Factors Associated with Self-Efficacy in Persons with Chronic Illness

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Abstract

Change of lifestyle may be necessary for persons with chronic illnesses in order to manage their health situation and reduce symptom distress. Success in changing lifestyle partly depends on a person's self-efficacy beliefs. This cross-sectional study explores social support, physical activity, and illness perceptions in relation to self-efficacy in a sample with morbid obesity and in a sample with chronic obstructive pulmonary disease (COPD). The linear regression analyses showed that higher physical activity and less emotional response to illness were directly associated with higher self-efficacy among persons with obesity, while more social support; fewer perceived consequences from illness; and more understanding of the illness were directly associated with higher self-efficacy among persons with COPD. The results indicate that obese persons are likely to benefit from increasing physical activity and from receiving emotional support. Persons with COPD may be empowered by being able to utilize cognitive coping strategies and by receiving social support.

Key words: self-efficacy, illness perception, morbid obesity, chronic obstructive pulmonary disease, cross-sectional study.

Factors Associated with Self-Efficacy in Persons with Chronic Illness

Improvements in medical treatments and healthcare have led to an increased number of persons living with chronic illness in the Western world. In spite of improved treatments, many experience symptoms and distress in everyday life that they have to cope with. Chronic illness is often influenced and caused, in part, by the person's choice of lifestyle. Tobacco use, poor dieting, physical inactivity, and the harmful use of alcohol are common lifestyle risk factors (World Health Organization, 2008). Given the increased occurrence of chronic illness and the challenges they represent to people's health, it is important to develop knowledge about how persons with chronic illness can change behavior to a healthier lifestyle.

According to the International Classification of Functioning, Disability, and Health (ICF) model, a person's degree of functioning or disability is created by the interaction of illness with the context it appears in (World Health Organization, 2001). Hence, functioning is influenced by illness, the environment, and by person-related factors. Self-efficacy is one person-related factor with an impact on how people act and change behavior, and it is therefore important to strengthen self-efficacy in persons with chronic illness who need to change lifestyle. Self-efficacy refers to a person's beliefs about how capable he or she is in performing the behaviors needed to bring about a desired outcome (Bandura, 1997). The concept contributes to the explanation of what people decide to do, the amount of effort they invest in what they do, and the persistence with which they continue to do as planned, even in the face of difficulties.

Perceptions of being powerless in relation to illness may interfere with coping and with making successful changes in lifestyle. Thus, raising self-efficacy is consequently addressed as one key goal of educational interventions for persons with

chronic illness (Lorig & Holman, 2003). Self-efficacy theory has been used as the framework for a range of studies in this area, where many have demonstrated self-efficacy to be modifiable by means of self-management interventions (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001; Lorig et al., 1999; Marks, Allegrante, & Lorig, 2005). The changeable nature of self-efficacy makes it suitable as outcome measure following health education intervention. However, the factors important for self-efficacy may vary between clinical groups. Previous research with a sample with heart condition found associations between greater perceived illness consequences and lower self-efficacy for coping with the condition (Lau-Walker, 2004). To date, no research has explored factors associated with self-efficacy with obesity and COPD samples, and the lacking evidence in this area constitutes a rationale for the present study.

One potentially important difference between the groups investigated is this study is the different prospects of the chronic course of illness. Morbidly obese persons may hope for weight reduction and improved health as result of changes in diet and activity. Persons with COPD, on the other hand, have to be reconciled with a lifetime course of illness and may rather hope to achieve a more effective way of managing their illness. Differences in perspective on illness may contribute to illness perceptions to be differently associated with self-efficacy in these groups. Similarly, the performing of physical activity and the experience of social support may be differently associated with self-efficacy in the groups. In turn, such differences may be important for clinical practice among persons with these health problems.

The self-efficacy model explored in this study is illustrated in Figure 1. The conceptual outline concerns the relationships between three different aspects of the ICF model (World Health Organization, 2001). Self-efficacy and illness perceptions

concern aspects within the person, whereas social support is part of the person's environment. Finally, physical activity is a behavioral factor. This outline also fits well with Bandura's model of triadic reciprocal causation; in essence, the interaction between the person, his or her behaviors, and the environment (Bandura, 1997).

INSERT FIGURE 1 ABOUT HERE

Purpose

The present study explores factors associated with self-efficacy in persons with morbid obesity and in persons with COPD.

