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Psychometric properties of a short measure for psychosocial factors and associations with phase of physical activity change among Finnish working-aged men

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Conflicts of interest

The authors declare no conflict of interests.

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Abstract

Insufficient physical activity (PA) and poor physical fitness are risks for several non-communicable diseases among working-aged men. PA programs have been launched to increase activity levels in the population but working-aged men have been underrepresented in these programs. The aim of the present cross-sectional study was to evaluate validity of a short scale for psychosocial factors among Finnish working-aged men who participated in a PA campaign. The study examined also the associations between psychosocial factors and phase of PA change across fitness groups. Physical fitness was assessed with a body fitness index (BFI) constructed on the basis of a hand grip test, the Polar OwnIndex Test, and body composition analysis (Inbody 720). The men were classified into low (n=162), moderate (n=358) and high (n=320) BFI groups. Psychosocial factors and self-reported phase of PA change were assessed with a questionnaire. Psychometric properties of the scale were assessed with confirmatory factor analysis and differences between phases of PA change were examined with One-way Analysis of Variance (ANOVA). The evaluated scale included factors for self-efficacy, goal setting, skills and social support. Good physical fitness was related to better perceived self-efficacy and ability to manage one's physical activity environment. Goal setting was critical for PA change at all fitness levels. Better understanding of the interactions between psychosocial factors and PA change could help in targeting PA programs to low-fit men. Further study should examine the validity of the improved psychosocial measure.

Keywords:

Physical activity change, physical fitness, psychosocial factors, self-efficacy, men

Introduction

Regular physical activity (PA) and good physical fitness in middle age have been associated with lower morbidity and mortality in later life (Savela, 2010; Shuval, 2014). Recent accelerometer-based data indicated that only one-fifth of adult Finnish men engage in the recommended amount (150 min/week) of moderate-to-vigorous PA (Husu et al., 2014; Husu, Paronen, Suni, & Vasankari, 2011). Moreover, physical fitness among young Finnish men has decreased continuously during the past decades (Kyröläinen, Santtila, Nindl, & Vasankari, 2010). Insufficient PA and poor physical fitness have effects on both the individual health and occupational life of working-aged men (Kolu, Vasankari, & Luoto, 2014; Taanila, 2011). Numerous PA programs and campaigns have been launched to raise awareness of PA and to increase activity levels in the population (Biddle, Brehm, Verheijden, & Hopman-Rock, 2012; Cavill, 2004). Effects on PA behavior have been minimal, and working-aged men have been underrepresented in these programs (Biddle et al., 2012; George et al., 2012). There is a need to evaluate not only fitness trends but also the motivational and psychosocial factors that predict PA among working-aged men.

In general, men have been less interested in health issues than women, despite the high value they place on sports and good fitness (Garfield, Isacco, & Rogers, 2008; Pietilä, 2008). In Finland and other western countries, an increasing proportion of men are aware of the benefits of PA and motivated to adopt healthy behaviors (George et al., 2012; Helldán, Helakorpi, & Uutela, 2013; Pietilä, 2008). Men are nevertheless more likely to have lifestyle-related chronic diseases than women and men's health behaviors differ by socio-economic status (Helldán et al., 2013). Major barriers to insufficient PA are lack of perceived need, motivation and time (Caperchione et al., 2012; Salmela et al., 2012; Vähäsarja et al., 2012). Social factors, like social norms (e.g. perceived social pressure to perform the behavior) and lack of social support from important people, may also hinder PA and healthy choices (Abel, 2008). PA

programs can help men to adopt regular PA habits, and to find motivational support, but a range of methods, targeted at different subgroups, is needed.

