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Chronic Non-Specific Low Back Pain in High School Students

A literature review

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On olemassa vahvaa näyttöä siitä, että alaselkäkivun esiintyvyys on korkea nuorten keskuudessa. Alaselkäkipupotilaat ohjataan yleensä fysioterapeuteille, mutta liikuntainterventioiden vaikuttavuudesta nuorten alaselkäkipujen ennaltaehkäisyssä ja hoidossa tiedetään vähän.

Kirjallisuuskatsauksen tavoitteena oli 1) selvittää lukio-opiskelijoiden alaselkäkipujen esiintyvyyttä ja siihen liittyviä tekijöitä ja 2) kartoittaa alan kirjallisuudesta mitkä liikunnan annostelun parametrit ovat nykyisen tietämyksen mukaan vaikuttavimmat kroonisen epäspesifin alaselkäkivun ennaltaehkäisyssä. Tarkoituksena oli näiden tietojen perusteella luoda tutkittuun tietoon perustuvat terveysliikuntasuositukset tälle potilasryhmälle.

Kirjallisuushaku suoritettiin Cochrane Library-, PeDro- ja PubMed-tietokannoista toukokuusta 2011 huhtikuun 2012 puoleenväliin asti. Tietokannoista löydettyjen artikkelien lähdeluetteloista etsittiin lisää aiheeseen liittyvää kirjallisuutta. Erillinen tietohaku suoritettiin sen selvittämiseksi, onko katsauksessa haettua tietoa olemassa suomalaisista lukiolaisista, jota ei ole julkaistu vertaisarvioiduissa sarjoissa.

Yhtäkään sellaista tutkimusta, jossa olisi tutkittu ennaltaehkäisevän liikunnan vaikuttavuutta lukiolaisten alaselkäkipuihin ei tietokantahaun perusteella ole tehty. Kirjallisuuskatsauksessa keskityttiin siksi alaselkäkipujen esiintyvyyden ja siihen liittyvien tekijöiden tarkasteluun. Kaksi satunnaistettua kontrolloitua tutkimusta, joissa käytettiin liikuntainterventioita alaselkäkivun sekundaariseen ennaltaehkäisyyn ja hoitoon alle 15-vuotiailla koululaisilla, on esitetty opinnäytetyössä suuntaa antavina esimerkkeinä.

Katsaukseen sisällytettyjen satunnaistettujen kontrolloitujen tutkimusten tulokset ovat lupaavia, mutta lisää tutkimusta tarvitaan aiheeseen liittyen. Jatkossa alan tutkimusta tulisi kohdentaa tarkemmin eri väestöryhmiin, kuten lukio-opiskelijoihin, koska tämä mahdollistaisi tutkittuun tietoon perustuvan liikunnan annostelun nykyistä paremmin.

Avainsanat	alaselkäkipu, preventiivinen liikunta, ennaltaehkäisevä liikunta, lukio, esiintyvyys, riskitekijät

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Abstract

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Introduction. There is strong evidence to support that the prevalence of low back pain (LBP) is high among adolescents. LBP patients are commonly referred to physiotherapists, but little is known about the effectiveness of exercise interventions in the prevention and management of LBP in adolescents.

Aim. To identify the prevalence and associated factors of LBP in high school students and to determine which exercise parameters have been proven most successful in the prevention of chronic non-specific LBP in high school students. The accomplishment of these aims would then lead to the creation of evidence-based recommendations for the prescription of health-related exercise for this patient group.

Methods. A literature review was carried out in the Cochrane Library, PeDro and PubMed databases from May 2011 to mid-April 2012. Bibliographies of the included studies were searched manually for additional references. A separate search was conducted to find out if there exists this type of data on Finnish high school students that has not been published in peer-reviewed articles.

Results. No studies were found in which the effectiveness of preventive exercise in high school students with LBP was investigated. Therefore, the emphasis of the literature review was on the prevalence and associated factors of LBP. Two randomized controlled trials (RCTs) were found where exercise interventions were used for the treatment and secondary prevention of LBP in children younger than 15 years old, and they were used for illustrative purposes.

Conclusions. The two RCTs show promising results in favor of exercise in the management of LBP, but more research is needed to confirm the hypotheses. More research should be conducted that targets specific population subgroups, such as high school students, to allow for evidence-based exercise prescription.

Keywords	low back pain, preventive exercise, prevention, high school students, prevalence, associated factors

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Appendix 1. Electronic Questionnaire

1 Introduction

Low back pain (LBP) was defined by the workgroup, which created the European Guidelines for Prevention in Low Back Pain in November 2004, as:

> (…) pain and discomfort, localised below the costal margin and above the inferior gluteal folds, with or without leg pain. Non-specific (common) low back pain is defined as low back pain not attributed to recognisable, known specific pathology (e.g. infection, tumour, osteoporosis, ankylosing spondylitis, fracture, inflammatory process, radicular syndrome or cauda equina syndrome).

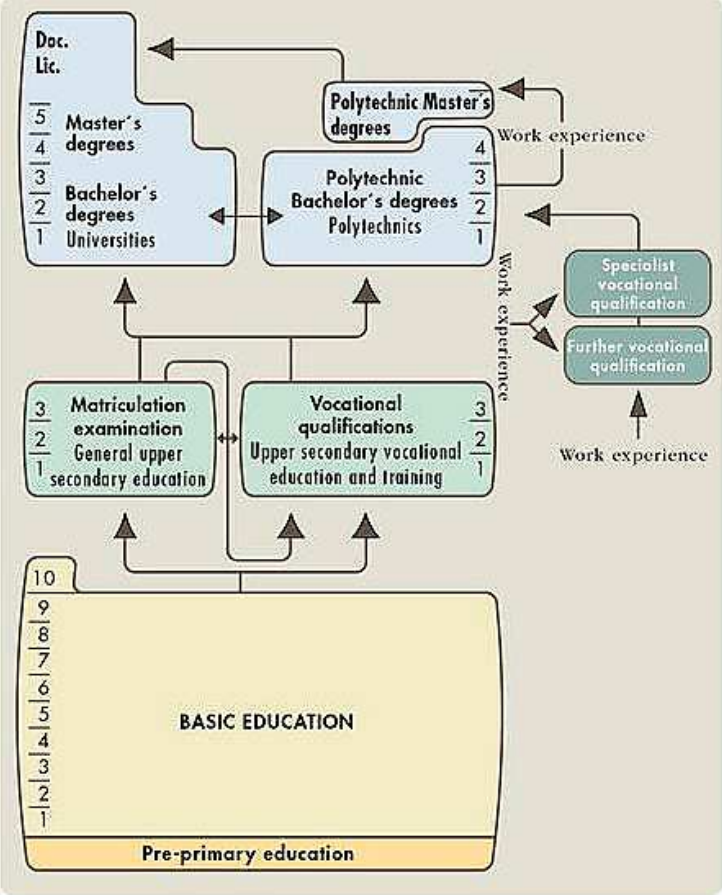
Low back pain is further classified by the duration of the symptoms into acute, subacute and chronic. Generally it is considered that acute LBP does not last more than six weeks. Subacute LBP, in turn, includes conditions of 6-12 weeks of evolution, and chronic LBP persists for over three months. (Balagué – Mannion – Pellisé – Cedraschi 2011: 3; Burton 2004: 7.)

