



<http://www.diva-portal.org>

Postprint

This is the accepted version of a paper published in *Nurse Education in Practice*. This paper has been peer-reviewed but does not include the final publisher proof-corrections or journal pagination.

Citation for the original published paper (version of record):

Backåberg, S., Rask, M., Brunt, D., Gummesson, C. (2014)

Impact of musculoskeletal symptoms on general physical activity during nursing education..

Nurse Education in Practice

<http://dx.doi.org/10.1016/j.nepr.2014.02.003>

Access to the published version may require subscription.

N.B. When citing this work, cite the original published paper.

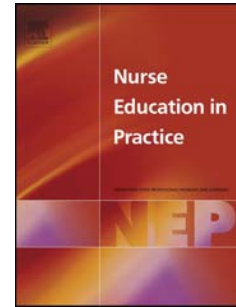
Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:lnu:diva-32759>

Accepted Manuscript

Impact of Musculoskeletal Symptoms on General Physical Activity During Nursing Education

Sofia Backåberg, MSc Mikael Rask, PhD David Brunt, PhD Christina Gummesson, PhD



PII: S1471-5953(14)00019-5

DOI: [10.1016/j.nepr.2014.02.003](https://doi.org/10.1016/j.nepr.2014.02.003)

Reference: YNEPR 1855

To appear in: *Nurse Education in Practice*

Received Date: 12 April 2013

Revised Date: 27 November 2013

Accepted Date: 7 February 2014

Please cite this article as: Backåberg, S., Rask, M., Brunt, D., Gummesson, C., Impact of Musculoskeletal Symptoms on General Physical Activity During Nursing Education, *Nurse Education in Practice* (2014), doi: 10.1016/j.nepr.2014.02.003.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

IMPACT OF MUSCULOSKELETAL SYMPTOMS ON GENERAL PHYSICAL
ACTIVITY DURING NURSING EDUCATION

Word count without references: 3673

Word count with references: 4496

Authors

Sofia Backåberg, Doctoral Student, MSc
Faculty of Health and Life Sciences, Department of Health and Caring Sciences, Linnaeus
University, Sweden
sofia.backaberg@lnu.se

Mikael Rask, Associate Professor, PhD
Faculty of Health and Life Sciences, Department of Health and Caring Sciences, Linnaeus
University, Sweden
mikael.rask@lnu.se

David Brunt, Professor, PhD
Faculty of Health and Life Sciences, Department of Health and Caring Sciences, Linnaeus
University, Sweden
david.brunt@lnu.se

Christina Gummesson, Senior Lecturer, PhD
Center for Teaching and Learning, Faculty of Medicine and Department of Health Sciences,
Division of Physiotherapy, Lund University, Sweden
christina.gummesson@med.lu.se

Corresponding author

Sofia Backåberg
Department of Health and Caring Sciences,
Linnaeus University, Sweden
S-351 95 Växjö, Sweden
E-mail: sofia.backaberg@lnu.se
Daytime phone: +46 706 68 56 89, Fax nr: +46 470 70 80 00

IMPACT OF MUSCULOSKELETAL SYMPTOMS ON GENERAL PHYSICAL ACTIVITY DURING NURSING EDUCATION

ABSTRACT

Nursing education should prepare students for a lifelong professional career including managing clinical physical demands. Musculoskeletal symptoms, such as bodily pain, have been reported among nurses and nursing students but less is known about the impact of symptoms in daily activities. The aim was to explore the prevalence of self-reported musculoskeletal symptoms and their impact on general physical activity among nursing students. This cross-sectional study was based on a questionnaire to all undergraduate nursing students at one university. The prevalence of symptoms and physical impact during past 3 and 12 months was calculated for each study year. Odds ratio was analyzed with logistic regression. Of 348 students 224 responded, 84% women, mean age 24.6 years (range 20-46). Of those 143 (64%) reporting symptoms during the past 12 months, 91 (64%) reported impact on physical activities. Most commonly reported were everyday activities such as transportations and prolonged sitting. The odds ratio for reporting symptoms was 1.8 for year 2 (95% CI: 0.9-3.5), and 4.7 for year 3 (95% CI: 2.1-10.7). The prevalence of musculoskeletal symptoms was high among nursing students and higher the final study year and not only resulted in discomfort but had an impact on the students' general physical activities.

