

TARTU ÜLIKOOL  
Spordipedagoogika ja treeninguõpetuse instituut

**Petteri Rauhala**

**Physical activity counseling in primary health care: factors influencing the  
physical activity counseling and promotion of the physical education  
programs in medical schools**

Liikumisnõustamine esmatasandi arstiabis: liikumisnõustamist mõjutavad tegurid ning  
liikumisharidusprogrammid meditsiiniõppes

**Bakalaureusetöö**

Kehalise kasvatuse ja spordi õppekava

Juhendaja:  
lektor M. Kull

Tartu 2015

## Table of contents

INTRODUCTION.....	3
1. PHYSICAL ACTIVITY COUNSELING PROVIDED BY PHYSICIANS.....	4
1.1. Evidence of physical activity counselling effectiveness and physical activity counselling rates among physicians.....	4
1.2. Physical activity counseling rates among physicians.....	4
2. FACTORS AFFECTING FOR DOCTORS PHYSICAL ACTIVITY COUNSELING.....	5
2.1. Attitudes of medical students and practitioners towards counseling physical activity.....	5
2.2. Barriers for counseling physical activity.....	6
2.3. Association between personal physical activity habits and counseling practices.....	8
3. PHYSICAL ACTIVITY EDUCATION IN MEDICAL SCHOOLS.....	10
3.1. Attitudes towards physical education in medical schools.....	11
3.2. Present situation of physical activity education in medical schools.....	12
4. THE HEALTH HABITS AND RATES OF PHYSICAL ACTIVITY OF MEDICAL STUDENTS.....	13
4.1. Physical activity habits of medical students.....	13
4.2. External and internal factors influencing physical activity habits of medical students.....	14
5. A WELL-DESIGNED PHYSICAL ACTIVITY EDUCATION PROGRAMS IN MEDICAL SCHOOLS.....	16
5.1. Physical activity behaviour of the medical students themselves.....	16
5.2. Theory-based teaching of physical activity.....	18
5.3. Practical counselling of patients to undertake physical activity.....	19
6. STRATEGY PLAN FOR INTEGRATE PHYSICAL ACTIVITY EDUCATION IN MEDICAL SCHOOLS.....	20
7. SUMMARY.....	23
REFERENCES.....	24
RESÜMEE.....	29
AUTORI LIHTLITSENTS TÖÖ AVALDAMISEKS.....	31

## INTRODUCTION

Physical inactivity has been identified as one of the major public health issues of the 21st century. It is considered to be one of the major causes of non-communicable diseases (NCDs). NCDs cause more than 36 million deaths per year across the globe (comprising approximately 63% of all deaths). The World Health Organization (WHO, 2013) has estimated that the total number of deaths from NCDs could increase to 55 million by 2030. This fact has prompted initiatives to find cost-effective strategies for the prevention of physical inactivity.

Training medical students, the doctors of the future, to promote and encourage physical activity (PA) could be a key element of a wider strategy to improve the level of PA for overall society. Doctors have long been recognized to have significant role for promoting healthy habits amongst the general population. They are in a good position to discuss health-related issues because they interact with patients on a regular basis, on average three times per year, and they are also perceived as a reliable source of information for health issues. Doctors also have an ethical obligation to encourage healthy lifestyles for their patients. However, there is a big gap between the awareness of the importance of PA counselling by doctors and the actual undertaking of this counselling.

This paper reviews the leading literature relating to PA counselling, aiming to give an overview of both the current prevalence and factors influencing PA counselling by doctors, as well as the methods of PA-related teaching during medical education. The specific objectives of this study are:

- 1) determine the rate of PA counselling provided by medical practitioners and identify the factors that have an effect on PA counselling by doctors,
- 2) describe the personal health habits of medical students including their rates of PA,
- 3) describe the current situation of PA-related education in medical schools.

Key words: Physical activity counselling, medical students, doctors, medical education, medical school

Võtmesõnad: liikumisnõustamine, meditsiinitudengid, arstid, meditsiiniõpe, meditsiinikool

# **1. PHYSICAL ACTIVITY COUNSELING PROVIDED BY PHYSICIANS**

Doctors are in a good position to promote and discuss health-related issues because they see patients regularly, on average three times per year, and they are also perceived as a reliable source of health-related information. Additionally, doctors have ethical obligation to encourage healthy lifestyles (Lobelo et al., 2009; Karvinen et al., 2010; Fie et al., 2011; Dacey et al., 2014). Although doctors are continued to be regarded as respected authorities, the abundance of information easily available on the Internet is bringing with it new challenges for health care professionals. This emphasizes the requirement of competence for in both knowledge and counselling skills in addressing health related questions (Agree et al., 2015).

## **1.1. Evidence of physical activity counselling effectiveness and physical activity counselling rates among physicians**

Research evidence (Grandes et al., 2009; Orrow et al., 2012) suggests that physical activity (PA) counselling is both potentially and currently an effective manner to increase patients PA levels. Grandes et al. (2009) made randomized intervention for 56 family physicians in Spain. 29 of these physicians were providing individual PA counselling, and giving PA informational materials to all their patients. The remaining 27 physicians collaborated as a control group and did not promote PA unless absolutely necessary. 2248 physically inactive patients were in the intervention group and 2069 physically inactive patients were in the control group (n=4317). Intervention results were assessed after 6 months in both groups, and patients who received personal counselling were reported to have significantly higher PA levels than the control group. Orrow et al. (2012) reported similar findings in their review of 15 studies (n=8745 patients). Therefore, research evidence suggests that PA counselling by physicians could be significant effect to increase their patients PA levels.

## **1.2. Physical activity counseling rates among physicians**

Despite the fact that PA is vital for health and the evidence that PA counseling can increase patients PA levels, studies show that physicians do not often counsel their patients about PA. A recent nationwide study from the USA (n=21850 patients) showed that only 32% of adult patients who had visited their physician in the past 12 months have been counseled to do PA

(Barnes et al., 2012). Corresponding PA counseling data from an Australian study were 18% (Robertson et al., 2011), with another study from Australia revealing that 32% of physicians never or hardly ever promoted PA habits to their patients (Gnanendran et al., 2011).

