

Identifying motivators and barriers to older community-dwelling people participating in resistance training – a cross sectional study

Running title: Motivators barriers resistance training ageing

Authors

Elissa Burton, Gill Lewin, Simone Pettigrew, Anne-Marie Hill, Liz Bainbridge, Kaela Farrier, Trish Langdon, Phil Airey, Keith D Hill

Elissa Burton, School of Physiotherapy and Exercise Science, Curtin University, GPO Box U1987, Perth, Western Australia, Australia 6845.

Gill Lewin, School of Nursing, Midwifery and Paramedicine, Curtin University, GPO Box U1987, Perth, Western Australia, Australia 6845.

Simone Pettigrew, School of Psychology and Speech Pathology, Curtin University, GPO Box U1987, Perth, Western Australia, Australia 6845.

Anne-Marie Hill, School of Physiotherapy and Exercise Science, Curtin University, GPO Box U1987, Perth, Western Australia, Australia 6845.

Liz Bainbridge, School of Physiotherapy and Exercise Science, Curtin University, GPO Box U1987, Perth, Western Australia, Australia 6845.

Kaela Farrier, School of Physiotherapy and Exercise Science, Curtin University, GPO Box U1987, Perth, Western Australia, Australia 6845.

Trish Langdon, Council on the Ageing (WA), Perth, Western Australia.

Phil Airey, Council on the Ageing (WA), Perth, Western Australia.

Keith D Hill, School of Physiotherapy and Exercise Science, Curtin University, GPO Box U1987, Perth, Western Australia, Australia 6845.

Corresponding Author

Correspondence concerning this article should be addressed to Dr Elissa Burton, School of Physiotherapy & Exercise Science, Curtin University, GPO Box U1987, Perth, Western Australia 6845.

Email: E.Burton@curtin.edu.au

[Phone: +61 8 9266 4926](tel:+61892664926)

There were no known conflicts of interest for this project.

Acknowledgements

This work was supported by a Healthway Research Project Grant (grant number 24208). The funder had no role in the study design, data collection, analysis and interpretation of the data, writing the report or the decision to submit the article for publication

Identifying motivators and barriers to older community-dwelling people participating in resistance training – a cross sectional study

Running title: Motivators barriers resistance training ageing

Keywords:

Weight training, strength training, ageing, motivators, barriers, older adults.

Abstract

Participation rates of older people in resistance training are low despite increasing research showing many health benefits. To increase the number of older people participating in resistance training it is important to know what would motivate people to become involved, what motivates those who participate to continue, and the factors preventing many older people from commencing participation. To investigate these issues, a questionnaire was mailed to three groups of older people, (1) those receiving home care services, (2) members of a peak non-government seniors' organisation, and (3) those participating in a specific gym-based resistance training program. In total, 1,327 questionnaires were returned (response rate 42.5%). To feel good physically and mentally were the main reasons motivating participation among all three groups, and falls prevention was an important motivator for the home care respondents. Pain, injury and illness were the main barriers to participating, or continuing to participate. However, medical advice was a factor influencing participation commencement. The results suggest organisations providing resistance training programs for older people should tailor the promotion and delivery of programs to address key motivators and barriers specific to each group to increase the proportion of older people initiating and continuing to engage in resistance training.

Introduction

Most countries have seen an increase in the number of older people (aged 60+ years) compared to 20 years ago and this is expected to more than double world-wide from 841 million in 2013 to 2 billion by 2050 (United Nations, 2013). With increases in life expectancy it is particularly important for older people to maintain their health and wellbeing to facilitate continued independent living, societal participation and quality of life. Being physically active is critical to maintaining health and wellbeing, as it assists in maintaining function, reduces the risk of developing chronic illnesses such as heart disease and type-2 diabetes and improves cognitive and mental health (Hupin et al., 2015; Taylor et al., 2004; Warburton, Nicol, & Bredin, 2006). The World Health Organization recommends older people participate in a minimum of 150 minutes of physical activity a week and that at least two sessions should include resistance training (World Health Organization, 2015).

There are many established health benefits of participating in resistance training (RT), also known as weight or strength training. These include increased muscle strength and bone density, improved levels of function to complete daily activities and a reduction in sarcopenia and the signs and symptoms of chronic illnesses such as diabetes, arthritis and depression (Liu & Latham, 2009). There is established evidence that when resistance and balance training are combined they reduce the rate of falls among older community-dwelling people, including those at higher fall risk (Gillespie et al., 2012; Sherrington, Tiedemann, Fairhall, Close, & Lord, 2011). Despite these benefits, the proportion of older people participating in the recommended amount of RT is low. Population level data from the United States (National Center for Health Statistics, 2015), Germany (Mayer et al., 2011) and Australia (Humphries, Duncan, & Mummery, 2011; Merom et al., 2012) suggest no more than 15% of older people are meeting the recommended levels.

To encourage older people who are currently not participating in RT to start, it is necessary to understand which factors might motivate or impede participation and whether there are any differences by gender. The small proportion of older people who are participating in RT should also be explored to understand their reasons for participating, to facilitate the use of a targeted approach when encouraging others to participate in these programs.

