

Sluttrapport for project: "Fatigue and physical activity"

Introduction

Fatigue is an under-recognised and poorly managed problem for many older people. At least 25% of older people in primary care settings, and up to 98% of older people in long-term care, report experiencing unpleasant, debilitating fatigue. Fatigue may contribute to older people reducing the amount or intensity of physical activity they perform and may be a key component in a cycle of decline. Physical activity is well known to afford health and well-being benefits, and contributes to maintenance of independence and higher quality of life.

The type of fatigue referred to in this series of studies is that defined as "A subjective unpleasant symptom which incorporates total body feelings ranging from tiredness to exhaustion, creating an unrelenting overall condition which interferes with individuals' ability to function to their normal capacity" (Ream & Richardson). The condition is often largely unexplained.

Most of the studies published during the post-doctoral fellowship focus on this problem of fatigue and include a concept description, a review of questionnaires used in research to measure fatigue, a study looking at the prevalence of the problem in people after a stroke, and an analysis of the association between fatigue and physical activity. A final study tested the relationship between walking characteristics and future decline in physical activity levels.

Besides exploring some of the reasons why fatigue is so difficult to study, the research showed that fatigue has complex relationships with physical activity and other health-related factors. Importantly, Study 4 showed that older people who report high levels of fatigue tend to have 15-20% lower daily energy expenditure, step count and total time spent performing higher intensity activity.

Publications:

1. **Egerton, T.** (2013). "Self-reported aging-related fatigue: a concept description and its relevance to physical therapist practice." Phys Ther **93**(10): 1403-1413.

DOI: 10.2522/ptj.20130011

Abstract:

Fatigue is one of the most common symptoms experienced by older people, both with and without chronic disease. It is unpleasant and distressing and can affect functioning and quality of life. Fatigue also may inhibit an older person from participating optimally in a physical therapy program aimed at rehabilitation or the promotion of better health. However, confusion surrounds the concept of self-reported aging-related fatigue, not only because of the complexity of the problem itself but also because of lack of clarity of definition and the use of the term "fatigue" to describe a range of different concepts. This article aims to provide clarification of the concept in the context of physical therapist clinical practice. The intention is to increase awareness of the issue among physical therapists, promoting their assessment and consideration of the problem when planning health interventions involving functioning, physical activity, and exercise for older people.

2. **Egerton T**, Riphagen, II, Nygard AJ, Thingstad P, Helbostad JL (2015). "Systematic content evaluation and review of measurement properties of questionnaires for measuring self-reported fatigue among older people." Qual Life Res **24**(9): 2239-2255.

DOI: 10.1007/s11136-015-0963-1

Abstract:

PURPOSE: The assessment of fatigue in older people requires simple and user-friendly questionnaires that capture the phenomenon, yet are free from items indistinguishable from other disorders and experiences. This study aimed to evaluate the content, and systematically review and rate the measurement properties of self-report questionnaires for measuring fatigue, in order to identify the most suitable questionnaires for older people. **METHODS:** This study firstly involved identification of questionnaires that purport to measure self-reported fatigue, and evaluation of the content using a rating scale developed for the purpose from contemporary understanding of the construct. Secondly, for the questionnaires that had acceptable content, we identified studies reporting measurement properties and rated the methodological quality of those studies according to the COSMIN system. Finally, we extracted and synthesised the results of the studies to give an overall rating for each questionnaire for each measurement property. The protocol was registered with PROSPERO (CRD42013005589). **RESULTS:** Of the 77 identified questionnaires, twelve were selected for review after content evaluation. Methodological quality varied, and there was a lack of information on measurement error and responsiveness. **CONCLUSIONS:** The PROMIS-Fatigue item bank and short forms perform the best. The FACIT-Fatigue scale, Parkinsons Fatigue Scale, Perform Questionnaire, and Uni-dimensional Fatigue Impact Scale also perform well and can be recommended. Minor modifications to improve performance are suggested. Further evaluation of unresolved

measurement properties, particularly with samples including older people, is needed for all the recommended questionnaires.

3. **Egerton T**, Hokstad A, Askim T, Bernhardt J, Indredavik B (2015). "Prevalence of fatigue in patients 3 months after stroke and association with early motor activity: a prospective study comparing stroke patients with a matched general population cohort." BMC Neurol **15**(1): 181.

