UNIVERSITI PUTRA MALAYSIA

EFFECTIVENESS OF OTAGO EXERCISE PROGRAMME ON PHYSICAL PERFORMANCE, FUNCTIONAL CAPACITY AND SELF-CONFIDENCE ON FALLS AMONG ELDERLY PEOPLE IN SHAHROUD, IRAN

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By

ALI DADGARI

Thesis submitted to the school of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

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November 2014

Chair: Prof Tengku Aizan Hamid, PhD
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Falls in older people are very common and its incidence increases with age. In the community, the proportion of people who sustain at least one fall varies from 28% to 35% annually among those aged 65 years. The purpose of this study was to examine the effects of a home based-exercise training programme on physical performance, functional capacity and incidence of falls among elderly community dwellers and to test the mediation effect of self-efficacy on the relationship between physical performance and functional capacity and fall.

Bandura's self-efficacy theory and the Transtheoretical Model (TTM) of exercise behaviour were theoretical framework of the study. Based on self-efficacy theory, exercise improves physical performance and functional capacity. In addition, transtheoretical model of exercise behaviour explained subjects' changing behaviour and staying on attained behaviour for at least 6 consecutive months.

This is a randomized control trial, with 317 subjects in control (n=157) and experimental (n=160) groups. Statistical analyses such as frequency, mean, standards deviation, t-Test and other compare means analyses were conducted. In addition, this study explored the best model fit for fall reduction due to exercise training.

According the findings of this study, six months home-based Otago exercise training programme improves physical performance and functional capacity, which in turn can reduce the incidence of fall and repeated falls. Participants in experimental group, showed significant decline in frequency of falls (p value> .00). Other finding of this study indicated that the relationship between physical performance and functional capacity with declined falls incidence is mostly due to self-efficacy gained through exercise training (CFI=1, RMSEA= .00). In other words, the findings of this study showed that self-efficacy can play a role between the relationships of physical functioning and falls reduction among elderly people. This study highlighted the role of self-efficacy as a mediator between the relationship of physical functioning and fall reduction among elderly people.

Abstrak tesis yang dikemulcakan kepada Senat Universiti Putra Malaysia Sebagai memenuhi keperlyan untuk Ijazah Doktor Falsafah

KEBERKESANAN PROGRAM SENAMAN OTAGO TERHADAP PRESTASI FIZIKAL, KEUPAYAAN FUNGSI DAN KEYAKINAN DIRI BERKAITAN JATUH DALAM KALANGAN WARGA TUA DI SHAHROUD, IRAN

Oleh

ALI DADGARI

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Pengerusi: Prof Tengku Aizan Hamid, PhD
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Jatuh merupakan perkara lazim dalam kalangan warga tua dan kekerapan jatuh meningkat dengan umur. Dalam sesebuah komuniti, perkadaran orang yang terjatuh sekurang-kurangnya sekali berbeza-beza daripada 28% hingga 35% setiap tahun bagi mereka yang berumur 65 tahun. Tujuan kajian ini adalah untuk memeriksa kesan program latihan senaman di rumah terhadap prestasi fizikal, keupayaan fungsi dan kekerapan jatuh dalam kalangan komuniti warga tua dan untuk menguji kesan pengantaraan efikasi kendiri terhadap hubungan antara prestasi fizikal dan keupayaan fungsi dan jatuh. Teori efikasi kendiri Bandura dan Model Transteori (TTM) bagi tingkah laku senaman merupakan rangka kerja teori bagi kajian ini. Berdasarkan teori efikasi kendiri, senaman menambah baik prestasi fizikal dan keupayaan fungsian. Selain itu, Model Transteori tingkah laku senaman menjelaskan perubahan tingkah laku dan pengekalan tingkah laku yang diperoleh bagi subjek sekurang-kurangnya 6 bulan berturut-turut.

Kajian ini merupakan kajian rawak kawalan, dengan 317 subjek yang berada kumpulan kawalan (n=157) dan kumpulan eksperimen (n=160). Analisis statistik seperti kekerapan, min, sisihan piawai, ujian-t dan analisis perbandingan min yang lain telah dilaksanakan. Di samping itu, kajian ini meneroka kepadanan model terbaik bagi pengurangan jatuh disebabkan oleh latihan senaman.

Menurut dapatan kajian ini, program latihan senaman Otago yang dijalankan di rumah selama enam bulan meningkatkan prestasi fizikal dan keupayaan fungsi dan seterusnya boleh mengurangkan kekerapan jatuh dan pengulangan jatuh. Peserta dalam kumpulan eksperimen menunjukkan pengurangan yang signifikan dalam kekerapan jatuh (nilai p>.00). Dapatan lain dalam kajian ini menunjukkan hubungan antara prestasi fizikal dan keupayaan fungsi dengan pengurangan kekerapan jatuh adalah sebahagian besarnya disebabkan oleh efikasi kendiri yang diperoleh melalui latihan senaman (CFI=1, RMSEA= .00). Dalam erti kata lain, dapatan kajian ini menunjukkan efikasi kendiri boleh memainkan peranan dalam hubungan antara fungsi fizikal dan pengurangan jatuh dalam kalangan warga tua. Kajian ini mengetengahkan peranan efikasi kendiri sebagai pengantara antara hubungan fungsi fizikal dan pengurangan jatuh dalam kalangan warga tua.

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Last but not the least I wish, to avail myself of this opportunity, express a sense of gratitude and love to my family, Leila, Navid and Negar for their patience and supports. I left them behind to study abroad, but they themselves know that they are always my first priority. In addition, I would like to remember my late parents who encouraged me to study in all stages of my life. In addition, my appreciations goes to my wife's parents who have supported us. I could not leave my wife and kids, if we had not have their support and company.

APPROVAL

I certify that a Thesis Examination Committee has met on November,13, 2014 to conduct the final examination of Ali Dadgari on his thesis entitled "**Effectiveness of Otago Exercise Programme on Physical Performance, Functional Capacity and Self-Confidence on Falls among Elderly People in Shahroud, Iran**" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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LIST OF ABBREVIATIONS

ABCS	Activity-specific Balance Confidence Scale
ACT	Arm Curl Test
ADL	Activity of Daily Life
AGS	American Geriatrics Society
BBS	Berg Balance Scale
BBT	Berg Balance Test
BGS	British Geriatrics Society
BMI	Body Mass Index
CST	Chair Stand Test
COPD	Chronic Obstructive Pulmonary Disease
FES	Falls Efficacy Scale
FoF	Fear of Falls/ Fear of Falling
M	Mean
OEP	Otago Exercise Programme
SCT	Social Cognitive Theory
SD	Standard Deviation
SHMU	Shahroud University of Medical Sciences
TTM	Transtheoretical Model
TUGT	Timed Up and Go Test
UPM	Universiti Putra Malaysia
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background

Fall is a common problem among elderly people and with increase of age both fall and sustaining falls-injury are more frequent (Karlsson, Vonschewelov, Karlsson, Cster, and Rosengen, 2013). Approximately, one elderly person out of three home dwelling persons aged 70 years or older fall annually and half of them experience recurrent falls (Luukinen, H., Lehtola, S., Jokelainen, J.,Vonnen-Sainio, R., Lotvonen, S., and Koistinen, P., 2007). Regardless of the causes of falls, specific diseases, decreased physical activity and decline in physical performance (strength, balance, and mobility) predisposes aged people to falls (Nelson, M. E., Layne, J. E., Bernstein, M. J., Nuern Berger, A., Castaneda, C., Kaliton, D. and Singh, A. F., 2004). Among all known risk factors of falls, either extrinsic or intrinsic, muscular weakness and loss of balance are known to be major risk factors of falls among elderly people (Tinetti and Kumar, 2010).

Several interventional researches have been conducted to explore preventive measures against falls among elderly people (Kim and Lockhart, 2010; Mitchell et al., 2007; Myers, Young, and Langlois, 1996; Province et al., 1995; Salmon, 2001). There are growing number of researches indicating that muscular strength and balance training programmes can be beneficial in improving balance, physical abilities and reducing risk of falls (Bernhart, 2013; Binns, 2006; Boone, 2013; Fujisawa et al., 2007; Hadjistavropoulos, Delbaere, and Fitzgerald, 2011; Jacobson, Smith, Fronterhouse, Kline, and Boolani, 2012). However, in a study investigating the preventive effects of a programme on the specified risk factors of falling, incidence of falls and injurious falls did not find significant difference (Sjösten, Salonoja, Piirtola, VahlBerg, Isoaho, Hyttinen, and Kivelä, (2007).

In addition, most of falls prevention intervention are very expensive and there is a huge doubt about their cost-effectiveness in developing countries (Haines, Hill, Brauer, Hoffmann, Etherton-Beer, 2013; Heinrich, Rapp, Stuhldreher, Rissmann, Becker, and Konig, 2012). The question is what kind of exercise can be effective, feasible and used widely in community. Elderly people living in community are encountered with lots of problems to participate institutional exercise training programmes because of transport barriers, lack of financial support and public availability (Nelson et al., 2004). Recent interventions for falls prevention are considering home-base exercise as an alternative for expensive institutional exercise for older persons Tiedemann, Sherrington, Sturnieks, and Lord, 2012). Exercise, in any form, is therapeutic for all ages especially in golden ages (Leutholtz, and Ripoll, 2011). Elderly people deprived of exercise facilities for any reason are recommended to exercise at home (Porter, Matsuda, and Lindbloom, 2010). Home-based exercise training can improve functional capacity among senior citizens (Esculier, Vaudrin, Beriault, Gagnon, and Tremblay, 2012). Researchers have investigated the effectiveness of home-based exercise on many diseases and conditions among elderly people (Nocera, and Horvat, 2008). Otago Exercise Programme (OEP) as a home based exercise has been introduces in New Zealand to prevent falls. Previous four preliminary trials OEP revealed promising results (Campbell, Robertson, Gardner, Norton, and Buchner, 1999). OEP includes a series of simple exercises which can be performed easily at home, plus walking sessions three times a day. However, there is lack

of extensive evidence to explore effects of OEP to prevent falls among vulnerable elderly people. This study is an attempt to examine OEP to improve strength of muscles, which can directly improve functional capacity and physical performance to reduce the falls among elderly community dweller. Moreover, this study examines the role of self-efficacy on the relationship between improved functional capacity and fall incidence.