Research questions

1. Are levels of self-efficacy different in persons with morbid obesity compared to persons with COPD?
2. Are sociodemographic background, social support, physical activity, and illness perceptions related to self-efficacy in the two groups?
3. Do the two groups differ with regard to the relationships between these variables?

Method

Study design

A prospective longitudinal study (Lerdal et al, 2011) was designed to explore whether participation in a patient education course might contribute to changes in health related quality of life and also to test 12 instruments regarding perception of illness and coping strategies with regard to their ability to detect change over time. In this study, data related to socio-demographic factors, social support, physical activity, illness perception, and self-efficacy are included in a cross-sectional design study.

Sample and data collection

Participants, persons with morbid obesity and COPD, were recruited during 2009-2010 as they were about to begin a patient education course (see below for details). All course attendants were given verbal and written information about the study and invited to participate. Out of a total number of 312 course attendants, 242 (78 %) gave their consent to participate. Those who consented completed the questionnaires in a secluded room on-site and returned it in a sealed envelope.

For this study, we included only participants with ≤ 20 % missing responses on the ten-item self-efficacy scale. Missing responses on the self-efficacy scale were replaced with the person's mean value of the valid scores, whereas persons with missing responses on categorical variables or single-item scales were excluded from the sample. Following this procedure, 22 persons were excluded, leaving a total sample of 220 participants for this study. In the sample, 134 participants (60.9 %) were diagnosed with morbid obesity. Morbid obesity was defined as having a body mass index (BMI) ≥ 40, or as BMI ≥ 35 combined with obesity-related somatic illness (World Health Organization, 2010). Eighty-six participants (39.1 %) were diagnosed with COPD; these represented all stages of illness severity and had varied levels of functioning. No sex differences were found between participants and non-participants in this study ($p = 0.59$), but participants ($M = 51$ years, $SD = 15$ years) tended to be younger than non-participants ($M = 54$ years, $SD = 14$ years; $p = 0.07$).

Patient education courses

Referral from a physician was required in order to be included in the courses. The courses varied in duration. The obesity group had a total of 40 hours of education, whereas the COPD group had 20-40 hours. The courses were grounded in cognitive behavior theory. They emphasized participants' work in uncovering hidden resources, strengthening self-concept and social skills, raising consciousness of

healthy lifestyle choices, and raising participants' beliefs in their ability to effectuate them. The aim of both courses was to facilitate participants' achieving a healthier lifestyle and improving their health-related quality of life (Lerdal et al., 2011).

Measures

Self-efficacy

The *General Perceived Self-Efficacy Scale* (GSE) (Schwarzer & Jerusalem, 1995) measures optimistic self-beliefs in coping with the demands of life. It consists of 10 statements that respondents rate on a scale from 1 'completely disagree' to 4 'completely agree'. The score is calculated by summing each individual's scores for the items. The score range is 10-40, with higher scores indicating higher self-efficacy. High correlations with self-appraisal, self-acceptance, and optimism indicate theoretical accuracy of the self-efficacy concept (Posadzki, Stockl, Musonda, & Tsouroufli, 2010), and factor analysis of the GSE has consistently produced the one-factor solution as used in this study. Item-total correlations has been found ranging between 0.25 and 0.63, with factor loadings ranging between 0.32 and 0.74, and internal consistency (Cronbach's α) = 0.82 (Leganger, Kraft, & Roysamb, 2000). Internal consistency of the GSE scale in the present sample was α = 0.92, which is considered excellent (Fayers & Machin, 2007).

Sociodemographic background

Data for age, sex, relationship status, family status, and employment status were collected. Formal education level was dichotomized with two categories; 12 years education or less versus more than 12 years.

Environmental characteristics

Social support was measured with participants' response to one question: "I think I have enough support from people with whom I have a close relationship."

Response categories were on a five point Likert type scale, ranging from totally agree (1) to totally disagree (5) (Lerdal et al., 2011). The scores were reversed in the analyses, so that higher scores indicated more support.

Health-related behavior

The level of physical activity was measured by two items on the Norwegian *"HUNT-2"* survey (Holmen et al., 2003). Items were scored by the current published definition (Thorsen et al., 2005), as explained in Figure 2.