Petrella et al. (2007) published a substantial report about the PA counseling practices of Canadian physicians. There are more than 27 000 primary care physicians in Canada and the researchers received responses from 13 166 Canadian physicians. 69.8% of these physicians reported that they were verbally counseling PA to their patients, whereas only 15.8% of these physicians provided written instructions related to PA to their patients. One study from Germany reported that slightly more than half (55%) of physicians were counselling patients to undertake PA (Bock et al., 2012).

In conclusion, evidence has shown that PA counselling by medical practitioners is effective manner to increase PA levels at population level. However, quantity of PA counselling is still low, and there is a need for increase systematically PA promotion activities in the healthcare system.

## **2. FACTORS AFFECTING FOR DOCTORS PHYSICAL ACTIVITY COUNSELING**

A number of intrinsic, extrinsic and organizational factors have been determined to affect the counseling practices of physicians. There are also some identified factors that inhibit counseling, as well as some factors that encourage medical practitioners to promote PA to their patients (Vuori et al., 2013; Lobelo et al., 2014).

### **2.1. Attitudes of medical students and practitioners towards counseling physical activity**

The majority of medical students and physicians consider that counseling PA to their patients is important, and most of them have a positive attitude towards promoting PA, including recognition of their own role in promoting PA to patients (Winzenberg et al., 2009; Gnanendran et al., 2011; Herbert et al., 2012).

In Australia, practically all medical students (99%) and all physicians (95%) agree or strongly agree that prevention of conditions related to physical inactivity is as important as other medical treatments (Gnanendran et al., 2011). Similarly, most of the fourth-year medical students (69%) from University of British Columbia, Canada, notified that the counseling of PA is highly relevant for the work of medical practitioners (Holtz et al., 2013). Likewise, in Germany, physicians reported a positive attitude towards the encouragement of PA to their patients (Bock et al., 2012).

These findings show that the medical community is aware of the scale of the problem of inactivity, and also that medical practitioners have a positive attitude towards PA counselling, in addition they believe that they have a role in influencing people's health behaviour.

Comparing these finding with the transtheoretical model of behavioural change at an individual level, it seems that physicians are already in phase three in the context of promoting PA to their patients (Prochaska & Velicer, 1997). If it is so, then this could mean that physicians own awareness, values or attitude are no longer a limiting factor in the provision of PA counselling at a population level.

On the other hand, Vuori et al. (2013), point out that the medical community, as a whole is not yet at the same position or phase of change. They submit that potential benefits of PA counselling are not yet fully realized at the medical community level. This change at the community level cannot happen by itself. To get a real breakthrough, Vuori et al. (2013) highlight the need for support and work from within the medical community, especially from credible and respected leaders and medical organizations, as this will enable the whole medical community to move to the next level.

## **2.2. Barriers for counseling physical activity**

Many factors have been identified for this disconnect between medical practitioners awareness and the actual undertaking of PA counseling. Herbert et al. (2012) investigated PA counseling barriers among primary care practitioners in their systematic review (19 studies). According their findings, major barriers were lack of time during medical consultation (14 studies), lack of knowledge and lack of training in PA counseling (8 studies), and difficulty in changing the the health behavior of patients (8 studies).

Lack of time during medical consultation was the most cited inhibiting factor for medical practitioners in the promotion of PA to patients (Herbert et al., 2012). This can be seen as an organizational or system level issue, and solving for this problem encompasses a wide range of initiatives, including time management, additional resources and policy-level decisions (Vuori et al., 2013). These differ from the solutions that will be presented in this study.

According to the review from Herbert et al. (2012), lack of knowledge and lack of skills for counseling were the second most frequently cited barrier for promote PA to patients. Other studies (Anand et al., 2011; Gnanendran et al., 2011; Bock et al., 2012; Morishita et al., 2014) support these results. These factors can be regarded as barriers on the individual level, and it is possible to address these hindrances through education.

In a survey in Bock et al. (2012), 26.9% of randomly selected German physicians stated that they did not have sufficient knowledge about how to effectively counsel PA to their patients. 73.7% of these general practitioners stated that it is problematic to promote lifestyle change to patients, and furthermore that they have failed in encouraging their patients to be more physically active in their life (Bock et al., 2012).

Similar results were reported from Japan. Morishita et al. (2014) researched Japanese primary care physicians (n=933) counseling practices. 59.3% of these primary care providers reported lack of knowledge about the exercise effects to health. An even larger percentage of respondents (68.7%) were reported to regard themselves as lacking competence to prescribing exercise to their patients.

There have been several studies about the level of knowledge of PA amongst medical students. This is important information as these students will one day be doctors. Anand et al. (2011) conducted a study on the attitude, knowledge, and physical activity practices of sixth year undergraduate medical students (n=161) in India. Only 9.3% of the surveyed students knew the accepted PA recommendations for adults. No more than 8.7% could define dynamic exercise, and barely 16% could define anaerobic training.

Similarly, a study from Scotland (Dunlop & Murray, 2013) presented data suggesting that only 40% of 177 final year medical students knew the UK guidelines for PA. However, 97% of those surveyed could faultlessly name the UK recommendation for the level of alcohol consumption. Furthermore, students from this study underestimated the risk of physical

inactivity. Medical students incorrectly rated physical inactivity to be the least lethal risk factor when compared with other factors such as tobacco, obesity and hypertension.

Similarly, other studies support the view that the level of knowledge and skills about counseling PA amongst medical students are far from optimal (Gnanendran et al., 2011; Farahbakhsh et al., 2012; Likus et al., 2013).

Additionally, studies reported inhibiting factors for effective PA counseling include inadequate education and training (Burke & Hulgren, 1975; Bock et al., 2012, Trilk & Phillips, 2014), low self-efficacy (Holtz et al., 2013), lack of reimbursement (Herbert et al., 2012), and lack of materials (Herbert et al., 2012). Herbert et al. (2012) stated that medical providers who received sufficient training in skills and knowledge to provide PA counseling are also more likely to do so.

Based on these findings, it does suggest that lack of time and lack of knowledge are one of the major limiting factors preventing the increase of PA promotion amongst both general practitioners and medical students.

### **2.3. Association between personal physical activity habits and counseling practices**

Lobelo et al. (2014) revealed in their review that the majority of studies (19 of 24) found a significant correlation between the medical providers own PA habits and their PA counselling practices. These findings are supported by number of other studies (Frank et al., 2008; Lobelo et al., 2009; Oberg and Frank, 2009; Howe et al., 2010; Bock et al., 2012; Holtz et al., 2013; Huijg et al., 2014; Morishita et al., 2014; Stanford et al., 2014).