1.2 Problem Statement

According to World Health Organization fall is a worldwide problem among elderly people and a known leading cause of disabilities (Kenny, Romero-Ortuno, and Cogan, 2013). Falls are not inevitable part of getting older and many falls are preventable Schleicher, Wedam, and Wu, 2012). Effectiveness of many exercise programmes have been investigated; however, the kind of exercise intervention most effective for fall prevention is not fully addressed. In addition, feasibility and cost-effectiveness of fall prevention programme is an issue to be considered. The effectiveness of costly intervention programmes to prevent falls which is achieved in small scale researches, brings this question up that if there is solution to implement intervention to prevent falls in large scale or community elderly people. It means that public availability of most programmes is under question. To meet this public need, the necessity for a home-based training exercise programme is proposed by some researchers (Kamide, Shiba, and Shibata, 2009; Esculier et al., 2012). Home-based exercise training programmes, in comparison to clinic-based interventions which are very luxurious and promising seems to be more feasible (Takano, Haneda, Maeda, Sakai, Matsuse, Kawaguchi, and Shiba, 2010). Lack of public availability of high-tech facilities, transportation barriers for elderly people, the problem of cost-benefit and cost effectiveness of any high-tech programme are major deterrents to use clinical-based exercise programmes for elderly people living in community (Nelson et al., 2004; Gomersall, Tufanaru, and White, 2012). In addition, it is known that majority of seniors citizens aged 85 years or above can rarely leave their homes and interventional programmes targeting on those “homebound” aged people are scarce (Ashworth, 2005). For those homebound elderly community dwellers, application of a home-based exercise training can be an alternative option to participate in centered-based exercise programmes to prevent falls (Stessman, Hammerman-Rozenberg, Cohen, Ein-Mor, and Jacobs, 2009).

Despite of obvious advantages of home-based exercise programmes, surprisingly, only few randomized controlled interventions studied on falls have investigated the effects of home-based training intervention among the community-dwelling aged people (Thomas et al., 2008). In addition, there have been some drawbacks in previous home-based programmes. Most of previous home-based intervention still rely on the most expert personnel who closely supervise their clients (Heinrich, S., Rapp, K., Stuhldreher, Rissmann, Becker, and Konig, 2012) and provide them with high standard care at their homes (Luukinen et al., 2007; Gardner, Robertson, McGee, and Campbell, 2002). Other researches emphasize on individualized tailored programmes (Clemson, Singh, Bundy, Cumming, Weissel, Munro and Black, 2010). Both of these kinds of home-based programmes rose the cost of intervention programme and brought some organizational barrier (Zachary, Casteel, Nocera, and Runyan, 2012). In addition, lack in large scale randomization was the main limitation of those studies (Jenkyn, Hoch, and Speechley, 2012). Moreover, previous home-based studies, examining the effect of muscle strength on falling among elderly adults concluded with conflicting results (Keskin, Borman, Ersöz, Kurtaran, Bodur, and Aky, 2008). Therefore, additional research with frail elderly

individuals will help answer if home-based exercise training would improve balance, reduce fear of falls and decrease incidence of falls in older ages (Kerse, Butler, Robinson, and Todd, 2004). Otago Exercise Programme (OEP) is one the most recent home-based programmes designed to overcome falls among elderly people (Campbell, and Robertson, 2013). OEP is introduced in New Zealand in four trials to assess its effectiveness (Binns, 2006). The Otago exercise program is composed of muscle strengthening, balance training, and walking, which suggests a specific training method (Yoo, Chung, and Lee, (2013). The OEP has now been implemented in many parts of the United Kingdom, the United States and Australia as a fall prevention programme. It was designed to be delivered by physiotherapists and nurses trained and supervised by physiotherapists (Campbell, and Robertson, 2013). However, it has not been tested in a primary care setting in the other countries and locations for its feasibility, impact, acceptability and cost-effectiveness especially in countries with different economic, social and cultural situations. Therefore, further research is needed to evaluate OEP's outcome in other communities and other high risk elderly people such as those with experience of falls (Campbell, and Robertson, 2013).

Previous OEP trials addressed elderly female clients. To date, this is the first OEO intervention to prevent falls among Iranian elderly community dwellers. In Iran, district health centers in both urban and rural areas routinely provide primary health care to community such as vaccination, maternal care and personal general health issues. It is the first intervention to organize district health centers to provide exercise training programme to community senior citizens to prevent falls. This study is designed to examine the hypothesis that if Otago home-based exercise training among high risk individuals (60 years old and above elderly people with previous history of falls in last 12 months) would be feasible with minimal expert supervision and would result in clinically important improvements in physical performance, functional capacity and falls incidence reduction.

1.3 Objectives

The objectives of this study are to examine:

1 the effects of OEP on physical performance among elderly community dwellers by examining the
   - 1.1 effects of OEP on Arm Curl Test (ACT)
   - 1.2 the effects of Otago exercise programme on Chair Stand Test (CST)

2 effects of OEP on functional capacity among elderly community dweller by examining the
   - 2.1 effects of OEP on Berg Balance Score (BBS)
   - 2.2 the effects of OEP on Timed Up an Go Test (TUGT)

3 effects of OEP on falls confidence among elderly community dwellers by examining the
   - 3.1 effects of OEP on Activity-specific Balance Confidence Scale (ABCS)
   - 3.2 effects of OEP on Falls Efficacy Scale (FES)

4 To examine the effects of OEP on falls among elderly community dwellers

5 To explore the role of self-efficacy on relationship between physical functioning and incidence of falls.

1.4 Research Hypotheses

Hypothesis of this study are as follow:

a) H_1: OEP can improve ACT among elderly people.
b) H_1: Home-based exercise training can improve CST among elderly people
c) H_1: Home-based exercise training can improve BBS among elderly people
d) H_1: Home-based exercise training can improve TUGT among elderly people
e) H_1: Home-based exercise training can improve FES among elderly people
f) H_1: Home-based exercise training can improve ABCS among elderly people
g) $H_{1:}$ Home-based exercise training can decrease falls incidence
h) H_1: Falls self-confidence can mediate the relationship between functional capacity and falls incidence.

1.5 Significance of the Study

The primordial purpose of this study is to add knowledge to previous studies on falls prevention programmes among elderly people. An important issue to be considered is the limited published knowledge on fall prevention programme in developing countries such as Iran, the findings of this research worth looking attentively. The results of this study will be beneficial in different areas and settings and can contribute to the scientific literature in different interrelated ways. Moreover, this study is considering the influence of psychological issues such as fear of falls and more importantly, highlight the role of self-efficacy in relationship between physical performance and falls incidence.

Contribution to research: The finding of this study can contribute to the body of knowledge concerning falls among elderly people. To achieve a better understanding of falls, its consequences and prevention this area of research needs a richer body of knowledge to illuminate the way for other researchers to explore the ways to reduce risk of falls. This study, to date, is the first study on falls among Iranian elderly citizen and have considered the public issue of falls in a scientific research. In addition, the role of self-efficacy in falls which has been rarely investigated in previous literature is brought up as a research issue. This is the first study, focusing on self-efficacy in Otago Exercise Programme as a fall prevention intervention.

Contribution to public health policy makers: This study will serve as the basis for future plans of action by being one of the first studies to focus on falls as biological and psychological issue. This study looks the problem of falls from both biological (muscular strength and balance) and psychological (self-efficacy) point of view. Therefore, all planners of falls prevention programmes may consider the results of this study as an evidence to plan a comprehensive programme on falls among community dwellers.
To date, this is the first study to apply Otago Exercise Programme in middle-east and the results of this study can be used to plan comprehensive programmes all over the world. The programme has been focused on a single intervention; however, it could be delivered in a multifactorial falls prevention programme, too. In addition, in developing countries, where sources are limited, public health policy makers can contribute for developing such exercise training programmes. This type of researches can highlight the pro and cones a these kinds of programmes and make it easier for policy makers to find the most appropriate intervention for their own communities. For instance in developing countries such programmes can be offered first to those with high-risk elderly people e.g. those with history of falls and/or other unknown risk factors of falls.

Contribution to health professionals: The results of this study help health professionals to be oriented to the elements and components of a fall prevention programme and can help them deliver and supervise the exercise training programmes for older people. In addition, this study highlights the importance of exercise training among elderly people. American Geriatrics Society recommends some activities including exercise and/ or physical activities to prevent falls among elderly people (Robertson and Gillespie, 2013). As such, other health professionals can benefit the findings of this study to apply similar exercises for other high risk groups such as patients with chronic diseases e.g. Parkinson disease (Noll, 2013), multiple sclerosis, stroke, arthritis and other neuromuscular or articular diseases, depression, anxiety, etc. (Karlsson et al., 2013).

Significance to community: A majority of frail elderly people rarely leave their homes, because of a variety of reasons such as physical inability, transport barriers and financial problems to have access to expensive high-tech rehabilitation and physiotherapy facilities. OEP as a standard home-based exercise training programme designed for high risk elderly people living in community and gives them a good opportunity to benefit its advantages including improving physical performance and functional capacity. This study was designed for elderly community dwellers to empower them against falls. Falls and its consequences such as injury and fracture, social burden to person and family, and economic burden to family and public can be very frustrating and costly. This study aimed to install the programme in all local district health centers.

1.6 Definition of the Key Words

Falls

Conceptual definition: Fall is defined as an unexpected, involuntary loss of balance by which a person comes to rest at a lower or ground level (Pereira et al., 2013). Other researchers have defined falls as "an unintentional descent that may or may not result in an injury, and in which any motion of descent may not necessarily result in a landing. (Berry et al., 2010).

Operational definition: In this research, falls is defined as any report of falls incidence by which a person comes to rest at a lower or ground level. In other words, any incidence of falls in last 12 months is which a client reports and the caregiver records in the questionnaire or the logbook is considered as falls.