INSERT FIGURE 2 ABOUT HERE

Illness perception

The *Brief Illness Perception Questionnaire* (BIPQ) (Broadbent, Petrie, Main, & Weinman, 2006) assesses cognitive and emotional representations of illness in eight one-item domains. The eight domains represent different dimensions of a person's illness perception; including consequences, timeline, personal control, treatment control, identity, concern, understanding, and emotional response. The items are assigned a score between 0 and 10, where a score of 0 indicates "no influence" and 10 "extreme influence". The instrument has been shown to possess good psychometric properties, in terms of test-retest reliability and concurrent, predictive, and discriminant validity (Broadbent et al., 2006), well representing the dimensions constructed in a revised version of the original instrument (Moss-Morris et al., 2002).

All the relevant measures had been translated into Norwegian and validated before they were used in this study.

Statistical analyses

Data were analyzed using SPSS for Windows version 19 (SPSS Inc., 2010). Differences between groups were assessed by Chi-square (χ^2) for categorical

variables or by *t*-test for continuous variables. Pearson's correlation coefficient (*r*) was used for bivariate correlation analysis. Hierarchical linear regression models were used in order to investigate group-specific predictors of self-efficacy (dependent variable) and in order to separate the amount of self-efficacy variance that was accounted for by the variables relating to the major concepts of the ICF model; that is, the social environment, health behavior, and personal characteristics (World Health Organization, 2001). Therefore, the independent variables were entered into the regression model in the following order: Block 1) social support; Block 2) physical activity; Block 3) the illness perception variables: consequences, personal control, identity, concern, understanding, and emotional response. Two illness perception variables, timeline and treatment control, were excluded from the regression model due to small correlation coefficients. All sociodemographic variables were excluded from the regression model due to small correlation coefficients ($r < 0.20$), in conjunction with their ambiguous associations with self-efficacy as evidenced from earlier research (Leganger et al., 2000; O'Sullivan & Strauser, 2009; Schieman & Campbell, 2001). Effect sizes (*ES*) were calculated as Cohen's *d*, and $ES > 0.40$ was considered medium effect size and clinically significant (Cohen, 1988; Cohen, 1992; Lipsey & Wilson, 2001). The level of significance was set at $p < 0.05$ and all tests were two-tailed.

Ethics

The Norwegian Research Ethics Committee and the Ombudsman of Oslo University Hospital approved of the study. Informed written consent was received from all participants.

Results

Sample characteristics and self-efficacy

The two sample subsets are described in Table 1. Self-efficacy levels were similar in the two groups. Persons with COPD were older and experienced more social support; they perceived their illness to have a longer term prospect (timeline), and they had less faith in treatment (treatment control) than obese persons. The obese persons had higher proportion of women; they lived more often with children; and had more often paid work than persons with COPD. Obese persons also experienced more consequences from illness; felt less personal control over it; were more concerned; and had more illness related emotional responses.

INSERT TABLE 1 ABOUT HERE

Bivariate relationships to self-efficacy

The group-specific bivariate relationships between self-efficacy and each of the other variables are shown in Table 2. In the obesity group, higher social support and higher levels of physical activity were associated with higher self-efficacy. Higher scores on illness consequences, timeline, and illness related emotional response were associated with lower self-efficacy in the obesity group, whereas higher scores on problems related to consequences, personal control, identity, concern, understanding, and emotional response were associated with lower self-efficacy in the COPD group.

INSERT TABLE 2 ABOUT HERE

Multivariate relationships to self-efficacy

Different factors were related to self-efficacy in the two groups (Table 3). In the obesity sample, higher levels of physical activity and less emotional response to illness were directly associated with higher self-efficacy after controlling for social support and the other illness perception variables. The final model explained 16.3 % of the variance in self-efficacy. Significant model improvement occurred when

including social support as independent variable in the first block and physical activity in the second block, accounting for 4.1 % and 5.3 % of self-efficacy variance, respectively.

In the COPD subsample, higher social support; less consequences from illness; and more understanding of the illness had direct relationships with higher self-efficacy after controlling for physical activity and the other illness perception variables. The final model explained 35.5 % of self-efficacy variance among the COPD participants, while significant model improvement occurred when the illness perception variables were included in the third block. These variables alone accounted for 30.7 % of self-efficacy variance.