Previous studies have found that older people cite poor health, pain and a lack of willpower as the main barriers to engaging in RT (Bopp, Wilcox, Oberrecht, Kammermann, & McElmurray, 2004; Keogh, Rice, Taylor, & Kilding, 2014; Kleppinger, Litt, Kuldorff, Unson, & Judge, 2003; Lin, Lee, Modeste, & Johnson, 2012). Physical health benefits, such as increasing strength, improving balance and function and preventing deterioration, have been identified as the main motivators (Bopp et al., 2004; Dionigi, 2007; Henwood, Tuckett, Edelstein, & Bartlett, 2011; Lübcke, Martin, & Hellström, 2012; Sims-Gould, Miran-Khan, Haggis, & Liu-Ambrose, 2012).

However, while these studies have explored the barriers and motivators to older people participating in strength training many only involved women; the sample sizes were small, the average participant age was under 70 years and no studies explored RT among frailer older people such as those who require organised assistance to continue living in their homes. Given the data that demonstrate that 1 in 4 people will be over the age of 65 by 2050 (Australian Bureau of Statistics, 2008), that the average life expectancy is now 79.5 for males and 84.0 for females (Australian Institute of Health and Welfare, 2012) and that a million older Australians access home care services each year (Australian Government Department of Social Services), these older populations should be examined regarding RT as they could potentially gain many health benefits from participation (Australian Government:

Aged Care Policy and Reform Group, 2014). It is also necessary to explore gender differences to identify whether different strategies are needed to motivate men and women to participate in RT. Previous research in other areas of physical activity has also identified some gender differences in motivators and barriers (for example women reported that they were not the “sporty type” or did not have as much time as men (Booth, Bauman, & Owen, 2002)), highlighting the need to include analyses of gender differences. Therefore, this study aimed to identify the motivating factors and barriers influencing a broad group of older community dwelling adults to either commence or continue participation in a resistance training program.

Methods

Study design and sample

The study was a cross-sectional descriptive study in which three groups of older people were surveyed by mail in June 2015 which included a reply paid envelope to encourage completion. The three groups comprised: 1) participants from an organised state-based resistance training program (Western Australia’s Living Longer Living Stronger program run through accredited community centres, gymnasiums and health services such as physiotherapy centres) (Council on the Ageing Western Australia, 2016b); 2) members of a peak non-government seniors’ organisation (Council on The Ageing Western Australia – COTAWA)(Council on the Ageing Western Australia, 2016a); and 3) older people living in the community receiving home care services through a large Western Australian home care agency. The sample from the latter two groups included both people currently engaged in resistance training programs and those not currently participating in resistance training at the time of completing the questionnaire.

Inclusion criteria were being aged 60+ years, living in the community (not residential care) and, in the case of the home care clients, receiving domestic assistance or

social care. Exclusion criteria were being unable to communicate adequately in English or having a diagnosis of dementia (home care participants).

In total, 3119 participants were sent the questionnaire. The distribution was 1,130 COTAWA members, 1,060 home care clients and 929 Living Longer Living Stronger (LLLS) participants. Ethics approval was obtained from Curtin University (HR38/2015) and the home care organisation (EC100) Human Research Ethics Committees.

Questionnaire

The questionnaire was developed by a project team encompassing the researchers, two consumer representatives (i.e., older people from the community) and organisational partners from Living Longer Living Stronger, COTAWA and the home care agency. As well as demographic and health data, the questionnaire focussed specifically on RT (type, amount, location) and the reasons why the respondent participated (in RT) or not (by check list). Given there is little research exploring the barriers to RT participation, these questions were generated by the research team and also from previous research exploring motivators and barriers to physical activity where it was applicable to RT (Baert, Gorus, Mets, Geerts, & Bautmans, 2011). As well as including possible suggestions for participating in RT or not, the questionnaire included space for respondents to describe additional factors influencing participation. The questionnaire was pilot tested by six home care clients and 16 Living Longer Living Stronger members who were not involved in the final study. Adjustments to the questionnaire were made based on the feedback provided during piloting.

Statistical analysis

Analyses were performed using SPSS (version 22). Continuous variables were tested for normality of distribution and where necessary non-parametric tests were used. Descriptive statistics were generated for all demographic data for the total sample and for each group. Chi-square tests were used to determine the differences by group and sex in the motivators and barriers to participating in or contemplating participation in resistance training. A p value of 0.05 or less was considered statistically significant.

Results

In total 1,359 questionnaires were returned from the 3,118 posted out across the three groups (total response rate 43.6%). The final sample comprised 1,327 questionnaires that met the inclusion criteria, representing an overall response rate of 42.6% (seniors' organisation: 51.7%, home care: 31.4%, RT program: 44.1%). Missing data were fewer than 2.3% for demographic variables and 3.2% for participation in resistance training. As missing data were minimal, no substitutions were made and only the available data were analysed. Table 1 outlines the demographic data for the total sample population and each group.

*****Table 1 near here*****

The median age of the total sample was 76.0 years (range 60-100 years). Two-thirds of all respondents were female, although females constituted three-quarters of the participating home care clients (Table 1). Eighty-four percent were born in Australia or the United Kingdom and almost all (98.9%, n=1,309) respondents spoke English at home. The majority of the respondents were living in the metropolitan area (89%, n=1,176) and almost half (45.9%, n=594) had completed further education past high school, particularly members from the seniors' organisation

(56.6%, n=327). Half the respondents rated their current financial status as “good” and 31.6% (n=417) responded “neither good nor bad”. Three-quarters lived in their own home without a mortgage and 14.4% lived in a retirement village. While the majority of home care respondents lived alone (n=185), most individuals in the other groups lived with a partner/spouse (n=609), and overall only a small proportion lived with their children or others (6.6%, n=88). There were significant differences between groups for all demographic data (Table 1). Due to these significant differences, demographic data were additionally analysed using univariate analysis to determine significant differences in respondent’s characteristics for individual motivators and barriers. These results can be found in Tables 2-4.