Key words: Musculoskeletal System; Prevalence; Nursing, students; Activity limitation; Physical performance

INTRODUCTION

Nurse education aims to prepare nursing students for a lifelong professional career by providing sufficient knowledge, skills and abilities required for the nursing profession. One important aspect of this is managing the physical demands of clinical work. Nurses are a professional group at risk of developing work-related musculoskeletal symptoms (MSS) (Swedish Work Environment Authority, 2012) and ergonomic interventions to prevent MSS have been carried out with varying results (Hignett, 2003, Nelson and Baptiste, 2006). Work technique training in groups has been a core feature in these interventions and technique training was referred to as training in safe lifting techniques, manual patient lifting and classes in body mechanics (Hignett, 2003, Nelson and Baptiste, 2006). MSS has been shown to be developed during the course of nursing education thus also making nursing students a target group for ergonomic interventions. Little has been reported about how MSS impact on nursing students' daily life activities. It is important in curriculum planning to integrate appropriate ergonomic education for nursing students. The aim of the present study was thus to explore the prevalence of self-reported MSS and their impact on general physical activity among nursing students.

BACKGROUND

Musculoskeletal symptoms among nurses

Health care staff are at risk for developing long-lasting musculoskeletal symptoms (MSS). Regular performance of patient transfers has been shown to be a risk indicator for low back pain and for reporting back injuries (Engkvist, 2008, Engkvist et al., 2001, Smith et al., 2005).

In a study of 1 163 nurses, 73 % reported musculoskeletal problems lasting at least one week or occurring at least monthly in the past year, with at least moderate pain intensity. These problems were associated to a great extent with functional consequences such as seeking care and missing and modifying work (Trinkoff et al., 2002). Other studies show a prevalence of 70-94% of long-lasting musculoskeletal disorders among registered nurses during the previous 12 months (Mitchell et al., 2008, Smith et al., 2005, Smith et al., 2004). These studies do not, however, provide information about the nurses' own experiences of the impact on general physical activity. MSS among nurses is thus a major problem and occupational back injuries still occur surprisingly often in general and planned patient transfer situations despite the availability of various assistive devices (Engkvist, 2008). Mitchell et al. (2008) reported in a cross-sectional study that the prevalence of low back pain among nurses 12 months after graduating is even higher (90%) than during the nursing programme (71%).

Musculoskeletal symptoms among nursing students

Several studies show a high prevalence (50-80%) of long-lasting musculoskeletal disorders among nursing students (Kamwendo, 2000, Mitchell et al., 2008, Singh et al., 2010, Smith and Leggat, 2004). Considerably lower prevalence (37%) was, however, found in a survey of current musculoskeletal disorders among female nursing students (Smith et al., 2003). The mean age of these students was only 20.2 years, which might explain the divergent result. Contributory factors to the development of MSS include higher age according to Hagen et al. (2011), while in a cross-sectional study of characteristics of low back pain (LBP) among nursing students and recently graduated nurses, occupational exposure was shown to be of greater importance than age for the development of LBP (Mitchell et al., 2008). Students within other health profession education also report a high prevalence of MSS, such as occupational therapy students (65%) (Leggat et al., 2008) and X-ray technology students

(37%) (Lorusso et al., 2010). The extensive use of computers among students in general might lead to discomfort and MSS according to Hupert et al., (2004) and Jenkins et al., (2007). Frequent adoption of awkward postures was associated with frequent discomfort in a study of 234 students ($p=0.009$) and work behaviour and duration of computer use was found to be a contributory factor for musculoskeletal discomfort (Noack-Cooper et al., 2009). In a study of 432 nursing students, 26% stated they had begun to develop musculoskeletal pain since starting the nursing programme and 44% stated that this was caused by an incident whilst on placement (Kneafsey and Haigh, 2007). Similar findings were found in a recent study where 29% of 371 nursing and physiotherapy students reported that they had begun to experience pain since becoming a student (Kneafsey et al., 2012). In a prospective cohort study of cumulative incidence of MSS during nurse education an increase of MSS was found and the authors suggest that nursing students should be a target group for ergonomic interventions (Cheung, 2010).