Despite attempts to adopt and maintain regular PA, most people fail to implement their intentions to increase PA (Hagger, 2014; Schwarzer, 2008). Individual capacities and socio-cultural factors may both offer resources for health promoting lifestyles (Abel, 2008). At the individual level, psychosocial factors, such as perceived need, social support, self-efficacy and self-regulatory skills (e.g. planning, goal setting and creating maintenance strategies) have been associated with PA (Bauman et al., 2012; de Bruijn & Rhodes, 2011; Schwarzer, 2008). Awareness on PA benefits may awake perceived need to change given that one has realistic view on own physical fitness and vulnerability to lifestyle related diseases (Bauman et al., 2012; Kaasalainen, Kasila, Villberg, Komulainen, & Poskiparta, 2013). Self-efficacy has been considered the most powerful determinant of PA, although alone it is not a sufficient predictor of behavioral change (Samson, 2011; Warner, 2014). Self-efficacy refers to an individual's confidence in his ability to successfully perform a desired behavior (Bandura, cop. 1997). Self-efficacy beliefs are very context- and behavior-specific, tend to change over time and have assume different forms during the process of PA change (Samson, 2011; Schwarzer, 2011). The majority of health behavior theories include a concept of self-efficacy or related construct of perceived behavioral control (Bandura, cop. 1997; Fishbein & Ajzen, 2011; Hagger, 2014; Prochaska & DiClemente, 1983; Schwarzer, 2008)

The dynamics between self-efficacy and other psychosocial factors have been shown to be integral for health behavior changes (Koring, 2012; Luszczynska, Schwarzer, Lippke, & Mazurkiewicz, 2011; Parschau, 2012; Parschau, 2013; Warner, 2014). Self-efficacy and action planning have had a reciprocal role in bridging the gap between intention and the target behavior (Luszczynska et al., 2011; Parschau, 2013). Action planning refers to preparation on when, where and how one is going to engage in the desired behavior (Schwarzer, 2011). People who lack sufficient self-efficacy are less likely to benefit from planning and to translate their intentions into action (Luszczynska et al., 2011; Parschau,

2013). Successful PA adopters are likely to promote their engagement in PA by creating plans, enlisting social support, comparing different PA alternatives, using self-monitoring or environmental cues, and applying previous positive PA experiences (Barz, 2014; Parschau, 2013; Romain et al., 2014; van Woerkum, 2014).

The transtheoretical model (TTM) posits five motivational stages in behavior change. The theory states that moving from a lower to a higher stage is a result of improvements in self-efficacy and self-regulatory skills (Prochaska & DiClemente, 1983). Recent research has contested the relevance of separating the behavior changes into five distinctive stages (Hagger, 2014; Nigg, 2011). Compared to the TTM, dual-phase models like, Health Action Process Approach (HAPA) and Integrated Behavior Change Model for Physical Activity (IBC), make a distinction only between motivational (pre-action) and volitional (post-action) processes of behavior change (Hagger, 2014; Schwarzer, 2008). Motivational processes refer to psychosocial factors, such as knowledge, attitudes, beliefs, risk perceptions, outcome expectations and action self-efficacy. These factors are needed in the pre-action phase when one is forming an intention to change PA (Bandura, cop. 1997; Hagger, 2014; Schwarzer, 2008). Volitional processes are more proximal for actual behavior and consist of action planning and control as well as maintenance and recovery self-efficacies (Schwarzer, 2008). A key hypothesis of the IBC model is that self-efficacy, subjective norms and intention will mediate autonomous motivation and actual behavior (Hagger, 2014). Autonomously motivated individuals are likely to perceive that engagement in the behavior represents their true self and that it is inherently rewarding (Hagger, 2014).

To date, while the psychosocial factors have been studied in various populations (Aaltonen, Rottensteiner, Kaprio, & Kujala, 2014; Hankonen, Absetz, Ghisletta, Renner, & Uutela, 2010; Lorentzen, Ommundsen, & Holme, 2007; Sorensen & Gill, 2008), working-aged men have not been a specific focus of research. The aim of the present study was to evaluate validity of a short scale for psychosocial factors among working-aged men who participated in a Finnish PA campaign. It was hypothesized that the

measure will differentiate factors related to skills, goal setting, self-efficacy and social support. The study examined also the associations between psychosocial factors and phase of PA change across different fitness groups. Phases of PA change were defined as pre-action and post-action according to the dual-phase models. It was hypothesized that post-action phase is related to active goal setting, better behavioral and self-regulatory skills and stronger social support and self-efficacy.