The study from Stanford et al. (2014) compared the PA levels and counselling practices of medical students and practitioners (n=1949) in the USA. Their study was revealing in that the physician's own meeting of PA guidelines is a strong predictor of his or her willingness to counsel PA to their patients. Another major factor affecting the level of PA counselling was the body mass index (BMI) of the student or practitioner. The researchers came to conclusion that medical students and physicians with a normal BMI who also performed the recommended level of PA were more likely to possess the self-confidence to provide PA



advice to their patients than those who were overweight or obese and who did not meet the minimum guidelines of PA (Stanford et al., 2014).

Other research (Frank et al., 2008) from USA conducted all medical students in the 2003 class of 16 U.S. medical schools. Participants (n=1658) filled out questionnaires three times during their medical school studies (first year, third year, and fourth year). Frank et al. (2008) tracked the relationship between students' own PA levels and the frequency of PA counselling. More than half (61%) of U.S. medical students met recommended level of PA. An interesting finding in this study was that the students PA level dropped temporary from first year (64%) to third year (56%), but recovered in the fourth year (62%). But the main finding in this study was that students who met PA guidelines felt more confident to promote PA to patients and had a higher frequency of PA counselling.

A recent study (Holtz et al., 2013) was also conducted on Canadian medical students' focusing on their PA habits, and how these habits affected their counselling practice. The survey assessed fourth -year medical students from the University of British Columbia, Canada. The survey was voluntary and the response rate was 62% (546 of 883 students). The format of the questionnaire was the same as was previously used for U.S. medical students (Frank et al., 2008). The PA levels of the fourth-year medical students are about equal between the U.S.A (Frank et al., 2008) and Canada (Holtz et al., 2013). Holtz et al. (2013) also supported the view that the Canadian medical students own level of PA affects their counselling practices. Those students who met the recommend level of PA were more likely to see that promoting PA behaviour is essential part of their work.

It has been previously reported by Frank et al. (2010), that physically active primary care physicians in Canada generally counsel patients to exercise more than inactive ones does.

Moreover, Frank et al. (2013) stated a significant connection with the physicians own prevention practices, and their patient's practices. They conducted the nationwide survey in Israel. This research was an objective study, where they compared doctor's own health behaviour (using 8 health-related indicators) with their patient's health practices. This study presented strong evidence that medical practitioner's own health behaviour really does affect to patient behaviour. For example, 49.1% of patients whose primary doctor had taken influenza vaccine had also been vaccinated while 43.2% of patients whose doctors did not take influenza vaccination were not vaccinated themselves. The scope of this study underlines

the significance of this finding. Frank et al. (2013) analysed the data of the largest health care organization patients in Israel, which covers more than half of the population of Israeli citizens (n=1 886 791) as well as 1488 primary care practitioners.

Recent study from Huijg et al. (2014) reported that a positive attitude of medical practitioners towards PA promotion is essential, and that there is a need to encourage this behaviour. Correspondingly, a positive attitude and motivation towards PA counselling is directly connected with the physician's own PA levels.

Therefore, as numerous studies are suggesting that the PA behaviour and attitude towards PA of medical students and practitioners are linked to their PA counselling practices. Furthermore, motivation, attitude, own PA levels, and promoting PA, are all connected with PA knowledge and skills (Huijg et al., 2014).

In conclusion, studies have shown that when medical students and medical practitioners are physically active themselves, they are more likely to see prevention as a more important issue, they are more likely to have a positive attitude towards PA counselling, and they will have more confidence to do undertake this counselling. This in turn leads to a higher frequency of physicians advising patients to be more physically active, and thus could lead to a positive effect on health at both the level of the individual and the overall population.

### **3. PHYSICAL ACTIVITY EDUCATION IN MEDICAL SCHOOLS**

Despite the global epidemic of non-communicable diseases and the recognition of the health benefits of regular PA (WHO, 2013), the promotion of PA by healthcare providers is still at a less than optimal level (Barnes et al., 2012). Health care professionals have generally positive attitudes towards PA promotion, and believe that PA has an important role in preventative medicine (Winzenberg et al., 2009; Gnanendran et al., 2011; Herbert et al., 2012). Yet lack of appropriate knowledge and skills has been recognised as a major limitation in transferring this positive attitude to the actual promotion of PA in practice (Anand et al., 2011; Gnanendran et al., 2011; Bock et al., 2012; Herbert et al., 2012; Morishita et al., 2014). Deficient education in medical schools has been identified as a cause for this (Anand et al., 2011; Gnanendran et

al., 2011; Farahbakhsh et al., 2012; Weiler et al., 2012; Dunlop & Murray, 2013; Holtz et al., 2013). Another identified factor related to PA counselling is medical practitioners own level of PA. Those medical students and physicians who are physically active themselves are more likely to promote PA to their patients. Giving more attention to PA education in medical schools could be expected to influence these main factors (Frank et al., 2008; Lobelo et al., 2009; Oberg and Frank, 2009; Howe et al., 2010; Bock et al., 2012; Holtz et al., 2013; Huijg et al., 2014; Morishita et al., 2014; Lobelo et al., 2014; Stanford et al., 2014).

Lack of PA education has been reported globally by several studies, both in developed (Gnanendran et al., 2011, Holtz et al., 2013; Weiler et al., 2012; Dunlop & Murray, 2013) and developing countries (Anand et al., 2011; Farahbakhsh et al., 2012).

### **3.1. Attitudes towards physical education in medical schools**

Gnanendran et al. (2011) reported that a majority of medical students (64%) from the Australian National University believe that medical school has a responsibility to provide education about PA, and additionally that these schools should support the PA of their students. Yet 30% of those medical students felt that they had insufficient education to provide PA counselling (Gnanendran et al., 2011). Dunlop and Murray (2013) published parallel findings from Scottish medical school students with 48% of these students stating that they were discontented with training concerned with PA counselling.

A study from India found that most of the medical students from Medical school in Central Delhi had a positive attitude towards PA, with only 14% of these students believed that PA education should not be provided by the medical school (Anand et al., 2011). Farahbakhsh et al. (2012) support these findings in their study conducted in Iran, where it was found that more than two-thirds of interns and almost 90% of physicians think that medical schools should have PA education during undergraduate training.