Almost half of the respondents (47.8%, n = 614) reported they were participating in RT at the time of completing the questionnaire. This included 93.5% (n=373) of the organised RT program respondents, compared to 34.7% (n=198) of the seniors’ group and 13.7% (n=43) of the home care client group. When comparing RT participation rates between the home care and the seniors’ organisation respondents, significant differences were found (χ^2 (1, n=885) = 45.52, p<0.001). Almost a third (31.9%, n=95) of home care and seniors’ organisation males were participating in a RT program compared to a quarter of the females (24.9%, n=146), which was a statistically significant difference between the sexes in these groups (χ^2 (1, n=884) = 4.83, p<0.028).

Perceived motivational factors for contemplating participation in resistance training

Six hundred and seventy respondents from the home care and seniors’ organisations were not participating in a RT program and were asked what factors might motivate them to participate in the future. As shown in Table 2, there was a

significant difference in the perceived motivational factors between the two groups (χ^2 (15, n=643) = 84.97, $p < 0.001$).

****Table 2 near here****

To feel good physically, to feel fit and to feel good mentally were the most commonly identified motivators for those who were not currently participating in RT. Falls prevention and to feel good mentally and physically were the most commonly identified motivators by the home care clients. By comparison, more of the seniors' organisation members identified to feel good physically and mentally than identified falls prevention as likely to motivate them to participate in RT.

To be more independent was perceived to be motivating by almost 50% more home care clients compared to the seniors' organisation members. However, to maintain weight and for the enjoyment were more likely to motivate the seniors' organisation members than home care clients to take up RT. Other motivational factors reported by respondents included improved mobility, if facilities were closer, if my friends did it, to prevent injury and if my doctor or physio recommended it.

Males and females identified different factors as motivators to begin RT, (χ^2 (15, n=643) = 45.77, $p < 0.001$, Table 2). A greater proportion of males than females reported being motivated by four of the five most commonly reported factors identified by group (home care or seniors organisation): to feel good physically, to feel fit, to feel good mentally and health professional advice. More females were motivated to participate in RT to prevent falls, for enjoyment, to be social, to be more independent and to feel strong.

Survey respondent characteristics (demographics) had a significant effect on a number of motivational factors for those contemplating participation in RT (Table 2). Health professional advice, doctor's advice, losing weight, for the competition/challenge and to feel strong were all significantly more likely to be nominated by younger respondents. Those who were widowed were more likely to identify enjoyment, feeling fit, strong and good physically and mentally as motivational factors.

Perceived motivational factors for participating in resistance training

Respondents from the three groups who were already participating in a RT program were asked the reasons motivating their involvement. The most commonly identified reasons motivating those participating in RT were: to feel good physically, to feel fit, to prevent falls and for the enjoyment. There was a significant difference between the three groups, with home care clients nominating some different reasons relative to those in the other groups (χ^2 (30, n=614) = 102.40, $p < 0.001$). The factors identified by the home care respondents were different from the other two groups were to be more independent, medical reasons, health professional advice and to prevent falls. The home care clients were also less motivated by being social, feeling good mentally and enjoyment.

****Table 3 near here****

Preventing falls was the most commonly nominated factor motivating home care respondents compared to feeling good physically for the other two groups. Three-quarters of the seniors' organisation and RT groups nominated feeling fit and two-thirds to feel good mentally as their second and third most commonly nominated motivators. Table 3 shows the home care group more often identified medical and health reasons (health professional advice, medical reasons, doctor's advice) than

the other two groups. The seniors' organisation respondents and those participating in a RT program more often identified physical and mental factors, such as to feel fit, for the enjoyment, to be social, to feel strong and to feel good physically and mentally. Other motivating reasons provided by the respondents in the open-ended section of this question included: being a habitual exerciser, to prevent injury/illness, improve health (including bone density, diabetes), maintain physical capabilities (including balance, mobility, strength, fitness) and because it is energising (feel good).

The three factors most commonly identified as motivators by both male and female respondents already participating in RT were to feel good physically, to feel fit and to feel good mentally. For each of these factors there was a smaller than one percent difference between the sexes. There was, however, a significant difference overall between the sexes in the factors most commonly nominated (χ^2 (15, n=614) = 116.29, $p < 0.001$). As was the case for those not yet participating in RT, preventing falls, for the enjoyment, to be social and to feel strong were more commonly identified as motivators for female respondents. Similarly younger respondents were more likely to nominate feeling fit, being social, maintaining weight, feeling strong and feeling good physically and mentally as reasons motivating them to participate in RT (Table 3).

