (-.66 - -.27)
Energy				.02*** (.01 - .03)
Stress				.21 ns. (-.02 - .45)
Social support				-.18 ns. (-.36 - .01)
R Square n	.13 2428	.16 2333	.18 2189	.21 1960

ns. p>.05
** p<.01
*** p<.001

Table 5. Mediation analyses between perceived autonomy support, autonomous motivation, self-care competence and physical activity, linear regression model. (Corrected by rescaled sampling weight)

	Estimate (95% CI)	n
1. Autonomous motivation x self-care competence	.27*** (.25 - .29)	2714
2. Autonomous motivation x physical activity	.70*** (.64 - .76)	2541
3. Autonomous motivation x physical activity Autonomous motivation x competence	**.70*** ** (.63 - .76) -.01 ns. (-.12 - .09)	2507
Sobel test: z=-0.12, SE=0.02, p=0.91		

	Estimate (95% CI)	n
1. Perceived autonomy support x autonomous motivation	.27*** (.23 - .30)	2648
2. Perceived autonomy support x physical activity	.19*** (.12 - .27)	2493
3. Perceived autonomy support x physical activity Perceived autonomy support x autonomous motivation	**-.00 ns.** (-.07 - .07) .71*** (.64 - .77)	2455
Sobel test: z=10.41, SE=0.02, p=0.00		

The bold values indicate mediation which exists if the predicted associations hold on each step of the analysis and if the effect of the independent variable on the dependent variable is less in the third step than in the second step.

1=the mediator regressed on the independent variable
2=the dependent variable regressed on the independent variable
3=the dependent variable regressed on both the independent variable and on the mediator.

ns. p>.05
*** p<.001