INSERT TABLE 3 ABOUT HERE

Discussion

The levels of self-efficacy were equal between morbidly obese persons and persons with COPD, but the factors related to self-efficacy differed between the two groups. In the obesity group, higher levels of physical activity and less emotional response to illness were directly related to higher self-efficacy. In the COPD group, more perceived social support; fewer consequences from illness; and more understanding of the illness were directly related to higher self-efficacy.

Comparison of the subsamples

Self-efficacy differences were not statistically significant between the two groups (Table 1). The mean GSE levels reported for this study were nearly the same as the levels reported in previous research on breast cancer patients, Cohen's d = 0.08 (Rottmann, Dalton, Christensen, Frederiksen, & Johansen, 2010). Higher GSE levels have been found among university students (Strobel, Tumasjan, & Spörrle, 2011), among young adolescents (Kvarme, Haraldstad, Helseth, Sørum, & Natvig,

2009), and among a representative sample of the Norwegian adult population (Leganger et al., 2000), Cohen's *d* ranging between 0.44 and 0.55. The comparisons suggest somewhat lower levels of self-efficacy in clinical samples than in the general population.

In this study, persons with COPD were significantly older than obese persons. The age difference may explain other differences between the two groups. For example, the younger persons with obesity were more likely to have their children at home and to be in a working position, as shown in the results. Higher age leads to natural changes in life situation; like grown children leaving home and the person eventually retiring from work roles. It may be that older persons generally receive more support from close persons than younger persons, and this would fit with higher age and more perceived support in the COPD group. Alternatively, persons in the two groups may have different perspectives on the support they receive. Older persons often experience a reduced size of social networks, and may actually feel more content with their social life as a result of this, provided that the networks do not become too small and the person's need for emotional closeness is warranted (Charles & Carstensen, 2010). These factors can possibly explain differences in perceived social support between the two groups. However, a risk of loneliness and isolation in old age, which has also been reported in previous research (Grenade & Boldy, 2008), indicates that evidence for an association between age and social support is mixed.

A large burden of illness is likely to impact negatively on a person's self-efficacy. An association between health and self-efficacy has been demonstrated among patients with various chronic conditions, including posttraumatic stress disorder (Solomon, Benbenishty, & Mikulincer, 1991), arthritis (Cross, March,

Lapsley, Byrne, & Brooks, 2006), and COPD (Bentsen, Rokne, Wentzel-Larsen, Henriksen, & Wahl, 2010). In this sample, the COPD group had a longer term prospect of illness (timeline) and less faith in treatment (treatment control) than the obesity group. These differences appear realistic, given the progressive course of COPD and the possibilities for change in the obesity group. However, obese persons reported significantly more illness consequences; less personal control; more concern; and more emotional response than their counterparts with COPD (Table 1). These results are interesting given the many possibilities for counteracting obesity, both by means of self (increasing physical activity and dieting) and by means of others, in terms of health education, medical treatment, and surgery. However, initiating change may also represent situations in which more failures can be experienced, which in turn may have a negative impact on self-efficacy. Obese persons frequently try to lose weight, continuously or occasionally (Bonsaksen, Hustadnes, Axelsen, & Bjørnsborg, 2011). Foreseeing more potential failures may add to their perceived burden of illness.

Factors associated with self-efficacy

According to Bandura (1997), self-efficacy is strengthened by experiencing that one is able to successfully perform actions as planned. Self-efficacy is also strengthened by vicarious experience (to see others be able), by verbal persuasion (to be told that one is able), and by the emotional arousal associated with the experience of doing. It arises from the dynamics between the internal aspects of the person (cognition and affect), his or her actions, and the environment in which the person acts. The model can be directly aligned with the ICF model (World Health Organization, 2001), and this study investigated how factors concerned with these three domains are related to self-efficacy in persons with morbid obesity and COPD.