These findings do support the view that the majority of medical students and medical practitioners have expectations that medical schools should equip them with sufficient knowledge and skills to provide PA counselling to their patients. Additionally, these studies suggest that a majority of students and practitioners believe that medical schools should support and encourage medical students to have a physically active lifestyle.

Medical students' and physicians' expectations are not incompatible with the views of the Deans of medical schools. 64% of U.S. medical school Deans stated that medical education should equip future doctors with the skills and knowledge to effectively undertake PA counselling. But only 24% of these heads of schools believed that their students are well prepared to counsel PA to patients when they graduate (Garry et al., 2002).

This topic is not new as Burke & Hultgren (1975) recognized 40 years ago that medical practitioners do not have adequate knowledge and skills to promote PA and they found that this was primarily due to the lack of formal education related to PA.

### **3.2. Present situation of physical activity education in medical schools**

Garry et al. (2002) assessed how the topic of PA was being taught in U.S. medical schools. Their findings showed that only 13% of a sample of 102 medical schools had formal teaching related to PA. For those few schools that taught PA-related materials, the average duration of teaching PA to first and second year students was five hours annually; only rising slightly to six hours during the third and fourth year of studies.

More recent studies suggest that this trend remains. For example, a study from the UK found that the average hours of teaching PA-related material was 4.2 hours per year in UK medical schools. 16% (five schools) of UK medical schools did not have any PA-related teaching and only 15 schools (56%) were teaching the current recommended level of PA to their students (Weiler et al., 2012).

Dacey et al. (2014) reviewed studies of 10 PA teaching programs (published 2000- 2012); seven from USA, one from United Arab Emirates, one from Bahrain, and one from Thailand. All the programs were based on a single medical school. The study reported noticeable variation in the duration of teaching, range from 2.5 hours to 4 years of studies.

Similar findings from Hauer et al. (2012) underscore that the time spent teaching PA in most medical schools is minimal. The study analysed the curricula of 109 medical schools during the period 1965- 2011. 62 of these schools reported eight or less hours of PA-related teaching during whole education.

As these findings show, it is understandable that the typical amount of teaching time at most medical schools is not sufficient to provide students with the sufficient knowledge and skills for the counselling of PA to their patients. Additionally, this data suggests that the level of PA-related training is not enough to support students in maintaining their own PA levels, which as we have seen is another major factor for promotion of PA counselling.

#### **4. THE HEALTH HABITS AND RATES OF PHYSICAL ACTIVITY OF MEDICAL STUDENTS**

As noted, studies have shown (Frank et al., 2007; Oberg & Frank, 2009; Howe et al., 2010; Huijg et al., 2014; Lobelo et al., 2014; Stanford et al., 2014) that the health behaviour of medical students and practitioners themselves is a major factor in the promotion of PA counselling practices. Thus there is a need to identify the present PA habits of medical students, as well as the factors that affect these habits.

##### **4.1. Physical activity habits of medical students**

Most studies report that the majority of medical students were more active than general population (Frank et al., 2008; Gnanendran et al., 2011; Standford et al., 2012; Holtz et al., 2013; Likus et al., 2013). Despite these positive results, there is still room for improvement of the PA levels of medical students.

The major motives of medical students to undertake PA have been identified as improving mood (35%), improving health (25%), and other reasons such as losing weight or releasing stress (Likus et al., 2014). Studies also report that there are a number of internal and external factors hindering university students to perceive recommendation level of PA (Gomez-Lopez et al., 2010; Kosteva et al., 2012).

Holtz et al. (2013) studied the PA levels of fourth-year medical students at the University of British Columbia, Canada. 64% (n=546) of the responders met PA guidelines. Similar results were shown in a study of U.S. fourth-year medical students, 61% of whom (n=1658) met recommended levels of PA (Frank et al., 2008).

Likus et al. (2013) reported results from Poland, and again these results reflected those of Canada and the US. Amongst Polish medical students approximately 65% (n=60) met the suggested level of PA. Likewise, a study from Australia reported that 70% (n=216) of medical students and physicians met PA levels (Gnanendran et al., 2011). Stanford et al. (2011) reported an even higher level of medical students (84%) meeting PA guidelines.

While most studies reported that the majority of medical student where met the recommended level of PA, there are also slightly divergent outcomes in some countries. For example, a study in India suggests that only one in three (32%) of Indian medical students fulfil the established guidelines of PA (Anand et al., 2011). The most alarming findings were reported from the UK. A study suggests that only 21% of junior doctors in the UK met recommended level of PA, a percentage that is even lower than the UK national average (Grupta & Fan, 2009).

Additionally, Cecil et al. (2014) investigated the link between mental health of UK medical students and health behaviours. The study found that 47% of these students have low PA levels. Furthermore, this study suggested that UK medical students are at risk of ‘burnout’; low levels of PA could be related to high levels of emotional exhaustion.

Providing a well-designed PA-related curriculum in medical schools can encourage medical students to meet PA recommendations in their own lifestyles, improving their health, and furthermore encourage a greater frequency and quality of PA counselling to the patients of these students.

#### **4.2. External and internal factors influencing physical activity habits of medical students**

Gomez-Lopez et al. (2010) examined reasons for an inactive lifestyle amongst university students. The study surveyed 323 students from University of Almeria, Spain. These students were not undertaking any PA during their spare time. The analysis revealed that there are a variety of inhibiting factors for the undertaking of PA by these students. The study characterised these barriers as external and internal. An important finding of the study was that external factors are more important than internal factors for lack of PA, and furthermore that those students who perceive a greater quantity of inhibiting factors are more likely to be

inactive. Identifying these factors could assist in providing solutions aimed at the prevention of an inactive student lifestyle. The researchers also noted that the commencement of academic studies is almost always a major change in the lives of young people; a transition from a more structured home environment to the freedom of living alone or with peers (Gomez-Lopez et al., 2010).

The most common identified external inhibiting factors for undertaking PA by students were the lack of time, tiredness because of work or studying, or PA facilities being too far from home (Gomez-Lopez et al., 2010; Gnanendran et al., 2011; Kosteva et al., 2012; Likus et al., 2013). The lack of time is also generally related to the increased time needed for studying or work. This can also cause stress and tiredness, also leading to a lack of motivation for PA (Gnanendran et al., 2011; Kosteva et al. 2012). In addition, Gomez-Lopez et al. (2010) reported that a lack of social support is also an important factor for the discouragement of young students in the undertaking of regular PA. Students whose friends were not regularly undertaking PA were more likely to be inactive themselves.