Being a nursing student thus entails not only an extensive amount of time working with a computer but also demanding clinical placement periods that include moving and handling patients, which are shown to be risk factors for MSS. Even though several studies have reported that musculoskeletal problems are a significant problem among both nursing staff as well as nursing students the methodology differs and several studies include only selected body-sites, which might imply that essential knowledge is lacking. A few studies have focused on the functional consequences (Mitchell et al., 2008, Trinkoff et al., 2002), but no studies have, to our knowledge, focused on the subjects' own perceptions of the impact on everyday life and general physical activities for nursing students. It would thus be valuable to gain knowledge about their perceptions of the severity and impact of their MSS. This

information should be useful for curriculum planning of the nursing programme in order to prevent MSS among nursing students.

METHODS

In order to investigate the prevalence and impact of musculoskeletal symptoms among nursing students a cross-sectional design was used and a questionnaire was developed and administered. Descriptive statistics and logistic regression were used to analyze the results.

Sample and procedure

All students in undergraduate nurse education (N=335) at a medium-sized university in Sweden were invited to participate and complete a questionnaire for this descriptive, cross-sectional study. The questionnaire was sent by mail. After a few weeks a reminder was sent to all students and after approximately two months a visit was made to the classes in each term during their ordinary classes. At the time for the study the undergraduate nurse education included 6 weeks of clinical studies during the first study year, 10 weeks during the second year and 10 weeks during the final study year. The ergonomic education was located at the university clinical training centre including both theoretical and practical training in small groups, spread over the three years: 11 hours the first year, 5 hours the second year and 5 hours the final year. Examinations of ergonomic skills were conducted during the first and final year.

The questionnaire was based on an instrument that had been used previously by one of the authors for a prevalence study on MSS in a general population and was tested for reliability and validity (Gummeson et al., 2003). In the original questionnaire fixed-alternative questions were used but in order to match the aim of the present study, open responses were

used to ensure that we would capture the variety of aspects of the impact of general physical activity relevant to the students. The students were requested to describe any MSS, defined as discomfort and/or symptoms from the body (for example pain or numbness), during the following periods of time: the past week, the past three months and the past year, and mark the location(s) of symptom(s) on a mannequin.

Socio-demographic information was collected (Table 1). Body mass index (BMI) was calculated using self-reported weight and height ($\text{weight}/\text{height}^2$). BMI was categorized according to the standard classification of the World Health Organization (WHO); underweight (<18.5), normal ($18.5-24.9$), overweight ($25-29.9$), obese (≥ 30) (World Health Organization, 2004). The location of the reported MSS was categorized into seven location groups: head, neck-shoulders-upper back, lower back-pelvis-hip, arm, wrist-hand, leg-knee, and foot. The responses concerning which type of activity that the MSS affected were classified according to increasing levels of strain into five categories: postural alignment, daily life/work/studies, physical training/leisure activity, heavier load/lifting activity and other activities. The postural alignment category included sitting, standing, lying or other body positions. Reported impact on for example walking, climbing stairs or daily transportation was categorized into daily life/work/studies. The different types of activity impact were classified into the following: activity limitation, psychological impact (e.g. sleep disturbance, worries of future, decreased concentration and mood), discomfort connected to activity and fatigue/less energy. A non-responder's analysis was performed regarding age and gender for all the students in undergraduate nurse education.

Statistical analysis

MSS during the past three months and 12 months were analyzed. The first step was to investigate the study population in terms of socio-demographic information (age, gender) and BMI categories. We examined to what extent nursing students experienced MSS and the location of the possible symptoms. The descriptive analysis of prevalence and location of MSS was calculated for each study year using percentages and 95% confidence intervals. The next step was to analyze which activities were affected by their MSS and also how the physical activity was affected. In order to investigate variables for MSS a logistic regression model was used to investigate the trend of MSS prevalence during the nursing programme. The dependent variable was reported MSS and we analyzed age, gender, BMI categories and study year. The odds ratio (OR) with 95% CI was calculated. Missing data were MSS past 12 months (N=5), year of birth (N=3), weight (N=4). These responders were excluded in the logistic regression (total sample N=212). Thirteen responders answered only one of the two questions regarding which physical activity impact and in what way the physical activity was affected. All data were analyzed using SPSS version 20.0 (SPSS Inc., Chicago, IL, USA).

Ethical considerations

The study was conducted in accordance with the Helsinki Declaration (World Medical Association, www.wma.net). The invited students were not required to participate and were informed of their rights via both verbal and written explanations. The study was initiated after approval by the Programme director and the Head of the department and informed consent was implied if the questionnaire was completed and returned. All data were treated confidentially. The first author, who was responsible for the data collection, was not involved in any teaching or examination activities for the students.