Methods

The participants were 841 Finnish men aged 18-64 enrolled in a PA campaign titled “The Adventures of Joe Finn”. The majority of the men were employed (78 %) and married (73 %). Participants’ physical fitness was assessed with a body fitness index (BFI) constructed on the basis of the Joe Finn fitness test battery (Heiskanen et al., 2012; Kaasalainen et al., 2013). The fitness tests included hand grip (Saehan’s dynamometer), the Polar OwnIndex Test (Polar Electro, Kempele, Finland) and an InBody 720 body composition analysis. The BFI was calculated from five test variables: body fat (%), visceral fat area (VFA) (cm²), maximal oxygen consumption (VO₂max) (ml/kg/min), skeletal muscle mass (SMM) (kg/m) and hand grip strength (kg/kg). VO₂ max was assessed with the Polar OwnIndex Test, and body fat (%), VFA and SSM were measured with bioelectrical impedance (BIA) using an InBody 720 analyser. All the fitness tests have shown good validity in large samples (Borodulin et al., 2004; Duz, Kocak, & Korkusuz, 2009; Rantanen et al., 2012). Each test result was compared with age-matched reference values and expressed as points. The BFI variables were weighted with the following multipliers: VO₂max 0.50, Fat % 0.10, VFA 0.15, SMM 0.15 and hand grip 0.15. The equations used in calculating the BFI have been described in detail elsewhere (Kaasalainen et al., 2013). The BFI ranges from '-5, +5', where < -3= very poor, < -1 = poor, < +1= acceptable, < +3=good and > +3 =very good. The men were classified into low (<-1) (n=163), moderate (≤ 1) (n=363) and high (n=324) BFI (>1) groups.

Psychosocial factors were evaluated with a previously reported measure (Kaasalainen et al., 2013) which formed part of a longer questionnaire. The scale contained 16 items evaluating social support and norms (Ajzen, 2006), process of change strategies and self-regulatory skills (Marcus & Forsyth, cop. 2009) and PA self-efficacy (Marcus & Forsyth, cop. 2009; Schwarzer, 2008). The items in the original scale were in Finnish and selected from previous studies (Hankonen, 2011; Kaasalainen, Kasila, Komulainen, Villberg, & Poskiparta, 2011; Korhonen, 2010). Participants were asked to assess on a five-point Likert-scale (1=strongly agree-4=strongly disagree, 5=I don't know) how well the statements described their personal situation.

Readiness for PA change was assessed with the question “Have you changed your physical activity habits during the past year?” (1 = No, and I have no intention to change, 2= No, but I intend to change in the near future, 3 = I have tried to change, 4 = I have made considerable changes, and 5=I have been doing PA on regular basis”) (Saaristo et al., 2007). Participants were assigned to one of three moderate-to-vigorous PA (MVPA) categories on the basis of their self-reported PA (Polar Electro, 2015). The categories were 1= less than 1h/week, 2= 1-3 h/week and 3= more than 3h/week. PA included both leisure time and other activities, such as commuting to work by walking or cycling. In the further analysis, a new variable was computed using self-reported PA and readiness for change. Participants were categorized into pre-action (motivational processes) and post-action (volitional processes) phases, with pre-action comprising readiness categories 1-3 and post-action categories 4-5. MVPA was used in recoding physically active pre-actors (MVPA>3h/wk) into post-actors. This variable was able to distinguish inactive pre-actors from participants who had already reached the PA recommendations and reported no intention to increase their PA.

Data were analyzed with IBM SPSS statistics 20.0 and Mplus 7.31 (Muthen & Muthen 1998-2012). In the statistical analyses, the men were stratified according to their phase of PA change category (pre-action/post-action). Validity of psychosocial items were examined using confirmatory factor

analysis. Factor loadings, χ^2 -value with degree of freedom (df) and fit indices (Comparative fit index (CFI), Tucker-Lewis index (TLI) and RMSEA (Root Mean Square Error Approximation)) have been reported. Cut-off values for acceptable fit were CFI/TLI>0.90 and RMSEA<0.06 (Hu, 1999). All models were estimated with maximum likelihood estimation with robust standard errors (MLR). Reliabilities for sum of scores were reported with Cronbach's alpha. One Way Analysis of Variance (ANOVA) and post-hoc tests (Bonferroni) were used to test for differences in psychosocial factors across the physical fitness groups. Means (M), standard deviations (SD), F- values with degrees of freedom (df) and significances (*p*-value) were reported. Six per cent of the data on psychosocial factors was missing, which reduced the original number of participants with complete data (n=899 to n=841).