Other studies show similar results. Anand et al. (2011) revealed that lack of time (43.5%), environment limitations or lack of physically active friends were the most prominent factors mitigating against regular PA for students. This was also reflected in Likus et al. (2013), the study found that 60% of medical students from Katowice, Poland stated that the major reason for not being physically active was lack of time.

Gnanendran et al. (2011) also reported that the increased requirements and stress caused by medical education were leading to time management problems, and this in turn leads to a lack of motivation in the maintenance of a healthy lifestyle. The researchers also noted that increased family responsibilities are another factor that may negatively affect the PA levels of students and medical practitioners.

Gomez-Lopez et al. (2010) also mentioned one other factor that cannot be overlooked, namely 'nightlife'. The social life of students tends to involve increased night-time activities and this may have some influence on their level of PA.

The major internal barriers working against regular PA for students as reported by Gomez-Lopez et al. (2010) include the dislike of PA by the less active students and the lack of perception of the benefits in undertaking PA. Laziness, unwillingness, and a lack of

appropriate facilities were also reported to be limiting factors for the PA of medical students (Gomez-Lopez et al., 2010).

All these inhibiting factors have a large effect on the life and health behavioural habits of young medical students. But when identified there is also a genuine possibility to decrease their effect on the everyday life of medical students. A well-designed physical education program for medical students can be an effective solution for this issue.

## **5. A WELL-DESIGNED PHYSICAL ACTIVITY EDUCATION PROGRAMS IN MEDICAL SCHOOLS**

In developing undergraduate medical curricula, and giving more attention to teaching techniques to PA promotion, there is a strong need requirement to have an evidence-based teaching plan. According to Hauer et al. (2012) a well-designed PA teaching programs is a combination of several learning strategies with practical training and feedback.

Based on previous findings in current paper and two substantial reviews of PA-related teaching in medical schools (Hauer et al., 2012; Dacey et al., 2014) there are three main components of a PA teaching program in medical schools. These components are:

- 1) PA behaviour of the medical students themselves,
- 2) theory-based teaching of PA,
- 3) practical counselling of patients to undertake PA.

Combining these three practical and theoretical elements in a PA program seems to be more effective than focussing on just one of them. The trans-theoretical model of behavioural change has been used as a leading theoretical framework in most of the educational programs (Hauer et al., 2012).

### **5.1. Physical activity behaviour of the medical students themselves**

As previously discussed, a number of studies have found that medical students and practitioners own PA behaviour is one of the strongest predictor of their PA counselling



quality and frequency (Frank et al., 2008; Oberg & Frank, 2009; Lobelo et al., 2014). Based on these findings it is evident that one of the chief components of a successful PA course should focus on the students' own PA practices in order to encourage PA counselling of their patients.

The other aim of this component is personal, focusing on the PA of the medical students themselves with the associated health benefits. A well-designed PA teaching program can have an effect on both these goals.

Although studies have shown that PA levels among medical students and practitioners tend to be higher than the general population, there is still room increase this percentage. And it has been noted that the medical students themselves expect medical schools to support them in maintaining a healthy lifestyle (Frank et al., 2008; Gnanendran et al., 2011; Stanford et al., 2012; Holtz et al., 2013; Likus et al., 2014).

The first step in planning this component is recognising the major inhibiting factors for medical student's personal level of PA during their medical education. As studies have shown, the biggest limiting factor has been identified as lack of time (Gomez-Lopez et al., 2010; Anand et al., 2011; Likus et al., 2014). If medical schools provide PA teaching courses to their students, credit points would be awarded from this PA teaching course. In addition, a well-designed PA program should plan its timetable schedule on consultation with both students and the faculty office. It should also be taken into account that studying in medical school can be extremely demanding and students are at risk of 'burnout' due to the existing burden of their studies (Cecil et al., 2014). However, this time management should be seen as an organizational issue rather than a major problem. There is need for a new way of thinking, and new ways of teaching. Technological development in recent years can assist in this innovative approach, for example via the development of supportive applications for smartphones.

To make sure that the PA course has a positive rather than negative outcome, it should be ensured that the course does not increase the stresses placed upon the students. In fact, the course should provide opportunity to relieve the stress of students via the enjoyment of the PA itself.

The second step is to create an atmosphere and environment that will create a positive attitude towards PA by the participating students. Hauer et al. (2012) has stated that while developing a positive environment can be a complex process, it is as an important a factor as teaching basic science for the successful training of medical students. Supporting findings have shown that students from medical schools that provide PA programs result in these students providing more PA counselling to their patients. Furthermore, students from these medical schools recognize that the promotion of PA is an important part of their work as doctors (Frank et al., 2006; Holtz et al., 2013).

In summary, the health behavioural habits of the medical students really do matter. Medical schools should provide a PA teaching course that would encourage students to achieve the recommend level of PA. The end result will be not only better health for medical students but also an increase in the level of PA counselling by these students to their patients.

## **5.2. Theory-based teaching of physical activity**

As previously discussed medical students' knowledge about the importance of PA is far from optimal, and there is a stated need for more education about this topic. Thus it is clear that this component should be an essential part of any PA teaching program. The aim of this theory-based teaching component is to increase the awareness and understanding of the students of the close relationship between PA and overall health (Hauer et al., 2012).

Topics that should be included in this theory-based teaching component include (Gates, 2015):

- 1) introduction to PA and health,
- 2) physiological adaptations to exercise,
- 3) public health and PA,
- 4) counselling PA to patients,
- 5) obesity and PA,
- 6) type 2 diabetes and PA,
- 7) cardiovascular diseases and PA,
- 8) hypertension and PA,
- 9) mental health and PA.

Additionally, basic information about behaviour change has been emphasized (Hauer et al., 2012).

This theory-based teaching component is based on cognitive learning theory, which emphasizes the learners' own understanding and processing of information. An important finding was that those programs that did not have this theory-based component were unsuccessful in changing medical students counselling behaviour (Hauer et al., 2012).