RESULTS

Of the 348 invited students 224 completed the questionnaire (response rate 64%). The response rate was 67% for year 1, 63% for year 2 and 62% for year 3. The mean age of the responders was 24.6 years, (SD 4.3, range 20-46) and there were more women (84%) than men. The majority of the respondents (70%) had a BMI within the normal range and 21% were overweight (Table 1). The mean age of the total invited population was 25.0 years (SD, 5.2, range 19-55) and 83% were women.

MSS during the previous 3 and 12 months were reported by 67% (95% CI: 60.8 – 73.2) and 64% (95% CI: 57.7 – 70.3) of the students for at least one bodily location. The most frequent location for MSS was lower back-pelvis-hip 37% (95% CI: 30.6 – 43.3) and 40% (95% CI: 33.6 – 46.4) respectively, and the second most frequent was neck-shoulders-upper back with 35% (95% CI: 28.8 – 41.3) and 30% (95% CI: 24.0 – 36.0). The prevalence and distribution of bodily location of MSS is shown in Table 2. The logistic regression analyzed for age, gender, BMI and study year showed that OR for MSS was 1.8 (95% CI: 0.9-3.5) for year 2, and 4.7 (95% CI: 2.1-10.7) for year 3, shown in Table 3.

Reported physical activity impact in terms of which type of activity and in what way the activity was affected is presented in Table 4. A majority of the 150 respondents with MSS (63% and 64%) reported that their symptoms had impact on their physical activities in general. Of those reporting impact, the most commonly affected types of activities were daily life activities such as work or studies (66% and 63% respectively) and physical training/leisure activities (51% and 52%). Thirty-nine per cent and 33% respectively reported that two or more of the activities were affected. The most common ways in which the

activities were affected by MSS were limitation in activity (57% and 67%) and discomfort connected to activity (55% and 43%). Two or more of the different impact variations were reported by 32% and 27% respectively. Numbers of nursing students responding and reporting MSS and impact the previous 12 months are shown in Figure 1.

DISCUSSION

The results of this study show that 67% (95% CI: 60.8 – 73.2) of the nursing students reported MSS during the past 3 months and 64% (95% CI: 57.7 – 70.3) during the past 12 months. The odds ratio for reporting MSS during study year 3 was OR 4.7 compared with the first study year. Of those reporting MSS during the past 3 and 12 months more than half of the students (63% and 64% respectively) reported that their symptoms impacted on their physical activities in general. The most commonly affected areas were daily life activities such as daily transportations, prolonged sitting and physical training. The most common ways that the symptoms impacted were limitation in activity (57% and 67%) and discomfort connected to activity (55% and 43%).

The present study shows that the majority of nursing students reported that MSS impacted on general physical activities (63% and 64%). This is, to our knowledge, the first study to highlight this perspective among nursing students. We could thus not find any instrument that focused the appropriate nuances of different levels of impact for this population. We thus invited the students to describe the impact on physical activity in their daily life in their own words and thereby gained information on the desired level of detail in accordance with the aim of the study.

Daily life activities such as work or studies and physical training/leisure activities (including walking, climbing stairs and daily transportations) were frequently affected. The activities classified in the work/study category have a low level of intensity that does not increase heart rate and breathing frequency (Swedish National Institute of Public Health, 2010). Physical exercise and leisure activities are categories that include activities on a moderate to high level of intensity, entailing increased heart rate and breathing frequency. This might lead to nursing students having difficulties in complying with the recommendation of physical activity in daily life (World Health Organization, 2010) which might affect the nursing students' long-term health and well-being. Postural alignment was reported as being affected by 29% and 24%. Within this category a sitting position connected to computer use and poor postural alignment was reported as being problematic. Of the nursing students reporting impact 39% and 33% respectively reported that two or more of the activities were affected. It is interesting to note that only 17% and 12% respectively of the students linked MSS symptoms to heavier load activities, see Table 4. This indicates that it is important to not exclusively highlight the moving and handling activities, such as patient transfers, in ergonomic interventions but also to give attention to, for example, postural alignment and other daily life activities.