LBP is a growing problem in today's society and results in one of the most common causes for incapacity leaves from work. Modern sedentary lifestyles, which furthermore implicate high levels of mental stress, lead to elevated risk of back symptoms. Lifetime prevalence of LBP has been reported as high as 84% by various authors, and, according to current knowledge, acute LBP becomes chronic in 5% to 10% of persons (Balagué et al 2011: 1; Chan – Mok – Yeung 2011: 1681).

According to epidemiological studies done in Finland, four out of five Finnish persons 30 years old or older have had at least one back pain episode during their lifetime. Over half of the aforementioned had experienced recurrent LBP involving up to five back pain episodes and 17% had chronic LBP. (Airaksinen, n.d.) This data shows that while back pain syndromes are extremely common in the Finnish population, they also have a tendency to relapse. In a survey study in the year 2000, back pain was found to be the most common site of musculoskeletal pain in young adults with 23% of the contestants referring that they had experienced back pain in the previous month (Riihimäki et al 2005: 85).

The Finnish high school students comprise an intriguing study population for chronic non-specific LBP research for several reasons. Firstly, high school in Finland is optional,

but the chances of obtaining admission to superior education in polytechnics or universities are remarkably higher for high school than vocational school graduates. This suggests that those persons that have undergone high school education may differ in some aspects from those persons that chose vocational education after 9th grade. (Figure 1.)



The Finnish basic education is initiated by children generally on the year of their seventh birthday, but, in some cases, elementary school may be started earlier or later depending on the matureness and cognitive capacities of the child. The obligatory basic education lasts nine years if it is completed as planned. High school education is optional and may be initiated after the completion of the obligatory basic education. Its function is to serve as a link from basic education to superior education in universities.

FIGURE 1. An overview of the structure of the Finnish education system (Finnish National Board of Education 2011).

Secondly, average Finnish high school students are between 15 and 20 years old. They are in a transition from adolescence to adulthood, thus undergoing intensive processes mentally, physically and hormonally. Many persons experience growth spurts at this age causing them to potentially suffer alterations in neuromuscular control mechanisms, which, according to current knowledge, puts a person at risk for developing LBP because of the implications it has on muscular stability of the trunk and movement efficiency (Rydeard – Leger – Smith 2006: 473).

Thirdly, young adults form a critical population in which several lifestyle habits have a tendency to change. High school students spend a large part of their typical day seated, often in ergonomically inadequate chairs and abnormal postures. Smoking is started in Finland around the ages of 13 and 15 years on average, and according to data from the year 2011, approximately one fifth of the Finnish youth between 16-18 years old smoke daily (Nuorten tupakointi 2012). Matriculation examinations and the admission process to superior education can cause considerable amounts of stress. All of these factors, among others, could potentially put high school students at a risk of LBP.

Finally, preventive methods are ideally implemented in the early stages of any condition that decreases a person's quality of life. Since high school students still have a relatively adaptive musculoskeletal system, they allow for a more significant impact to take place with the adaption of preventive methods for LBP such as a proper exercise program. Also, they have not yet acquired persistent postures and movement patterns in their profession, so it may be beneficial to educate them about back pain and adequate ergonomics at this stage.

As described by the American Board of Preventive Medicine (2011), the goal of preventive medicine is to "protect, promote, and maintain health and well-being and to prevent disease, disability, and death." Several studies have found LBP at a young age to be a strong predictor for LBP in adulthood (Hestbaek – LeBoeuf-Yde – Kyvik – Manniche 2006: 468, 471; Jones – Macfarlane 2004: 312, 315). If LBP could be prevented at an early stage, its long-term consequences could possibly be reduced (Feldman – Shrier – Rossignol – Abenhaim 2001: 30). The working group on the guidelines of prevention in LBP supports the argument that more randomized controlled trials (RCTs) are needed that would evaluate the potential benefits of the use of preventive programs and risk factor modifications at a young age (Burton et al 2004: 4).

2 Methods

The objectives of this study were 1) to identify the prevalence of LBP and associated factors of LBP in high school students and 2) to determine which exercise parameters have been proven most successful in the prevention of chronic non-specific low back pain in high school students. These objectives were chosen to give evidence-based recommendations for the prescription of preventive exercise for chronic non-specific LBP in this particular population subgroup.

A literature review was carried out from May 2011 to mid-April 2012. Searches were conducted in the PubMed, PeDro and Cochrane Library databases with the combination of the following keywords: chronic LBP, high school, secondary school, students, adolescents, children, exercise, prevention, physiotherapy and physical therapy. Differences in the choice of words between countries were taken into account to increase the sensitivity of the search. Secondary school was used as a synonym for high school.

Bibliographies of the studies that were found in electronic databases were consulted for additional studies. Only studies that were accepted in peer-reviewed journals were included. Articles published in peer-reviewed journals and found in scientific databases were considered of sufficient quality for this review. The inclusion and exclusion criteria are given in Table 1. The criteria were defined prior to the database search.

Table 1. The inclusion criteria used in the review.

Study design	Any study design published in peer-reviewed journals.
Publication date	Publications after the year 2002.
Publication language	English, French, Finnish and Spanish.
Population	High school students. Age range of subjects must include at least persons that are 15-19 years old.
Intervention	Preventive exercise.
Outcome measures	At least one of the following: prevalence of LBP, risk factors, perceived pain intensity and quality of life.
Exclusion criteria	Young adults that participate in competitive sports or work on a regular basis.

An additional search was conducted in the Finnish language websites of the National Institute for Health and Welfare, Statistics Finland, the City of Helsinki's Education Department, the Ministry of Education and Culture and the Ministry of Social Affairs and

Health. The purpose of this search was to find out whether this type of data is available on Finnish high school students that has not been published in peer-reviewed articles.

Due to the lack of evidence that would permit achieving the primary objective of the study, a detailed review protocol such as is described by several authors was not strictly followed (Moher – Liberati – Tetzlaff – Altman – The PRISMA group 2009; White – Schmidt 2005; Hemingway 2009; Nightingale 2009). In addition, research on LBP in adolescents is increasing in number, and several extensive reviews have already been published (e.g. Jones – Macfarlane 2004; Smith – Leggat 2007; Cardon – Balagué 2004).

The Finnish education system differs from those of other countries in some fundamental aspects, which makes the comparison of results between countries challenging. Although LBP in adolescents and young adults has been studied previously in Finland, according to the author's best knowledge, no data has been published that would isolate high school students from other populations. Therefore, a more open, discussion-like perspective was undertaken to the literature review.

3 Results

With the combination of words "prevention low back pain students", 32, 3 and 0 articles were found in the PubMed, Cochrane Library and PeDro databases respectively. "Low back pain secondary school" found 317 results in the PubMed database while "secondary school" found 48 results and "high school prevention" 26 in the PeDro database. These, and other search results, were revised by title and abstract for inclusion. No studies were found in which the effectiveness of preventive exercise for chronic non-specific LBP in high school students would have been studied.