In summary, improving the theoretical PA knowledge of medical students' leads to medical practitioners with a higher confidence in PA counselling which in turn leads to a greater quantity and quality of PA advice being offered by these physicians.

### **5.3. Practical counselling of patients to undertake physical activity**

A well-designed PA teaching program will have a practical counselling training component. In a successful program, medical students are not randomly offering PA counselling to patients. On the contrary, they should be coached on the counselling process (Hauer et al., 2012). Firstly this means that they receive guidance and feedback on their counselling skills. Secondly, they should have the opportunity to practice advising with standardized patients, such as training with actors. These active learning elements, where learner can repeat cycles of practice and feedback with standardized patients, has been found to get better results when compared to randomized training in a clinical environment.

The counselling of PA to patients can be complicated. Thus a well-designed PA teaching program should provide opportunities for high quality counselling training including guidance, feedback, and standardized patients. This should also have a positive effect on the confidence of medical students with regard to the counselling of PA (Hauer et al., 2012).

In conclusion, combination of all three elements (medical students own PA, theory-based teaching and practical counselling) should give a better outcome than implementation of any one by itself. The transtheoretical behavioural change model is suggested as the key theory framework for a whole program. Successful implementation of PA teaching in medical education would offer a positive opportunity to improve student health and overall wellness, evolve knowledge and skills, furthermore, increase quantity of PA promotion among future doctors.

## **6. STRATEGY PLAN FOR INTEGRATE PHYSICAL ACTIVITY EDUCATION IN MEDICAL SCHOOLS**

At present there is no standardized model to integrate PA teaching into undergraduate medical education. Furthermore there are no guidelines, adequate monitoring instruments, or a wider plan on how to implement PA teaching in medical education (Phillips et al., 2015).

Phillips et al. (2015) has established a wider strategy on how to integrate Lifestyle Medicine into medical school education. The study identifies the key co-operation partners who are important in developing this process. The study also clearly presented why these stakeholders are essential when there is intent to initiate PA teaching courses in medical schools.

The Institute of Lifestyle Medicine, part of the Harvard Medical school, has been a leader in this strategic planning process in co-operation with several other US medical schools. This planning group is composed of medical school Deans and students, medical curriculum developers, researchers, medical societies, and other persons from key stakeholder institutions such as government and policy institutes. This group has had two meetings, the first in September 2013, and the second in August 2014 (Phillips et al., 2015).

Phillips et al. (2015) published a short summary of the discussion and the conclusions from these two meetings. The planning group evaluated existing challenges and opportunities for the implementation of Lifestyle Medicine teaching. In their strategy plan there are 5 stages in the process to enable the inclusion of PA teaching into medical education:

- 1) support from Medical School Deans,
- 2) interest of medical students in physical activity teaching,
- 3) evaluation of medical students knowledge and skills of physical activity,
- 4) research and evidence-based teaching,
- 5) political support for teaching physical activity in medical schools.

### **Support from Medical School Deans**

Support of the Deans of medical schools as well as curriculum developers is an essential component in the integration process (Phillips et al., 2015). As Vuori et al. (2013) stated this process of change could only be realized with the support of the medical community and its key persons.

### **Interest of medical students in physical activity teaching**

Medical students awareness of and interest in the PA topic is vital for the process of change to be successful. As future doctors, medical students are key actors in the increased provision of PA counselling. If medical students do not see the importance of PA, and if they are not recognizing this topic on their own, it is very unlikely that the current rates of PA counselling are going to improve (Phillips et al., 2015). Therefore, both the teaching format and teaching methods of PA should be well-designed. This will have a positive effect on the student's own PA habits, and in addition it will give the skills and knowledge for PA counselling in practice.

### **Evaluation of medical students knowledge and skills of physical activity**

Monitoring the knowledge and skills of medical students is also a very important component of strategy. Some questions related to PA in final exams would be an effective message from the medical community as to the value of PA (Phillips et al., 2015). This could reinforce the message that prevention is an essential part of the work of the physician and it would also strengthen the position of PA as a true component of medical education.

### **Research and evidence-based teaching**

The amount of research and evidence that PA teaching should have greater prominence in medical education is rising (Phillips et al., 2015). A growing numbers of studies are also emphasising that the implementation of PA teaching into medical education could be an effective strategy in improving health amongst the general population. Teaching PA in medical schools has to be evidence-based, including the topics and methods (Frank et al., 2007; Vuori et al., 2013). For example, Hauer et al. (2012) report in their study that the trans-theoretical behavioural change model by Prochaska and Diclemente was the most commonly used theoretical framework to teach PA-related topics (Hauer et al., 2012). Furthermore Vuori et al. (2013) has stated that the increase in the publication of research and scientific evidence is a relevant part of a wider strategy to increase acceptance of PA-related topics in the medical community.

### **Political support for teaching physical activity in medical schools**

The organizational barrier is one reported inhibiting factor for the spread of PA counselling. This means, for example, that the available resources for education and in health care system for PA counselling is limited. Also related are the values of the policymakers themselves. Policymakers direct resources based on their own values and knowledge. Strong evidence-

based argumentation will help medical schools to promote the need for resources for the further development of PA teaching in medical education (Vuori et al., 2013).

In summary, Phillips et al. (2015), supported by Vuori et al. (2013) has presented a clear strategy and roadmap of how to increase the prominence of PA within the medical community, how to develop PA teaching in medical education, and thus achieve the chief objective of improving the physical activity habits of the overall population. When regarding future health challenges, providing a well-designed PA education to medical students can play a key role for the future solution to the global epidemic of physical inactivity. This is why there should give more attention for physical activity teaching in medical schools.

## 7. SUMMARY

The aim of this thesis was to give an overview of the current prevalence and factors influencing PA counselling by doctors, as well as the methods of PA-related teaching during medical education.