Balance

Conceptual definition: Ragnarsdottir (1996), defined balance as 'a function demanding continuous adjustments of muscle activity and joint position to keep the body weight above the base of support'. In a more close definition to falls, balance is defined as a multidimensional concept, referring to the ability of a person not to fall (Pollock, Durward, Rowe, and Paul, 2000).

Operational definition: In this study, balance is the subjects score in "Berg Balance Scale". Total score varies between 0 and 56. In interpretation of Berg Balance Scale, scores between 0 to 20 are considered as sever impaired balance (high risk of falls), scores between 21 to 40 are classified as moderate impaired balance (medium risk of falls) and scores of 41 to 56 are categorized as mild or not impaired balance (low risk of falls).

Muscular Strength

Conceptual definition: Muscular strength is defined as the maximal ability of a muscle to contract and generate force (Hanney, Kolber, Schack-Dugre, Negrete, and Pabian, 2010).

Operational definition: In this study, muscular strength is defined as subjects' score in the Chair Stand Test (CST) and Arm Curl Test (ACT), which assess muscular strength in lower and upper extremity. CST and ACT are physical performance tests used to assess lower and upper-extremity strength and function. In CST a 5-repetition test measures subjects' "strength" (Ward et al., 2010). A 10-repetition test is a measure of "strength and endurance". Moreover, the ACT is applied in dominant hand. Individual patients whose arm curl in 30 seconds is less than the lower limit of the confidence intervals can be considered to be impaired upper body muscular strength (Rikli and Jones, 2012).

Self-efficacy

Conceptual definition: Bandura (1982) defined self-efficacy as, "people's judgments of their capabilities to organize and execute courses of action required attaining designated types of performances". Self-efficacy means one's self confidence towards learning. People usually engage in certain behaviours when they believe they are capable of implementing those behaviours successfully, this means that they have high self-efficacy (Bandura, 1977).

Operational definition: In this research, subjects' scores in the Activities-specific Balance Confidence Scale (ABCS) are considered as their self-efficacy. The Activities-specific Balance Confidence Scale is a scale with 16 items; each item is rated from 0% (no confidence) to 100% (complete confidence). Clients are asked to rate the level of confidence that they will lose their balance in daily activities.

Fear of Falls

Conceptual definition: Fear of falling, first described as "Ptophobia," by Bhala, O'Donnell, and Thoppil, in 1982. It means a phobic reaction to standing or walking and was subsequently classified by Murphy and Isaacs in 1982 as "Post fall syndrome" (Jung, Lee, and Lee, 2009).

Operational definition: In this study, Falls Efficacy Scale (FES) is used to assess clients' fear of falling. It is a rating scale with 10 items to assess clients' fear of falls in performing daily activities. Each item is rated from one, meaning extreme confidence to ten, meaning no confidence at all. Participants with lower self-efficacy report avoiding most of activities because of fear of falling get higher FES scores. On the other hands, participants with higher self-efficacy report less avoiding most of activities because of fear of falling and represent lower FES scores. The accepted cutoff point for fear of falling is 70. A total score of greater than 70 indicates that the person has a fear of falling (Tinetti, Richman, and Powell, 1990).

Exercise

Conceptual definition: Exercise is a subset of physical activity. It is planned and repetitive body movement, which improves or maintains one or more components of physical fitness e.g., cardiovascular endurance, muscular strength, balance and flexibility (Miller et al., 2014).

Operational definition: This study applied Otago Exercises Programme for muscular strengthening and balance maintaining. Otago exercise is a set of muscular strengthening and balance maintaining action used to increase functional capacity and reduce the risk of falls among participants of the study. All the exercises are explained in details in Appendix A_1 in the English Language and depicted in the booklet in Appendix A_2 in Farsi (Persian Language).

Elderly

Conceptual definition: There is no United Nations standard numerical criterion for being elderly, but the UN agreed that cutoff age for elderly is 60 years old and above to refer to the older population (WHO, 2012).

Operational definition: In the study, older Iranian aged 60 years and above were the study respondents.

1.7. Conceptual Framework of the Study

This study is designed to apply OEP to improve physical performance and functional capacity. They are independent variables (IV) of the study which may directly prevent falls incidence as a dependent variable (DV). In addition, self-efficacy may play a role as mediator in the relationship between physical performance and functional capacity, and falls incidence. The conceptual framework of this study is depicted in Figure. 1.1.

This study was conducted based on two well-reputed theories called Transtheoretical Model (TTM) for change behaviour and self-efficacy. Application of TTM for change behavior is to explain elderly community dwellers' changing behaviour of exercise for at least 6 months, which corresponds to the fifth stage of TTM, called maintenance. Moreover, in this study, Bandura's self-efficacy theory is used to explain how self-efficacy may affect the relationship between old people's physical performance and functional capacity and incidence of falls during old ages.

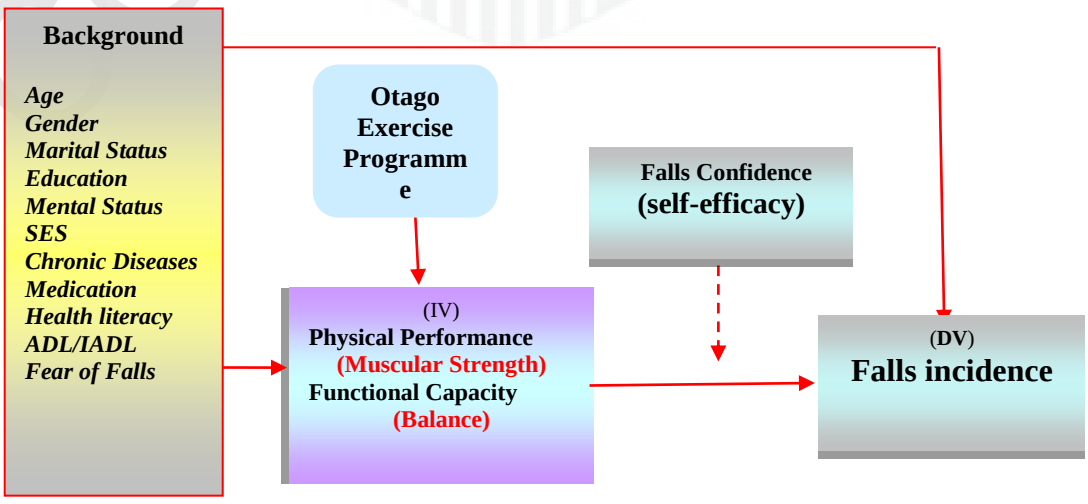

Figure 1.1. Conceptual Framework of the Study

1.8. Limitation of the Study

There are some minor limitations that may affect the outcome of this study. The primary limitation of the study was the application of falls self-report profiles. In data collection, self-reported data are condemn to be reluctant about their validity. In current study, falls incidence was the only data collected by self-report. In some cases, in order to validate the falls, the researcher asked clients' caregivers to approve occurrence of falls. Another limitations of this research was the contamination of the information from experimental group to control group, especially in rural areas where the societies are small and close to one another and people easily quote their personal information. In other words, one participant in control group could be informed about the exercise and was interested to follow the program in experimental group. The research team predicted this problem and informed them than the programme would go forward step by step and asked them to keep their previous routine condition until the research team prescribe suitable exercise for them. They informed them that exercise should be prescribed by an authorized doctor, professional physiotherapist, expert academic nurse or a specialized trained staff. The researcher also warn them about the hazards of over-dosed exercised done by their own. In current study, researchers encountered data contamination between subjects in control and experimental groups in two clusters. They were unintentionally informed that they were in control group. In contaminated clusters subjects or their caregivers insisted to be in experimental group and participate in Otago exercise programme. Researchers excluded contaminated data in those clusters.

REFERENCES

American Geriatric Society, British Geriatrics Society and American Academy of Orthopedic Surgeons Panel on Falls Prevention. (2001). Guideline for the Prevention of falls in older persons. *JAGS,* 49, 664-672.

Anderson, R. T., Kimmick, G. G., McCoy, T. P., Hopkins, J., Levine, E., Miller, G. et al. (2012). A randomized trial of exercise on well-being and function following breast cancer surgery: the RESTORE trial. *Journal of Cancer Survivorship*, 6, 172-181.

Arnarson, A., Geirsdottir, O. G., Ramel, A., Briem, K., Jonsson, P. V., and Thorsdottir, I. (2013). Effects of whey proteins and carbohydrates on the efficacy of resistance training in elderly people: double blind, Randomized controlled trial. *European Journal of Clinical Nutrition*. 67, 821–826

Artino Jr, A. R. (2006). Self-efficacy beliefs: from educational theory to instructional practice Anthony R. Artino, Jr. University of Connecticut, 5, 2006. ERIC.

Artino Jr, A. R. (2012). Academic self-efficacy: from educational theory to instructional practice. *Perspectives on Medical Education*, 1, 76-85.

Ashworth, N. L., et al. (2005). "Home versus center based physical activity programs in older adults." *Cochrane Database* Syst Rev 1

Bai, Y. L. and Chiou, C. P. (2012). Safe exercises for elderly diabetic patients with chronic complications. [Review] (Chinese). Hu Li Tsa Chih, *Journal of Nursing*. 59(6):81-5.

Baker, K. R., Nelson, M. E., Felson, D. T., Layne, J. E., Sarno, R., and Roubenoff, R. (2001). The efficacy of home based progressive strength training in older adults with knee osteoarthritis: a randomized controlled trial. *The Journal of Rheumatology*, 28, 1655.

Bandura, A. (2007). Much ado over faulty conception of perceived self-efficacy grounded in faulty experimentation. *Journal of Social and Clinical Psychology*, 26(6), 641-758.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioural change. Psychological Review, 84(2), 191-215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122-147.

Bandura, A. (1990). Perceived self-efficacy in the exercise of personal agency. *Journal of Applied Sport Psychology*, 2(2), 128-163.

Bandura, A. (1992). Exercise of personal agency through the self-efficacy mechanism. British Psychological Society, St. Andrews, Scotland, Apr 1989 (Ed). Washington, DC, US: Hemisphere Publishing Corp. 3-38

Bandura, A. (1995). Self-efficacy in changing societies. New York: Cambridge University Press.

Bandura, A. (2006). Guide for constructing self-efficacy scales. *Self-efficacy beliefs of adolescents*, 5, 307-337.