Results

Confirmatory factor analysis was conducted, first for the whole dataset, and then stratified by groups of PA change. The research hypothesis was based on a four-factor model for self-efficacy, goal-setting, skills and social support. The final factors were labeled Self-efficacy (SE), Social support (SS), Skills (SK) and Goal setting (GS) (Table 2). The following items were excluded from the models due to low correlations and poor fit: a) *"I value PA highly"*, b) *"I have good possibilities to be physically active"*, c) *"I have good exercise skills"*, d) *"I have sought information on exercise (e.g. on the Internet, from health professionals)"* e) *"I believe that by being active I can encourage the people close to me to engage more in physical activity"*. Items "b", "c", and "d" were intended to measure constructs of the skills factor and items "a" and "e" to form part of subjective norms and social support (SS). The remaining two items in the skills factor, *"I am able to find different exercise alternatives"* and *"I have found an enjoyable way to exercise"*, described one's active engagement in PA planning and management rather than PA skills per se. Item "a" measured positive attitude to PA, and in the present data it was skewed towards high values (skewness= -2.39). Social responsibility was evaluated with item "e" but it showed

poor fit to the model. The item had a moderate correlation with the other constructs for social support and norms in all the fitness categories, but the correlation was higher in the low-fit than moderate- or high-fit categories ($r=0.46$, $r=0.44$, $r=0.35$, respectively).

The goodness-of-fit indices indicated that the final models showed acceptable fit to the data (CFI/TLI>0.90 and RMSEA<0.05). The model for the pre-action phase had the lowest factor loadings and goodness-of-fit indices (CFI/TLI=0.95/0.92, RMSEA=0.05). Conventional χ^2 -test was not used as the p -values seemed to be oversensitive to sample size ($p<0.05$) (Marsh, 1994). The results were reviewed for negative residual variances and factor cross-loadings, which could have been affected by model misspecification (McIntosh, 2012). These were not observed, and hence the models were accepted on the basis of the goodness-of-fit indices. The factor inter-correlations were moderate (Table 3). The highest correlation was between SK and SE ($r=0.55$) and the lowest between SS and GS ($r=0.37$).

Further analyses were conducted to examine differences in the psychosocial sub-scores (SE, SS, SK and GS) across the physical fitness categories (Table 4). The results indicated that, in the pre-action phase, all the scores differed between the low- and high-fit groups, although social support was not higher among the moderate- than low-fit men (Table 4). The SE and SK scores increased significantly with level of fitness. In the post-action phase, scores for SS and SK were lower among the low-fit than high-fit men, but no differences were observed in these scores between the low- and moderate-fit groups. A higher GS score differentiated the high-fit men in the post-action phase from the other fitness groups. Again, the higher the fitness level, the higher was the SE score.

Discussion

This study explored the validity of a short version of previously developed measure for PA specific psychosocial factors among Finnish working-aged men (Kaasalainen et al., 2013). Constructs evaluated were self-efficacy, goal setting, skills and social support, which were selected to describe different

resources for engagement in PA and motivational phase of PA change. Confirmatory factor analysis indicated that while the measure was able to assess self-efficacy and goal setting as in the original scale, the skills and social support items were heterogeneous and did not match the hypothesized factors. The final factor for skills described the ability to manage one's PA environment and to find an enjoyable way to exercise. Skills were associated with self-efficacy, and these two factors distinguished the most clearly between the pre-action and post-action phases of PA change. The revised short version of the scale can better demonstrate psychosocial differences between physically active and inactive men.