In the obesity group, high negative emotional arousal was associated with low self-efficacy. Obesity may give rise to low self-esteem or perceived stigma (Puhl & Brownell, 2001). The emotional impact from illness decreases self-efficacy, as shown in the results. Low self-efficacy can, in turn, evoke negative affect when performing activities. The interplay between these factors appears to be useful for understanding the dynamics of self-efficacy (Bandura, 1997; Leganger et al., 2000; Watt & Martin, 1994). Higher physical activity levels were also related to higher self-efficacy in this group. Obese persons who want to improve their health and to lose weight may do so effectively by increasing physical activity. Persons who regularly perform physical activity will likely experience mastering the activity as well as positive emotional arousal when doing it, both adding to the person's self-efficacy (Bandura, 1997; Leganger et al., 2000; Watt & Martin, 1994). In addition, being physically active over time may help the person to improve physical health and to lose weight. Reaching the defined outcomes is the most certain proof of success, further strengthening the person's sense of efficacy (Bandura, 1997). However, it should be kept in mind that the effect size of physical activity as a factor predicting self-efficacy was relatively low, and that it explained only a small proportion of self-efficacy variance (Table 3).

Understanding of one's illness can be viewed as a cognitive prerequisite for knowing what to do in order to cope with the situation, whereas experiencing many and severe consequences from illness may give rise to hopelessness and futility and thereby detract from coping beliefs. The results for the COPD group may demonstrate this; where high scores on consequences and low scores on understanding of the illness both were related to lower self-efficacy. This concurs with recent research reporting that low health literacy in COPD patients was

associated with poor overall health, low adherence to treatment regimes, and increased hospital admissions (Roberts, Ghiassi, & Partridge, 2008). Knowledge about strategies that can be employed to cope with illness may be one basic step in building self-efficacy in the person. Associations between more severe illness consequences and lower self-efficacy has been reported in a study of a heart condition sample (Lau-Walker, 2004), and may indicate common problems for persons with heart- and lung diseases, respectively. Being dependent on medication, persons having such illnesses may feel less able to influence the course of their illness. More social support was also associated with higher self-efficacy in persons with COPD. Social support may be provided in the form of verbal persuasion; as when the person is encouraged by significant others to try new ways of managing illness-related problems. Social support may also add to the person's understanding of his or her illness, as when close persons talk with the person about the illness; how it affects the person; and how the person in turn can influence the course of illness. Self-efficacy has been related to improved self-management for persons with COPD (Disler, Gallagher, & Davidson, 2012; Warwick, Gallagher, Chenoweth, & Stein-Parbury, 2010). Thus, strategies for increasing factors related to self-efficacy – social support and illness understanding – appear clinically important.

In view of the self-efficacy and the ICF models, the results of this study suggest that factors concerned with the person, the environment, and activities are differently associated with self-efficacy in morbid obesity and in COPD. For persons with obesity, behavior in terms of performing physical activity, and the person's affective responses in terms of low levels of negative emotional arousal, were associated factors. In the COPD group, cognitive resources in term of the person's capacity for understanding the illness, was related to self-efficacy, as was the

environmental component in the form of perceived social support from close persons. The progressive nature of COPD makes these results meaningful, as persons with this illness will gradually experience lower functional capacity and thus must rely on other means of coping. Cognitive and social resources for coping may become more important as behavioral strategies gradually become more difficult to use.

The amount of variance in self-efficacy explained by the statistical models was substantially different for the two subsamples. Sixteen per cent of the variance was explained by the final model variables for the obesity group, whereas 35.5 % was explained by the same variables for the COPD group. In relation to COPD, the illness perception variables represented nearly all of the explained self-efficacy variance, highlighting their importance in the model. Given the smaller amount of variance explained for the obesity group, other factors with theoretically proposed relationships to self-efficacy should be explored further.

Study limitations

Prior research has found specific efficacy beliefs to be good predictors of intentions and behavior (Ajzen, 1988; Conner & Norman, 1996; Hagler et al., 2007; Leganger et al., 2000). The one previous study that was found to assess relationships between self-efficacy and illness perceptions used both general and specific measures (Lau-Walker, 2004). The present study, however, measured the participants' beliefs in their ability to cope with general demands in life, and not self-efficacy beliefs related to one specific demand or task (Schwarzer & Jerusalem, 1995; Schwarzer & Luszczynska, 2007). As a result, comparisons with previous research using specific self-efficacy measures for these clinical groups should be made with caution. The groups investigated in this study were unequal in size; the

obesity group being substantially larger than the COPD group. This reduced the number of independent variables to be included in the separate analyses for each group.