Bandura, A. (1981). Self-referent thought: A developmental analysis of self-efficacy. New York: Social cognitive development: Frontiers and possible futures, 200-239.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, 28(2), 117-148.

Bandura, A. (2002). Social foundations of thought and action. The Health Psychology Reader, London: *Sage Publication* Ltd, 94-106.

Bandura, A. and Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, 88(1), 87-99.

Bandura, A., Reese, L., and Adams, N. E. (1982). Microanalysis of action and fear arousal as a function of differential levels of perceived self-efficacy. *Journal of Personality and Social Psychology*, 43(1), 5-21.

Bennett, J. A. (2000). Focus on research methods-mediator and moderator variables in nursing research: conceptual and statistical differences. *Research in Nursing and Health*, 23 (5), 415-420.

Berg, K. (1989). Measuring balance in the elderly: preliminary development of an instrument. *Physiotherapy Canada*, 41(6), 304-311.

Bergland, A. (2012). Fall risk factors in community-dwelling elderly people. Norsk Epidemiology. *Norwegian Journal of Epidemiology*, 22 (2). 151-164.

Berry, S. D., Quach, L., Procter-Gray, E., Kiel, D. P., Li, W., Samelson, E. J. and Kelsey, J. L. (2010). Poor adherence to medications may be associated with falls. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 65(5), 553-558.

Biddle, S. J. H. and Fuchs, R. (2009). Exercise psychology: A view from Europe. Psychology of Sport and Exercise, 10(4), 410-419.

Binns, E. (2006). The Otago exercise programme: do strength and balance improve? (Doctoral dissertation, Auckland University of Technology).

Blanchard, C. (2008). Understanding exercise behaviour during home-based cardiac rehabilitation: a theory of planned behaviour perspective. *Can. J. Physiol. Pharmacol*, 86(1-2), 8-15.

Bland, J. M., and Altman, D. G. (1997). Statistics notes: Cronbach's alpha. *BMJ*. 314(7080), 572.

Bogaerts, A., Delecluse, C., Boonen, S., Claessens, A. L., Milisen, K., and Verschueren, S. M. P. (2011). Changes in balance, functional performance and fall risk following whole body vibration training and vitamin D supplementation in institutionalized elderly women. A 6 month randomized controlled trial. *Gait and Posture*, 33(3), 466-472.

Bohannon, R. (2006). Reference values for the Timed Up and Go Test: a descriptive meta-analysis. *Journal of Geriatric Physical Therapy*, 29, 2-64.

Bronstein, J. and Tzivian, L. (2013). Perceived self-efficacy of library and information science proFESsionals regarding their information retrieval skills. Library and *Information Science Research*, 35(2). 151-158

Buckworth, J., Lee, R. E., Regan, G., Schneider, L. K., and DiClemente, C. C. (2007). Decomposing intrinsic and extrinsic motivation for exercise: Application to stages of motivational readiness. Psychology of Sport and Exercise, 8(4), 441-461.

Burbank, P. M. (2001). Promoting exercise and behaviour change in older adults: interventions with the transtheoretical model. New York: Springer Publishing Company.

Burbank, P. M., Reibe, D., Padula, C. A., and Nigg, C. (2002). Exercise and older adults: changing behaviour with the transtheoretical model. *Orthopaedic Nursing*, 21(4), 51-63.

Bussey, K., and Bandura, A. (1999). Social cognitive theory of gender development and differentiation. *Psychological Review*, 106(4), 676-713.

Cameron, I. D., Murray, G. R., Gillespie, L. D., Robertson, M. C., Hill, K. D., Cumming, R. G. et al. (2010). Interventions for preventing falls in older people in nursing care facilities and hospitals. Cochrane Database Syst. Rev, 1.

Campbell, A. J. and Robertson, M. C. (2013). Fall prevention: single or multiple interventions? Single interventions for fall prevention. *Journal of the American Geriatrics Society*, 61(2), 281-284.

Campbell, A. J., Robertson, M. C., Gardner, M. M., Norton, R. N., and Buchner, D. M. (1999). Falls prevention over 2 years: a randomized controlled trial in women 80 years and older. *Age and ageing*, 28(6), 513-518.

Campbell, A. J., Robertson, M. C., La Grow, S. J., Kerse, N. M., Sanderson, G. F., Jacobs, R. J. et al. (2005). Randomized controlled trial of prevention of falls in people aged 75 with severe visual impairment: the VIP trial. *BMJ: British Medical Journal*, 331, (7520), 817. 1-8

Carpenter, C. R., and Gillespie, L. D. (2010). Evidence-based emergency medicine/systematic review abstract: preventing falls in community-dwelling older adults. *Annals of Emergency Medicine*, 55(3), 296-298.

Cesari, M., Landi, F., Torre, S., Onder, G., Lattanzio, F., and Bemaberi, R. (2002). Prevalence and risk factors for falls in an older community-dwelling population. *J Gerontol Med Sci*, 57(11), 722-726.

Chan, K. S. and Fong, K. N. K. (2013). Accidental falls among community-dwelling people with chronic stroke in Hong Kong. *Asian Journal of Gerontology and Geriatrics*, 8(8). 1-7.

Chang, M., Huang, Y. h., and Jung, H. (2011). The effectiveness of the exercise education programme on fall prevention of the community-dwelling elderly: a preliminary study. *Hong Kong Journal of Occupational Therapy*, 21, 56-63.

Chen, Y. M., Hwang, S. J., Chen, L. K., Chen, D. Y., and Lan, C. F. (2008). Risk factors for falls among elderly men in a veterans home. *Journal of the Chinese Medical Association*, 71(4), 180-185.

Chi, I., Jordan, M. M., Guo, M., Xie, B., and Bai, Z. (2013). Tai chi and reduction of depressive symptoms for older adults: A meta-analysis of randomized trials. *Geriatrics and Gerontology International*, 13(1), 3-12.

Clemson, L., Singh, M. F., Bundy, A., Cumming, R. G., Weissel, E., Munro, J. and Black, D. (2010). LiFE Pilot Study: A Randomized trial of balance and strength training embedded in daily life activity to reduce falls in older adults. Australian *Occupational Therapy Journal*, 57(1), 42-50.

Clemson, L., Cumming, R. G., Kendig, H., Swann, M., Heard, R., and Taylor, K. (2004). The effectiveness of a community-based program for reducing the incidence of falls in the elderly: a randomized trial. *Journal of the American Geriatrics Society*, 52(9), 1487-1494.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of applied psychology*, 78(1), 98-104.

Dadgari, A. (2009). Fear of Falling in Elderly. Southeast Asia Psychology Conference. Universiti Malaysia Sabah.

Davis, J. C., Robertson, M. C., Ashe, M. C., Liu-Ambrose, T., Khan, K. M., and Marra, C. A. (2010). Does a home-based strength and balance programme in people aged≥ 80 years provide the best value for money to prevent falls? A systematic review of economic evaluations of falls prevention interventions. *British journal of sports medicine*, 44(2), 80-89.

DiClemente, C. C. and Prochaska, J. O. (1982). Self-change and therapy change of smoking behaviour: A comparison of processes of change in cessation and maintenance. *Addictive Behaviours*, 7(2), 133-142.

Dukas, L., Staehelin, H. B., Schacht, E., and Bischoff, H. A. (2005). Better functional mobility in community-dwelling elderly is related to D-hormone serum levels and to daily calcium intake. *The Journal of Nutrition, Health and Aging*, 9(5), 347-351.

Edwards, J. R. and Lambert, L. S. (2007). Methods for integrating moderation and mediation: a general analytical framework using moderated path analysis. *Psychological Methods,* 12 (1), 1-22.

Eriksson, S., Gustafson, Y., and Lundin-Olsson, L. (2008). Risk factors for falls in people with and without a diagnose of dementia living in residential care facilities: a prospective study. *Archives of Gerontology and Geriatrics,* 46(3), 293-306.

Esculier, J. F., Vaudrin, J., Beriault, P., Gagnon, K., and Tremblay, L. E. (2012). Home-based balance training programme using wii fit with balance board for parkinson's disease: A pilot study. *Journal of Rehabilitation Medicine,* 44(2), 144-150.

Fallon, E. A. and Hausenblas, H. A. (2003). Transtheoretical Model: Is termination applicable to exercise? *American Journal of Health Studies,* 19(1), 35-44.

Fallon, E. A., Hausenblas, H. A., and Nigg, C. R. (2005). The Transtheoretical Model and exercise adherence: examining construct associations in later stages of change. *Psychology of Sport and Exercise,* 6(6), 629-641.

Faulkner, J. A., and Brooks, S. V. (1995). Muscle fatigue in old animals. Fatigue: neural and muscular mechanisms. New York: Plenum, 471-80.

Fletcher, P. and Hirdes, J. (2002). Risk factors for falling among community-based seniors using home care services. *J Gerontol Med Sci,* 57(8), M504-510.

Fletcher, G. F., Balady, G., Blair, S. N., Blumenthal, J., Caspersen, C., Chaitman, B. and Pollock, M. L. (1996). Statement on exercise: Benefits and recommendations for physical activity programs for all Americans a statement for health professionals by the committee on exercise and cardiac rehabilitation of the council on clinical cardiology, American heart association. *Circulation,* 94(4), 857-862.

Fortinsky, R. H., Iannuzzi-Sucich, M., Baker, D. I., Gottschalk, M., King, M. B., Brown, C. J. et al. (2004). Fall-risk assessment and management in clinical practice: views from healthcare providers. *Journal of the American Geriatrics Society,* 52(9), 1522-1526.

Friedman, S. M., Munoz, B., West, S. K., Rubin, G. S., and Fried, L. P. (2002). Falls and fear of falling: which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. *Journal of the American Geriatrics Society*, *50*(8), 1329-1335.

Li, F., Fisher, K. J., Harmer, P., and McAuley, E. (2005). Falls self-efficacy as a mediator of fear of falling in an exercise intervention for older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences,* 60(1), 34-40.

Gai, J., Gomes, L., and Jansen, D. C. C. (2009). Ptophobia: the fear of falling in elderly people. *Acta Médica Portuguesa,* 22(1), 83-85.

