



## Give musculoskeletal health to schoolchildren and young workers

### Setting the problem (to be addressed)

### Preliminary scoping focusing on the research perspective



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## Setting the problem – General context

“An aging working population emphasizes the need to provide a sustainable working life for young workers, enabling them to work productively for their entire working life. In order to reduce occupational accidents and diseases and to increase work participation among young workers (...) there is a need for a better understanding of the risk factors associated with occupational accidents and health, and to increase our knowledge on how to facilitate the inclusion of young workers in the labour market. Young workers are faced with potentially harmful exposures to hazardous work (e.g. heavy lifting) to a greater degree than older workers. Young workers are also at higher risk of occupational accidents compared with older workers.”

*Hanvold TN, Kines P, Nykänen M, Ólafsdóttir S, Thomée S, Holte KA, Vuori J, Wærsted M and Veiersted KB, Young workers and sustainable work life, p. 7.*  
<https://norden.diva-portal.org/smash/get/diva2:912427/fulltext01.pdf>



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## Setting the problem 1

The lifelong impact of musculoskeletal pain needs to be considered, as there are reports of schoolchildren reporting pain at earlier stages of life. The findings of research on school children raises the issue of young workers coming into the workplace with pre-existing musculoskeletal problems that have the potential to be exacerbated by work.

EU-OSHA. The ageing workforce: implications for occupational safety and health - A research review, p.38. Available at: [https://osha.europa.eu/sites/default/files/publications/documents/The\\_ageing\\_workforce\\_implications\\_for\\_OSH.pdf](https://osha.europa.eu/sites/default/files/publications/documents/The_ageing_workforce_implications_for_OSH.pdf)

## Setting the problem 2

The risks of developing MSDs increases with age because of cumulative exposure and for easily understanding reasons: muscles, bones and joints naturally deteriorate with age. By taking care of ones' body throughout adulthood the risk of developing a MSDs can be lower, but even better is to start with this already in childhood. Young people have a professional career ahead. It is therefore important to make them aware of the problem as early as possible, which is why prevention and promotion of a good musculoskeletal health must begin at school (age).

### Setting the problem 3

A research carried out on this issue (Murphy S.s et al.) shows that in a sample of 679 schoolchildren between the ages of 11 and 14 years, 27 % of the children reported neck pain, 18 % reported upper back pain and 22 % reported having lower back pain.

Another study shows that “postural development evolves through a series of stages (growth spurts, development of balance and coordination, postural stability), which occur when children are at school age. The reduction in the level of physical activity, increased body weight, overloaded school bags, (...) and increased usage of electronic devices have negative side effects such as bad body posture habits” (Brek et al.).

Murphy, S., Buckle, P. & Stubbs, D. (2007), 'A cross-sectional study of self-reported back and neck pain among English schoolchildren and associated physical and psychological risk factors', *Applied Ergonomics*, Vol. 38, No 6, pp. 797-804.

Brek et al., The weight of pupil's schoolbags in early school age and its influence on body posture, *BMC Musculoskeletal Disorders* (2017) 18:117, DOI 10.1186/s12891-017-1462-z <https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-017-1462-z>

### Setting the problem 4

“It is estimated that MSDs affect 1 in 8 children and young people (CYP). Causes for MSDs include trauma, orthopaedic, rheumatic and congenital conditions, and obesity. Musculoskeletal ill health has huge impact on growth, development and psychosocial wellbeing with potential for lifelong consequences. It is estimated that there is over 40 million CYP around the world who are seriously overweight with including increased risk of serious health issues that include MSDs. Data indicates that at least 30% of CYP will sustain injury to their bones or joints; sports, play, and traffic accidents are the most common causes. A single knee injury early in life can increase the risk for osteoarthritis in adulthood five-fold and a hip injury could more than triple the risk.”

Helen Foster and Stuart Weinstein, Global alliance for Musculoskeletal Health of the Bone and Joint Decade (website = information retrieved on 01/03/2019), <http://bjdonline.org/musculoskeletal-problems-in-children-and-young-people/>

## Setting the problem 5

“Musculoskeletal (MSK) pain in children and adolescents is responsible for substantial personal impacts and societal costs, but it has not been intensively or systematically researched. This means our understanding of these conditions is limited, and healthcare professionals have little empirical evidence to underpin their clinical practice. (...) Rates of self-reported MSK pain in adolescents are similar to those in adult populations and they are typically higher in teenage girls than boys. Epidemiological research has identified conditions such as back and neck pain as major causes of disability in adolescents, and in up to a quarter of cases there are impacts on school or physical activities. A range of physical, psychological and social factors have been shown to be associated with MSK pain report, but the strength and direction of these relationships are unclear. There are few validated instruments available to quantify the nature and severity of MSK pain in children, but some show promise. Several national surveys have shown that adolescents with MSK pain commonly seek care and use medications for their condition”.