A further aim of the study was to investigate the relation between physical fitness and psychosocial factors at different phases of PA change (pre-action and post-action). As hypothesized, the most of the high-fit men were in the post-action phase of PA change and these individuals scored higher in self-efficacy, skills, goal-setting and social support than their low-fit counterparts. In contrast, differences between the moderately-fit and high-fit post-actors were observed only in self-efficacy. The moderately-fit participants were likely to be in the middle of the "intention-behavior gap" and attempting to adopt or maintain a sufficient PA level. The self-efficacy items in this study assessed confidence to exercise in different situations, and hence were related rather to PA maintenance than initiation. According to the theoretical assumptions and experimental findings intention formation demands action self-efficacy while maintenance self-efficacy is critical for regular engagement in PA (Luszczynska et al., 2011; Parschau, 2012; Schwarzer, 2011). The moderately-fit men in the post-action phase tended to have adequate action self-efficacy but would require even stronger maintenance self-efficacy and self-regulation skills to engage in regular PA. Only a few of the low-fit men were sufficiently active and located in the post-action phase. Among these men, regular PA may have begun only recently, so that the transfer effects of exercise to the BFI were not yet evident. Low fitness may also be a result of poor

PA quality (e.g. low intensity), an unhealthy diet, diseases or genetic factors (Rankinen & Bouchard, 2008).

Self-efficacy and skills also separated the fitness categories in the pre-action phase, but social support differentiated only between low- and high-fit. The majority of the low-fit men desired to increase PA but self-efficacy, poor self-regulatory skills and lack of social support were potential barriers to PA (Kaasalainen et al., 2013). The dual-phase PA theories suggest that behavioral change demands a different sort of self-efficacy at different phases of change (Schwarzer, 2008). The low-fit men, in particular, had low self-efficacy in the pre-action phase, which implies that they may find it difficult to engage in PA in general, irrespective of other factors. Higher and more specific self-efficacy seems to be needed when to translate intentions into PA behavior (Rhodes & Yao, 2015). Low self-efficacy in the pre-action phase may originate from negative PA experiences, feelings of shame about having an unfit body or poorer PA skills than peers (Castonguay, 2015; Gavarkovs, 2015). An encouraging social environment, enjoyable exercise alternatives and experiences of mastery could promote self-efficacy and the adoption of more regular PA (Hagger, 2014; Parschau, 2013; Rose & Parfitt, 2012; Ryan & Deci, 2000). Notably, in the present study, self-efficacy was related to perceived ability to find different exercise alternatives and having found an enjoyable way to exercise. This finding underlines the importance of creating opportunities for men to gain familiarity with different PA alternatives that suits their existing PA skills. Previous research suggests that variation in activities may also attract men to engage in PA programs (George et al., 2012).

All the men in the post-action phase scored higher in goal setting than any group in the pre-action phase. This was different from other psychosocial factors where high-fit men scored better than low-fit in post-actors even at pre-action phase. The result reflected the hypothesized link between goal setting and actual behavior (Schwarzer, 2011). A previous study suggests that preparatory actions, goal-setting

and planning are needed for the successful adoption and maintenance of PA (Barz, 2014). Goal setting and planning can promote self-efficacy, if the goals are realistic and based on the individual's personal needs and motives (Williams & French, 2011). Self-selected goals are the result of self-efficacy whereas goals assigned by others may reduce self-efficacy (Samson, 2011). People with low self-efficacy may not benefit from planning because they feel unable to implement their plans (Luszczynska et al., 2011; Parschau, 2012). Neither self-efficacy nor planning are sufficient to facilitate PA change, if the individual doesn't value PA, lacks fundamental PA skills or receives little support for PA from important people (Bauman et al., 2012; Rodgers, Markland, Selzler, Murray, & Wilson, 2014; Verdonk, 2010).

In this study, perceived social support had a relatively strong relationship with skills but a low correlation with goal setting. This suggests that social support could be beneficial for men who are initiating change in PA, but who have not yet acquired confidence in their PA skills and ability to maintain PA in the long term. The social environment can offer several resources for self-efficacy, including encouragement, feedback and positive social comparison (Samson, 2011). Availability of social support may be important especially for young inactive men (Kaasalainen et al., 2013). The desire to be a role model for the family or important others can also motivate inactive men to increase PA (Caperchione et al., 2012; Pietilä, 2008). In contrast, a performance-oriented fitness culture, such as is currently dominant, may not offer low-fit men suitable role models (Castonguay, 2015). In this study, the psychosocial scale included the statement: *"I believe that by being active I can encourage the people close to me to engage more in physical activity"*, and it had a stronger relationship with social support the lower the respondent's physical fitness level. Pedersen et al. (2013) found that inactive individuals who were willing to increase their PA would have wanted more support from friends and family and also easy access to exercise facilities (Pedersen, Kjølner, Ekholm, Grønbæk, & Curtis, 2009). Social responsibility may encourage less active men to adopt health behaviors, but cross-sectoral co-operation

is needed to establish a social and physical environment favorable to adoption of a physically active lifestyle.