Gardner, M. M., Robertson, M. C., McGee, R., and Campbell, A. J. (2002). Application of a falls prevention program for older people to primary health care practice. *Preventive Medicine,* 34(5), 546-553.

Gibson, R. S., Heaney, A., and Hull, K. (2013). Can a multi-factorial assessment and interventional programme decrease inpatient falls in an elderly care ward? *BMJ Quality Improvement Reports,* 2(1). 1-3.

Gillespie, L. D., Robertson, M. C., Gillespie, W. J., Sherrington, C., Gates, S., Clemson, L. M., and Lamb, S. E. (2012). Interventions for preventing falls in older people living in the community. *Cochrane Database Syst Rev*, *9* (11).

Gillespie, L. D., Gillespie, W. J., Robertson, M. C., Lamb, S. E., Cumming, R. G., and Rowe, B. H. (2007). Interventions for preventing falls in elderly people (Review). *Cochrane Libr,* 11, 1-289.

Gobbi, L. T. B., Oliveira-Ferreira, M. D. T., Caetano, M. J., Lirani-Silva, E., Barbieri, F. A., Stella, F. et al. (2009). Exercise programs improve mobility and balance in people with Parkinson's disease. *Parkinsonism and Related Disorders,* 15, S49-S52.

Gomersall, J., Tufanaru, C., and White, S. (2012). The cost effectiveness of exercise for preventing falls in older people living in the community: A systematic review. *The JBI Database of Systematic Reviews and Implementation Reports,* 10(57), 3949-3959.

Granacher, U., Gollhofer, A., Hortoboígyi, T., Kressig, R. W., and Muehlbauer, T. (2013). The importance of trunk muscle strength for balance, functional performance, and fall prevention in seniors: a systematic review. *Sports Medicine,* 43(7): 627-641.

Gribbin, J., Hubbard, R., Gladman, J. R., Smith, C., and Lewis, S. (2010). Risk of falls associated with antihypertensive medication: population-based case-control study. *Age and Ageing,* 39(5), 592-597.

Haines, T. P., Hill, A. M., Hill, K. D., Brauer, S. G., Hoffmann, T., Etherton-Beer, C. et al. (2013). Cost effectiveness of patient education for the prevention of falls in hospital: economic evaluation from a randomized controlled trial. *BMC Medicine,* 11(1), 135-147.

Han, T. S., Wu, F. C. W., and Lean, M. E. J. (2013). Obesity and weight management in the elderly: A focus on men. *Best Practice and Research Clinical Endocrinology and Metabolism,* 27(4), 509-525.

Hanney, W. J., Kolber, M. J., Schack-Dugre, J., Negrete, R., and Pabian, P. (2010). The Influence of Education and Exercise on Neck Pain. *American Journal of LifeStyle Medicine,* 4(2), 166-175.

Hansma, A. H. G., Emmelot-Vonk, M. H., and Verhaar, H. J. J. (2010). Reduction in falling after a falls-assessment. *Archives of Gerontology and Geriatrics,* 50(1), 73-76.

Harding, S. and Gardner, A. (2009). Fear of falling. *Australian Journal of Advanced Nursing, The, 27,* 94.

Hartikainen, S., Lnnroos, E., and Louhivuori, K. (2007). Medication as a risk factor for falls: critical systematic review. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 62(10), 1172-1181.

Heinrich, S., Rapp, K., Stuhldreher, N., Rissmann, U., Becker, C., and Konig, H. H. (2012). Cost-effectiveness of a multifactorial fall prevention program in nursing homes. *Osteoporosis International,* 24(4), 1215-1223.

Hill, K. D., Schwarz, J. A., Kalogeropoulos, A. J., and Gibson, S. J. (1996). Fear of falling revisited. *Archives of Physical Medicine and Rehabilitation,* 77(10), 1025-1029.

Hill, K., Choi, W., Smith, R., and Condron, J. (2005). Tai Chi in Australia: acceptable and effective approach to improve balance and mobility in older people? *Australasian Journal on Ageing,* 24(1), 9-13.

Hill, K. and Schwarz, J. (2004). Assessment and management of falls in older people. *Internal Medicine Journal,* 34(9-10), 557-564.

Hinrichs, T., Bucchi, C., Brach, M., Wilm, S., Endres, H. G., Burghaus, I. et al. (2009). Feasibility of a multidimensional home-based exercise programme for the elderly with structured support given by the general practitioner's surgery: Study protocol of a single arm trial preparing an RCT[ISRCTN 58562962]. *BMC Geriatrics,* 9(1), 37-51.

Hodkinson, H. (1972). Evaluation of a mental test score for assessment of mental impairment in the elderly. *Age and Ageing,* 1(4), 233-238.

Hoglund, M. W., Sadovsky, R., and Classie, J. (2009). Engagement in life activities promotes healthy aging in men. *Journal of Men's Health,* 6(4), 354-365.

Hotchkiss, A., Fisher, A., Robertson, R., Ruttencutter, A., Schuffert, J., and Barker, D. B. (2004). Convergent and Predictive Validity of Three Scales Related to Falls in the Elderly. *The American Journal of Occupational Therapy,* 58(1), 100-103.

Huang, T. t. (1998). *Fall-prevention in Taiwanese elderly adults.* Ph.D. The University of Texas at Austin, United States -- Texas.

Huang, J., Unosson, M., Wressle, E., and Marcusson, J. (2012). Health consequences associated with being overweight or obese: a Swedish population based study of 85-year olds. *Journal of the American Geriatrics Society,* 60(2), 243-250.

Iannuzzi-Sucich, M., Prestwood, K. M., and Kenny, A. M. (2002). Prevalence of sarcopenia and predictors of skeletal muscle mass in healthy, older men and women. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences,* 57(12), M772-M777.

Jackson, D. (2010). How Personal Trainers Can Use Self-Efficacy Theory to Enhance Exercise Behavior in Beginning Exercisers. *Strength and Conditioning Journal,* 32(3), 67-71.

Jaggers, J. R., Dudgeon, W., Blair, S. N., Sui, X., Burgess, S., Wilcox, S., and Hand, G. A. (2013). A home-based exercise intervention to increase physical activity among people living with HIV: study design of a randomized clinical trial. *BMC public health,* 13(1), 502-514.

Jenkyn, K. B., Hoch, J. S., and Speechley, M. (2012). How much are we willing to pay to prevent a fall?: cost-effectiveness of a multifactorial falls prevention program for community-dwelling older adults. *Canadian Journal on Aging/La Revue canadienne du vieillissement,* 31(2), 121-137.

Jones, C. J., Rikli, R. E., and Beam, W. C. (1999). A 30-s chair-stand test as a measure of lower body strength in community-residing older adults. *Research Quarterly for Exercise and Sport,* 70(113), 162-181

Jones, C. J. and Rikli, R. E. (2002). Measuring functional. *The Journal on Active Aging,* 1, 24-30.

Jones, F. and Riazi, A. (2011). Self-efficacy and self-management after stroke: a systematic review. *Disability and Rehabilitation,* 33(10), 797-810.

Judge, J. O. (2003). Balance Training to Maintain Mobility and Prevent Disability. *American Journal of Preventive Medicine,* 25(3), 150-156.

Jung, D. (2008). Fear of falling in older adults: comprehensive review. *Asian Nursing Research*, 2(4), 214-222.

Kafoa, P. M., and Helbig, C. R. (2013). Predicting Future Falls in the Elderly Using the Timed Up and Go Test. In *International Journal of Exercise Science: Conference Abstract Submissions*. 2(5), 54.

Kamangar, F. and Islami, F. (2013). Sample size calculation for epidemiologic studies: principles and methods. *Archives of Iranian Medicine*, 16(5), 295-300.

Kamide, N., Shiba, Y., and Shibata, H. (2009). Effects on balance, falls, and bone mineral density of a home-based exercise program without home visits in community-dwelling elderly women: a randomized controlled trial. *Journal of Physiological Anthropology*, 28(3), 115-122.

Kannus, P., Sievenen, H., Palvanen, M., Jervinen, T., and Parkkari, J. (2005). Prevention of falls and consequent injuries in elderly people. *The Lancet*, 366(9500), 1885-1893.

Karinkanta, S., Heinonen, A., Sievnen, H., Uusi-Rasi, K., Fogelholm, M., and Kannus, P. (2009). Maintenance of exercise-induced benefits in physical functioning and bone among elderly women. *Osteoporosis International*, 20(4), 665-674.

Karlsson, M. K., Vonschewelov, T., Karlsson, C., Cöster, M., and Rosengen, B. E. (2013). Prevention of falls in the elderly: A review. *Scandinavian Journal of Public Health*, 41(5), 442-454.

Kelly, K. D., Pickett, W., Yiannakoulias, N., Rowe, B. H., Schopflocher, D. P., Svenson, L. et al. (2003). Medication use and falls in community-dwelling older persons. *Age and Ageing*, 32(5), 503-509.

Kennett, D. J., Worth, N. C., and Forbes, C. A. (2009). The contributions of Rosenbaum's model of self-control and the transtheoretical model to the understanding of exercise behaviour. *Psychology of Sport and Exercise*, 10(6), 602-608.

Kenny, R. A., Romero-Ortuno, R., and Cogan, L. (2013). Falls. *Medicine*, 41(3), 155-159.

Kerse, N., Butler, M., Robinson, E., and Todd, M. (2004). Fall Prevention in Residential Care: A Cluster, Randomized, Controlled Trial. *Journal of the American Geriatrics Society*, 52(4), 524-531.

Keselman, H. J., Huberty, C. J., Lix, L. M., Olejnik, S., Cribbie, R. A., Donahue, B. et al. (1998). Statistical practices of educational researchers: an analysis of their ANOVA, MANOVA, and ANCOVA analyses. *Review of Educational Research*, 68(3), 350-386.

Keskin, D., Borman, P. I., Ersöz, M., Kurtaran, A., Bodur, H., and Aky_z, M. f. (2008). The risk factors related to falling in elderly females. *Geriatric Nursing*, 29(1), 58-63.