The most common ways in which MSS affected the students were limitation in activity and discomfort connected with activity. These are not surprising findings but notable being as the high percentage of experienced limitation in activity impacts on the students' everyday life, such as study result and performance in clinical placement. Psychological impact includes e.g. sleep disturbance, worries about the future, decreased concentration and mood. Of those who reported impact of MSS 23% and 23% respectively reported psychological impact, which is something that, to our knowledge, has not been shown previously. We thus agree with

Cheung who stated that “the ability of nursing students to deliver high quality patient care depends in part on their ability to conserve their own health and well-being” (Cheung, 2010). Furthermore we suggest that a daily life perspective is taken into consideration when organizing and designing ergonomic training for nursing students as well as for registered nurses. Such a perspective could also include a more individual approach in the ergonomic education to meet the different needs.

In the present study two-thirds of the nursing students reported MSS which concurs with previous findings in studies of long-lasting symptoms (12 months) among nursing students (Kamwendo, 2000, Mitchell et al., 2008, Smith and Leggat, 2004). These results appear however to be lower than those concerning registered nurses in general (Smith et al., 2005, Smith et al., 2004, Trinkoff et al., 2002). On the other hand studies of the general population in a similar age range have shown a prevalence of 5-51% for long-lasting MSS (Sjögren et al., 2009, Català et al., 2002, Hagen et al., 2011, Kahlin et al., 2009), which is lower in comparison with the results in the present study. The differences between groups (general population, nursing students, registered nurses) presented above, appear to indicate that nursing students can be seen to be in a negative trajectory for developing long-lasting musculoskeletal symptoms. This was confirmed in a large nationwide population-based study in which the 7-year cumulative incidence of diagnosed musculoskeletal disorders was 76% among nurses compared to 66% among the general population (Chung et al., 2013).

The logistic regression analysis showed, in accordance with previous studies (Cheung, 2010, Kneafsey and Haigh, 2007) that the odds ratio of reporting MSS was high during the second study year (OR 1.8, 95% CI: 0.9-3.5), and OR 4.7 (95% CI: 2.1-10.7) during the third and final study year. We could not find similarly high odds of reporting MSS for the variables of

age, gender and BMI. This indicates that nursing students, while carrying out their education and clinical training are at risk for developing MSS which is worrying and should be taken into consideration in the organization of nursing education programmes. Being as the present study was based on cross-sectional data it can only give limited information about the mechanisms behind the high level of MSS during nurse education. In order to gain knowledge about the changes over time further longitudinal studies with prospective designs should be performed. The results, however, still indicate that the prevalence of MSS among nursing students is higher during their last year of study. Being as the symptoms reported in this study were not related to age, gender or BMI it is likely that their MSS are connected to the type of activity they are exposed to during their nursing education.

The study population can be considered to be representative for nursing students in terms of age. The mean age of the study population was 24.6 years (SD 4.3) and the mean age of the total population of nursing students at the university was 25 years (SD 5.2). There were more women than men in the study population (84% women) which is consistent with the distribution for the total study population (83% women) and for undergraduate nursing programmes in Sweden in general (88% women) (Swedish National Agency for Higher Education, 2012).

Nursing students must be well prepared for the physical demands both during and after nursing education. The high prevalence of MSS in the current study might indicate that ergonomic education needs to be revised and carefully planned and the educational aspects need to be reconsidered. The nursing education needs to carefully consider that the students are facing a demanding future and need tools and preparation to maintain good health. This study shows that the students' MSS impact on daily physical low-intense activities such as

prolonged sitting, computer use or daily transportations, which might give some indication of which focus ergonomic interventions should have. We thus recommend that ergonomic education should not only focus on patient handling activities but also on the management of low intense activities in daily life.

CONCLUSION

In conclusion the prevalence of MSS is high among nursing students and seems to be higher compared to a general population but lower than among registered nurses. Higher odds for reporting MSS during study year 3 compared to year 1 were found. The students experience that their MSS impact on their general physical activities, most commonly in low to moderate intensity level activities, such as work or study, physical exercise and leisure activities. The students with MSS reported activity limitation and discomfort connected to activity. These results indicate that the focus in ergonomic education during nursing education programmes should focus on both managing patient handling activities but also on how to manage low to moderate intense activities in daily life in order to prevent MSS in a lifelong perspective.

CONFLICT OF INTEREST STATEMENT

The authors declare no potential conflicts of interests with respect to the research, authorship and/or publication of this article. All of the authors have contributed in this study with design, data collection and analysis as well as writing the manuscript. The main contribution to data collection and manuscript writing was made by the first author.

FIGURE CAPTION

Figure 1. Numbers of nursing students responding and reporting musculoskeletal symptoms (MSS) and impact previous 12 months.

