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# Neck/shoulder and back pain in new graduate nurses: A growth mixture modeling analysis

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ABSTRACT

*Background:* Although it is well known that musculoskeletal disorders are common among registered nurses, little longitudinal research has been conducted to examine this problem from nursing education to working life.
*Objectives:* The aim was to investigate the prevalence and incidence of neck/shoulder and back pain in nursing students in their final semester, and one and two years after graduation. Furthermore, to identify common trajectories of neck/shoulder and back pain, and explore sociodemographic and lifestyle-related factors, contextual factors and health outcome that might be characteristic of individuals in the various trajectories.
*Design:* Longitudinal study following nursing students from their final year of studies, with follow-ups one and two years after graduation.
*Settings and participants:* Nursing students who graduated from the 26 universities providing undergraduate nursing education in Sweden 2002 were invited to participate ($N = 1700$). Of those asked, 1153 gave their informed consent.
*Methods:* The participants answered postal surveys at yearly intervals. Descriptive statistics were used to analyze prevalence and incidence of pain, and growth mixture modeling was applied to identify different homogeneous clusters of individuals following similar trajectories in pain development across time.
*Results:* The prevalence of neck/shoulder and back pain remained constant over time (around 50% for neck/shoulder pain and just over 40% for back pain). Six different development trajectories for each symptom were found, reflecting patterns of stable pain levels or variation in levels over time: one symptom-free group, two decreasing pain groups, two increasing pain groups, and one chronic pain group. With few exceptions, the same factors (sex, children, chronic disease, working overtime, work absence, sickness presence, physical load, depression, self-rated health, sleep quality and muscular tension) were associated with neck/shoulder and back pain trajectories. Different types of physical load characterized new nurses with neck/shoulder pain and back pain respectively.
*Conclusions:* The high prevalence of pain among nursing students and among new graduate nurses, suggests that it would be effective to implement preventive strategies already during nursing education, but they should also preferably continue after graduation. Many factors associated with pain in the neck/shoulder and back seem to be modifiable, and thereby constitute targets for preventive strategies.


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**What is already known about the topic?**

- Musculoskeletal disorders represent a main cause for absence from work worldwide.
- Musculoskeletal disorders are a common problem among registered nurses.
- The areas most commonly affected among nurses are back, neck and shoulder.
- Little longitudinal research exists on new graduates' musculoskeletal symptoms.

**What this paper adds**

- Pain in the neck/shoulder and back was reported by around half of the new nurses during nursing education and post graduation.
- Six patterns of pain levels over time were found in both neck/shoulder and back.
- A variety of factors, e.g. working overtime, work absence, physical load at work, and depression, were differentially associated with the six pain trajectories.

## 1. Introduction

Disorders of the musculoskeletal system represent a main cause for absence from work worldwide and result in considerable costs for the healthcare system as well as for the individual (Luttman et al., 2003). Over 44 million (one in six) members of the European Union workforce have a long-standing health problem or disability that affects their work capacity (Bevan et al., 2009). The term "musculoskeletal disorders" refers to health problems of the locomotor apparatus, i.e. muscles, tendons, the skeleton, cartilage, ligaments and nerves. It includes all forms of ill health ranging from light, transitory disorders to irreversible, disabling injuries. The most important localization of musculoskeletal disorders can be related to the neck and upper extremities (e.g. the shoulder, arm and hand), the main articulations (e.g. the knee), and the lower back (Luttman et al., 2003).

Musculoskeletal disorders are common among registered nurses (Engels et al., 1996; Hou and Shiao, 2006). The literature showed that the prevalence of musculoskeletal disorders anywhere in the body varied between 57 and 94% among registered nurses, and that the most commonly affected areas were the lower back, neck and shoulder (ibid). This high prevalence is a serious problem, as disorders of the musculoskeletal system are one of the main causes of sickness absence worldwide (Luttman et al., 2003). In addition, Andersen et al. (2012) found that moderate to severe pain significantly increased the risk of long-term sickness absence for the low back, neck/shoulders and knees among female healthcare workers. Sweden is no exception; here too, musculoskeletal disorders are one of the most common reasons for sickness absence among registered nurses (Mulder, 2011). Musculoskeletal disorders among registered nurses were also reported as a reason for leaving nursing care (Fochsen et al., 2005; Sjogren et al., 2005). Sickness absence and its implications for intention to leave nursing may worsen the global shortage of nurses (Buchan and Aiken, 2008), which not only creates a financial burden but also impairs patient safety (Rauhala et al., 2007).

The National Research Council in the USA argues that none of the common musculoskeletal disorders is uniquely caused by work exposures, but are what the World Health Organization calls "work-related conditions" because they can be caused by work exposures as well as non-work factors (National Research Council, 2001). Factors from three domains that may be involved in relation to musculoskeletal disorders are: (1) physical, organizational, and social aspects of work and the workplace, (2) physical and social aspects of life outside the workplace, including physical activities, financial incentives, and cultural values, and (3) the physical and psychological characteristics of the individual (National Research Council, 2001). These three domains can all be incorporated in the biopsychosocial framework described by Melin and Lundberg (1997) and Lundberg and Melin (2002), which summarizes available evidence about the development of musculoskeletal disorders. The framework concludes that biomechanical demands and ergonomic conditions at work are important for muscle tension and development of musculoskeletal disorders, but that stress, separately, and in addition to physical conditions, may contribute to elevated physiological arousal and muscle tension. According to Lundberg and Melin (2002), conditions at work, e.g. time pressure, may contribute to keeping stress levels and muscular tension elevated also after work, and may thus reduce the time for rest and recuperation. In addition, Lundberg and Melin (2002) conclude that demands from unpaid household chores and child care, may further contribute to keeping stress levels elevated, which has a greater effect on women.

Among registered nurses, it has been found that a wide variety of factors from all of the three domains are associated with musculoskeletal disorders (Engels et al., 1996; Hou and Shiao, 2006; Smith et al., 2004). Several studies that have examined factors associated with low back pain among registered nurses or female healthcare workers have focused on physical tasks such as heavy lifting, bending postures, transfer and/or poor knowledge of ergonomics (Jensen et al., 2012; Karahan et al., 2009; Yip, 2004), but also on stress (Warming et al., 2009), low social support (Byrns et al., 2004), and poor work relationships with colleagues (Yip, 2004). While there is an abundance of cross-sectional and epidemiological studies documenting the high prevalence and persistence of low back pain in nursing personnel (Menzel, 2004), there are far fewer studies on neck/shoulder pain and its relation to potential influencing factors among registered nurses (Harcombe et al., 2010; Smedley et al., 2003; Smith et al., 2006). Smedley et al. (2003) found that the strongest predictors of pain in the neck/shoulder were previous history of the symptom, physical exposure at work (reaching, pushing and/or pulling) and low mood and stress (Smedley et al., 2003). Smith et al. (2006) found that high mental pressure was a risk factor for musculoskeletal disorders of the neck and shoulder, while Harcombe et al. (2010) found that job strain had a strong association with neck pain.