Two randomized controlled trials were found in which authors the aim was to study the effectiveness of exercise interventions in the treatment of non-specific LBP in schoolchildren (Jones – Stratton – Reilly – Unnithan 2007; Fanucchi et al 2009). Neither of the studies targeted specifically high school students, and the age ranges were not within the age range that was specified in the inclusion criteria. Also, the use of exercise as a method for the primary prevention of LBP was not investigated in these studies. Therefore, these RCTs were excluded as results of this literature review. Nevertheless, their results are presented shortly in Chapter 3.2 because they are currently the only studies that are closely related to this subject.

Several studies were found on the prevalence of LBP in adolescents as well as factors that are associated with an increased risk of LBP. Risk factor modification cannot be considered prevention (Cardon – Balagué 2004: 664). Nonetheless, an overview of LBP prevalence and associated factors is presented as follows. Knowledge of risk factors is clinically relevant as it supports physiotherapists in identifying those persons at risk to develop chronic LBP, and who would, consequently, benefit from preventive interventions. It also helps in planning adequate treatment by creating hypotheses of the types of activities that may exacerbate and/or alleviate LBP.

3.1 Low Back Pain and Associated Factors in High School Students

In literature, the risk factors for an increased prevalence of LBP have been classified in numerous ways. Generally, risk factors are first classified into modifiable and non-modifiable factors. Knowledge of non-modifiable risk factors can support clinicians to

screen patients at risk of LBP whereas information on modifiable factors is even more crucial as these factors can be affected by exercise, for instance. Thus, the objective of the health professional should be to guide individuals with LBP or at risk to develop LBP to affect these factors independently.

Several physical characteristics have been suggested to correlate with an increased risk of LBP (Auvinen 2010: 32-33). Physical characteristics include non-modifiable factors (e.g. growth spurts) and modifiable factors such as lower extremity muscle tightness and muscle strength. For example, Feldman et al (2001) found that decreased hamstring and quadriceps flexibility was associated with increased LBP prevalence in high school students (Feldman et al 2001: 32-33). The assessment and treatment of problems in the locomotor apparatus are the expertise of physical therapy. Hence, their assessment, analysis and treatment according to the necessities of individual patients are recommended by the author and left to the best clinical reasoning of the therapist.

3.1.1 Non-Modifiable Factors

The non-modifiable factors that have been shown to correlate with a higher or lower LBP prevalence include gender and age. Hereditary factors are briefly mentioned. Although it is hard to quantify their significance, they are generally accepted as a one explaining factor in musculoskeletal conditions.

3.1.1.1 Age

Low back pain at a young age was previously thought to be indicative of a serious underlying condition, but recent epidemiological studies have shown this belief to be untrue. Studies from the last two to three decades have, in fact, found a high prevalence of non-specific LBP in adolescents. The prevalence of LBP increases considerably between the ages of 12 and 18 years and reaches that of the adult population by the end of the growth period. (Auvinen 2010: 23; Bejia – Abid – Ben Salem – Letaief – Younes – Touzi – Bergaoui 2005: 331.)

Low back pain is experienced in all age groups, but its relation to the perceived quality of life seems to be different among specific age groups. A survey conducted in the UK

showed that the rate of annual consultation prevalence of LBP was lowest among children between the ages of 0 and 14 and highest among individuals between 45 and 64 years of age. (Balagué et al 2011: 1.) Other authors also report that consultations for LBP in children are uncommon (Jones – Macfarlane 2004: 312). Naturally, consultation rates seem to be higher in chronic LBP than LBP. Bejia et al (2005) report a need for medical care (medical consultation or physiotherapy) in 58.5% of a cohort of Tunisian schoolchildren with chronic LBP, 23.2% with frequent and 20.5% with occasional LBP.

3.1.1.2 Gender

Korovessis, Repantis and Baikousis (2010) found statistically significant differences in LBP presentation between male and female students in a cross-sectional study. A total of 688 study subjects from five different high schools participated in the study. The mean age of the participants was 16 years with an age range of 15 to 19 years. In this study, a higher LBP prevalence was found for female students than male students (P= 0.0143). Nearly half of the female participants (45%) reported LBP while the corresponding percentage for males was 36%. Girls also reported higher intensities for the pain they perceived (P=0.0053). Pain intensity was 5 or 6 on the Visual Analogue Scale (VAS) in 10.4% of females and 4.7% of males. (Korovessis – Repantis – Baikousis 2010: 514-516.)

A cross-sectional study among 400 Kuwaiti students supports these findings. Shebab and Al-Jarallah (2005) conducted individual interviews to 199 male and 201 female students with a mean age of 14.4 years. Their results show a higher prevalence of LBP in female than male students (P=0.003) with approximately 65% of females and 51% of males reporting LBP. (Shebab – Al-Jarallah 2005: 32-33.) Gender-related differences in the prevalence of LBP may be due to hormonal factors, differences in pain perception and stress coping mechanisms among other things. Girls may also have to perform more household chores in their free-time as is suggested by Shebab and Al-Jarallah (Shebab – Al-Jarallah 2005: 34).

3.1.1.3 Hereditary Factors

A statistically significant correlation was found between LBP in Tunisian students and family history of LBP ($P= 10^{-6}$). Of the students that suffered from LBP, 45.7% reported a family history of LBP in comparison to 22.3% of pain-free subjects. (Bejia et al 2005: 334.) Although it seems likely that hereditary factors have a role in the risk to suffer from LBP, these findings do not tell to which extent hereditary factors explain LBP prevalence. It is likely that the home environment, both physically and socially, influences LBP patterns.

3.1.2 Modifiable Factors

In this overview, modifiable factors have been classified into subgroups for a more comprehensive and logical presentation. Subgroups include anthropometric measures, study conditions and posture, psychosocial factors and other lifestyle habits. Physical activity and exercise are discussed in more detail in Chapter 4.

3.1.2.1 Anthropometric measures

Poussa et al (2005) measured annually the body height and weight and the degrees of trunk asymmetry, thoracic kyphosis and lumbar lordosis in Finnish school-aged children. Information on LBP history from the same cohort was collected on two occasions: at the ages of 14 and 22 years. The last follow-up at 22 years was done for 430 study subjects, which represented 40.6% of the original cohort. This study did not find statistically significant correlations between LBP and most anthropometric measures. (Poussa et al 2005: 596-597.)

According to Poussa et al (2005), only growth from 11 to 14 years seems to predict LBP incidence at the age of 22 years, but the correlation was statistically significant in men only (Poussa et al 2005: 595-596). Feldman et al (2001) found that a high growth spurt, defined as five or more centimeters in six months, predicted LBP in a cohort of Canadian high school students in grades 7-9 (Feldman 2001 et al: 30-32). Correlation between LBP and anthropometric measures was not found in a study among North-Eastern Slovenian secondary school students (Turk – Vauhnik – Mičetić-Turk 2010:

1034) or among 11-14 year old students from northwestern England (Watson et al 2003: 13).