Perceived barriers to participating in resistance training

The 670 respondents who were not participating in a RT program (home care clients and seniors' organisation only) were also asked to identify the reasons they did not participate in these activities (barriers). Pain was the most commonly nominated barrier for those not participating in RT, followed by ongoing injury or illness and feeling too old. There was a significant difference in the responses between the two groups – home care and the seniors' organisation (χ^2 (18, n=643) = 162.71,

p<0.001). Table 4 shows having an ongoing injury or illness, being in pain, feeling too old and RT being too hard were all selected more often by home care clients as barriers to participating compared to the seniors' organisation respondents. Having no time was more of a barrier for the seniors' group compared to the home care group. Not liking the activities and not being interested were also selected more often by the seniors' organisation respondents compared to the home care group. The cost of participating in a RT program was selected by only a small percentage of the groups combined.

****Table 4 near here****

Other reasons for non-participation provided in the open response section by the respondents included: specific health issues such as arthritis, multiple sclerosis, back pain, heart problems, recent surgery, being lazy, wheelchair confined, fear, inconvenient location, do enough already/too busy, and preferring other types of exercise.

Ongoing injury or illness, pain, not interested and feeling too old were the four most commonly identified reasons for male non-participation in RT (Table 4). There was a statistically significant difference between the sexes (χ^2 (18, n=643) = 43.49, p<0.001), with a higher percentage of females reporting pain, class times not available or suitable, cost and nobody to do it with (Table 4). Older respondents from the total sample were more likely to report feeling too old as a barrier to participating in RT, while younger participants were more likely to nominate ongoing injury/illness, pain, cost, having no where to train, and don't know how as barriers for not participating in RT (Table 4).

Discussion

This study found that three distinct groups of older people identified both common and different motivators and barriers to RT. This suggests that efforts to promote RT need to be specifically tailored to different target groups of seniors to improve uptake and sustain participation.

One of the largest differences between the seniors' organisation members and home care clients was in the proportion identifying falls prevention as a reason for taking up RT. There are a number of possible reasons for this difference. To be eligible for home care, individuals have to be assessed as having an ongoing functional dependency and many experience mobility difficulties. Home care clients have been found to have a 50% higher falls rate than the general community dwelling older population, with 44-46% falling in any one year and an even greater proportion having fear of falling (Burton & Lewin, 2016; Smith & Lewin, 2008). While 66% of home care clients identified falls prevention as a good reason for taking up RT, only 35% (n=198) of home care clients were participating in RT. This is consistent with the results of other studies demonstrating that knowing the benefits of exercise does not mean older people will participate in RT, even those at high risk of falls (Haines, Day, Hill, Clemson, & Finch, 2014).

The majority of the most commonly nominated RT motivators in this study related to health and wellbeing. Feeling good both physically and mentally were important to all groups in this study, which reflects results from other RT studies (Damush, Perkins, Mikesky, Roberts, & O'Dea, 2005; Henwood et al., 2011; Lübcke et al., 2012; Picorelli et al., 2014). This outcome suggests the large body of evidence extolling the physical and mental health benefits of being physically active can also be used to promote RT.

Doctors' or health professional's advice, medical reasons and to be more independent were also commonly identified motivators for older people to take up RT in the present study. However, a recent study of 1,799 Australians found fewer than one in five respondents had received a physical activity recommendation from their general practitioner (GP) in the previous 12 months, and when the GP did recommend physical activity, 59% of the time they prescribed aerobic activity and only 13% RT (Short et al., 2015). This is despite the physical activity guidelines for older people recommending 30 minutes of moderate intensity activity on most days, including resistance and balance training two days a week (Australian Government Department of Health, 2014). There is a growing body of evidence for the effectiveness of RT exercise in the prevention and treatment of a number of chronic illnesses (Lange, Vanwanseele, & Fiatarone Singh, 2008; Liu-Ambrose et al., 2005). Further promotion of the benefits of RT to both GPs and older people themselves is needed, particularly emphasising the important role GP's and physiotherapists have on influencing physical activity participation for older people (Hill et al., 2011; Kerse, Elley, Robinson, & Arroll, 2005; D.-C. Lee, McDermott, Hoffmann, & Haines, 2013).

There was considerable commonality in the motivators identified by RT participants and non-participants, but a distinguishing factor was perceived enjoyment. Fifty percent of participants gave enjoyment as a reason for engaging in RT, whereas only 19.3% of non-participants nominated enjoyment as a potential reason for commencing RT. Additionally, home care clients who participated (28.6%) or did not participate (11.7%) did not identify enjoyment as often as the seniors' organisation members (48.4%) or the RT program participants (54.1%). Not expecting to enjoy RT could be an important reason why more home care clients are not involved. However, for the proportion of home care clients participating in RT, the potential to prevent falls and help them be more independent was obviously more important than enjoyment (65.7% and 54.3% vs 28.6%). This, and the fact that greater

proportions of home care clients nominated medical or health as reasons to participate compared to the other groups who nominated feeling fit, being social, losing or maintaining weight and feeling strong no doubt reflects differing priorities associated with the differences in the health and functional status between the groups.

