

# Innovative training programs for frail elderly in the skilling up stage

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# Chapter 10

Valorization

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## Relevance

This dissertation adds new knowledge to the field of training regimes in No-Go elderly individuals. The research for this thesis used a whole-body vibration device that produces stochastic resonance vibration and an exergame device in the form of a dance-game. This Doctoral Thesis also revealed that whole-body vibrations are a safe training method for Go-Goes elderly individuals (Chapter 4 and 5) and for No-Goes elderly individuals (Chapter 6). This work also showed that the use of whole-body vibration and exergaming as skilling-up training regime to improve balance, strength and gait in especially No-Go elderly individuals may be effective (Chapter 7). Based on the results of this thesis, the following conclusions can be made: firstly, SR-WBV demonstrate no side-effects and considered not be harmful under training conditions of use in this dissertation. Secondly, there is strong evidence that an implementation of this innovative training program into clinical practice may be of advantage for the elderly, especially for the No-Go elderly. From these cognitions, further research should be carried out to strengthen the findings of this thesis and to evaluate cost-effectiveness (and cost-utility) as well as, cost-benefit of this new training intervention.

This chapter explains how to translate the findings of the doctoral thesis into a target group, it exemplifies why this training regime can be considered as an innovative program; it describes in which services this training regimes can be transferred and it demonstrates what the next research steps are to be made.

## Target group

The findings of this Doctoral thesis are relevant for elderly individuals. It is known that aging is an individual process and that the human body has two ages. Chronological age is the current lifetime in years, while biological age is the current state of physical capacity and cognitive ability of an individual. Biological age should be taken into account in the context of this present work, because in elderly decreased physical capacity and cognitive ability may impair their health [1]. This Doctoral Thesis focused on No-Goes elderly individuals. Based on the findings, future studies could further develop the study methodology with a prolongation of the intervention period to evaluate the effects on physical performance. Furthermore, the cognition level and the cost-effectiveness (and cost-utility) as well as, cost-benefit of this new training intervention should be examined.

The findings are relevant for all physicians and health professionals who are working with No-Goes elderly individuals. Physicians and health professionals could encourage No-Go elderly individuals to carry out exercise programs to improve their physical performance.

## **Innovative product**

Daily activities such as washing, dressing, going to the restroom, moving, standing up and eating are important motor actions that an elderly individual has to carry out to remain independent. However, many elderly are in need for care. In Switzerland, 4% of elderly people over 65 living at home are not able to carry out one of these daily activities while in nursing homes, the figure rises to 67% [2]. Over 37% of the elderly are not able to carry out a minimum of five activities of daily living [2]. In this case every person should have access to safe and effective therapy. The public health system in western societies often faces major challenges to improve efficiency in medical care and organizational age-appropriate conditions. This thesis presents evidence for the implementation of whole-body vibration and exergame as a new and innovative training method for elderly in need of care (i.e. No-Go elderly) (Chapter 9). This innovative training method can be seen as a component of a modular system concept. This is based on that elderly individual's biological age appears in different forms [3]. The concept includes examination of the elderly person classification into Go-Go, Slow-Go and No-Go elderly and the whole-body vibration and exergame treatment method of an elderly individual. In this context, 'examination' means to evaluate the current physical and mental function of an elderly person. In addition, physical performance (e.g. balance, strength) should be assessed.

## **Activities and product**

Based on that, the evidence based findings of this thesis is to integrate into a practical therapy or treatment concept to increase motor ability of elderly (No-Go) individuals. This innovative training program supports elderly individuals by means of a comprehensive package. This comprehensive package includes the examination of the physical and mental function level and a training regime that integrates a motivation-volition model. There is a bulk of evidence on the benefits of increased physical activity on health status (in the elderly). Despite the obvious advantages of physical activity, it is not easy to motivate (elderly) persons towards more exercise. It is well known, if a person wants to achieve a goal (e.g. improvement of muscle strength) positive concepts to inspiring themselves and strive to attain their potential is required. Motivation is needed. This Doctoral-Thesis used a motivation-volitions model with success to maintain up the adherence-rate of the study participants. The training regimen in this Doctoral Thesis is based on the motivation-volition model [4]. However, the motivation-volition model was detailed reported in Chapter 9.

This thesis used the Short Physical Performance Battery Test (SPPB) to test the current physical performance level. The SPPB shows good validity and reliability in diverse populations [5, 6]. SPPB was used for all three groups (Go-Go, Slow-Go and No-Go). Additionally, specific measurements were used to evaluate strength or flexibility of individual muscles.

Another recommendation is the De Morton Mobility Index (DEMMI). The DEMMI was used for all elderly acute medical patients [7], for community-dwelling adults who require informed care

[8] and for healthy community-dwelling elderly individuals [9]. The DEMMI is an interval-level unidimensional scale, which consists of 15 hierarchical items that estimate mobility across a spectrum from bed-bound to independent mobility [7]. The advantage of this assessment is that the No-Go group can then be subdivided into 1) mobile elderly who can move with aids, b) elderly individuals who cannot move by themselves and are dependent on a wheelchair, or c) elderly individuals who are bedridden. Further studies should use the DEMMI for the No-Go-group.

To evaluate the mental function of an elderly individual the Mini-Mental State Examination (MMSE) can be proposed. The MMSE provides a brief screening method assessing the severity of cognitive impairment and documenting cognitive changes occurring over a time period [10]. This doctoral thesis used the MMSE as an instrument for inclusion and exclusion criterion.

### **Next steps**

The results of this Thesis suggest that not all the elderly may equally benefit from this innovative method to improve motor ability. Especially the No-Go groups showed higher effect-sizes (Chapter 3: meta-analysis, Chapter 4: SR-WBV shows no effect in Slow-Goes, Chapter 7: SR-WBV and exergaming shows beneficial effects in No-Goes). Therefore, it can be proposed as “best practice” that researchers and clinicians may classify their participants and patients into Go-Go, Slow-Go and No-Go when working with elderly persons to apply the best training for the specific group.

This thesis does not provide information about monetary costs and benefits of this innovative method in elderly individuals. Future health economic evaluations studies should focus on the cost-effectiveness, cost-utility and cost-benefit of this WBV and exergaming program. The results of such health-economic evaluations can give new insight into the precise cost of this training regime and allow comparison among alternative training programs. These results may be of uppermost relevance for elderly individuals, insurers, government and society in general. At present, this Thesis evaluated side-effects and could present that SR-WBV is a safe training method in Slow-Go and No-Go elderly individuals. Further findings are an improved physical performance level (e.g. strength) in No-Go elderly individuals. These results can be used by insurers, government and society as background information to develop new training regimes for No-Go elderly in Switzerland.

The classification of functionality in Go-Go, Slow-Go and No-Go elderly allows to better prescribe and develop individually adapted training programs. Go-Go and Slow-Go elderly may profit more from traditionally exercise while No-Go elderly may yield highest benefits by a training regimen consisting of whole-body vibration and exergaming.

Moreover, the findings of this thesis are especially relevant for the members of the No-Go group. This innovative program shows that especially the No-Go elderly may profit from WBV and exergaming to improve balance, strength and gait (Chapter 7). It can be argued that this innovative training program could also be used as a preventive measure against dynapenia, because WBV and exergame is a sensorimotor training method that stimulates the nerve-muscle-system [11]. Moreover, this valid intervention method increases muscle strength in elderly individuals [12].

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