ACCEPTED MANUSCRIPT

REFERENCES

- Català, E., Reig, E., Artés, M., Aliaga, L., López, J.S., Segú, J.L., 2002. Prevalence of pain in the Spanish population: telephone survey in 5000 homes. *European Journal of Pain* 6 (2), 133-140
- Cheung, K., 2010. The incidence of low back problems among nursing students in Hong Kong. *Journal of Clinical Nursing* 19 (15-16), 2355-2362
- Chung, Y-C., Hung, C-T., Li, S-F., Lee, H-M., Wang, S-G., Chang, S-C., Yang, J-H., 2013. Risk of musculoskeletal disorder among Taiwanese nurses cohort: a nationwide population-based study. *BMC Musculoskeletal Disorders* 14(1), 1-6.
doi:10.1186/1471-2474-14-144
- Engkvist, I.-L., 2008. Back injuries among nurses – A comparison of the accident processes after a 10-year follow-up. *Safety Science* 46 (2), 291-301
- Engkvist, I.L., Kjellberg, A., Wigaeus, H.E., Hagberg, M., Menckel, E., Ekenvall, L., 2001. Back injuries among nursing personnel — identification of work conditions with cluster analysis. *Safety Science* 37 (1), 1-18
- Gummeson, C., Atroshi, I., Ekdahl, C., Johnsson, R., Ornstein, E., 2003. Chronic upper extremity pain and co-occurring symptoms in a general population. *Arthritis Care and Research* 49 (5), 697-702
- Hagen, K., Linde, M., Heuch, I., Stovner, L.J., Zwart, J.A., 2011. Increasing prevalence of chronic musculoskeletal complaints. A large 11-year follow-up in the general population (HUNT 2 and 3). *Pain Medicine* 12 (11), 1657-1666
- Hignett, S., 2003. Intervention strategies to reduce musculoskeletal injuries associated with handling patients: a systematic review. *Occupational and Environmental Medicine* 60 (9), doi: 10.1136/oem.60.9.e6

- Hupert, N., Amick, B.C., Fossel, A.H., Coley, C.M., Robertson, M.M., Katz, J.N., 2004. Upper extremity musculoskeletal symptoms and functional impairment associated with computer use among college students. *Work* 23 (2), 85-93
- Jenkins, M., Chaumont Menéndez, C., Amick Iii, B.C., Tullar, J., Hupert, N., Robertson, M.M., Katz, J.N., 2007. Undergraduate college students' upper extremity symptoms and functional limitations related to computer use: A replication study. *Work* 28 (3), 231-238
- Kahlin, Y., Werner, S., Romild, U., Alricsson, M., 2009. Self-related health, physical activity, BMI and musculoskeletal complaints: a comparison between foreign and Swedish high school students. *International Journal Of Adolescent Medicine And Health* 21 (3), 327-341
- Kamwendo, K., 2000. Adherence to healthy lifestyles: A comparison of occupational therapy students with nursing and physiotherapy students. *Scandinavian Journal of Occupational Therapy* 7, 156-164
- Kneafsey, R., Haigh, C., 2007. Learning safe patient handling skills: student nurse experiences of university and practice based education. *Nurse Education Today* 27 (8), 832-839
- Kneafsey, R., Ramsay, J., Edwards, H., Callaghan, H., 2012. An exploration of undergraduate nursing and physiotherapy students' views regarding education for patient handling. *Journal of Clinical Nursing* 21 (23-24), 3493-3503
- Leggat, P., Smith, D., Clark, M., 2008. Prevalence and correlates of low back pain among occupational therapy students in Northern Queensland. *Canadian Journal Of Occupational Therapy*, 75 (1), 35-41