Ongoing physical injuries or illnesses and pain were the most common barriers to RT identified by both non-participant groups. This finding is consistent with earlier research that found injury and illness were identified as barriers to physical activity in general by home care clients (Burton, Lewin, & Boldy, 2013) and other studies that identified poor health and pain as barriers in older community dwelling populations (Bopp et al., 2004; Hill et al., 2011; Keogh et al., 2014; Kleppinger et al., 2003). Despite many believing that poor health or pain are reasons not to exercise in the present study, randomised trials have demonstrated significant improvements in a range of health-related conditions for older people participating in RT, including low back pain (Liu-Ambrose et al., 2005; Vincent, George, Seay, Vincent, & Hurley, 2014), chronic stroke (Flansbjerg, Miller, Downham, & Lexell, 2008; M. J. Lee, Kilbreath, Singh, Zeman, & Davis, 2010), lower limb osteoarthritis (Baker et al., 2001; Lange et al., 2008) and type 2 diabetes (Castaneda et al., 2002).

Feeling too old was also a commonly perceived barrier for the home care respondents. At an average age of 82.0 years, they were six and ten years older than the seniors' organisation members and RT participants respectively. However, there was a 96 year old still participating in RT from the RT group, illustrating age is not necessarily a barrier. A number of studies investigating RT have included the oldest-old (80+ years) and found that many were still involved in RT on a regular basis up to 18 months later (Damush et al., 2005; Henwood et al., 2011; Rydeskog, Frändin, & Hansson Scherman, 2005).

Many of the motivators and barriers to participating in RT identified in this study have also been found for older people participating in general physical activity (Baert et al., 2011; Burton et al., 2013). However, fear of falling has been found in the physical activity literature to be a barrier to being physically active, unlike this research where the home care clients in particular were motivated to commence or continue RT participation due to the belief that it would reduce their risk of falling. Transferability of many motivators and barriers may be possible for other forms of physical activity in these specific populations however caution must be taken because this study identified factors specific to RT.

A limitation to the study was that respondents were provided with lists of possible reasons to participate or not participate in RT and asked to indicate which applied to them. This may have resulted in respondents identifying motivators or barriers that they would not have thought of for themselves and therefore an overestimation of the importance of different factors may have occurred. Given that the process was the same for all groups it is unlikely to account for the differences found between the groups. Another limitation was the number of non-responders to the survey. Almost 1,800 surveys were not returned (57%), and potential bias may have occurred because it cannot be assumed that non-responders would answer the questions similarly to those who did respond. However, the sample was chosen using an electronic random number generator of each total (group) population, giving each participant equal opportunity to be included. Using a questionnaire was deemed the most feasible process by which to collect data and to be the most convenient to participants while adding to the current knowledge base.

Four previous studies (Bopp et al., 2004; Keogh et al., 2014; Kleppinger et al., 2003; Lin et al., 2012) that explored barriers to participation in RT used questionnaires

(one a focus group and survey), however they had smaller samples sizes (average 241 participants) making generalisation difficult; three of the studies only included women and the other had only 145 males participate. Additionally half of the studies included a RT program with results based solely on respondent experiences in the training program. Particular attention was paid to avoid these issues for this study. The sample was large, included substantial numbers of both sexes and respondents above 70 years, as well as those with a range of functional and health issues. Generalisation of these results to the general older adult population as well as to the specific populations included may therefore be possible.

Conclusion

This study found that the three groups of older people (receiving home care services, seniors' organisation members and those participating in a structured RT program) identified both common and different motivators and barriers to participating in RT. This suggests that efforts to promote RT need to be specifically tailored to different target groups of seniors to improve uptake and sustain participation. In particular, GPs and health professionals should be encouraged to promote RT to their older patients to address issues of pain, injury and other chronic health problems that can prevent engagement and ongoing participation, with appropriate supervision if required. They should also modify their explanation of the potential benefits for RT based on the patient's medical and social background. Specifically, when GPs and other health professionals take the opportunity to promote RT to older people, it may be beneficial to explore the motivators and barriers for the individual and personalise the recommended strategies for increasing uptake of RT. Future research is needed to explore GPs' and health professionals' understanding of the specific benefits of RT and their reasons for promoting (or not promoting) RT to their older patients as well as methods for optimising uptake and sustained participation.

References

- Australian Bureau of Statistics. (2008). *3222.0 - Population projections, Australia 2006 to 2101*. Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/mediareleasesbyTopic/2CA2134677EF9D03CA257C2E0017283B?OpenDocument>
- Australian Government Department of Health. (2014). *Australia's physical activity and sedentary behaviour guidelines: Recommendations for older Australians*. Retrieved from <http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-strateg-phys-act-guidelines#chba>
- Australian Government Department of Social Services. *Home and Community Care Program Minimum Data Set 2013-14 Annual Bulletin*. Canberra, ACT.
- Australian Government: Aged Care Policy and Reform Group. (2014). *Concise facts and figures in aged care. 2013-2014*. Canberra: ACT.
- Australian Institute of Health and Welfare. (2012). *Australia's Health 2012. Australia's health series no. 13. Cat. no. AUS 156*. Canberra.
- Baert, V., Gorus, E., Mets, T., Geerts, C., & Bautmans, I. (2011). Motivators and barriers for physical activity in the oldest old: A systematic review. *Ageing Research Reviews, 10*, 464-474. doi: 10.1016/j.arr.2011.04.001
- Baker, K. R., Nelson, M. E., Felson, D. T., Layne, J. E., Sarno, R., & Roubenoff, R. (2001). The efficacy of home based progressive strength training in older adults with knee osteoarthritis: A randomized controlled trial. *Journal of Rheumatology, 28*(7), 1655-1665
- Booth, M., Bauman, A., & Owen, N. (2002). Perceived barriers to physical activity among older Australians. *Journal of Aging and Physical Activity, 10*, 271-280
- Bopp, M., Wilcox, S., Oberrecht, L., Kammermann, S., & McElmurray, C. (2004). Correlates of strength training in older rural African American and Caucasian women. *Women and Health, 40*(1), 1-20. doi: 10.1300/J013v40n01_01