- Physical activity (PA) counselling by doctors has been found to be a cost-effective strategy to increase the rates of PA for the overall population and a majority of both medical students and medical practitioners have a positive attitude towards the promotion of PA to patients. However, in spite of this, actual PA counselling rates are low.
- Doctors have mentioned that the lack of knowledge and the lack of skills are major causes for the low rates of PA counselling. This is primarily due to the inadequate teaching of PA-related topics in medical schools.
- Medical students and medical practitioners own level of personal PA behaviour is another strong factor for the promotion of PA counselling. Physically active medical students and doctors are more likely to provide a greater quantity and quality of PA counselling to their patients.
- Providing a well-designed PA education program for medical students will not only have a positive effect on their own personal health but will also have a positive effect on the PA rates of the overall population.
- A well-designed PA teaching program should have both practical and theoretical components. It should have three main elements: 1) improving the PA behaviour of the medical students themselves, 2) theory-based teaching of PA, and 3) provide practical counselling skills related to PA.
- There are 5 stages in an effective strategic plan aiming to integrate a PA teaching program into medical education: 1) support from the Deans of Medical School, 2) evoking the interest of medical students in the teaching of PA, 3) evaluation of the knowledge and skills of medical students in PA, 4) research and evidence-based teaching and 5) political support for the teaching of PA.

Provision of a well-designed PA-related education program in medical schools could play a key role in the future solution to the global problem of the epidemic of physical inactivity. This is why there should give more attention for physical activity teaching in medical schools.

## REFERENCES

- Agree EM, King AC, Castro CM, Wiley A, Borzekowski DL. "It's Got to Be on This Page": Age and cognitive style in a study online health information seeking. *J Med Internet Res* 2015; 25:17. doi:10.2196/jmir.3352.
- Anand T, Tanwar S, Kumar R, Meena GS, Ingle GK. Knowledge, attitude, and level of physical activity among medical undergraduate students in Delhi. *Indian J Med Sci* 2011; 65:133-42.
- Barnes PM, Schoenborn CA. Trends in adults receiving a recommendation for exercise or other physical activity from a physician or other health professional. *NCHS data brief* 2012; 86:1-8.
- Bock C, Diehm C, Schneider S. Physical activity promotion in primary health care: results from a German physician survey. *Eur J Gen Pract* 2012; 18:86-91.
- Burke EJ, Hultgren PB. Will physicians of the future be able to prescribe exercise? *J Med Educ* 1975; 50:624-6.
- Cecil J, Mchale C, Hart J, Laidlaw A. Behaviour and burnout in medical students. *Med Educ Online* 2014; 19: doi:10.3402/meo.v19.25209.
- Dacey ML, Kennedy MA, Polak R, Phillips EM. Physical activity counseling in medical school education: a systematic review. *Med Educ Online* 2014; 19:10. doi:10.3402/meo.v19.24325.
- Dunlop M, Murray AD. Major limitations in knowledge of physical activity guidelines among UK medical students revealed: implications for the undergraduate medical curriculum. *Br J Sports Med* 2013; 47:718-20.
- Farahbakhsh F, Rostami M, Kordi R. Necessity of adding sports and exercise medicine topics to the undergraduate medical curriculum in Iran. *Thrita J Med Sci* 2012; 1:49-52.



Fie S, Norman IJ, While AE. The relationship between physicians' and nurses' personal physical activity habits and their health-promotion practice: A systematic review. *Health Educ J* 2011; 72:102-19.

Frank E, Carrera JS, Elon L, Hertzberg VS. Predictors of US medical students' prevention counseling practices. *Prev Med* 2007; 44:76-81.

Frank E, Dresner Y, Shani M, Vinker S. The association between physicians' and patients' preventive health practices. *CMAJ* 2013; 185:649-53.

Frank E, Segura C, Shen H, Oberg E. Predictors of Canadian physicians' prevention counseling practices. *Can J Public Health* 2010; 101:390-95.

Frank E, Tong E, Lobelo F, Carrera J, Duperly J. Physical activity levels and counseling practices of U.S. medical students. *Med Sci Sports Exerc* 2008; 40:413-21.

Garry JP, Diamond JJ, Whitley TW. Physical activity curricula in medical schools. *Acad Med* 2002; 77:818-20.

Gates AB. Training tomorrow's doctors, in exercise medicine, for tomorrow's patients. *Br J Sports Med* 2015; 49:207-8.

Gnanendran A, Pyne DB, Fallon KE, Fricker PA. Attitudes of medical students, clinicians and sports scientists towards exercise counseling. *J Sports Sci Med* 2011; 10: 426-431.

Gómez-López M, Gallegos AG, Extremera AB. Perceived Barriers by University Students in the Practice of Physical Activities. *J Sports Sci Med* 2010; 9:374-381.

Grandes G, Sanchez A, Sanchez-Pinilla RO, Torcal J, Montoya I, Lizarraga K, Serra J. Effectiveness of physical activity advice and prescription by physicians in routine primary care: a cluster randomized trial. *Arch Intern Med* 2009; 169:694-701.

Gupta K, Fan L. Doctors: fighting fit or couch potatoes? *Br J Sports Med* 2009; 43:153-54.

Hauer KE, Carney PA, Chang A, Satterfield J. Behavior change counseling curricula for medical trainees: a systematic review. *Acad Med* 2012; 87:956-68.

Herbert ET, Caughey MO, Shuval K. Primary care providers' perceptions of physical activity counselling in a clinical setting: a systematic review. *Br J Sports Med* 2012; 46:625-31.

Holtz KA, Kokotilo KJ, Fitzgerald BE, Frank E. Exercise behaviour and attitudes among fourth-year medical students at the University of British Columbia. *Can Fam Physician* 2013; 59:26-32.

Howe M, Leidel A, Krishnan SM, Weber A, Rubenfire M et al. Patient-related diet and exercise counseling: do providers' own lifestyle habits matter? *Prev Cardiol* 2010; 13:180-85.

Huijg JM, van der Zouwe N, Crone MR, Verheijden MW, Middelkoop BJ et al. Factors influencing the introduction of physical activity interventions in primary health care: a qualitative study. *Int J Behav Med* 2014; doi:10.1007/s12529-014-9411-9.

Karvinen KH, DuBose KD, Carney B, Allison RR. Promotion of physical activity among oncologists in the United States. *J Support Oncol* 2010; 8:35-41.

Kosteva AR, Salata BM, Krishnan SM, Howe M, Weber A et al. Physician variation in perceived barriers to personal health. *Int J Gen Med* 2012; 5:53-57.

Likus W, Milka D, Bajor G, Jachacz-Lopata M, Dorzak B. Dietary habits and physical activity in students from the Medical University of Silesia in Poland. *Rocz Panstw Hig* 2013. 64:317-24.