- Lorusso, A., Vimercati, L., L'Abbate, N., 2010. Musculoskeletal complaints among Italian X-ray technology students: a cross-sectional questionnaire survey. *BMC Research Notes* 3114-117, doi:10.1186/1756-0500-3-114
- Mitchell, T., O'Sullivan, P.B., Burnett, A.F., Straker, L., Rudd, C., 2008. Low back pain characteristics from undergraduate student to working nurse in Australia: A cross-sectional survey. *International Journal of Nursing Studies* 45 (11), 1636-1644
- Nelson, A., Baptiste, A.S., 2006. Evidence-based practices for safe patient handling and movement. *Orthopaedic Nursing* 25 (6), 366-379
- Noack-Cooper, K.L., Sommerich, C.M., Mirka, G.A., 2009. College students and computers: Assessment of usage patterns and musculoskeletal discomfort. *Work* 32 (3), 285-298
- Singh, A., Devi, Y., John, S., 2010. Epidemiology of musculoskeletal pain in Indian nursing students. *International Journal of Nursing Education* 2 (2), 6-8
- Sjøgren, P., Ekholm, O., Peuckmann, V., Grønbaek, M., 2009. Epidemiology of chronic pain in Denmark: an update. *European Journal of Pain* 13 (3), 287-292
- Smith, D.R., Choe, M.-A., Jeon, M.Y., Chae, Y.R., An, G.J., Jeong, J.S., 2005. Epidemiology of musculoskeletal symptoms among Korean hospital nurses. *International Journal of Occupational Safety Ergonomics* 11 (4), 431-440
- Smith, D.R., Leggat, P.A., 2004. Musculoskeletal disorders among rural Australian nursing students. *Australian Journal of Rural Health* 12 (6), 241-245
- Smith, D.R., Sato, M., Miyajima, T., Mizutani, T., Yamagata, Z., 2003. Musculoskeletal disorders self-reported by female nursing students in central Japan: a complete cross-sectional survey. *International Journal of Nursing Studies* 40 (7), 725-729
- Smith, D.R., Wei, N., Kang, L., Wang, R.-S., 2004. Musculoskeletal disorders among professional nurses in mainland China. *Journal of Professional Nursing* 20 (6), 390-395

Swedish National Agency for Higher Education, R 2012:10. Universitet och högskolor. ISSN: 1400-948X

Swedish National Institute of Public Health, R 2010:14. Editorial committee: Professional Associations for Physical Activity. ISSN: 1651-8624

Swedish Work Environment Authority, 2012. Work-Related Disorders. In: Arbetsmiljöstatistik. ISSN: 1652-1110

Trinkoff, A.M., Lipscomb, J.A., Geiger-Brown, J., Brady, B., 2002. Musculoskeletal problems of the neck, shoulder, and back and functional consequences in nurses. American Journal of Industrial Medicine 41 (3), 170-178

World Health Organization, WHO, 2004, Obesity: preventing and managing the global epidemic. In: WHO Technical Report Series No 894. ISSN: 0512-3054

World Health Organization, WHO, 2010. Global recommendation on physical activity for health. ISBN: 978 92 4 159 997 9

World Medical Association, WMA, 2008. Declaration of Helsinki - Ethical principles for medical research involving human subjects. [Online] Accessed 20/12/2012, <http://www.wma.net/en/30publications/10policies/b3/17c.pdf>

IMPACT OF MUSCULOSKELETAL SYMPTOMS ON GENERAL PHYSICAL ACTIVITY DURING NURSING EDUCATION

Table 1-4

Table 1. Characteristics of the responders ($n=224$) in three study years in one nursing education programme.

Characteristics	Study year number of students												Total number of students			
	Year 1 $n=87$				Year 2 $n=73$				Year 3 $n=64$				$n=224$			
	%	Mean	SD	Range	%	Mean	SD	Range	%	Mean	SD	Range	%	Mean	SD	Range
Age, years		23.9	4.1	20-39		24.7	4.8	21-46		25.5	3.8	22-37		24.6	4.3	20-46
Gender (women)	82				93				78				84			
BMI (kg/m ²)																
<18.5 (underweight)	2				6				7				4			
18.5-24.9 (normal)	71				69				69				70			
25-29.9 (overweight)	23				21				16				21			
≥30 (obese)	4				4				8				5			

Table 2. Prevalence, duration and location of musculoskeletal symptoms among nursing students during the past 3 and 12 months.