It seems that overweight and obesity may play a role in LBP prevalence among adults, but contradictory evidence exist on whether adolescent LBP correlates with anthropometric measures (Auvinen 2010: 25-26). Although it seems logical that a higher body mass index (BMI) would increase the strain on the anatomical structures of the spine and thus be associated with LBP, caution should be used in interpreting this type of causality. Overweight adolescents could be less motivated to exercise, have less information about health-related topics, have other underlying health conditions, or be more carefree about their health status, which may also provoke LBP. On the contrary, those adolescents with a very low BMI could potentially have less muscle mass to support the spine causing LBP to occur after prolonged strain on the back muscles.

3.1.2.2 School Studying Conditions and Posture

In this section, the term school studying conditions is used to refer to the physical, psychological and social factors that affect the health and welfare of students. Although it may be difficult for high school students to vary some of these elements, the school studying conditions are classified as modifiable factors because, with sufficient scientific evidence to present, health professionals could advocate for a positive change in these risk factors. Also, some elements of the school studying conditions can easily be modified by the subjects themselves.

Saarni et al (2009) conducted a controlled intervention study to evaluate the effects of ergonomically designed school workstations on the musculoskeletal symptoms in 12 year old and 14 year old students from two different Swedish-speaking secondary schools in Finland. Participants in the intervention group used adjustable saddle-type chairs and desks with comfort curves that enabled the accommodation of the body and provided arm support. A previous study by the authors indicated that this type of school furniture allowed a more upright, neutral sitting position than conventional chairs and desks. (Saarni et al 2009: 491-492.)

A total of 88 students participated in the study by Saarni et al (2009) and a 26-month follow-up period was used. Although good posture is thought to be crucial in the treatment and prevention of musculoskeletal problems, the results of the study did not support the hypothesis that this type of school workstation would decrease the intensity level of musculoskeletal pain in schoolchildren. (Saarni et al 2009: 492-497.) Additionally, Poussa et al (2005) did not find that spinal sagittal posture or trunk asymmetry would predict LBP in their study population (Poussa et al 2005: 597).

However, an epidemiological study conducted among a total of 662 Tunisian schoolchildren with a mean age of 14 years (range 11 - 19 years) found that dissatisfaction with the school chair was associated with LBP and chronic LBP. Dissatisfaction with the school chair was perceived in the height and/ or comfort of the chair, and it was reported by 38% of the subjects with LBP and 17.5% of those without LBP ($P=10^{-5}$). Of the subjects with chronic LBP, 11.2% reported dissatisfaction with the school chair as opposed to 4.8% of those without LBP (P=0.05). (Bejia et al 2005: 332-335.)

The contradictory findings may be a result of differences in culture and/or exposure time to school furniture or some other confounding factors. The studies used different outcome indicators, which may also influence the results. Saarni et al (2009) did not report whether their study population was satisfied with the type of school furniture they used.

Results from studies among Tunisian students (Bejia et al 2005: 334) and students from northern England (Watson et al 2003: 13) showed that the weight of the school bag did not correlate with LBP. Similarly, Korovessis et al (2010) did not find significant correlation between LBP and backpack weight (Korovessis et al 2010: 515). Association between LBP and the way in which the school materials are carried was not found in Tunisian, English, or Kuwaiti adolescents (Bejia et al 2005: 334; Watson et al 2003: 13; Shebab – Al-Jarallah 2005: 33).

3.1.2.3 Psychosocial Factors

Psychosocial factors such as anxiety, depression, distress and fear-avoidance behavior have been suggested to be associated with greater risk to suffer from LBP (Burton

2005: 542). This association has been explained by their effects on pain perception and possible somatization of psychological strain as musculoskeletal pain. However, when comparing the results of studies on these phenomena in cohorts, the reader should bear in mind the different culture-related meanings these symptoms may have and their possible influence on the results.

In a cohort of 502 Canadian high school students, lower mental health, measured with a five-item Mental Health Index, was associated with higher LBP prevalence (Feldman et al 2001: 32). Bejia et al (2005) found anxiety, tiredness, sleeplessness, and depression to be less frequent in pain-free children versus children with LBP. These symptoms were present in 49% of pain-free children, 75% of children with LBP and 80% of children with chronic LBP. These authors also found an association between LBP and school failure, which was measured as being held back one year. (Bejia et al 2005: 333.) Although these results show an association between psychosocial discomfort and LBP, conclusions cannot be made on whether they are a cause or consequence of LBP.

Korovessis et al (2010) found gender-related differences in all the psychological and psychosocial parameters that were included in their study (Table 2). All parameters resulted in favor of the male students. Female students reported more stress (P=0.0316 to 0.0001), nervousness (P=0.0006), and they were more worn out (P=0.0226 to 0.0004). Female students were also more frequently depressed (P= 0.001 to 0.0055), downhearted and blue (P=0.0183 to 0.0001) and tired (P=0.0001 to 0.031) than boys. (Korovessis – Repantis – Baikousis 2010: 515.) It has been proposed that these factors may correlate with an increased risk to suffer from LBP. The findings of this study suggest, therefore, that girls are at a higher risk to suffer from LBP, which is consistent with epidemiological findings.

Table 2. Gender-related, statistically significant differences found by Korovessis et al (2010) in the psychological and psychosocial parameters. The table was modified from the table used by the original authors. (Korovessis et al 2010: 515.)

Parameter	**Frequency (Significance)**	**% of Boys**	**% of Girls**
Stress	Continuous (P=0.0001)	7	22
	Usually (P=0.0068)	9	16
	Very often (P=0.0316)	25	32
Nervousness	Continuously (P=0.0006)	7	15
Worn out	Always (P=0.0004)	3	10
	Usually (P=0.001)	7	17
	Very often (P=0.0226)	21	28

Depressed	Usually (P=0.0055)	2	6
	Very often (P=0.001)	11	4
Downhearted and blue	Usually (P=0.0062)	3	7
	Very often (P=0.0183)	9	15
Tired	Always (P=0.0001)	7	19
	Usually (P=0.0401)	15	21
	Very often (P=0.0001)	39	22
	Sometimes (P=0.0311)	28	35

Watson et al (2003) conducted a cross-sectional study among 1446 schoolchildren between 11 and 14 years old. The study's objective was to assess to which extent both mechanical and psychosocial factors influence LBP prevalence among schoolchildren. Watson et al (2003) used the Strengths and Difficulties Questionnaire (SDQ) to identify "negative" (four items) and "positive" (one item) behavior in their cohort. According to the definitions used in the study, negative behavior or difficulties include hyperactivity, conduct problems, emotional problems and peer problems while a higher score on the prosocial dimension meant positive behavior or strength. Data from this study showed that those English students with higher negative behavior scores in the SDQ were significantly more likely to report LBP. Positive behavior was not associated with LBP. (Watson et al 2003: 12-14.)

3.1.2.4 Other Lifestyle-Related Habits

In a cross-sectional study by Shebab and Al-Jarallah (2005), those Kuwaiti students that smoked reported increased prevalence of LBP in comparison to those that did not. Among students that suffered from LBP and those that were pain-free, the rate of male smokers was 17.8% and 7.1% respectively (P=0.023). In a cohort of Canadian 7-9th graders, smokers were more likely to develop LBP (Feldman et al 2001: 32). Most other studies support these finding even though some contradictory results have also been published (Auvinen 2010: 31). The association between smoking and LBP seems to be stronger among adolescents than adults (Shebab – Al-Jarallah 2005: 33-35).