The cross-sectional study design did not allow causal relationships to be inferred from the results. The associations reported in this study between self-efficacy, physical activity, and illness perceptions may be oppositely directed – self-efficacy may well contribute to determine levels of physical activity and illness perceptions. Models where the direction of influence goes both ways are equally viable. Also, there is a potential sampling bias related to the study participants being at the start of a patient education program, indicating a motivation toward making changes. Hence, the sample may be different from the larger populations with morbid obesity and COPD, and caution should be made in generalizing the results to the study population.

Practice implications

Health professionals should educate persons with chronic illness about the nature, course, and management of illness, as well as monitor the emotional response to illness and seek to instill hope and motivation for lifestyle change. Empowerment strategies aimed at increasing the understanding of the illness and decreasing demoralizing feelings of hopelessness and futility appear important to employ in order to foster self-efficacy.

The variables important for self-efficacy in the two groups appear to associate with different sources of self-efficacy, as theoretically proposed (Bandura, 1997). This understanding implies different treatment strategies to be adopted for the groups. One influential source of self-efficacy for the obese persons, physical activity, is a behavioral factor. This concerns experiences from doing, from enactive

mastery experience. Obese persons who perform physical activity do the right thing and know it. This aspect of managing self-care, to do what is in his or her best interest, may evoke positive feelings, adding further to self-efficacy. Therefore, support for physical activity should be part of interventions for obese persons. For this group, emotional support is also important in order to counteract the influence from illness-related emotional response.

The factors of importance for self-efficacy in the COPD group were cognitive and social. Cognitive strategies that can be derived from understanding the illness represent possible means of coping with it. Social support may provide vicarious experience, as social interaction may enable the person to learn from others how they cope with challenges in everyday life (Bandura, 1997). Therefore, building and maintaining cognitive coping strategies, as well as providing adequate social support, may be important strategies for raising self-efficacy in persons with COPD and ought to be emphasized in their treatment and care.

Conclusion

The factors associated with self-efficacy were different between the two groups. In obese persons, higher physical activity levels were related to higher self-efficacy, whereas more negative emotional response to illness was related to lower levels. In COPD persons, more social support was related to higher self-efficacy, whereas more illness consequences and more problems with understanding the illness was related to lower levels. For clinical practice, the results imply that health professionals should emphasize different strategies for increasing self-efficacy in interventions for persons with these chronic illnesses.

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Conflict of interest

The authors report no conflicts of interest.

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Table 1

Characteristics of the morbid obesity (n=134) and COPD (n=86) subsamples

Characteristics	**Obesity**	**COPD**	***ES***	***p***
Sociodemographic				
Mean age (SD)	42.4 (10.5)	64.4 (9.7)	-2.18	<0.001
Male sex (n/%)	40/29.9	46/53.5		<0.001
Education > 12 years (%)	45 (33.6)	24 (27.9)		0.38
Living in relationship (%)	89 (66.4)	50 (58.1)		0.21
Living with children (%)	65 (48.5)	6 (7.0)		<0.001
Working (%)	74 (55.2)	23 (26.7)		<0.001
Environmental	*M (SD)*	*M (SD)*		
Social support (1-5)	3.9 (1.0)	4.2 (0.8)	-0.33	0.02
Health behavior				
Physical activity (0-3)	1.2 (0.9)	1.2 (0.9)	0.00	0.99
Illness perception				
Consequences (0-10)	7.3 (2.3)	6.2 (2.5)	0.46	0.001
Timeline (0-10)	6.9 (2.6)	9.4 (1.3)	-1.22	<0.001
Personal control (0-10)	6.2 (2.4)	5.1 (2.3)	0.47	0.001
Treatment control (0-10)	1.6 (2.1)	3.1 (2.5)	-0.65	<0.001
Identity (0-10)	6.7 (2.4)	6.3 (2.0)	0.18	0.19
Concern (0-10)	7.5 (2.3)	6.0 (2.8)	0.59	<0.001
Understanding (0-10)	2.8 (3.4)	2.9 (2.3)	-0.03	0.68
Emotional response (0-10)	6.9 (2.6)	5.0 (2.9)	0.69	<0.001
Self-efficacy (10-40)	26.5 (6.4)	27.6 (6.4)	-0.17	0.21

Note. Effect sizes (ES) are provided as Cohen's *d.* *P*-values indicate probability of differences between diagnostic groups by *t*-tests or χ^2. Higher scores on the scales indicate more social support, higher level of physical activity, higher level of illness perception, and higher level of self-efficacy, respectively.

