



## Article

# The relationship between physical functional limitations, and psychological distress: Considering a possible mediating role of pain, social support and sense of mastery



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## ABSTRACT

The aim of this study was to examine associations between selected physical functional limitations related to performing daily activities and psychological distress. We also aimed to investigate if these associations vary across age (moderation), and to explore pain, sense of mastery and social support as potential moderators and mediators. The study was based on pooled data from two rounds (2008 and 2012) of a Norwegian nationally representative cross-sectional health survey (N = 8520) including individuals aged  $\geq 16$  years (Age groups = 16–44 and  $\geq 45$  years). Physical functional limitations comprised decreased ability to: i) climb stairs, ii) carry objects, or iii) both. Psychological distress was measured as anxiety and depressive symptoms occurring separately or in combination (CAD). Of respondents reporting physical functional limitations, 8–14% reported depressive symptoms, 5–7% anxiety symptoms, and 13–28% reported CAD. Physical functional limitations were significantly associated with all three forms of psychological distress, particularly among individuals 16–44 years, and were more strongly related to CAD than to anxiety or depression occurring separately. The association with CAD was twice as strong when both types of physical functional limitations were present. Pain, sense of mastery and social support were significant modifiers of depression, whereas all three were significant mediators of the relationship between physical functional limitations and anxiety, depression and CAD. Sense of mastery mediated the relationship between physical functional limitations and CAD, but most strongly among those 16–44 years. Social support was only a significant mediator among those  $\geq 45$  years. Close associations between physical functional limitations and psychological distress highlight special needs among individuals experiencing daily functional limitations. The results also suggest that pain, low social support, and low sense of mastery may contribute to aggravate psychological distress.

## Introduction

The World Health Organization (WHO) (2013) has estimated that 2.2–3.8% of people worldwide, aged 15 years and older, have significant difficulties in performing daily activities due to loss of physical function. Prevalence estimates indicate that as many as 16% of the US population between the ages of 18 and 44 have at least one functional disability (Courtney-Long et al., 2015). The prevalence estimates increase with age, and are reported to be 26% among individuals aged 45–64 and 36% among those 65 years and older in the same US sample (Courtney-Long et al., 2015).

Functional limitations are commonly defined as restricted ability to perform necessary daily tasks like carrying and walking, which require

functional mobility and strength. There is an important distinction between basic functional limitations and reduced discretionary leisure activities (Parmelee, Harralson, Smith & Schumacher, 2007). Ability to function physically on a daily basis – and in a satisfactory way, is important to mental health (Christensen, Doblhammer, Rau & Vaupel, 2009; Schnittker, 2005; Verbrugge and Jette, 1994). Functional limitations might lead to mental health problems (Chen et al., 2012), and mental health problems may increase the complexity, challenges, and difficulties for individuals with functional limitations (Kojima, 2012; Raphael, Schmolke & Wooding, 2005). Despite the large scientific literature on the interrelationship between somatic and mental health (Lenze, 2001; Nosek, Hughes & Robinson-Whelen, 2008; Scott et al., 2007), and the importance of physical daily functioning to mental

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health, relatively few studies have investigated the relationship between physical functional limitations and mental health. The few studies that are published to date have focused on the elderly (Lee et al., 2012; Lenze, 2001; Muramatsu, Yin & Hedeker, 2010; Stegenga et al., 2012; Suttajit et al., 2010) and shown that the relationship between physical functional limitations related to carrying and squatting and depressive symptoms, are stronger than those resulting from difficulties related to standing, running, and climbing stairs, although all limitations are significantly associated (Lee et al., 2012). Among younger individuals, functional limitations associated with arthritis and lower limb injury (such as problems walking, carrying, etc.) have also been shown to be related to psychological distress (McCarthy et al., 2003; Shih, Hootman, Strine, Chapman & Brady, 2006). Although the relationship between functional limitations and mental health problems is complex and is most likely bidirectional, longitudinal evidence suggests that disability often precedes depression (Chen et al., 2012).

Several factors, and perhaps most notably pain, sense of mastery and social support, might moderate or mediate the association between physical functional limitations and mental health, but such moderation and mediation mechanisms are scarcely investigated. *Pain* is well known to be associated with psychological distress (Bair, Robinson, Katon & Kroenke, 2003; Campbell, Clauw & Keefe, 2003; Currie and Wang, 2004; McWilliams, Cox & Enns, 2003; Parmelee et al., 2007). To examine the impact of functional limitations on psychological distress, it is important to separate the impact of functional limitations from that of pain. Functional limitations are not always associated with pain, either because pain is under control (e.g., through medication), or due to lack of pain (Ramage-Morin and Gilmour, 2010). In this paper, we thus discuss a possible moderator and mediator role of pain.