- Burton, E., & Lewin, G. (2016). Characteristics of older people who fall, cannot get up and call emergency services for help? *Journal of the American Geriatrics Society*, 64(1), 217-218. doi: 10.1111/jgs.13900
- Burton, E., Lewin, G., & Boldy, D. (2013). Barriers and motivators to being physically active for older home care clients. *Physical and Occupational Therapy in Geriatrics*, 31(1), 21-36. doi: 10.3109/02703181.2012.751474
- Castaneda, C., Layne, J. E., Munoz-Orians, L., Gordon, P. L., Walsmith, J., Foldvari, M., . . . Nelson, M. E. (2002). A randomized controlled trial of resistance exercise training to improve glycemic control in older adults with type 2 diabetes. *Diabetes Care*, 25(12), 2335-2341
- Council on the Ageing Western Australia. (2016a). *COTA Western Australia, for older Australians*. Retrieved from <http://www.cotawa.org.au/>
- Council on the Ageing Western Australia. (2016b). *Living Longer Living Stronger*. Retrieved from <http://www.llswa.org.au/>
- Damush, T., Perkins, S., Mikesky, A., Roberts, M., & O'Dea, J. (2005). Motivational factors influencing older adults diagnosed with knee osteoarthritis to join and maintain an exercise program. *Journal of Aging and Physical Activity*, 13(1), 45-60
- Dionigi, R. (2007). Resistance training and older adults' beliefs about psychological benefits: The importance of self-efficacy and social interaction. *Journal of Sport and Exercise Psychology*, 29(6), 723-746
- Flansbjerg, U. B., Miller, M., Downham, D., & Lexell, J. (2008). Progressive resistance training after stroke: Effects on muscle strength, muscle tone, gait performance and perceived participation. *Journal of Rehabilitation Medicine*, 40(1), 42-48. doi: 10.2340/16501977-0129
- Gillespie, L., Robertson, M., Gillespie, W., Sherrington, C., Gates, S., Clemson, L., & Lamb, S. (2012). Interventions for preventing falls in older people living in the

community. Issue 9. Art. No.: CD007146. *Cochrane Database of Systematic Reviews*. doi: 10.1002/14651858.CD007146.pub3

- Haines, T., Day, L., Hill, K. D., Clemson, L., & Finch, C. (2014). "Better for others than for me": A belief that should shape our efforts to promote participation in falls prevention strategies. *Archives of Gerontology and Geriatrics*, 59(1), 136-144. doi: <http://dx.doi.org/10.1016/j.archger.2014.03.003>
- Henwood, T., Tuckett, A., Edelstein, O., & Bartlett, H. (2011). Exercise in later life: the older adults' perspective about resistance training. *Ageing and Society*, 31(08), 1330-1349. doi: 10.1017/S0144686X10001406
- Hill, A.-M., Hoffmann, T., McPhail, S., Beer, C., Hill, K., Brauer, S., & Haines, T. (2011). Factors associated with older patients' engagement in exercise after hospital discharge. *Archives of Physical Medicine and Rehabilitation*, 92(9), 1395-1403. doi: 10.1016/j.apmr.2011.04.009
- Humphries, B., Duncan, M., & Mummery, W. (2011). Prevalence and correlates of resistance training in a regional Australian population. *British Journal of Sports Medicine*, 44, 653-656. doi: 10.1136/bjism.2008.048975
- Hupin, D., Roche, F., Gremeaux, V., Chatard, J.-C., Oriol, M., Gaspoz, J.-M., . . . Edouard, P. (2015). Even a low-dose of moderate-to-vigorous physical activity reduces mortality by 22% in adults aged ≥ 60 years: A systematic review and meta-analysis. *British Journal of Sports Medicine*, 0, 1-8. doi: 10.1136/bjsports-2014-094306
- Keogh, J., Rice, J., Taylor, D., & Kilding, A. (2014). Objective benefits, participant perceptions and retention rates of a New Zealand community-based, older-adult exercise programme. *Journal of Primary Health Care*, 6(2), 114-122
- Kerse, N., Elley, C., Robinson, E., & Arroll, B. (2005). Is physical activity counseling effective for older people? A cluster randomized, controlled trial in primary care. *Journal of the American Geriatrics Society*, 53(11), 1951-1956. doi: 10.1111/j.1532-5415.2005.00466.x

