3-2019

Effectiveness of Proprioceptive Neuromuscular Facilitation (PNF) on Gait and Balance in Older Adults

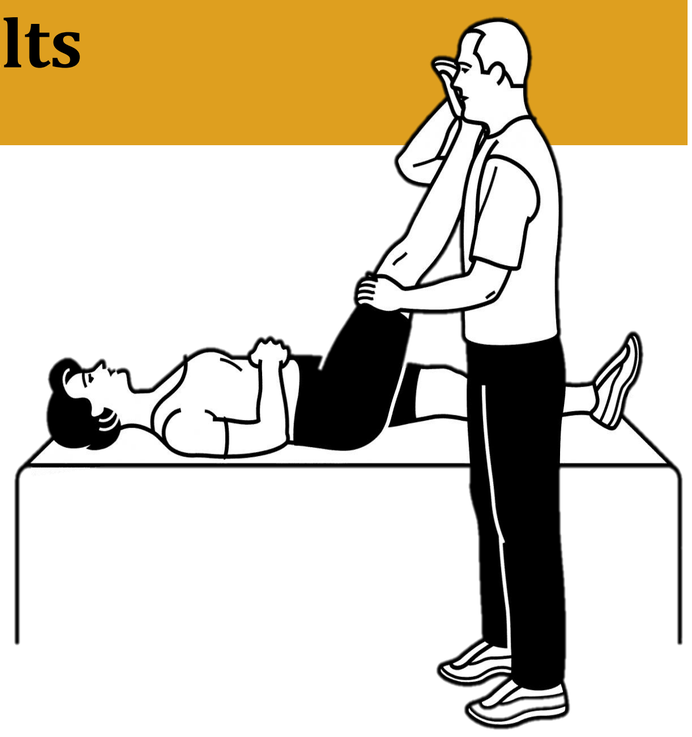
Alyssa Bradenburg
Western Michigan University, alyssa.r.brandenburg@wmich.edu

Savannah Dugan
Western Michigan University, savannah.m.dugan@wmich.edu

Effectiveness of Proprioceptive Neuromuscular Facilitation (PNF) on gait and balance in older adults

Alyssa Brandenburg & Savannah Dugan

Proprioceptive Neuromuscular Facilitation (PNF) approach uses the anatomical structures of the agonist and antagonist muscles to sequence muscle movements thus improving body functions and engagement in occupations in those with functional limitations. Proprioception involves sensory receptors that provide information regarding body position and movement. The neuromuscular system involves the nerves, muscles, and facilitation to make tasks easier for the client to perform. PNF patterns are performed in a spiral diagonal direction with resistance provided by an occupational therapist, putting emphasis on functional training and motor relearning.



1Ask: Research Question

Is Proprioceptive Neuromuscular Facilitation (PNF) an effective approach to improve gait and balance in older adults?

2aAcquire: Search Terms

Patient/Client Group: Older adults with impaired gait and balance; **I**ntervention (or Assessment): Proprioceptive Neuromuscular Facilitation; **C**omparison: Other interventions/no intervention; **O**utcome(s): Increase gait and balance

Databases: Pubmed; NCBI; Cochrane Library; ClinicalKey

Search Terms: Proprioceptive Neuromuscular Facilitation; Older Adults; Falls; Balance; Gait; Proprioceptive Integration Pattern; Elderly; Community-dwelling

2bAcquire: Selected Articles

Candace et al (2017): A randomized control trial evaluating if the use of theraband in PNF patterns have similar benefits of manual PNF patterns (control group) on mobility, balance, and fear of falls.

Mesquita, Carvalho, Freire, Neto, & Zangaro (2015): A randomized control trial comparing the effects of PNF patterns and Pilates on the static and dynamic postural balance of elderly women compared to general exercise (control group) to prevent falls and promote functional independence.

Silva, Amorim, Carvalho, & Mesquita (2017): A single group pre-post study using simple random sampling of older women who did not perform regular physical exercise, to analyze plantar support and functional balance with use of PNF exercises.

3aAppraise: Study Quality

Candace et al (2017): Level II, n=23. Data collected at baseline and at four weeks using Fear of Fall Scale, Numeric Pain Scale, Timed Up & Go, Elderly Mobility Scale, and Berg Balance Scale. Both experimental and control groups taught same six PNF exercise patterns and performed for five minutes each. T-PNF group (experimental) performed these exercises with use of a theraband. Exercises performed for one hour, two times per week for four weeks.

Mesquita, Carvalho, Freire, Neto, & Zangaro (2015): Level II, convenience sampling of women, n=58. Data collected at baseline and at four weeks using Stabilometry, Timed Up & Go, Functional Reach Test, and Berg Balance Scale. Individuals in both PNF and Pilates groups (experimental groups) received training for 50 minutes, three times per week for four weeks. Protocols delivered with progressive levels of difficulty. Control group participants continued normal daily activities.

Silva, Amorim, Carvalho, & Mesquita (2017): Level III, simple random sample, n=20. Data collected at baseline and at four weeks using S-PLATE Electronic Baropodometry and Timed Up & Go. Participants performed PNF patterns for four weeks following three different techniques: rhythmic initiation, sustain-relax, and reversal of antagonists.

3bAppraise: Study Results

PNF is an effective treatment for gait and balance difficulties, as well as improvements in functional reach, range of motion, muscle strength, and subjective improvement on reducing fall risks and levels of pain. Both traditional PNF groups (p=.001), the T-PNF group (p=.02), the Pilates group (p=.001), as well as the PNF group (p=.0001) in the qualitative study demonstrated significant improvements in the Timed Up & Go assessment.

4Apply: Conclusions for Practice

Overall, PNF is an effective treatment to improve gait and balance in older adults, but there is limited research in the United States. Therefore, future studies recommend using larger and diverse sample sizes to allow for an accurate generalization. These three studies reported short-term effects of PNF exercises, therefore long-term outcomes should be explored.

References:

Candace, W. YH., Kennis, C. KW., Evelyn, K. YC., Jeffrey, T. HC., Margaret, L. YL., Hwang, S., & Shirley, N. PC. (2017). Effect of a 4-week theraband exercise with PNF pattern on improving mobility, balance and fear of fall in community-dwelling elderly. *Journal of Korean Society Physical Medicine, 12*(4), 73-82. http://dx.doi.org/10.13066/kspm.2017.12.4.73

McHugh Pendleton, H., & Schultz-Krohn, W. (2013). *Pedretti's occupational therapy: Practice skills for physical dysfunction*. St. Louis, MO: Elsevier.

Mesquita, L. S., Carvalho, F. T., Freire, L. S., Neto, O. P., & Zangaro, R. A. (2015). Effects of two exercise protocols on postural balance of elderly women: A randomized controlled trial. *BMC Geriatrics, 15*(61). doi: 10.1186/s12877-015-0059-3

Silva, I. A., Amorim, J. R., Carvalho, F. T., & Mesquita, L. S. (2017). Effect of a proprioceptive neuromuscular facilitation (PNF) protocol on the postural balance of older woman. *Fisioter Pesqui, 24*(1), 62-67. doi: 10.1590/1809-2950/16636724012017

Research supports the use of PNF to improve gait and balance in older adults.

College of Health and Human Services
Department of Occupational Therapy
Western Michigan University