Bodily location of symptoms	Study year number of students						Total number of students	
	Year 1 <i>n</i> =87		Year 2 <i>n</i> =73		Year 3 <i>n</i> =64		<i>n</i> =224	
	3 m <i>n</i>	12 m <i>n</i>	3 m <i>n</i>	12 m <i>n</i>	3 m <i>n</i>	12 m <i>n</i>	3 m <i>n</i> /% (95% CI)	12 m <i>n</i> /% (95% CI)
Head	3	3	5	2	2	2	10/5 (2.2-7.9)	7/3 (0.8-5.2)
Neck-shoulders-upper back	28	18	28	23	23	26	79/35 (28.8-41.3)	67/30 (24.0-36.0)
Lower back-pelvis-hip	33	35	30	28	19	26	82/37 (30.6-43.3)	89/40 (33.6-46.4)
Arm	4	4	4	2	7	9	15/7 (3.7-10.3)	15/11 (6.9-15.1)
Wrist-hand	8	6	9	9	4	5	21/9 (5.3-12.8)	20/9 (5.3-12.8)
Leg-knee	14	14	12	14	11	13	37/17 (12.08-21.9)	41/18 (13.0-23.0)
Foot	6	7	6	5	2	2	14/6 (2.9-9.1)	14/6 (2.9-9.1)
At least one location	55	45	52	48	43	50	150/67 (60.8-73.2)	143/64 (57.7-70.3)

Table 3. Odds ratio (OR) and 95% confidence interval (CI) for prevalence of MSS among nursing students.

	OR	95% CI
Age	1.00	0.93 – 1.01
Gender	0.53	0.23 – 1.27
BMI	1.05	0.96 – 1.15
Study year 1 ^a		
Study year 2	1.75	0.89 – 3.45
Study year 3	4.64	2.05 – 10.53

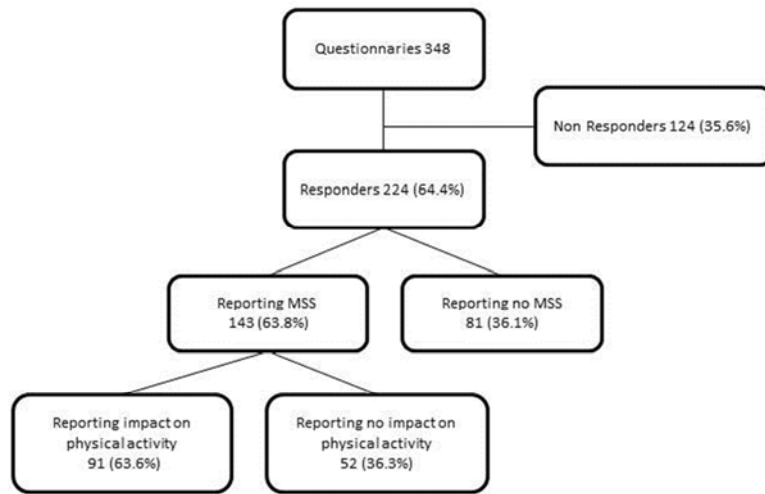
^aConstant

Table 4. Impact of type of activity and in which way the activity was affected among nursing students reporting symptoms, 3 or 12 months previously.

	Study year Number of students with MSS						Total Number of students with MSS	
	Year 1		Year 2		Year 3		<i>n</i> =150	<i>n</i> =143
	<i>n</i> =55	<i>n</i> =45	<i>n</i> =52	<i>N</i> =48	<i>n</i> =43	<i>n</i> =50	3 m	12 m
	3 m	12 m	3 m	12 m	3 m	12 m	<i>n</i> (%)	<i>n</i> (%)
Activity impact total^a	33	31	32	25	30	35	95 (63)	91 (64)
Type of activity								
Daily life/work/studies	18	20	26	17	19	20	63 (66 ^b)	57 (63 ^b)
Physical training/leisure act	17	18	17	12	14	17	48 (51 ^b)	47 (52 ^b)
Postural alignment	9	8	11	6	8	8	28 (29 ^b)	22 (24 ^b)
Heavier load, lifting activity	3	3	7	4	6	4	16 (17 ^b)	11 (12 ^b)
Other activities	0	0	1	1	2	1	3 (3 ^b)	2 (2 ^b)
Two or more of the above	10	10	15	8	12	12	37 (39 ^b)	30 (33 ^b)
Impact								
Activity limitation	17	21	19	19	18	21	54 (57 ^b)	61 (67 ^b)
Discomfort connected to act	21	16	14	9	17	14	52 (55 ^b)	39 (43 ^b)
Psychological impact	9	8	7	7	6	6	22 (23 ^b)	21 (23 ^b)
Fatigue, less energy	4	4	4	3	2	3	10 (11 ^b)	10 (11 ^b)
Two or more of the above	11	11	10	5	9	9	30 (32 ^b)	25 (27 ^b)

^a Number of students, of those with MSS, reporting impact on general physical activity.

^b Percentage of Activity impact total



ACCEPTED MANUSCRIPT