Feldman et al (2002) conducted a prospective cohort study with a follow-up period of 12 months amongst a total of 502 Canadian high school students with a mean age of 13.8 years at the beginning of the study. The results of this study indicate that working is associated with higher reporting of musculoskeletal pain in high school students.

This association was stronger during the first six months of the study, which coincided with the winter season. Therefore, it could be hypothesized that students who work and go to school at the same time experience higher stress levels, which has also been shown to correlate with LBP in some studies. (Feldman – Shrier – Rossignol – Abenhaim 2002: 957-960.) Nonetheless, causality relationships should be considered cautiously because high stress levels could be a cause or consequence of LBP.

Feldman et al (2002) used musculoskeletal pain and not LBP as an outcome measure, but evidence of an association between LBP and work was also found. Watson et al (2003) conducted a study among 1446 English schoolchildren, and, according to the authors, the risk to suffer from LBP was 60% higher if the child had a part time job. Part time jobs in this cohort were not associated with heavy lifting. (Watson et al 2003: 13.)

Working is common among the Finnish youth. Many university students work during their studies, and most high school students also look to get employed at least for the summer time. According to Statistics Finland, 60.4% of the Finnish population aged 15-24 worked in February 2012. The corresponding percentages were 61.7% in men and 59.1% in women. (Työllisyysasteet sukupuolen ja iän mukaan 2011/02 – 2012/02.) The need for methods to prevent LBP in this population group should be assessed.

3.2 Physical Activity, Exercise and Low Back Pain in Adolescence

There are contradictory findings about the relation between physical activity, exercise and adolescent LBP. For instance, Turk et al (2011) found a statistically significant correlation with those students, who spent more time watching TV, presenting less LBP (P=0.012). On average, the 107 students that did not report LBP watched TV for 1.9 hours per day while the 83 adolescents that reported LBP watched TV for 1.5 hours per day.

Meanwhile, a cross-sectional study by Auvinen et al (2008) revealed a higher prevalence of musculoskeletal pain, including LBP, in those Finnish 15-16 year olds that participated frequently in sports and exercise activities. The prevalence rates depended to some extent on the type of exercise. (Table 3.) Some of the differences in the relationship between physical activity, exercise and adolescent LBP that have been found may

be due to the different definitions that are used for these terms. A U-shaped relation between physical activity and the risk for developing LBP seems likely and is supported by some epidemiological studies (Auvinen 2010: 26-28).

Jones et al (2007) conducted a randomized controlled trial for students that suffered from recurrent non-specific LBP. A total of 54 participants with a mean age of 14.6 years were randomized into an intervention group (27 participants) and a control group (27 participants). The intervention consisted of an 8-week exercise program that was done twice a week with each session lasting approximately 30 minutes. The program was compiled from a combination of strength, flexibility, and aerobic exercises, and it included pain relieving exercises, reconditioning exercises, and progressive exercises. Overall compliance to the exercise intervention was good (88%). (Jones et al 2007: 1682-1683.)

Jones et al (2007) studied the efficacy of the exercise intervention in the treatment of recurrent non-specific LBP through a diary that was filled in by each participant during one week pre- and post-intervention. In the intervention group, reported pain intensity decreased ($P < 0.01$), the frequency of prevention from participating in physical activity or sports decreased ($P < 0.01$), and weekly participation in sports activities increased ($P < 0.01$). In this study, the exercise intervention was not found to significantly affect the frequency of non-specific LBP during the week, school absence or the average daily time spent on sedentary activities. (Jones et al 2007: 1683-1684.)

When comparing the pre- and post-intervention values in the RCT by Jones et al (2007), the mean pain intensity on a 10 point scale decreased in the intervention group from 6.5 to 3.7 while it increased from 5.3 to 6.0 in the control group. Similarly, in the intervention group, the number of absences from physical activity decreased from 1.1 to 0.2 and weekly participation in sports increased from 2.6 hours to 4.6 hours. In the control group, these values were 0.7 and 3.1 hours pre-intervention and 0.8 and 3.1 hours post-intervention for the number of absences from physical activity and weekly participation in sports respectively. (Jones et al 2007: 1684.)

The only other study that has been done on the efficacy of exercise in the management of LBP in adolescents is a randomized trial by Fanucchi et al (2009), which included a total of 72 South African schoolchildren that had had a LBP episode in the

previous three months. The participants' mean age was 12.3 years. The intervention group (39 participants) received weekly exercise sessions given by a physiotherapist. The sessions lasted 40-45 minutes, and they included education about LBP and the importance of the exercises. Subjects in the intervention group were also given a home exercise program, and they were encouraged to perform it regularly. Follow-up was conducted at 0, 3 and 6 months i.e. three months after the intervention. Attendance to the exercise classes was good with only 5 students (13%) missing more than one class. (Fanucchi – Stewart – Jordaan – Becker 2009: 98-101.)

The number of students that complained of LBP decreased in the intervention group whereas this number remained high in the control group. The Visual Analogue Scale (VAS) was used to report the perceived pain intensity in the participants. In the post-intervention follow-up at 3 months, pain intensity had decreased 2.2 cm in the VAS more in the intervention group than the control group. At 6 months, a 2.0 cm difference between the groups persisted in favor of the intervention group. The decline in the number of students that complained of LBP and the level of perceived pain intensity was promising, but it was not statistically significant. (Fanucchi et al 2009: 101.)

Significant differences between the intervention group and the control group were not found in rectus femoris length, lumbar stability or proprioception. However, hamstring and iliopsoas muscle length and neural mobility had improved significantly in the intervention group. (Fanucchi et al 2009: 101.) It seems likely that in order for lumbar stability and proprioception to improve significantly, a longer intervention would be necessary. Also, these types of exercises have been used in only one study, which decreases the ability to generalize the results, so more randomized trials that use exercise interventions as a preventive method should be done. The fact that hamstring and iliopsoas muscle length improved and LBP incidence and intensity decreased could suggest that these factors are related.

In addition to the amount of physical activity, research should be conducted on the effects of different exercise modalities as some exercise types might be harmful for the developing spine. Roller blading and rugby were found to correlate with LBP in a study among 11-14 year old English schoolchildren (Watson et al 2003: 13, Table 3). Meanwhile, results from a population-based study amongst Finnish adolescents indicate that frequent participation, defined as at least once a week, in gymnastics, dancing or gym

training increased the risk of LBP in girls. In boys, the corresponding activities were volleyball, gymnastics, gym training, downhill skiing and snowboarding. Cross-country skiing, on the contrary, correlated with lower LBP prevalence in both genders. Finally, participation in various exercise activities simultaneously seemed to protect from LBP. (Auvinen et al 2008: 1893-1899, Table 3.)

Table 3. Conclusions made by the original authors on physical activity and exercise habits in the studies used for this review.