While self-efficacy has been established as one of the major determinants of regular PA (Bauman et al., 2012), the associations between physical fitness and self-efficacy have been less studied. Physical fitness may affect PA identity and interact with perceived confidence to engage in PA and achieve PA goals (Springer, Lamborn, & Pollard, 2013). Low fitness may be shamed and affect negatively self-efficacy (Castonguay, 2015). However, it should be taken into account that physical fitness may be related to genotype and that socio-economic factors may limit possibilities to manage one's health and engage in PA (Abel, 2008; Helldán et al., 2013; Rankinen & Bouchard, 2008). The low-fit participants in the present study were more often obese, had chronic diseases and had lower educational status than the moderate or high-fit men. Low-fit and overweight persons may have stronger weight-loss motives and perceived need to engage in PA than their less overweight counterparts. This can be interpreted as a positive sign, as regular PA and good fitness reduce the risk for metabolic diseases despite overweight (Juraschek et al., 2014; O'Donovan, Hillsdon, Ukoumunne, Stamatakis, & Hamer, 2013). Weight loss is often associated with extrinsic motivation to engage in PA, and hence long-term maintenance of PA may need autonomous motives (Hagger & Chatzisarantis, 2008). It is important to encourage active low-fit men to continue engagement in the kind of PA they enjoy, and help inactive men to seek suitable PA alternatives.

Enjoyable PA experiences and positive affective responses have played a central role in efforts to promote PA among inactive people (Aaltonen et al., 2014; Allender, Cowburn, & Foster, 2006; Hagger & Chatzisarantis, 2008; Warner, 2014). These factors have been associated with improved action self-efficacy and progress in PA change (Barz, 2014; Parschau, 2012). Rose et al. (2012) concluded that self-selected intensity and type of exercise may facilitate positive feelings and strengthen the individual's commitment to exercise (Rose & Parfitt, 2012). The importance of self-efficacy for regular PA is evident,

while the role of affective responses and sources of self-efficacy has been less studied (Rose & Parfitt, 2012; Warner, 2014). Thus far, research has suggested that mastery experiences and the promotion of positive affective states are among the most important predictors of self-efficacy (Warner, 2014). Physical activities that do not demand special PA skills or a high fitness level could be recommended for unfit men. Such activities might include green exercise and outdoor PA. In the natural environment, people can engage in physical activities on their own or in groups, enjoy a sense of autonomy but nevertheless have an opportunity to share experiences with others (Calogiuri & Chroni, 2014). Furthermore, outdoor activities have been perceived as less exhausting than corresponding PA indoors (Gladwell, Brown, Wood, Sandercock, & Barton, 2013). This may also promote PA enjoyment and motivation among low-fit men. Better understanding of relations between affects and PA could increase knowledge about effective methods of encouraging inactive people to adopt a more active lifestyle.

This cross-sectional study has limitations. The data were collected from a Finnish PA campaign titled the “Adventures of Joe Finn”, and thus the participants were likely to have positive attitudes to PA in general. All the men voluntarily participated in the fitness tests and answered the questionnaire. The strength of the data collection in the campaign context is its wide reach of Finnish working-aged men. Although the majority of the participants were employed, the data collection method also allowed the participation of unemployed men. A previous study of occupational PA counseling proposed that the workplace environment is a challenging setting for reaching inactive persons (Aittasalo, 2006). The present campaign was targeted, in particular, at inactive men, yet almost the same proportion of low-fit men (20 %) were recruited in the present study as in population-based survey studies (Husu et al., 2011). Another limitation is the use of self-reports, which are sensitive to over- and underestimation bias. However, we measured physical fitness as an outcome variable, as it may be better related to PA habits than self-reported PA (Borodulin et al., 2005).