Kamper SJ, Henschke N, Hestbaek L, Dunn KM, Williams CM. Musculoskeletal pain in children and adolescents. *Braz J Phys Ther.* <http://dx.doi.org/10.1590/bjpt-rbf.2014.0149>

Ther. <http://www.scielo.br/pdf/rbfis/2016nahead/1413-3555-rbfis-bjpt-rbf20140149.pdf>

## Setting the problem 6

The study “found a significant increase in neck and shoulder pain over time in the transition from technical school to working life. High mechanical workload was associated with neck and shoulder pain among women, while a high level of shoulder muscle endurance capacity was associated with lower rates of neck and shoulder pain among men. Perceived muscle tension and ethnicity were the most consistent predictors for neck and shoulder pain, found among both women and men”.

*Hanvold TN et al, A longitudinal study on risk factors for neck and shoulder pain among young adults in the transition from technical school to working life*  
*Scand J Work Environ Health* [2014;40\(6\):597-609](https://doi.org/10.5271/sjweh.2014.40(6):597-609) [http://www.sjweh.fi/show\\_abstract.php?abstract\\_id=3437](http://www.sjweh.fi/show_abstract.php?abstract_id=3437)

## Setting the problem – Backpacks 1

- The use of backpacks by schoolchildren as a potential MSDs factor seems to be one of the main research streams related to the topic (at least the scientific literature on the topic seems to be quite important).
- Backpack use is associated with musculoskeletal pain among schoolchildren (Trevelyan and Legg, 2006; Moore et al., 2007).
- To prevent these disorders safe limits were established as a maximum of 10% of student body weight (Brackley and Stevenson, 2004; Bauer and Freivalds, 2009).

Trevelyan, F.C., et al., Back pain in school children – Where to from here?, *Appl Ergon*, 2006, 37:45-54.

Moore, J.M., et al, Association of relative backpack weight with reported pain, pain sites, medical utilization, and lost school time in children and adolescents, *J Sch Health*, 2007, 77 (5):232.239.

Brackley, H.M.,and Stevenson JM, Are children's backpack weight limits enough? A critical review of the relevant literature, *Spine* 29(19):2184-90  
10.1097/01.brs.0000141183.20124.a9

## Setting the problem – Backpacks 2

“Shoulder, upper back, neck and lower back pain was commonly reported among school children carrying heavy backpacks. Excessive load on the back leading to forward bending of the trunk and neck was found to be the biomechanical cause for the musculoskeletal pain. Recommendations for prevention included improving educational facilities, proper awareness and education, storing most of the books in schools, and better design of backpacks”.

Deepak et al. ar Sharan D., et al, A systematic review of risk factors for musculoskeletal pain due to heavy backpacks in school children. Proceedings 19<sup>th</sup> Triennial Congress of the IEA, Melbourne 9-14 August 2015.

## Setting the problem – School design, school furniture, pupil posture / healthy back promotion

Recent literature has indicated that MSDs are prevalent amongst school students. Student posture in classroom environments is a risk factor for spinal MSD, but the relationship between student classroom postures and the development of subsequent adult MSD is unknown. This review examined the literature on school student (pupil) posture (five year olds through to university) in classroom environments, and its potential for predisposing adults to musculoskeletal conditions (particularly neck and low back pain) in their working life. The review indicated that factors as student posture, anthropometrics and furniture, and computer use could influence the prevalence of MSD among school students. It is suggested that any attempts to reduce MSD amongst school children should involve micro and macro ergonomic factors such as classroom furniture design, posture education, backpack weight and load carriage, learning systems re-organisation and general organisation of school activities. However, none of the papers reviewed provided any specific evidence that student MSD was related to subsequent MSD in adult life. Therefore it is concluded that there was no clear objective evidence to support the view that there is a relationship between poor school posture and the development of neck and/or low back pain in adult working life.

P. Grimes, S.J. Legg, Musculoskeletal Disorders(MSD) in School Students as a Risk Factor for Adult MSD: A Review of the Multiple Factors Affecting Posture, Comfort and Health in Classroom Environments, January 2004, *Journal of the Human-Environment System* 7(1):1-9.