- Kleppinger, A., Litt, M., Kulldorff, M., Unson, C., & Judge, J. (2003). Health perceptions as predictors of exercise adherence in older women. *European Journal of Sport Science*, 3(4), 1-15. doi: 10.1080/17461390300073405
- Lange, A. K., Vanwanseele, B., & Fiatarone Singh, M. A. (2008). Strength training for treatment of osteoarthritis of the knee: A systematic review. *Arthritis & Rheumatism*, 59(10), 1488-1494. doi: 10.1002/art.24118
- Lee, D.-C., McDermott, F., Hoffmann, T., & Haines, T. (2013). They will tell me if there is a problem': limited discussion between health professionals, older adults and their caregivers on falls prevention during and after hospitalization. *Health Education Research*, 28(6), 1051-1066. doi: 10.1093/her/cyt091
- Lee, M. J., Kilbreath, S. L., Singh, M. F., Zeman, B., & Davis, G. M. (2010). Effect of progressive resistance training on muscle performance after chronic stroke. *Medicine and Science in Sports and Exercise*, 42(1), 23-34. doi: 10.1249/MSS.0b013e3181b07a31
- Lin, S.-F., Lee, J., Modeste, N., & Johnson, E. (2012). Attitudes and beliefs predicting Taiwanese older adults' intentions to attend strength and balance training programs. *Journal of Applied Gerontology*, 31(2), 260-281. doi: 10.1177/0733464810385815
- Liu-Ambrose, T. Y., Khan, K. M., Eng, J. J., Lord, S. R., Lentle, B., & McKay, H. A. (2005). Both resistance and agility training reduce back pain and improve health-related quality of life in older women with low bone mass. *Osteoporosis International*, 16(11), 1321-1329. doi: 10.1007/s00198-005-1842-3
- Liu, C., & Latham, N. (2009). Progressive resistance strength training for improving physical function in older adults. Issue 3. Art No.: CD002759. *Cochrane Database of Systematic Reviews*. doi: 10.1002/14651858.CD002759.pub2

- Lübcke, A., Martin, C., & Hellström, K. (2012). Older adults' perceptions of exercising in a senior gym. *Activities, Adaptations and Aging*, 36(2), 131-146. doi: 10.1080/01924788.2012.673157
- Mayer, F., Scharhag-Rosenberger, F., Carlsohn, A., Cassel, M., Müller, S., & Scharhag, J. (2011). The intensity and effects of strength training in the elderly. *Deutsches Ärzteblatt International*, 108(21), 359-364. doi: 10.3238/arztebl.2011.0359
- Merom, D., Pye, V., Macniven, R., van der Ploeg, H., Milat, A., Sherrington, C., . . . Bauman, A. (2012). Prevalence and correlates of participation in fall prevention exercise/physical activity by older adults. *Preventive Medicine*, 55(6), 613-617. doi: <http://dx.doi.org/10.1016/j.ypmed.2012.10.001>
- National Center for Health Statistics. (2015). *Health, United States, 2014: With special feature on adults aged 55–64*. Hyattsville, MD <http://www.cdc.gov/nchs/data/hus/hus14.pdf>.
- Picorelli, A., Pereira, D., Felicio, D., Dos Anjos, D., Pereira, D., Dias, R., . . . Pereira, L. (2014). Adherence of older women with strength training and aerobic exercise. *Clinical Interventions in Aging*, 9, 323-331. doi: 10.2147/cia.s54644
- Rydeskog, A., Frändin, K., & Hansson Scherman, M. (2005). Elderly people's experiences of resistance training. *Advances in Physiotherapy*, 7(4), 162-169. doi: doi:10.1080/14038190500239591
- Sherrington, C., Tiedemann, A., Fairhall, N., Close, J., & Lord, S. (2011). Exercise to prevent falls in older adults: An updated meta-analysis and best practice recommendations. *NSW Public Health Bulletin*, 22(3-4), 78-83. doi: 10.1071/NB10056
- Short, C. E., Hayman, M., Rebar, A. L., Gunn, K. M., De Cocker, K., Duncan, M. J., . . . Vandelanotte, C. (2015). Physical activity recommendations from general practitioners in Australia. Results from a national survey. *Australian and New*

Zealand Journal of Public Health, early on-line. doi: 10.1111/1753-6405.12455

Sims-Gould, J., Miran-Khan, K., Haggis, C., & Liu-Ambrose, T. (2012). Timing, experience, benefits, and barriers: Older women's uptake and adherence to an exercise program. *Activities, Adaptations and Aging, 36*(4), 280-296. doi: 10.1080/01924788.2012.729188

Smith, J., & Lewin, G. (2008). Home care clients' participation in fall prevention activities. *Australasian Journal of Ageing, 27*(1), 38-42

Taylor, A., Cable, N., Faulkner, G., Hillsdon, M., Narici, M., & Van De Bij, A. (2004). Physical activity and older adults: A review of health benefits and the effectiveness of interventions. *Journal of Sports Sciences, 22*(8), 703-725. doi: 10.1080/02640410410001712421

United Nations. (2013). *World Population Ageing 2013*. New York.

Vincent, H. K., George, S. Z., Seay, A. N., Vincent, K. R., & Hurley, R. W. (2014). Resistance exercise, disability, and pain catastrophizing in obese adults with back pain. *Medicine and Science in Sports and Exercise, 46*(9), 1693-1701. doi: 10.1249/mss.0000000000000294

Warburton, D., Nicol, C., & Bredin, S. (2006). Health benefits of physical activity: The evidence. *CMAJ, 174*(6), 801-809. doi: 10.1503/cmaj.051351

World Health Organization. (2015). *Physical activity and older adults: Recommended levels of physical activity for adults aged 65 and above*.