The analyses revealed that classifying the phase of PA change was problematic: the original categorization failed to distinguish individuals who were active and had no need to increase their PA from inactive intenders. Therefore, a new variable was computed on the basis on self-reported PA and readiness for PA change. After that, we were able to separate different activity levels among pre-action and action phases. Nevertheless, readiness for PA change and current PA level should have been assessed more accurately in the questionnaire. Overall, the usefulness of evaluating the motivational phase of PA change is dependent on the characteristics of the target population. Rhodes & de Bruijn (2013) propose that stage of change assessment is worthwhile only for groups who aim to reach public physical activity guidelines. From a public health perspective, the intention to increase PA among those who are already sufficiently active is of no interest (Rhodes & de Bruijn, 2013).

The majority of the studies evaluating PA campaigns have focused on exploring participants' awareness of health behaviors and risk perceptions (Cavill, 2004). However, less is known about the psychosocial factors of working-aged men who participate in such campaigns (Gavarkovs, 2015; George et al., 2012). This knowledge could help to improve the effectiveness of PA campaigns targeted at working-aged men. The present study evaluated the validity of a previously used measure (Kaasalainen et al., 2013), which took into account the central psychosocial factors that have shown associations with PA behavior (Bauman et al., 2012). The data collection during the campaign influenced the selection of measures as the participants answered the questionnaires in field conditions. The analysis indicated that the ability of the measure to assess hypothesized psychosocial constructs was limited. The result demonstrated the importance of choosing a sufficient number of items for each measured construct. The evaluated measure included a wide range of items covering various psychosocial factors. To establish a more valid measure, the skills items should be more clearly defined. Items showing lack of fit should be replaced with statements specifically on either PA skills or self-regulatory skills. When interpreting the results of this study, it should be noted that the distributions of the psychosocial sub-scores tended to be

skewed towards high values among those in the higher fitness categories. Further studies would need to examine the validity and reliability of the improved scales. The associations between psychosocial factors and physical fitness in working-aged men also need to be investigated in longitudinal studies.

Conclusions

The present study extended understanding of associations between psychosocial factors and phase of physical activity change in working-aged Finnish men. The tool used to measure psychosocial factors has been validated for evaluating self-efficacy, goal setting, skills and social support. Results indicated that good physical fitness was related to better perceived self-efficacy and ability to manage one's physical activity environment. Goal setting was critical for PA changes at all fitness levels. Better understanding of the relationships between the phase of PA change and psychosocial factors in low-fit men could help in targeting PA programs to this hard-to-reach group. Further study should examine the validity of a short psychosocial measure.

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Tables

Table 1. Descriptive statistics on socio-demographical factors, physical activity and phase of PA change.

	Low BFI (n=162, 19 %)	Moderate BFI (n=358 43 %)	High BFI (n=320, 38 %)
	f (%)	f (%)	f (%)
Educational level*			
Low (≤ 9 years)	15 (10)	33 (10)	25 (8)
Intermediate (12 years)	84 (54)	193 (57)	130 (42)
High (≥ 12 years)	58 (37)	112 (33)	155 (50)
BMI*			
<25 kg/m ²	13 (8)	123 (34)	218 (68)
25-30 kg/m ²	55 (34)	198 (55)	103 (32)
>30 kg/m ²	94 (58)	37 (10)	0 (0)
Self-reported diseases*			
None	123 (76)	289 (81)	276 (86)
At least one	39 (24)	69 (19)	45 (14)
Physical activity*			
<1h/week	64 (39)	62 (17)	1 (0,3)
1-3h/week	70 (43)	205 (58)	106 (33)
>3h/week	29 (18)	91 (25)	222 (66)
Readiness for PA Change*			
Has not increased/intends to increase	59 (36)	124 (35)	94 (29)
Has tried to increase	70 (43)	137 (38)	81 (25)
Has increased/maintained regular PA	33 (20)	97 (27)	145 (45)
Phase of PA change*			
Pre-action ¹	117 (72)	212 (60)	81 (25)
Post-action ²	45 (28)	146 (40)	239 (75)

¹**Pre-action**=No self-reported changes in PA during the past year and current PA<1-3h/wk. ²**Post-action**=Increased PA during the past year (PA>3h/wk) or maintaining current PA>3h/wk. *p<0.05, tested with chi square-test.