[https://www.researchgate.net/publication/238445989\\_Musculoskeletal\\_DisordersMSD\\_in\\_School\\_Students\\_as\\_a\\_Risk\\_Factor\\_for\\_Adult\\_MSDA\\_Review\\_of\\_the\\_Multiple\\_Factors\\_Affecting\\_Posture\\_Comfort\\_and\\_Health\\_in\\_Classroom\\_Environments](https://www.researchgate.net/publication/238445989_Musculoskeletal_DisordersMSD_in_School_Students_as_a_Risk_Factor_for_Adult_MSDA_Review_of_the_Multiple_Factors_Affecting_Posture_Comfort_and_Health_in_Classroom_Environments)

## Setting the problem – Use of information and communication technologies (ICT)

- **Many children use ICT on a daily basis for a range of educational, leisure and social activities.**
- **Concurrent with increased exposure, is growing evidence that children experience ICT-related musculoskeletal complaints requiring treatment.**
- **Most common diagnosed ICT-related MSDs among young people are:**
  - Non- specific neck pain
  - Thoracic postural pain disorder
  - Non-specific back pain
  - Lumbar postural pain disorder

Katz, J., Prevalence of Upper Extremity Musculoskeletal Disorders in College Students, 2000, *American Journal of Medicine* 109 (7):586-588.

Straker, L., Are Children More at Risk of Developing Musculoskeletal Disorders from Working with Computer or with Paper?, in *Proceedings of the XVth Annual Conference of the International Society for Occupational Ergonomics and Safety*, 2001, 344-353, Fairfax, VA:IOS Press.

Breen, R., An investigation of children's posture and discomfort during computer use, 2007, *Ergonomics* 50(10). 1582-1592.

Ciccarelli M., Children's utilisation of allied health treatment to manage ICT-related pain, *Proceedings 19th Triennial Congress of the IEA*, Melbourne 9-14 August 2015.

## Setting the problem – Prevention & Promotion

“Teaching children and teenagers about lifestyles that promote good bone health is an essential component of addressing this major public health problem- (...). There is an education Protect Your Bones program in Cleveland Clinic which aims “to teach young people about making appropriate decisions each day to promote good bone health. The program is divided into 3 parts: assessment of knowledge, discussion of topics, and a quiz. Based on quiz results, the students improved their understanding of trauma by 50%, arthritis by 30%, and osteoporosis by 15%. More than 80% of the students strongly agreed that they learned something from the lecture, that the information was worth sharing with their families, however more research also is needed to further define the efficacy of education programs on preventing musculoskeletal injuries, arthritis, and osteoporosis”.

[M. J. DeFranco, et al. Musculoskeletal disease in children and teenagers: Addressing an emerging epidemic, Rheumatology network, Vol. 26, Mar 22, 2009](https://www.rheumatologynetwork.com/arthritis/musculoskeletal-disease-children-and-teenagers-addressing-emerging-epidemic)  
<https://www.rheumatologynetwork.com/arthritis/musculoskeletal-disease-children-and-teenagers-addressing-emerging-epidemic>  
<https://www.eular.org/myUploadData/files/WHO%20Europe%20NCD%20Strategy%20for%20GMUSC.pdf>

## Setting the problem – Sedentary behaviour / reduction in the level of physical activity / Obesity

Reducing total sedentary time spent both in and out of school remains an important challenge. Interrupting sedentary time more often in the “working” (school) day could also reap important musculoskeletal and metabolic health rewards for children.

[Abbot, R.A., et al., Patterning of Children’s Sedentary Time at and Away from School, 2013, Obesity 21, E:131-E133.](https://onlinelibrary.wiley.com/doi/full/10.1002/oby.20127)  
<https://onlinelibrary.wiley.com/doi/full/10.1002/oby.20127>

## Setting the problem – Sedentary behaviour / reduction in the level of physical activity / Obesity

“Total sedentary (absence of whole-body movement) time is associated with obesity, abnormal glucose metabolism, and the metabolic syndrome. (...) This study provides evidence of the importance of avoiding prolonged uninterrupted periods of sedentary (primarily sitting) time. These findings suggest new public health recommendations regarding breaking up sedentary time that are complementary to those for physical activity.”

Healy G.N., Breaks in Sedentary Time: Beneficial Associations with Metabolic Risk, 2008, Diabetes Care 31:661-666.  
<https://www.ncbi.nlm.nih.gov/pubmed/18252901>

**Thank You!**