Kim, H., Yoshida, H., and Suzuki, T. (2011). The effects of multidimensional exercise on functional decline, urinary incontinence, and fear of falling in community-

dwelling elderly women with multiple symptoms of geriatric syndrome: A randomized controlled and 6-month follow-up trial. *Archives of Gerontology and Geriatrics*, 52(1), 99-105.

Kim, J. E. (2011). Physical activity and a home-based exercise program to improve cognitive function and balance in the elderly with mild cognitive impairment: Yangcheon Gold Campaigne. *Alzheimer's and Dementia*, 7(4), S620-S621.

Kim, S. and Lockhart, T. (2010). Effects of 8 weeks of balance or weight training for the independently living elderly on the outcomes of induced slips. *International Journal of Rehabilitation Research*, 33(1), 49 55.

Kinirons, M., HOPPER, A., and Barber, M. (2006). Falls in older people. *Women's Health Medicine*, *3*, 173-174.

Kirk, A., MacMillan, F., and Webster, N. (2010). Application of the transtheoretical model to physical activity in older adults with type 2 diabetes and/or cardiovascular disease. *Psychology of Sport and Exercise*, 11(4), 320-324.

Kok, G., Den Boer, D. J., De Vries, H., Gerards, H. J. H., and Mudde, A. N. (2014). self-efficacy and attribution theory. *Self-Efficacy: Thought Control of Action*, 245.

Korpershoek, C., van der Bijl, J., and Hafsteinsdóttir, T. (2011). Self-efficacy and its influence on recovery of patients with stroke: a systematic review. *Journal of Advanced Nursing*, 67(9), 1876-1894.

Kostka, T. (2005). Quadriceps maximal power and optimal shortening velocity in 335 men aged 23–88 years. *European Journal of Applied Physiology*, 95(2-3), 140-145.

Kruger, J., Buchner, D. M., and Prohaska, T. R. (2009). The prescribed amount of physical activity in randomized clinical trials in older adults. *The Gerontologist*, 49(S1), S100-S107.

Kuo, S. L. and Nitz, J. C. (2011). Establishment of predictive validity and reliability of a newly developed fear of falling scale in Hong Kong. *Hong Kong Physiotherapy Journal*, 29(1), 2-11.

Kouladjian, L., Gnjidic, D., Chen, T. F., and Hilmer, S. N. (2014). Modifications to the Drug Burden Index Calculation May Limit Interpretation of its Association with Clinical Outcomes in Older Adults. *Neurocritical care*, 21(2), 365-366.

Kvelde, T., McVeigh, C., Toson, B., Greenaway, M., Lord, S. R., Delbaere, K., and Close, J. C. (2013). Depressive Symptomatology as a Risk Factor for Falls in Older People: Systematic Review and Meta-Analysis. *Journal of the American Geriatrics Society*, 61(5), 694-706

Kyrdalen, I. L., Moen, K., Røysland, A. S., and Helbostad, J. L. (2013). The Otago Exercise Program Performed as Group Training Versus Home Training in Fall-prone Older People: A Randomized Controlled Trial. *Physiotherapy Research International*, 19(2), 108-116.

Lajoie, Y. and Gallagher, S. P. (2004). Predicting falls within the elderly community: comparison of postural sway, reaction time, the Berg Balance Scale and the Activities-specific Balance Confidence (ABC) scale for comparing fallers and non-fallers. Archives of Gerontology and Geriatrics, 38(1), 11-26.

Lattanzio, F., Landi, F., Bustacchini, S., Abbatecola, A. M., Corica, F., Pranno, L. et al. (2012). Geriatric conditions and the risk of adverse drug reactions in older adults. *Drug Safety*, 35(1), 55-61.

Lee, J. S., Kwok, T., Leung, P. C., and Woo, J. (2006). Medical illnesses are more important than medications as risk factors of falls in older community dwellers? A cross-sectional study. *Age and Ageing*, 35(3), 246-251.

Legters, K. (2002). Fear of falling. *Physical Therapy*, 82(3), 264-272.

Lenio, J. A. (2006). Analysis of the Transtheoretical Model of behaviour change. *Journal of Student Research University of Wisconsin-Stout*, 73-86.

Letvak, S. (2000). Falls in the elderly: A multifactorial problem. *Journal of Emergency Nursing*, 26(5), 448-451.

Leung, D. P., Chan, C. K., Tsang, H. W., Tsang, W. W., and Jones, A. Y. (2011). Tai chi as an intervention to improve balance and reduce falls in older adults: a systematic and meta-analytical review. *Alternative Therapies in Health and Medicine*, 17(1), 40-48.

Leutholtz, B. C. and Ripoll, I. (2011). Exercise and disease management. New York: CRC Press. Tayloe and Francis Group.

Li, F., Fisher, K. J., Harmer, P., and McAuley, E. (2005). Falls self-efficacy as a mediator of fear of falling in an exercise intervention for older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 60(1), 34-40.

Lin, M. R., Hwang, H. F., Wang, Y. W., Chang, S. H., and Wolf, S. L. (2006). Community-based Tai Chi and its effect on injurious falls, balance, gait, and fear of falling in older people. *Physical Therapy*, 86(9), 1189-1201.

Lockhart, T. E. (2008). An integrated approach towards identifying age-related mechanisms of slip initiated falls. *Journal of Electromyography and* Kinesiology, 18(2), 205-217.

Lord, S. R., Menz, H. B., and Sherrington, C. (2006). Home environment risk factors for falls in older people and the efficacy of home modifications. Age and ageing, 35(suppl 2), ii55-ii59.

Lutz, R. S., Stults-Kolehmainen, M. A., and Bartholomew, J. B. (2010). Exercise caution when stressed: Stages of change and the stress exercise participation relationship. *Psychology of Sport and Exercise,* 11(6), 560-567.

Luukinen, H., Lehtola, S., Jokelainen, J.,Veennen-Sainio, R., Lotvonen, S., and Koistinen, P. (2007). Pragmatic exercise-oriented prevention of falls among the elderly: a population-based, randomized, controlled trial. *Preventive Medicine,* 44, 265-271.

MacKinnon, D. P., Fairchild, A. J., and Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology,* 58, 593-617.

Marshall, S. J. and Biddle, S. J. (2001). The transtheoretical model of behaviour change: a meta-analysis of applications to physical activity and exercise. *Annals of Behavioural Medicine,* 23(4), 229-246.

Matsuda, P. N., Shumway-Cook, A., and Ciol, M. A. (2010). The effects of a home-based exercise program on physical function in frail older adults. *Journal of Geriatric Physical Therapy,* 33(2), 78-84.

Mayo, N. E., Kay-Lyons, M. J., Scott, S. C., Moriello, C., and Brophy, J. (2013). A randomized trial of two home-based exercise programmes to improve functional walking post-stroke. *Clinical Rehabilitation,* 27(7), 659-671

McAuley, E. and Blissmer, B. (2000). Self-efficacy determinants and consequences of physical activity. *Exercise and Sport Sciences Reviews,* 28(2), 85-88.

McMurdo, M. E., Millar, A. M., and Daly, F. (2000). A randomized controlled trial of fall prevention strategies in old peoples' homes. *Gerontology,* 46(2), 83-87.

Metter, E. J., Conwit, R., Tobin, J., and Fozard, J. L. (1997). Age-associated loss of power and strength in the upper extremities in women and men. *The Journals of Gerontology Series a: Biological Sciences and Medical Sciences,* 52(5), B267-B276.

Miake-Lye, I. M., Hempel, S., Ganz, D. A., and Shekelle, P. G. (2013). Inpatient fall prevention programs as a patient safety strategy: a systematic review. *Annals of Internal Medicine,* 158(5, Part-2), 390-396.

Miller, K. L., Magel, J. R., and Hayes, J. G. (2010). The effects of a home-based exercise program on balance confidence, balance performance, and gait in debilitated, ambulatory community-dwelling older adults: a pilot study. *Journal of Geriatric Physical Therapy,* 33(2), 85-91.

Morley, J. E. (2007). Falls and fractures. *Journal of the American Medical Directors Association,* 8(5), 276-278.

Muir, S. W., Berg, K., Chesworth, B., Klar, N., and Speechley, M. (2010). Balance impairment as a risk factor for falls in community-dwelling older adults who are high functioning: a prospective study. *Physical Therapy*, 90(3), 338-347.

Muller, D., Judd, C. M., and Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology*, 89(6), 852-863.

Murphy, R., Cooper, Z., Hollon, S. D., and Fairburn, C. G. (2009). How do psychological treatments work? Investigating mediators of change. *Behaviour Research and Therapy*, 47(1), 1-5.

Murphy, K., and Lowe, S. (2013). Improving fall risk assessment in home care: interdisciplinary use of the timed up and go (TUG). *Home Healthcare Nurse*, 31(7), 389-396.

Nelson, M. E., Layne, J. E., Bernstein, M. J., NuernBerger, A., Castaneda, C., Kaliton, D. and Singh, M. A. F. (2004). The effects of multidimensional home-based exercise on functional performance in elderly people. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 59(2), M154-M160.

Neuls, P. D., Clark, T. L., Van Heuklon, N. C., Proctor, J. E., Kilker, B. J., Bieber, M. E.,and Newton, R. A. (2011). Usefulness of the Berg Balance Scale to predict falls in the elderly. *Journal of Geriatric Physical Therapy*, 34(1), 3-10.

Nigg, C. R., and Courneya, K. S. (1998). Transtheoretical model: Examining adolescent exercise behavior. *Journal of Adolescent Health*, 22(3), 214-224.

Nigg, C. R., Geller, K. S., Motl, R. W., Horwath, C. C., Wertin, K. K., and Dishman, R. K. (2011). A research agenda to examine the efficacy and relevance of the Transtheoretical Model for physical activity behaviour. *Psychology of Sport and Exercise*, 12(1), 7-12.

Nocera, J. R., and Horvat, M. (2008, April). Home-based exercise intervention for individuals with Parkinson's disease. In *Research Quarterly for Exercise and Sport.* 79(1), A84-A84.

Noll, D. R. (2013). Management of falls and balance disorders in the elderly. *Journal of the American Osteopathic Association*, 113(1), 17-22.