Lobelo F, Duperly J, Frank E. Physical activity habits of doctors and medical students influence their counselling practices. *Br J Sports Med* 2009; 43:89-92.

Lobelo F, Garcia de Quevedo I. The Evidence in support of physicians and health care providers as physical activity role models. *Am J Lifestyle Med* 2014; doi:10.1177/1559827613520120.

Morishita Y, Numata A, Miki A, Okada M, Ishibashi K et al. Primary care physicians' own exercise habits influence exercise counseling for patients with chronic kidney disease: a cross-sectional study. *BMC Nephrol* 2014; 15:48. doi:10.1186/1471-2369-15-48.

Oberg EB, Frank E. Physicians' health practices strongly influence patient health practices. *J R Coll Physicians Edinb* 2009; 39:290-91.

Orow G, Kinmonth AL, Sanderson S, Sutton S. Effectiveness of physical activity promotion based in primary care: systematic review and meta-analysis of randomised controlled trials. *BMJ* 2012; 26:344. doi:10.1136/bmj.e1389.

Petrella RJ, Lattanzio CN, Overend TJ. Physical activity counseling and prescription among Canadian primary care physicians. *Arch Intern Med* 2007; 167:1774-81.

Phillips E, Pojednic R, Polak R, Bush J, Trilk J. Including lifestyle medicine in undergraduate medical curricula. *Med Educ Online* 2015; 20:26150 doi:10.3402/meo.v20.26150.

Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot* 1997;12:38-48.

Robertson R, Jepson R, Shepherd A, McInnes R. Recommendations by Queensland GPs to be more physically active: which patients were recommended which activities and what action they took. *Aust N Z J Public Health* 2011; 35:537-42.

Stanford FC, Durkin MW, Blair SN, Powell CK, Poston MB et al. Determining levels of physical activity in attending physicians, resident and fellow physicians and medical students in the USA. *Br J Sports Med* 2012; 46:360-64.

Stanford FC, Durkin MW, Stallworth JR, Powell CK, Poston MB et al. Factors that influence physicians' and medical students' confidence in counseling patients about physical activity. *J Prim Prev* 2014; 35:193-201.

Trilk JL, Phillips EM. Incorporating 'Exercise is Medicine' into the University of South Carolina School of Medicine Greenville and Greenville Health System. *Br J Sports Med* 2014; 48:165-7.

Vuori IM, Lavie CJ, Blair SN. Physical activity promotion in the health care system. *Mayo Clin Proc* 2013; 88:1446-61.

WHO (World Health Organization). Global action plan for the prevention and control of non-communicable diseases 2013-2020. 2013

[http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf?ua=1), 20.01.2015.

Weiler R, Chew S, Coombs N, Hamer M, Stamatakis E. Physical activity education in the undergraduate curricula of all UK medical schools: are tomorrow's doctors equipped to follow clinical guidelines? *Br J Sports Med* 2012; 46:1024-26.

Winzenberg T, Reid P, Shaw K. Assessing physical activity in general practice: a disconnect between clinical practice and public health? *Br J Gen Pract* 2009; 59: 850-855.

## RESÜMEE

### **Liikumisnõustamine esmatasandi arstiabis: liikumisnõustamist mõjutavad tegurid ning liikumisharidusprogrammid meditsiiniõppes**

Kehaline inaktiivsus on üks oluline rahvatervise probleem 21.sajandil kuna on mitmete mittenakkuslike haiguste peamistest põhjustest. Oluline roll elanikkonna liikumisaktiivsuse toetamisel ja arendamisel võib olla meditsiinipersonalil kuna nende roll on inimeste tervise parandamine. Käesoleva töö eesmärgiks oli anda teaduskirjanduse põhjal ülevaade liikumisnõustamisest esmatasandi arstiabis, teguritest mis mõjutavad meditsiinipersonali poolt läbiviidavat liikumisnõustamist ning liikumisharidusprogrammide meditsiiniõpingute raames.

- Uuringud näitavad, et meditsiinipersonali poolt läbi viidav liikumisnõustamine on efektiivne meetod elanikkonna liikumisaktiivsuse suurendamisel ning nii meditsiinitudengitel kui arstidel on positiivne suhtumine oma patsientide liikumisaktiivsuse suurendamise osas. Samas selgub, et liikumisnõustamine on vähe levinud arstide igapäevases töös.
- Peamise põhjusena vähese liikumisnõustamise osas toovad arstid esile väheseid teadmisi ja oskusi liikumisnõustamiseks, mille üheks põhjuseks on ebapiisav ettevalmistus antud valdkonnas meditsiiniõpingute raames.
- Samuti mõjutab oluliselt liikumisnõustamist meditsiinitudengite ja arstide isiklik liikumisaktiivsuse tase. Arstid ja meditsiinitudengid, kelle enda liikumisaktiivsus on kõrgem, nõustavad suurem tõenäosusega enam oma patsiente liikumisaktiivsuse suurendamise osas.
- Heatasemelise liikumishariduse võimaldamine meditsiiniõpingute raames seostub nii meditsiinitudengite enda paremate tervisenäitajatega kui ka võimalusega suurendada elanikkonna liikumisaktiivsust.
- Heatasemeline liikumisharidusprogramm sisaldab nii praktilisi kui teoreetilisi komponente: 1) meditsiinitudengite enda piisav liikumisaktiivsuse arendamine, 2) teoreetilised teadmised liikumisaktiivsuse teemadel, 3) liikumisnõustamise praktiliste oskuste arendamine.

- Liikumishariduse integreerimiseks meditsiiniõpingutesse tuuakse välja 5-astmeline strateegiline plaan: 1) dekaani toetus, 2) meditsiinitudengites huvi tekitamine liikumishariduse vastu, 3) meditsiinitudengite teadmiste ja oskuste hindamine liikumishariduse osas, 4) teadus- ja tõenduspõhine õpetamine, 5) poliitiline toetus liikumishariduse edendamiseks.

Heatasemeliste liikumisharidusprogrammide võimaldamine meditsiiniõppes võib osutuda üheks võtmekohaks elanikkonna vähese liikumisaktiivsuse probleemiga toimetulekul ning seetõttu tuleks enam tähelepanu pöörata liikumisharidusele meditsiiniõpingute raames.

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Physical activity counseling in primary health care: factors influencing the  
physical activity counseling and promotion of the physical education  
programs in medical schools

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