Author	**Journal and Publication Year**	**Type of Study and Country**	**Participants**	**Conclusions of the Original Author**
Auvinen et al.	Medicine & Science in Sports & Exercise 2008	population-based study, Finland	6945 participants, ages 15-16 years	Girls: Higher prevalence of LBP associated with frequent participation in gymnastics, dancing or gym training and lower prevalence with participation in cross-country skiing and aerobics. Boys: Higher prevalence of LBP was associated with frequent participation in volleyball, gymnastics, gym training, downhill skiing or snowboarding and lower prevalence with participation in cross-country skiing.
Bejia et al.	Eur Spine J. 2005	cross-sectional study, Tunisia	622 participants: 326 female, 296 male, mean age 14,1 ± 1,3 years	Basketball and swimming were associated with LBP and football with chronic LBP. Bowling was associated with both LBP and chronic LBP.
Feldman et al.	Am J Epidemiol 2001	Canada	502 participants from 3 high schools; 52,6% male, mean age 13,8 ± 0,1 years	No association between physical activity and the development of LBP was found.
Korovessis et al.	J Spinal Disorder Tech 2010	cross-sectional study, Greece(?)	from 5 high schools; 350 female, 338 male, mean age 16 ± 1 years	Boys were more active in competitive sports (soccer, basketball, etc) than girls, but they reported less LBP than girls. Girls spent more time working on the computer than boys, but they had LBP more often than boys.
Shebab and Al-Jarrallah	Journal of Adolescent Health 2005	cross-sectional study, Kuwait	400 participants: 201 female, 199 male, mean age 14.4 ± 2,5 years	Higher levels of physical activity, participation in sports, and competitive sports activities were found to be associated with LBP.
Turk et al.	Coll. Antropol. 2011	Slovenia	190 participants: 100 elementary school students (11-15 yrs) and 90 secondary school students (17-18 yrs)	Statistically significant correlation was found only for the time spent watching TV. Those students that did not have LBP watched TV for longer periods of time.
Watson et al.	Arch Dis Child 2003	cross-sectional study, England	1446 participants from 2 secondary schools: 779 female, 667 male, age range 11-14	A slightly significant association was found between the top tertile of time spent playing sports (> 4 hours per week) and reporting low back pain. Positive correlation was found only for roller blading and rugby. There was no association between sedentary activities and LBP.

4 Discussion

Research on LBP is growing in number. In this literature review, several studies were found where the effectiveness of different exercise modalities on LBP was investigated. Information about the prevalence of LBP in school-aged children and adults as well as the associated factors is also increasing. Yet, the preventive methods for LBP in high school students have not been examined by researchers despite the characteristics they present that make them an interesting study population.

Exercise is widely accepted as a modality for the treatment and prevention of LBP recurrence as well as disability levels experienced because of LBP in the general population (Burton et al 2004: 10; Rainville et al 2004: 107). In fact, authors of systematic reviews on the prevention of LBP conclude that only exercise interventions seem to be effective (Balagué et al 2011: 3). However, the mechanisms by which exercise aids in the management and prevention of LBP remain partly unknown. The initial goal of this study was to give physiotherapists tools for the prescription of health-related exercise for the prevention of chronic non-specific LBP in high school students. Nonetheless, detailed exercise recommendations cannot be given for high school students based on the review because currently there is not enough evidence to support specific exercise parameters for LBP prevention.

When physiotherapists treat an existing condition, treatment and exercise prescription must always be done individually. Treatment appointments create an opportunity to converse with the rehabilitee about his or her interests, preferences and goals. On the contrary, preventive measures are usually targeted to a larger population. Such methods include exercise groups for the general population, education and promotion of healthy habits to name a few. This has led to the custom to recommend similar types of preventive exercises for all kinds of persons.

No studies were found that would have fulfilled all the inclusion criteria. This shows that the concept of preventive exercise in adolescents is relatively new, and this literature review can be used to justify the need for research on LBP in high school students. A systematic review protocol was not strictly followed, which is a methodological

weakness of this study. However, due to the lack of evidence that would allow giving evidence-based recommendations for the prescription of exercise for high school students and, thus, accomplishing the initial objective of this study, a simple review of the literature was considered sufficient. Contradictory results are presented to increase the objectivity of the review.

The American College of Sports Medicine dictates four parameters for exercise prescription: frequency, intensity, duration, and the type of exercise. The approval of the exercise parameters by the individual significantly increases motivation and commitment to the exercise regime. Yet, in a structured literature review by Slade and Keating (2010), the authors did not find any studies that would have evaluated patient satisfaction to exercise programs for chronic non-specific LBP (Slade – Keating 2010: 1494).

A semi-structured, descriptive electronic questionnaire was made by the author for the purposes of a potential future research project intended on providing more information on this matter. The questionnaire has been designed to determine the LBP risk factors presented by Finnish high school students and the opinions they have on health-related exercise characteristics. The questionnaire is currently in Finnish because of its intended target group. (Appendix 1.) If implemented correctly, the results of the questionnaire could provide useful information for the design of an exercise program for the prevention of non-specific LBP in high school students that would part from their own preferences.

5 Conclusions

According to the studies that were used in this literature review, LBP prevalence seems to increase with age and be more frequent in females than males. Hereditary factors may also play a role, but it remains unknown to which extent. Results from the studies included in this literature review indicate the following modifiable factors to be associated with LBP: a rapid growth spurt in adolescence, dissatisfaction with the school chair, school failure (being held back one year), lower mental health, smoking and working. On the contrary, the studies do not support an association between LBP and anthropometric measures, ergonomically designed school workstations, spinal sagittal posture, trunk asymmetry, weight of the school bag, or the method for carrying school materials.

The relationship between physical activity and LBP in adolescence is currently unclear. It seems likely that the frequency, intensity, duration, and type of exercise affect the prevalence of LBP in a complex way. The studies included in this review reported contradictory findings on the association between physical activity levels, sedentary behavior and LBP prevalence. In terms of types of exercise, the included studies showed an association between LBP and basketball, bowling, roller blading, rugby and swimming. Meanwhile, frequent participation in cross-country skiing was associated with lower LBP prevalence in Finnish boys and girls. Gender-related differences were found in the relationship between LBP and other exercise modalities.

Only two randomized controlled trials were found in which the efficacy of exercise interventions in the management of non-specific LBP in children and adolescents were investigated. These studies showed promising results in favor of exercise as a method for the treatment and secondary prevention of recurrent non-specific LBP in adolescents (Jones et al 2007) and LBP in schoolchildren (Fanucchi et al 2009). The high prevalence of LBP in adolescence and the apparent positive effects of exercise should be used as an incentive for more research in this field.

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Electronic Questionnaire

Opinnäytetyö I Fysioterapia I Metropolia AMK

Tutkimuksen kuvaus

1 VASTUULLINEN TUTKIJA

Tutkimuksesta on päävastuussa fysioterapeuttiopiskelija Anu Nygren, e-mail: anu.nygren@metropolia.fi
Ohjaajina toimivat fysioterapian koulutusohjelman yliopettaja Riku Nikander, e-mail: riku.nikander@metropolia.fi, fysioterapian lehtori Tiina Karihtala, e-mail: tiina.karihtala@metropolia.fi ja lehtori Sami Grönberg, e-mail: sami.gronberg@metropolia.fi

2 TUTKIMUSLAITOS

Opinnäytetyö tehdään Metropolia Ammattikorkeakoulun Hyvinvointi ja toimintakyky –klusteriin osana Fysioterapian koulutusohjelmaa (210 op).