Some studies have reported associations between physical functional limitations and pain on the one hand and between pain and psychological distress on the other (Alschuler, Theisen-Goodvich, Haig & Geisser, 2008; Ramage-Morin and Gilmour, 2010). However, to date, few have studied the relationship between pain, daily functioning and mental health thoroughly (Jensen, Moore, Bockow, Ehde & Engel, 2011). The only study known to us, by Parmelee et al. (2007), reported pain to mediate the relationship between basic functional limitations associated with osteoarthritis and depression. This mediator role was complete, eliminating any significant direct relationship between functional limitations and depression (Parmelee et al., 2007). More studies have examined functional limitations as mediators between pain and depression, but with mixed results. Some studies have shown the relationship to be not significant (Geerlings, Twisk, Beekman, Deeg & van Tilburg, 2002; Parmelee et al., 2007; Wang, Jayasuriya, Man & Fu, 2012), whereas others have indicated significant associations (albeit with cancer patients, and not those with functional limitations), with the association shown to be strongest among the youngest patients (Dickens, Jayson, Sutton & Creed, 2000; Williamson, 2000).

*Sense of mastery* is also likely to moderate or mediate the association between functional limitations and psychological distress. Sense of mastery refers to whether individuals feel they are able to influence important outcomes in their lives. A moderator role can be envisioned in which sense of mastery buffers the direct association between functional limitations and mental health. However, a mediator role can also be envisioned where the indirect pathway via sense of mastery explain much of the relationship between functional limitations and psychological distress. In the latter case, functional limitations must have a significant impact on sense of mastery, which in turn must be directly associated with psychological distress. The direct pathway must be significantly changed upon addition of the mediator (e.g., sense of mastery). Functional limitations have previously been shown to be independently associated with sense of mastery (Yang, 2006). As described for pain, sense of mastery is also known to be independently associated with mental health (Ross and Mirowsky, 2013). High sense

of mastery is commonly associated with both better mental and physical health, as well as improved overall functioning in life (Lavikainen, Fryers & Lehtinen, 2006; Taylor and Stanton, 2007), and a significant negative association has been reported for sense of mastery and episodes of major depression (Ross and Mirowsky, 2013). Jang, Haley, Small, and Mortimer (2002) have previously reported sense of mastery to moderate the relationship between functional disability and depression. However, in another study (Yang, 2006), a mediator, but not moderator role of mastery was reported for the same association (i.e., functional limitations and depression). Functional limitations and depression were more highly correlated among individuals reporting low, rather than high, sense of mastery ( $p < 0.001$ ). It is possible that high levels of mastery lead to better management of health-related problems and more effective mobilization of personal resources and coping strategies, as has been observed in the elderly (Jang et al., 2002).

Another important factor in the relationship between functional limitations and psychological distress may be *social support*. Physical functional limitations may, for example, lead to isolation and loneliness. Low social support may thus mediate the relationship between functional limitations and psychological distress. Social support is commonly referred to as a person's perception of being loved, cared for, and valued by others (Lavikainen et al., 2006; Taylor and Stanton, 2007; Thoits, 2011). Social support tends to make people less vulnerable to negative emotional conditions, more likely to participate in health-promoting activities and social events, as well as to provide a network for help and practical assistance when needed (Myers, 2000; Thoits, 2011; Umberson and Montez, 2010). Perceived social support may also increase feelings of self-esteem and self-worth, which in turn may lead to emotional well-being (Jang et al., 2002; Thoits, 2011). Lack of social support was found to act as a mediator in the relationship between diagnosed physical impairments (i.e., sensory and amnesic impairments) or functional limitations and psychological distress among the elderly in a previous Norwegian study (Bøen, Dalgard & Bjertness, 2012; Yang, 2006). Social support has also been identified as an important buffer (moderator) against psychological distress (Ehsan and De Silva, 2015; Kawachi and Berkman, 2001). Social support, through its ability to increase proactive coping, has been shown to significantly moderate psychological distress through a weakening of the association between physical impairment and depression in the elderly (Greenglass, Fiksenbaum & Eaton, 2006). Additionally, high levels of social support are associated with less pain and better physical functioning (Jensen et al., 2011). Thus, whereas high social support can be beneficial for health-related outcomes, low social support is associated with increased risk for compromised health and physical functioning (Gazmararian, Baker, Parker & Blazer, 2000).

The primary aim of this study was to explore the association between physical functional limitations and psychological distress. Additionally, we examined the potential moderator and mediator role of pain, sense of mastery, and social support. Previous research in this area has primarily focused on the elderly. In this study, we therefore explore these associations in different adult age groups. Analyses are based on a large regularly repeated Norwegian health survey including individuals aged 16 years or older ( $N = 8520$ ). The sample is nationally representative and covers pooled data from two survey rounds (2008 and 2012). Functional limitations include difficulties with carrying objects and/or climbing stairs. Our main hypotheses were that difficulties in performing everyday tasks are related to greater psychological distress. We further postulated that this relationship is at least partly associated through an alternate pathway (mediator) of pain. Further, the psychosocial parameters sense of mastery and social support were postulated to act as either mediators or moderators. Finally, it was hypothesized that these relationships would be equally relevant for both the younger and the older populations.

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