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Original article

Predictors of increase in physical activity during a 6-month follow-up period among overweight and physically inactive healthy young adults

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Abstract

Background/Objective: The beneficial effects of physical activity (PA) are well known, but it remains challenging to increase PA among physically inactive and overweight young individuals. The present study aimed to examine how selected psychological and physical characteristics assessed at baseline predict the increase in total PA over a 6-month follow-up among 51 physically inactive and overweight adults (20 women, 31 men; age 26–40 years) who participated in a lifestyle counselling study without supervised PA sessions.
Methods: Baseline measurements included a questionnaire assessment of sense of coherence and psychological flexibility, heart rate monitoring-based stress/recovery from stress (stress%/recovery% during 24 hours), and body composition. PA volume was elicited through interview. Participants who increased their PA by $\geq$ 500 *metabolic equivalent* of task-minutes/week during the follow-up compared with their prebaseline PA level were regarded as able to increase PA. Logistic regression was used to analyze associations of baseline characteristics with PA increase.
Results: During the 6-month follow-up, 41% of the participants increased their total PA by $\geq$ 500 *metabolic equivalent* of task-minutes/week. The best predictors of the increase in PA were high meaningfulness subscores of the sense of coherence questionnaire (multivariate adjusted odds ratio 1.57, 95% confidence interval 1.04–2.35) and high recovery% during a day off (odds ratio 1.15, 95% confidence interval 1.02–1.30).
Conclusion: A strong sense of meaningfulness and better recovery from stress predict an increase in PA among physically inactive and overweight young adults. Therefore, participants with a low sense of meaningfulness and low recovery from stress may require support from other interventions to be able to increase their PA.

Keywords: Obesity; Physical activity; Physical inactivity; Recovery; Sense of coherence

Introduction

Physical activity (PA) has many health benefits including reducing the risks of obesity and type 2 diabetes[1] and favorably impacting psychological well-being[2] and stress.[3] Accordingly; regular PA plays important roles in preventing chronic diseases and promoting physical and psychological well-being. However, one third of adults worldwide do not reach the current PA recommendation[4] (i.e., $\geq$ 150 minutes of moderate intensity PA weekly).[5]

Physical inactivity together with increasing prevalence of being overweight[6] predisposes people to increased risk of cardiometabolic diseases. Thus, healthcare workers and other professionals strive to increase people's participation in regular PA. However, this is a challenging goal. Despite exercise

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counselling or other strategies to increase PA (such as internet- or mobile phone/smartphone-based applications), not all physically inactive and overweight individuals manage to increase their PA. Therefore, it is important to study the factors that influence a person's likelihood of starting/increasing their PA after exercise counselling or other interventions. Such knowledge could help in selecting additional interventions (such as stress management) necessary to successfully increase PA.

Both physical and psychosocial factors are associated with successfully increasing PA within populations of physically inactive and overweight adults. Of the physical factors, older age,[7] male sex,[7,8] higher[9] or lower[7] body mass index (BMI), and higher physical fitness[8] at baseline have been associated with increased PA observed during follow-up periods within physically inactive and overweight (or predominantly overweight) study populations (with a mean age of around 40–50 years). Psychosocial factors that predict an increase of PA in these study populations include a higher stage of readiness to change PA habits,[7,9] greater motivation to increase PA, and higher self-efficacy for PA.[9] Higher self-efficacy is also associated with an increase of PA in other target groups, e.g., among patients with type 2 diabetes[10] and arthritis.[11] However, less is known about the factors that predict an increase in PA among younger overweight and physically inactive adults.

The psychological factor of a strong sense of coherence (SOC) is also associated with a greater prevalence of PA among healthy adults[12,13] and with higher PA volume in adult type 1 diabetics.[14] A 13-year follow-up study by Myers et al[15] showed that a low SOC was associated with decreased engagement in PA among patients with myocardial infarction. SOC could also be associated with PA in other target groups, such as among overweight and physically inactive adults. SOC reflects psychological characteristics formed from three components: comprehensibility (one's ability to understand what happens around him/her), manageability (the extent to which one can manage a situation alone or through significant others in one's social network), and meaningfulness (ability to find meaning in the situation).[16–18] SOC is also associated with other health-related factors, such as morbidity[19,20] and mortality.[21–23]

Another potential predictor of PA is psychological flexibility, which reflects an individual's willingness to endure negative private events (e.g., discomfort during physical activity), acceptance of these events, and ability to live according to his/her values. A person with greater psychological flexibility usually also shows higher acceptance skills and less experiential avoidance.[24] It is suggested that psychological flexibility is associated with health-related benefits, while psychological inflexibility is considered to be associated with psychopathology.[25] For example, high psychological flexibility has been reported to be associated with better chronic pain management[26] and fewer symptoms of disordered eating.[27,28] Additionally, physically active adults show better mindfulness skills (a component of psychological flexibility) than less physically active adults.[29] This suggests that high psychological flexibility might also be associated with an increase of PA.

Stress may also be an important determinant of PA. Prospective studies show that psychological stress predicts less PA/exercise or more sedentary behaviour.[30] High job strain is also a risk factor for leisure time physical inactivity.[31] Both positive and negative stress may cause physiological alterations in the body. Stress can influence heart rate variability (HRV), with higher effort at work associated with lower daytime HRV, and lower levels of perceived stress at work associated with higher HRV during work time.[32] The association between perceived stress and reduced PA raises the question of whether objectively measured stress is also associated with PA.

The present study aimed to investigate how selected psychological (SOC and psychological flexibility) and physical (body composition, objectively measured stress, and recovery) factors measured at baseline predict an increase in PA among physically inactive and overweight healthy young adults during an intervention study without supervised PA sessions.

Methods

Study design

The present investigation is part of the Body and Future Health study, which aims to examine the effects of independently executed lifestyle changes (nutrition and PA) on body composition and metabolic and psychological stress (see www.controlled-trials.com/ISRCTN92130721/kujala). The complete project is a randomized controlled trial with four experimental groups (Appendix Figure 1): mini-intervention, mini-intervention + electronic fitness coach, mini-intervention + whey protein drink, and control. Briefly, the mini-intervention included simple instructions for improving nutrition (e.g., “eat regularly”, “avoid sugar”) and increasing PA (“perform relaxing and enjoyable exercise daily”). PA advice was based on PA recommendations for healthy adults: $\geq$ 150 minutes moderate intensity or 75 minutes vigorous intensity exercise weekly.[5] Control participants were informed about the study aims but not instructed to make any specific lifestyle changes (although they were not advised to avoid lifestyle changes). The electronic fitness coach and whey protein drink are explained briefly in Appendix Figure 1.

The intervention period lasted 6 months. Laboratory and real-life measurements were performed at baseline (before starting the intervention), mid-intervention (at the 3-month follow-up), and following completion of the intervention (at the 6-month follow-up). PA during the past 3 months was ascertained via a detailed interview at baseline (prebaseline 3-month PA level) and at the 3- and 6-month follow-up visits.

Preliminary analyses revealed no between-group differences in increases in PA. Therefore, in the present substudy, we examined individuals from all four study groups together using study group information as a covariate. Increase in PA (compared to prebaseline PA level) was assessed for the whole 6-month follow-up and predictors of increases in PA were obtained from the baseline measurements.