Table 2

Bivariate relationships between self-efficacy and the study variables in obesity (n=134) and COPD (n=86) subsamples

Variables	**Obesity**		**COPD**	
	r	*p*	*r*	*p*
Age	-0.07	0.41	-0.09	0.39
Sex	-0.03	0.73	-0.14	0.19
Education	0.09	0.29	0.04	0.75
Relationship status	0.03	0.76	0.06	0.56
Living with children	0.09	0.31	0.08	0.45
Work status	-0.07	0.44	0.01	0.95
Social support	0.20	0.02	0.15	0.17
Physical activity	0.27	<0.01	0.14	0.21
Consequences	-0.23	<0.01	-0.39	<0.001
Timeline	-0.19	0.03	-0.01	0.95
Personal control	-0.16	0.06	-0.27	0.01
Treatment control	-0.04	0.64	0.14	0.21
Identity	-0.14	0.12	-0.25	0.02
Concern	-0.11	0.19	-0.42	<0.001
Understanding	-0.08	0.36	-0.27	0.01
Emotional response	-0.26	<0.01	-0.41	<0.001

Note. Table content is Pearson's correlation coefficients (*r*) and corresponding probability values (*p*).

Table 3

Multivariate linear regression analyses with self-efficacy as dependent variable for obesity (n=134) and COPD (n=86) subsamples

Independent variables	**Obesity**		**COPD**	
	β	*p*	*β*	*p*
Block 1. Environment factors				
Social support	0.12	0.16	0.22	0.03
Explained variance	**4.1 %**	**0.02**	**2.2 %**	**0.17**
Block 2. Health behavior				
Physical activity	0.18	0.04	0.02	0.86
R^2 change	**5.3 %**	**<0.01**	**2.6 %**	**0.14**
Explained variance	**9.4 %**	**<0.01**	**4.8 %**	**0.13**
Block 3. Illness perceptions				
Consequences	-0.10	0.43	-0.31	0.04
Personal control	-0.08	0.40	-0.09	0.40
Identity	-0.04	0.69	-0.00	0.99
Concern	0.19	0.10	-0.13	0.37
Understanding	-0.06	0.50	-0.27	0.01
Emotional response	-0.25	0.03	-0.12	0.32
R^2 change	**6.9 %**	**0.12**	**30.7 %**	**<0.001**
Explained variance	**16.3 %**	**<0.01**	**35.5 %**	**<0.001**

Note. β = association with self-efficacy having all other variables controlled for in the final regression model.

Figure 1. Theoretical model of factors associated with self-efficacy

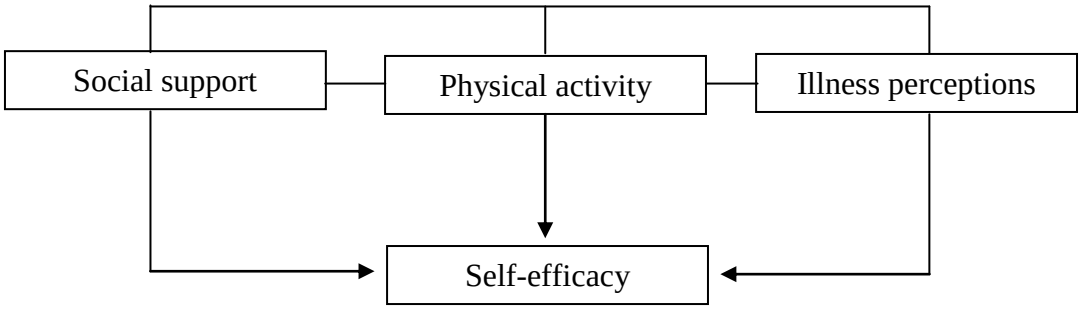

Figure 2. The scoring of items measuring self-reported level of activity

Question: How much physical activity do you have in leisure time? Travel to work is regarded as leisure. State approximately how many hours per week you are physically active. Choose a number of hours that may apply to a typical week last year.

	Hours per week			
	a	*b*	*c*	*d*
Response categories	*No*	*<1*	*1–2*	*≥3*
1. Low-level activity (not sweaty/breathless)	0	0	2	2
2. High-level activity (sweaty/breathless)	0	2	3	4