Olson, S. L., Shu-Shi, C., and Ching-Yi, W. (2011). Effect of a home exercise program on dynamic balance in elderly with a history of falls. *Journal of Aging and Physical Activity*, 19(4), 291-305.

Osborne, J. W. (2012). Best practices in data cleaning: A complete guide to everything you need to do before and after collecting your data. SAGE Publications, Incorporated.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66(4), 543-578.

Pallant, J. (2010). SPSS survival manual: a step by step guide to data analysis using SPSS. New York: Allen and Unwin Book Publishers, Open University Press.

Pate, R. R., Pratt, M., Blair, S. N., Haskell, W. L., Macera, C. A., Bouchard, C. and Wilmore, J. H. (1995). Physical activity and public health. *JAMA: the Journal of the American Medical Association*, 273(5), 402-407.

Pereira, C. L., Baptista, F., and Infante, P. (2013). Role of physical activity in the occurrence of falls and fall-related injuries in community-dwelling adults over 50 years old. *Disability and Rehabilitation*, (0) 1-8.

Pereira, V. V., Maia, R. A., and Silva, S. M. C. D. A. (2013). The functional assessment Berg Balance Scale is better capable of estimating fall risk in the elderly than the posturographic Balance Stability System. *Arquivos de Neuro-psiquiatria*, 71(1), 5-10.

Perkins, J. M., Multhaup, K. S., Perkins, H. W., and Barton, C. (2008). Self-efficacy and participation in physical and social activity among older adults in Spain and the United States. *The Gerontologist*, 48(1), 51-58.

Plotnikoff, R. C., Hotz, S. B., Birkett, N. J., and Courneya, K. S. (2001). Exercise and the transtheoretical model: a longitudinal test of a population sample. *Preventive Medicine*, 33(5), 441-452.

Pollock, A. S., Durward, B. R., Rowe, P. J., and Paul, J. P. (2000). What is balance? *Clinical Rehabilitation*, 14(4), 402-406.

Porter, E. J., Matsuda, S., and Lindbloom, E. J. (2010). Intentions of older homebound women to reduce the risk of falling again. *Journal of Nursing Scholarship*, 42(1), 101-109.

Powell, L. E. and Myers, A. M. (1995). The activities-specific balance confidence (ABC) scale. *Journals of Gerontology Series A: Biological and Medical Sciences*, 50(1), 28-34.

Prochaska, J. O., Redding, C. A., and Evers, K. E. (2008). The transtheoretical model and stages of change. In (2 ed., pp. 60-84). San Francisco, CA: Jossey-Bass/Pfeiffer.

Prochaska, J. O. and Velicer, W. F. (1997). The transtheoretical model of health behaviour change. *American Journal of Health Promotion*, 12, 38-48.

RAJI, P. (1996). Functional balance tests (review article). *Audial*, 21(4), 1-9

Ragnarsdottir, M. The concept of balance. *Physiotherapy*, 82(6), 368-375.

Resnick, B. (2001). Testing a model of exercise behaviour in older adults. *Research in Nursing and Health*, 24(2), 83-92.

Resnick, B. and Nigg, C. (2003). Testing a theoretical model of exercise behaviour for older adults. *Nursing Research*, 52(2), 80-88.

Rikli, R. E., and Jones, C. J. (2002). Senior Fitness Test Manual. *Monaldi Arch Chest Dis*, 58(2), 194.

Robbins, J. A., Robertson, M. C., and Campbell, A. J. (2001). A home-based, nurse-delivered exercise programme reduced falls and serious injuries in people 80 years of age. *Evidence Based Medicine*, 6(6), 182.

Robertson, M. C., Campbell, A. J., Gardner, M. M., and Devlin, N. (2002). Preventing injuries in older people by preventing falls: a meta-analysis of individual level data. *Journal of the American Geriatrics Society*, 50(5), 905-911.

Robertson, M. C., Campbell, A. J., and Herbison, P. (2005). Statistical analysis of efficacy in falls prevention trials. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 60(4), 530-534.

Robertson, M. C., Devlin, N., Gardner, M. M., and Campbell, A. J. (2001). Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls: Randomised controlled trial. *BMJ: British Medical Journal*, 322 (7288), 697-704.

Robertson, M. C. and Gillespie, L. D. (2013). Fall Prevention in Community-Dwelling Older Adults Fall Prevention in Community-Dwelling Older Adults. JAMA, 309 (13), 1406-1407.

Robertson, M. C., and Campbell, A. J. (2008). What type of exercise reduces falls in older people? Evidence-Based Sports Medicine, 135.

Robison, J., and Rogers, M. A. (1994). Adherence to exercise programmes. *Sports Medicine*, 17(1), 39-52.

Rosenblatt, N. J. and Grabiner, M. D. (2012). Relationship between obesity and falls by middle-aged and older women. *Archives of Physical Medicine and Rehabilitation*, 93(4), 718-722.

Rydwik, E., Frandin, K., and Akner, G. (2009). Effects of a physical training and nutritional intervention program in frail elderly people regarding habitual physical

activity level and activities of daily living-A randomized controlled pilot study. *Arch. Gerontol. Geriatr.* 51(3), 283-289.

Salminen, M. J., VahlBerg, T. J., Salonoja, M. T., Aarnio, P. T. T., and Kivelñ, S. L. (2009). Effect of a risk-based multifactorial fall prevention program on the incidence of falls. *Journal of the American Geriatrics Society,* 57(4), 612-619.

Salmon, P. (2001). Effects of physical exercise on anxiety, depression, and sensitivity to stress: A unifying theory. *Clinical Psychology Review,* 21(1), 33-61.

Salonen, L. and Kivela, S. L. (2012). Eye diseases and impaired vision as possible risk factors for recurrent falls in the aged: a systematic review. *Current Gerontology and Geriatrics Research,* 2012(2), 1-10

Samuel, S. E., Nayak, A., and Kotian, M. S. (2013). Fear of falls and compliance in exercise intervention by community dwelling older adults at risk of falling. *International Journal of Health and Rehabilitation Sciences (IJHRS),* 2(1), 8-14.

Sarkin, J. A., Johnson, S. S., Prochaska, J. O., and Prochaska, J. M. (2001). Applying the transtheoretical model to regular moderate exercise in an overweight population: validation of stages of change measure. *Preventive Medicine,* 33(5), 462-469.

Schaubert, K. L. and Bohannon, R. W. (2005). Reliability and validity of three strength measures obtained from community-dwelling elderly persons. *The Journal of Strength and Conditioning Research,* 19(3), 717-720.

Scheffer, A. C., Schuurmans, M. J., Van Dijk, N., Van der Hooft, T., and De Rooij, S. E. (2008). Fear of falling: measurement strategy, prevalence, risk factors and consequences among older persons. *Age and ageing, 37,* 19-24.

Schleicher, M. M., Wedam, L., and Wu, G. (2012). Review of tai chi as an effective exercise on falls prevention in elderly. *Research in Sports Medicine,* 20(1), 37-58.

Schneider, E. C., Shubert, T. E., and Harmon, K. J. (2010). Addressing the escalating public health issue of falls among older adults. *NC Med J,* 71(6), 547-552.

Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist,* 26 (3-4), 207-231.

Seelig, H. and Fuchs, R. (2011). Physical exercise participation: A continuous or categorical phenomenon? *Psychology of Sport and Exercise,* 12(2), 115-123.

Sims, J., Hill, K., Davidson, S., Gunn, J., and Huang, N. (2006). Exploring the feasibility of a community-based strength training program for older people with depressive symptoms and its impact on depressive symptoms. *BMC Geriatrics,* 6(1), 18.

Sjosten, N. M., Salonoja, M., Piirtola, M., VahlBerg, T., Isoaho, R., Hyttinen, H. et al. (2007). A multifactorial fall prevention programme in home-dwelling elderly people: A randomized-controlled trial. *Public Health,* 121(4), 308-318.

Sherrington, C., Whitney, J. C., Lord, S. R., Herbert, R. D., Cumming, R. G., and Close, J. C. (2008). Effective exercise for the prevention of falls: a systematic review and meta-analysis. *Journal of the American Geriatrics Society,* 56(12), 2234-2243.

Shumway-Cook, A., Ciol, M. A., Hoffman, J., Dudgeon, B. J., Yorkston, K., and Chan, L. (2009). Falls in the Medicare population: incidence, associated factors, and impact on health care. *Physical Therapy,* 89, 324.

Skelton, D., Dinan, S., Campbell, M., and Rutherford, O. (2005). Tailored group exercise (Falls Management Exercise-FME) reduces falls in community-dwelling older frequent fallers (an RCT). *Age and Ageing,* 34, 636-639.

Sniehotta, F. F., Scholz, U., and Schwarzer, R. (2005). Bridging the intention–behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology and Health,* 20(2), 143-160.

Sorock, G. S., Chen, L. H., Gonzalgo, S. R., and Baker, S. P. (2006). Alcohol-drinking history and fatal injury in older adults. *Alcohol,* 40(3), 193-199.

Steadman, J., Donaldson, N., and Kalra, L. (2003). A randomized controlled trial of an enhanced balance training program to improve mobility and reduce falls in elderly patients. *Journal of the American Geriatrics Society,* 51(6), 847-852.

Stessman, J., Hammerman-RozenBerg, R., Cohen, A., Ein-Mor, E., and Jacobs, J. M. (2009). Physical activity, function, and longevity among the very old. *Archives of Internal Medicine,* 169(16), 1476-1483.

Sturnieks, L., St George, R., and Lord, R. (2008). Balance disorders in the elderly. *Neurophysiologie Clinique/Clinical Neurophysiology,* 38(6), 467-478.

Sun, W., Watanabe, M., Hirota, C., Tanimoto, Y., Kono, R., Takasaki, K., and Kono, K. (2010). Obstacle-negotiating gait and related physical measurement indicators for the community-dwelling elderly in Japan. *Archives of Gerontology and Geriatrics*, 50(3), e41-e45.

Suzuki, T., Kim, H., Yoshida, H., and Ishizaki, T. (2004). Randomized controlled trial of exercise intervention for the prevention of falls in community-dwelling elderly Japanese women. *Journal of Bone and Mineral Metabolism,* 22(16), 602-611.