3 TUTKIMUKSEN TARKOITUS

Opinnäytetyö käsittelee suomalaisten lukiolaisten kroonista alaselkäkipua. Tavoitteena on saada tietoa suomalaisten lukiolaisten alaselkäkipuoireilusta ja selvittää miten ennaltaehkäisevän liikunnan avulla voitaisiin vähentää selkäkipuoireilua tässä ikäryhmässä.

4 OSALLISTUMINEN TUTKIMUKSEEN

Tutkimukseen osallistuminen on vapaaehtoista. Osallistuminen edistää fysioterapian alan kehittymistä ja sen menetelmien perustumista tutkittuun tietoon. Sitä kautta edistetään suomalaista terveydenhuoltoa.

☐ Olen lukenut ja ymmärtänyt tutkimuksen kuvauksen.

Lue kysymykset huolella loppuun asti ja valitse sitten sinua lähinnä olevin vaihtoehto. Vastaathan kaikkiin kysymyksiin totuudenmukaisesti. Tietoja käytetään ainoastaan tutkimustarpeisiin. Tulokset julkaistaan nimettöminä ja tietoja käsitellään luottamuksellisesti.

Henkilötiedot

1. Täytäthän tiedot totuudenmukaisesti. Tietoja käytetään ainoastaan tutkijan kirjanpitotarpeisiin. Tulokset julkaistaan nimettöminä ja tietoja käsitellään luottamuksellisesti.

a) Etunimi

b) Sukunimi

c) Sukupuoli

d) Syntymävuosi

e) Asuinpaikka

f) Postinumero

g) Sähköpostiosoite

Kehonkoostumus

2. Vastaa parhaan arviosi mukaan. Ilmoita pituus senttimetreinä ja paino kiloina.
Huom! Pyöristä arvosi lähimpään kokonaislukuun! esim. jos painat 70,5 kg niin ilmoita painoksesi 71.

a) Pituus (cm)

b) Paino (kg)

Opiskelu

3. Lukio, jossa opiskelet

4. Vuosi, jona aloitit lukion

5. Milloin koet realistisesti voivasi valmistua ylioppilaaksi?

6. Asteikolla 1-5 kuinka tärkeäksi koet opiskelun nykyisessä elämäntilanteessasi?
1 = ei lainkaan tärkeä, 5 = erittäin tärkeä

1 2 3 4 5

opiskelun tärkeys ☐ ☐ ☐ ☐ ☐

Alaselkäkipu

7. Onko sinulla nyt alaselkäkipua tai onko sinulla ollut alaselkäkipua viimeisten 6 kuukauden aikana?

☐ Kyllä.

☐ Ei. (Siirry kysymykseen 15.)

8. Milloin alaselkäkivut ovat alkaneet?

☐ Ala-asteella tai aikaisemmin

☐ Yläasteella

☐ Lukiossa

9. Kuinka usein sinulla on alaselkäkipua?

☐ Kuukausittain tai harvemmin

☐ 1-2 kertaa viikossa

☐ 3-4 kertaa viikossa

☐ Päivittäin tai lähes päivittäin

☐ Kipu on jatkuvaa

10. Arvioi, kuinka kauan alaselkäkipu kestää kerrallaan (keskiarvo).

☐ Alle tunnin kerrallaan

☐ Muutaman tunnin kerrallaan

☐ Päivän tai kaksi kerrallaan

☐ Usean päivän kerrallaan

☐ Kipu on jatkuvaa

11. Kuinka voimakasta alaselkäkipusi on pahimmillaan?

0 = ei lainkaan kipua, 10 = pahin mahdollinen kipu

	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
kivun voimakkuus pahimmillaan	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

12. Kuinka voimakasta alaselkäkipusi on lievimmillään?

0 = ei lainkaan kipua, 10 = pahin mahdollinen kipu

	0	1	2	3	4	5	6	7	8	9	10
kivun voimakkuus lievimmillään	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

13. Kuinka usein syöt alaselkäkipuihin särkylääkkeitä?

☐ en koskaan tai hyvin harvoin

☐ muutaman kerran kuukaudessa

☐ viikoittain

☐ päivittäin

14. Liittyykö alaselkäkipu kuukautisiin? (naiset)

☐ Kyllä, alaselkäkipu ilmenee ainoastaan tai lähes aina kuukautisten aikaan

☐ Ei, minulla on alaselkäkipua yhtä paljon kuukautisten aikana kuin muulloinkin

15. Oletko joskus ollut poissa koulusta alaselkäkipujen takia?

☐ Kyllä

☐ Ei

16. Oletko käynyt lääkärissä alaselkäkipujen takia?

☐ Kyllä

☐ Ei

17. Oletko saanut fysioterapiaa alaselkäkipujen takia?

☐ Kyllä

☐ Ei

Fyysinen aktiivisuus

18. Kuinka usein keskimäärin harrastat liikuntaa? Liikunnalla tarkoitetaan tässä fyysistä aktiivisuutta eli lihasten tahdonalaista, energiankulutusta lisäävää toimintaa (Liikunnan käypä hoito -suositus 2010). Laske siis mukaan myös hyötyliikunta.

kertaa viikossa ☐

19. Kuinka paljon aikaa käytät keskimäärin liikuntaan?

minuuttia päivässä

20. Kuinka kuormittavaa on harrastamasi liikunta keskimäärin?

- Kevyttä: ei hengästymistä tai hikoilua
- Kohtuullisen rasittavaa: lievä hengästyminen
- Rasittavaa: selvä hengästyminen ja hikoilu
- Hyvin rasittavaa: voimakas hengästyminen ja hikoilu

21. Mainitse kolme pääasiallista liikuntamuotoasi. Ota huomioon myös mm. hyötyliikuntamuodot. Kerro lisäksi kuinka usein harrastat kutakin liikuntamuotoa.
esim. "kävely, päivittäin"

a) Eniten harrastan

b) Toiseksi eniten harrastan

c) Kolmanneksi eniten harrastan

Liikuntamieltymykset

22. Liikun mieluiten...

- Yksin.
- Kaverin kanssa.
- Joukkueessa (kaikki tuttuja).
- Ryhmässä (ainakin osa tuntemattomia).

23. Kuinka monta kertaa viikossa olisit valmis suorittamaan harjoitteita oman selkäsi hyvinvoinnin edistämiseksi? Laske tähän mukaan tällä hetkellä harrastamasi liikunta. Esim. jos liikut 2 krt/vk ja olisit valmis liikkumaan 3 krt/vk, vastaa 3 krt/vk. Jos et olisi valmis lisäämään liikunnan määrää, vastaa 2 krt/vk.

kertaa viikossa

24. Kuinka paljon aikaa olet valmis käyttämään liikuntaan oman hyvinvointisi edistämiseksi? Laske tähän mukaan harrastamasi liikunta samaan tyyliin kuin ed. kysymyksessä.

minuuttia päivässä

25. Kuinka kuormittavaa saa liikunta mielestäsi olla?

- Kevyttä: ei hengästymistä tai hikoilua
- Kohtuullisen rasittavaa: lievä hengästyminen
- Rasittavaa: selvä hengästyminen ja hikoilu
- Hyvin rasittavaa: voimakas hengästyminen ja hikoilu

26. Mitä välineitä käyttäisit mielelläsi harjoitteiden apuvälineenä? Voit valita useamman kuin yhden vaihtoehdon. Kirjoita kohtaan "muu" kaikki mieleesi tulevat vaihtoehdot, jotka eivät ole listalla!