Table 2. Confirmatory factor analysis, goodness-of-fit indexes and standardized factor loadings for psychosocial factors.

	Pre- action n=410	Post- action n=430	All n=841
Overall model fit			
χ^2 (df)	871 (55)	1085 (55)	2060 (55)
CFI/TLI	0.95/0.92	0.97/0.96	0.97/0.96
RMSEA	0.05	0.04	0.04
Skills (Cronbach's alpha=0.62)			
1. I am able to find different exercise alternatives	0.546	0.572	0.584
2. I have found an enjoyable way to exercise	0.711	0.785	0.776
Goal Setting (Cronbach's alpha=0.70)			
3. I have set myself goals for exercise	0.740	0.766	0.786
4. I believe that I can achieve my exercise goals	0.581	0.817	0.725
Social support (Cronbach's alpha=0.78)			
5. People close to me support my physical activity	0.871	0.933	0.912
6. People close to me have a high regard for exercise	0.730	0.675	0.703
Self-efficacy (Cronbach's alpha=0.81)			
7. I am able to exercise when I am tired	0.667	0.696	0.710
8. I am able to exercise when I am bad tempered	0.730	0.732	0.753
9. I am able to exercise when I am busy	0.656	0.684	0.697
10. I am able to exercise although the people close to me do not place a high value on physical activity	0.601	0.688	0.654
11. I am able to restart exercise after an inactive period	0.534	0.561	0.559

Abbreviations: df=degree of freedom, CFI=comparative fit index, TLI= Tucker-Lewis index, RMSEA= Root Mean Square Error Approximation, ¹**Pre-action**=No self-reported changes in PA during the past year and current PA<1-3h/wk. ²**Post-action**=Increased PA during the past year (PA>3h/wk) or maintaining current PA>3h/wk. **Excluded items:** a) I regard highly PA, b) I have good possibilities to be physically active, c) I have good exercise skills, d) I believe that by being active I can encourage the people close to me to engage more in physical activity.

Table 3. Pearson correlations between factors for psychosocial factors

	SK	SS	SE	GS
Skills (SK)	1	.469**	.554**	.514**
Social support (SS)		1	.433**	.366**
Self-efficacy (SE)			1	.486**
Goal setting (GS)				1

**Statistically significant correlation, $p < 0.001$.

Table 4. Differences in psychosocial factors by physical fitness and phases of PA change.

Psychosocial sub-scores and physical fitness (BFI)	Phase of PA change*							
	M	SD	Pre-action ¹ post-hoc	F(df)	M	SD	Post-action ² post-hoc	F(df)
Goal Setting			p=0.010	1.64			p<0.001	7.82
Low BFI (L)	2.53	0.72	L<H	(408)	2.94	0.77	L<H	(427)
Moderate BFI (M)	2.75	0.65	L<M,		3.10	0.67	M<H	
High BFI (H)	2.77	0.71			3.36	0.61		
Skills			p<0.001	9.41			p<0.001	12.97
Low BFI (L)	2.90	0.67	L<M<H	(408)	3.09	0.67	L<H	(427)
Moderate BFI (M)	3.07	0.61			3.33	0.59	L<M,	
High BFI (H)	3.32	0.52			3.57	0.49		
Social support			p=0.02	2.68			p<0.001	7.81
Low BFI (L)	3.00	0.70	L<H	(408)	3.08	0.68	L<H	(427)
Moderate BFI (M)	3.16	0.67			3.33	0.64	L<M,	
High BFI (H)	3.25	0.61			3.48	0.59		
Self-efficacy			p<0.001	10.43			p<0.001	11.08
Low BFI (L)	2.64	0.57	L<M<H	(408)	2.85	0.55	L<M<H	(427)
Moderate BFI (M)	2.80	0.55			3.09	0.57		
High BFI (H)	3.00	0.54			3.26	0.54		

*Differences between BFI-categories tested with one-Way ANOVA, M=mean, Abbreviations: SD=standard deviation, p=p-value, PA=physical activity, BFI=body fitness index. ¹Pre-action=No self-reported changes in PA during the past year and current PA<1-3h/wk. ²Post-action=Increased PA during the past year (PA>3h/wk) or maintaining current PA>3h/wk.