Svanstrom, L., Ader, M., Schelp, L., and Lindstrom, A. (1996). Preventing femoral fractures among elderly: The community safety approach. *Safety Science,* 21, 239-246.

Taggart, H. M. (2002). Effects of Tai Chi exercise on balance, functional mobility, and fear of falling among older women. Applied Nursing Research,15(4), 235-242.

Tehada, J. A. (1990). Effects of a fall prevention program on the incidence of falls among hospitalized elderly. M.S. San Jose State University, United States, California.

Takano, Y., Haneda, Y., Maeda, T., Sakai, Y., Matsuse, H., Kawaguchi, T., and Shiba, N. (2010). Increasing muscle strength and mass of thigh in elderly people with the hybrid-training method of electrical stimulation and volitional contraction. *The Tohoku Journal of Experimental Medicine*, 221(1), 77-85.

Tavakol, M. and Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55.

Taylor, D., Hale, L., Schluter, P., Waters, D. L., Binns, E. E., and McCracken, H. (2012). Effectiveness of Tai Chi as a Community Based Falls Prevention Intervention: A Randomized Controlled Trial. *Journal of the American Geriatrics Society*, 60(5), 841-848.

Taylor, D. and Stretton, C. (2004). The Otago exercise programme: an evidence-based approach to falls prevention for older adults living in the community. *Journal of Primary Health Care*, 31(6).

Teixeira, P. J., Carraca, E. M. D., Silva, M. N., and Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioural Nutrition and Physical Activity*, 9(1), 78-108.

Thomas, S., Mackintosh, S., and Halbert, J. (2010). Does the 'Otago exercise programme reduce mortality and falls in older adults?: a systematic review and meta-analysis. *Age and Ageing*, 39(6), 681-687.

Thompson, C. (2011). Exercising theory: a perspective on its practice. *Studies in Philosophy and Education*, 30(5), 449-454.

Tiedemann, A., Sherrington, C., Sturnieks, D. L., and Lord, S. R. (2012). Fall Prevention. In Encyclopedia of Exercise Medicine in Health and Disease Springer Berlin HeidelBerg 331-334.

Tinetti, M. E., and Kumar, C. (2010). The patient who falls:"It's always a trade-off". *JAMA*, 303(3), 258-266.

Tinetti, M. E., and Powell, L. (1993). Fear of falling and low self-efficacy: A cause of dependence in elderly persons. *Journals of Gerontology*, 48, 35-38.

Tinetti, M. E., De Leon, C. F. M., Doucette, J. T., and Baker, D. I. (1994). Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *Journal of Gerontology*, 49(3), M140-M147.

Tinetti, M. E., Speechley, M., and Ginter, S. F. (1988). Risk factors for falls among elderly persons living in the community. *New England Journal of Medicine*, 319(26), 1701-1707.

Tinetti, M. E., De Leon, C. F. M., Doucette, J. T., and Baker, D. I. (1994). Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *Journal of Gerontology*, 49(3), M140-M147.

Tinetti, M. E., Richman, D., and Powell, L. (1990). Falls efficacy as a measure of fear of falling. *Journal of Gerontology*, 45(6), P239-P243.

Tokarski, W. (2004). Sport of the elderly. *Kinesiology*, 36(1), 98-103.

Toraman, N. F., and Ayceman, N. (2005). Effects of six weeks of detraining on retention of functional fitness of old people after nine weeks of multicomponent training. *British journal of sports medicine*, 39(8), 565-568.

Tousignant, M., Corriveau, H. Roy, P. M., Desrosiers, J., Dubuc, N., and Hebert, R. (2012). Efficacy of supervised Tai Chi exercises versus conventional physical therapy exercises in fall prevention for frail older adults: a randomized controlled trial. *Disability and Rehabilitation*, 2012, 1-7.

Tromp, A. M., Pluijm, S. M. F., Smit, J. H., Deeg, D. J. H., Bouter, L. M., and Lips, P. (2001). Fall-risk Screening Test: A Prospective Study on Predictors for Falls in Community-dwelling Elderly. *Journal of Clinical Epidemiology*, 54(8), 837-844.

Tung, K. K. (2012). The Effectiveness of Virtual Reality Exercise for Improving Balance Control, Reducing Fall Risk and Incidence Among the Frail Elderly with a History of Falls (Doctoral dissertation, Faculty of Health and Social Sciences, The Hong Kong Polytechnic University).

Ulbrich, S. L. (1999). Nursing practice theory of exercise as self-care. *The Journal of Nursing Scholarship*, 31(1), 65-70.

Uritani, D., Matsumoto, D., Asano, Y., Yoshizaki, K., Nishida, Y., and Shima, M. (2011). Effects of regular exercise and nutritional guidance on body composition, blood pressure, muscle strength and health-related quality of life in community-dwelling Japanese women. *Obesity Research and Clinical Practice.* 7(2), 155-163.

Velicer, W. F., Prochaska, J. O., Fava, J. L., Norman, G. J., and Redding, C. A. (1998). Smoking cessation and stress management: applications of the Transtheoretical

Model of behaviour change. *Homeostasis in Health and Disease,* 38(5-6), 216-233.

Vellas, B. J., Wayne, S. J., Romero, L. J., Baumgartner, R. N., and Garry, P. J. (1997). Fear of falling and restriction of mobility in elderly fallers. *Age and ageing, 26,* 189-193.

Vogel, H. (2013). Muscle Disease Associated with Age and Systemic Disorders. Muscle Disease: Pathology and Genetics, Second edition, 339-350.

Ward, B. K., Mohammed, M. T., Brach, J. S., Studenski, S. A., Whitney, S. L., and Furman, J. M. (2010). Physical Performance and a Test of Gaze Stabilization in Older Adults. *Otology and Neurotology,* 31(1), 168-172.

Weinstein, M., and Booth, J. (2006). Preventing falls in older adults: A multifactorial approach. *Home Health Care Management and Practice,* 19(1), 45-50.

Weisner, K., Beekley, M., and Finley, M. (2013). Functional Assessment Performance and Muscular Strength Improve in an Older Adult Following an 8-Week Kaatsu-Walk Training Program: A Case Study. *Physical and Occupational Therapy in Geriatrics,* 31(1), 61-70.

Whitney, J. C., Lord, S. R., and Close, J. C. (2005). Streamlining assessment and intervention in a falls clinic using the Timed Up and Go Test and Physiological Profile Assessments. *Age and Ageing,* 34(6), 567-571.

Williams, D. M. (2010). Outcome expectancy and self-efficacy: Theoretical implications of an unresolved contradiction. *Personality and Social Psychology Review.*

World Health Organization. (2012). Definition of an older or elderly person. Health statistics and health information systems http://www. who. int/healthinfo/survey/ageingdefnolder/en/index. html (accessed 21 June 2012).

Woo, J., Hong, A., Lau, E., and Lynn, H. (2007). A Randomized controlled trial of Tai Chi and resistance exercise on bone health, muscle strength and balance in community-living elderly people. *Age and Ageing,* 36(3), 262-268.

Woolcott, J. C., Richardson, K. J., Wiens, M. O., Patel, B., Marin, J., Khan, K. M. et al. (2009). Meta-analysis of the Impact of 9 Medication Classes on Falls in Elderly Persons Medications and Falls in Elderly Persons. *Archives of Internal Medicine,* 169(21), 1952-1960.

Wu, A. D. and Zumbo, B. D. (2008). Understanding and using mediators and moderators. *Social Indicators Research,* 87(3), 367-392.

Yagci, N., Cavlark, U., Aslan, U., and Akdog, B. (2007). Relationship between balance performance and musculoskeletal pain in lower body comparison healthy middle aged and older adults. *Archives of Gerontology and Geriatrics* 45(45), 109-119.

Yardley, L., Beyer, N., Hauer, K., Kempen, G., Piot-Ziegler, C., and Todd, C. (2005). Development and initial validation of the Falls Efficacy Scale -International (FE S-I). *Age and Ageing*, 34(6), 614-619.

Yoo, E. J., Jun, T. W., and Hawkins, S. A. (2010). The effects of a walking exercise program on fall-related fitness, bone metabolism, and fall-related psychological factors in elderly women. *Research in Sports Medicine*, 18(4), 236-50.

Yoo, H. N., Chung, E., and Lee, B. H. (2013). The effects of augmented reality-based Otago exercise on balance, gait, and falls efficacy of elderly women. Journal of physical therapy science, 25(7), 797.

Young, A., and Dinan, S. (2005). ABC of sports and exercise medicine: Activity in later life. BMJ: British Medical Journal, 330(7484), 189-191.

Yu-Yahiro, J. A., Resnick, B., Orwig, D., Hicks, G., and Magaziner, J. (2009). Design and implementation of a home-based exercise program post-hip fracture: the Baltimore hip studies experience. *PMandR*, 1(4), 308-318.

Zachary, C., Casteel, C., Nocera, M., and Runyan, C. W. (2012). Barriers to senior centre implementation of falls prevention programmes. *Injury Prevention*, 18(4), 272-276.

Zhang, J. G., Ishikawa-Takata, K., Yamazaki, H., Morita, T., and Ohta, T. (2006). The effects of Tai Chi Chuan on physiological function and fear of falling in the less robust elderly: an intervention study for preventing falls. *Archives of Gerontology and Geriatrics*, 42(2), 107-116.

Zheng, J., Pan, Y., Hua, Y., Shen, H., Wang, X., Zhang, Y. (2013). Strategic targeted exercise for preventing falls in elderly people. *Journal of International Medical Research.* 41(2), 418-426.

Ziere, G., Dieleman, J. P., Hofman, A., Pols, H. A., Van Der Cammen, T. J. M., and Stricker, B. H. (2006). Polypharmacy and falls in the middle age and elderly population. *British Journal of Clinical Pharmacology*, 61(2), 218-223.

Zink, R. C. (2012). Sampling Methodology: Implications for Drawing Conclusions from Clinical Research Findings. Principles of Research Methodology: A Guide for Clinical Investigators, New York: Edited by Supino PG, Borer JS. Springer 197-205.