- En halua käyttää välineitä.
- Keppi
- Kuminauha
- Kahvakuula
- Irtopainot
- Hyppynaru
- Pilates-rengas tai muu samantyyppinen
- Tasapainolauta
- Skeittilauta
- Trampoliini
- Tennis-, sulkapallo- tai muu samantyyppinen maila
- Jumppapallo
- Jalkapallo tai muu samantyyppinen
- Koripallo
- Polkupyörä
- Muu

Jos valitsit "Muu", täsmennä:

27. Millaisissa olosuhteissa haluaisit toteuttaa liikuntaohjelmaa oman selkäsi hyvinvoinnin edistämiseksi? Voit valita useamman kuin yhden vaihtoehdon ja kirjoittaa kohtaan "muu" kaikki mieleesi tulevat vaihtoehdot, jotka eivät ole listalla.

- ☐ Ulkona
- ☐ Sisätiloissa, esim. liikuntasalissa
- ☐ Kotona
- ☐ Koulussa
- ☐ Uimahallissa
- ☐ Kuntosalilla
- ☐ Mahdollisimman helposti missä vain, esim. bussipysäkillä
- ☐ Muu

Jos valitsit "Muu", täsmennä:

28. Kaipaatko ohjausta liikunnan toteuttamiseksi? Voit valita useamman kuin yhden vaihtoehdon.

- ☐ En ole kiinnostunut osallistumaan ohjattuun liikuntaan.
- ☐ Olen kiinnostunut kertaohjauksesta, jossa liikkeiden oikea suoritustapa käydään läpi.
- ☐ Olen kiinnostunut 5-10 kerran liikuntakurssista, jonka jälkeen voin jatkaa omatoimisesti.
- ☐ Olen kiinnostunut säännöllisestä ryhmäliikunnasta.

29. Kuinka paljon rahaa olet valmis laittamaan oman selkäsi hyvinvoinnin edistämiseksi
a) kertamaksuna, esim. välineiden hankinta?
b) kuukausittain toistuvana maksuna, esim. ohjatun liikunnan osallistumismaksu?

a) euroa kertamaksuna

b) euroa/ kuukausi

30. Mitkä näistä ovat sinun mielestäsi tehokkaita menetelmiä liikunnan säännöllisyyden kirjaamiseksi ja kannustamiseksi? Voit valita useamman kuin yhden vaihtoehdon.

- ☐ En ole kiinnostunut liikkumiseni seuraamisesta (määrä).
- ☐ Pidän mieluiten itse liikkumisestani kirjanpitoa.
- ☐ Paperisen lomakkeen täyttäminen (liikuntapassi tai muu), josta huolehdin itse.

- [ ] Paperisen lomakkeen täyttäminen (liikuntapassi tai muu), jonka täyttöä seuraa joku, esim. liikunnanopettaja tai fysioterapeutti.
- [ ] Sähköinen palvelu, esim. Facebook-ominaisuus.
- [ ] Liikuntapäiväkirja kännykkäominaisuutena.
- [ ] Muu

Jos valitsit "Muu", täsmennä:

31. Miten haluat saada palautetta liikunnan tuloksista? Voit valita useamman kuin yhden vaihtoehdon.

- [ ] Sisäinen palaute on minulle riittävää.
- [ ] Lähipiirin kehut ja kommentit.
- [ ] Asiantuntijan palaute.
- [ ] Kuntotestaus.
- [ ] Muu

Jos valitsit "Muu", täsmennä:

32. Vastaa oletko samaa mieltä seuraavan väitteen kanssa: "Selän hyvinvointia edistävän liikunnan tulisi toteutua kouluaikana."

- ○ Täysin eri mieltä
- ○ Eri mieltä
- ○ Ei samaa mieltä, mutta ei eri mieltä
- ○ Hieman samaa mieltä
- ○ Täysin samaa mieltä

33. Vastaa oletko samaa mieltä seuraavan väitteen kanssa: "Olen motivoitunut liikkumaan oman hyvinvointini edistämiseksi."

- ○ Täysin eri mieltä
- ○ Eri mieltä
- ○ Ei samaa mieltä, mutta ei eri mieltä

- [ ] Hieman samaa mieltä
- [ ] Täysin samaa mieltä

34. Pohdi, mikä motivoi tai voisi motivoida sinua liikkumaan? Voit valita useamman kuin yhden vaihtoehdon ja halutessasi voit täsmentää vastaustasi alla olevaan laatikkoon.

- [ ] Kaverit
- [ ] Perhe
- [ ] Terveys
- [ ] Huvi
- [ ] Ulkonäkö
- [ ] Omien suoritusten ylittäminen
- [ ] Kilpailu muiden kanssa
- [ ] Hyvän olon tunne
- [ ] Muu, mikä? (vastaa laatikkoon)

Täsmennys: 

35. Onko koulullasi kuntosali, jota saat käyttää vapaa-ajallasi? (esim. hyppytunneilla tai koulun jälkeen)

- [ ] Ei ole, enkä olisi kiinnostunut käyttämään sitä.
- [ ] Ei ole, mutta jos olisi, olisin kiinnostunut käyttämään sitä.
- [ ] On, mutta en käytä sitä koskaan tai hyvin harvoin.
- [ ] On ja käytän sitä joskus.
- [ ] On ja käytän sitä säännöllisesti.
- [ ] En tiedä.

36. Onko opiskelijoilla mahdollisuus käyttää koulusi liikuntasaleja omalla vapaa-ajallaan? (esim. hyppytunneilla tai koulun jälkeen)

- Ei ole, enkä olisi kiinnostunut käyttämään niitä.
- Ei ole, mutta jos olisi, olisin kiinnostunut käyttämään niitä.
- On, mutta en käytä niitä koskaan tai hyvin harvoin.
- On ja käytän niitä joskus.
- On ja käytän niitä säännöllisesti.
- En tiedä.

37. Onko koulussasi tarjolla liikuntaa vapaa-ajalla muuten kuin lukion kilpajoukkueissa? (esim. aerobic, tanssi, juoksuklubi, lihaskuntotunnit)

- Ei ole, enkä olisi kiinnostunut osallistumaan niihin.
- Ei ole, mutta jos olisi, olisin kiinnostunut osallistumaan niihin.
- On, mutta en osallistu niihin koskaan tai hyvin harvoin.
- On ja osallistun niihin joskus.
- On ja osallistun niihin säännöllisesti.
- En tiedä.

KIITOS OSALLISTUMISESTASI!