DOI: 10.1186/s12883-015-0438-6

Abstract:

BACKGROUND: Fatigue is a common complaint after stroke. Reasons for higher prevalence are still unclear. This study aimed to determine if fatigue prevalence in stroke patients is different to that of age and gender matched general population controls, and to explore whether early motor activity was associated with reduced likelihood of fatigue three months after stroke. **METHODS:** This was a prospective multicenter cohort study of stroke patients admitted to eleven regional Norwegian hospitals, within 14 days after stroke. Stroke patients (n = 257) were age and gender matched to participants in a general population health survey (HUNT3-survey) carried out in a regional county of central Norway. The single-item fatigue questionnaire from the HUNT3-survey was administered to both groups to compare prevalence. The association between early motor activity (time in bed, time sitting out of bed, and time upright) and fatigue at three months after stroke (Fatigue Severity Scale) was tested with logistic regression. Simple models including each activity outcome, with adjustment for stroke severity and pre-stroke function, were tested, as well as a comprehensive model that included additional independent variables of depression, pain, pre-stroke fatigue, age and gender. **RESULTS:** Prevalence was higher after stroke compared with the general population: 31.1 % versus 10.9 %. In the simple regression models, none of the early motor activity categories were associated with fatigue three months after stroke. In the comprehensive model, depression, pain and pre-stroke fatigue were significantly associated with post-stroke fatigue. Time in bed through the daytime during hospital stay approached statistical significance ($p = 0.058$) with an odds ratio for experiencing fatigue of 1.02 (95 % CI 1.00-1.04) for each additional 5.4 minutes in bed. **CONCLUSIONS:** Stroke patients had higher prevalence of fatigue three months after stroke than the age and gender matched general population sample, which may be partly explained by the stroke population being in poorer health overall. The relationship between early motor activity (and inactivity) and fatigue remains unclear. Further research, which may help drive development of new treatments to target this challenging condition, is needed.

4. **Egerton T**, Chastin SF, Stensvold D, Helbostad JL (2015). "Fatigue May Contribute to Reduced Physical Activity Among Older People: An Observational Study." J Gerontol A Biol Sci Med Sci.

DOI: 10.1093/gerona/glv150

Abstract:

BACKGROUND: Fatigue is one of the most commonly reported symptoms in primary care and perceived by older people as an overwhelming and distressing experience that restricts their activity and social participation. Self-reported fatigue is complex and multifactorial, with relatively little known about the causes and impacts among older people. This study tested the association between fatigue and objectively measured physical activity in a large cohort of older adults and identified factors that may explain this association. **METHODS:** Using cross-sectional data from 980 community-living 70- to 77-year-olds, the associations between self-reported fatigue and four physical activity outcomes derived from an accelerometer-based activity monitor were tested. Attenuating effects on the association of age, gender, body mass index (BMI), physical condition, comorbidity, depression, and sleep quality were evaluated. **RESULTS:** Nine percent of the sample reported being fatigued. Fatigued individuals had 1,150 fewer steps/day, 9 minutes/day less of moderate-vigorous activity, 12 minutes/day less of daily activity, and 15% fewer counts/minute, when compared with those not fatigued. BMI, physical condition, and comorbidity attenuated the association, and final regression models including these variables explained most (56%-72%) of the association between fatigue and activity. **CONCLUSIONS:** Fatigue was associated with clinically important reductions in daily physical activity levels of older people. The findings show BMI, physical condition (in particular cardiorespiratory fitness), and comorbidity to be important factors in explaining the fatigue-physical activity association. Modification of these factors may facilitate increases in daily activity levels by lessening fatigue.

5. **Egerton T**, Helbostad JL, Stensvold D, Chastin SFM. "Fatigue alters the pattern of physical activity behaviour and energy expenditure in older adults: Observational analysis of data from the Generation 100 study." Submitted

Abstract:

Fatigue has been associated with reductions in daily activity of older people. Summary measures of daily physical activity provide limited understanding of how fatigue affects physical activity

behaviour. This study examined the hour-by-hour energy expenditure measured by accelerometry in order to provide insight into physical activity behaviours of older people experiencing fatigue.

Fatigued participants were matched to 'not fatigued' participants by age, gender and BMI. Each group consisted of 86 people with mean age 73.8 years (SD 2.0), BMI 26.5 kg/m² (SD 3.9) and 61% female. The phase space plot, constructed to express rate of change of average vertical axis counts per hour as a time series, showed fatigued participants deviated from the not fatigued participants during the morning period, when rate of energy expenditure was increasing. Older people who feel fatigue have restricted ability to expend energy, which appears to lead to the lower overall levels of physical activity.

6. **Egerton T**, Paterson K, JL Helbostad "The association between gait characteristics and ambulatory physical activity in older people: A cross-sectional and longitudinal observational study using Generation 100 data." Submitted.

Abstract

This study aimed to determine if temporal-spatial gait characteristics are associated with free-living ambulatory physical activity in relatively-healthy older people. 630 women and 593 men had valid data from gait tests and activity monitoring. Gait speed alone was associated with daily step count. Gait speed along with cadence, walk ratio, step length, step time, and swing time were associated with the measures of time spent in higher intensity activity and overall energy expenditure. Those who walked slower were less active. After controlling for gait speed, shorter step length, shorter step time, shorter swing time and higher cadence were associated with less activity. This finding may be an indication of the functional consequences of a breakdown in the stride length-cadence relationship and/or compensations to increase stability. Variability and symmetry measures showed no association with physical activity levels. Gait speed was the only predictor of future change in activity.