Retrieved from

http://www.who.int/dietphysicalactivity/factsheet_olderadults/en/

Table 1 Survey Respondent Demographics

Demographics % (N)	Home Care Org	COTAWA	LLLS	Total Sample	p-value
Currently participating in resistance training	13.7 (43)	34.7 (198)	93.5 (373)	47.8 (614)	<0.001
Gender					<0.001
Male	25.5 (84)	38.0 (222)	31.5 (129)	32.9 (435)	
Female	74.5 (246)	62.0 (362)	68.5 (281)	67.1 (889)	
Age (Median, Variance)	82.0 (61.8)	76.0 (53.9)	72.0 (45.7)	76.0 (61.9)	<0.001
Country of Birth					0.025
Australia	63.0 (208)	61.6 (360)	58.8 (241)	61.1 (809)	
United Kingdom	17.3 (57)	24.3 (142)	25.6 (105)	23.0 (304)	
Asia-Pacific	5.7 (19)	4.8 (28)	6.9 (31)	5.6 (75)	
Europe	7.1 (33)	3.9 (28)	4.6 (3)	6.2 (82)	
Other	3.6 (12)	3.9 (23)	3.1 (13)	3.7 (48)	
Marital Status					<0.001
Never married	1.8 (6)	5.7 (33)	3.2 (13)	3.9 (52)	
Married/ de facto	36.2 (119)	56.7 (331)	70.7 (290)	55.9 (740)	
Widowed	48.6 (160)	25.7 (150)	18.0 (74)	29.0 (384)	
Separated/divorced	13.4 (44)	11.8 (69)	7.6 (31)	10.9 (144)	
Area Live In					<0.001
Metropolitan area	81.7 (269)	90.2 (526)	93.2 (381)	89.0 (1176)	
Country town/other rural	18.2 (60)	9.8 (57)	6.8 (28)	10.9 (145)	
Level of Education					<0.001
Finished before last year of high school	55.9 (176)	30.1 (174)	39.7 (160)	39.4 (510)	
Completed high school	19.4 (61)	13.3 (77)	13.4 (54)	14.8 (192)	
Completed TAFE course	14.6 (46)	22.3 (129)	23.3 (94)	20.8 (269)	
Completed University degree	10.2 (32)	34.3 (198)	23.6 (95)	25.1 (325)	
Current Financial Status					<0.001
Very strained	3.7 (12)	0.7 (4)	1.7 (7)	1.7 (23)	
Strained	11.0 (36)	6.2 (36)	4.9 (20)	7.0 (92)	
Neither good nor bad	38.8 (127)	29.9 (174)	28.4 (116)	31.6 (417)	
Good	40.7 (133)	52.7 (307)	54.5 (223)	50.3 (663)	
Very good	5.8 (19)	10.5 (61)	10.5 (43)	9.3 (123)	
Housing Status					<0.001
Own your own home without mortgage	61.2 (200)	76.5 (447)	80.1 (327)	73.8 (974)	
Own your own home with mortgage	5.8 (19)	6.0 (35)	4.4 (18)	5.5 (72)	
Rent privately	6.1 (20)	2.1 (12)	3.9 (16)	3.6 (48)	
Rent state housing	9.2 (30)	0.9 (5)	0.7 (3)	2.9 (38)	

Live in retirement village	16.2 (53)	15.6 (91)	11.3 (46)	14.4 (190)
Other	4.6 (15)	0.9 (5)	0.5 (2)	1.7 (22)
Current Living Status				<0.001
Live alone	56.2 (185)	38.2 (223)	25.9 (106)	38.9 (514)
Live with partner/spouse	34.0 (112)	56.2 (328)	68.5 (281)	54.5 (721)
Live with others/children	9.7 (32)	5.7 (33)	5.6 (23)	6.6 (88)

Note. LLLS denotes Living Longer, Living Stronger.

Table 2 Motivational factors for those not currently participating in a RT program

Motivational Factors % (N)	Home Care Org	Seniors' Organisation	Male	Female	Total Sample
Health professional advice ^a	22.7 (37)	35.4 (104)	36.5 (57)	28.0 (84)	30.9 (141)
To feel fit ^m	30.7 (50)	52.0 (153)	50.6 (79)	41.3 (124)	44.4 (203)
Medical reasons ^f	27.6 (45)	28.2 (83)	30.1 (47)	27.0 (81)	28.0 (128)
Doctor's advice ^a	26.4 (43)	32.7 (96)	31.4 (49)	30.0 (90)	30.4 (139)
Enjoyment ^m	11.7 (19)	23.5 (69)	14.1 (22)	22.0 (66)	19.3 (88)
To be social ^c	19.0 (31)	19.4 (57)	10.3 (16)	24.0 (72)	19.3 (88)
To prevent falls	44.8 (73)	41.8 (123)	34.6 (54)	47.3 (142)	42.9 (196)
To be more independent	21.5 (35)	13.6 (40)	11.5 (18)	19.0 (57)	16.4 (75)
To lose weight ^{a,c}	28.2 (46)	32.0 (94)	28.8 (45)	31.3 (94)	30.6 (140)
To maintain weight ^h	10.4 (17)	22.4 (66)	21.8 (34)	16.3 (49)	18.2 (83)
Competition/challenge ^a	1.8 (3)	3.4 (10)	2.6 (4)	3.0 (9)	2.8 (13)
To feel strong ^{a,m,d}	23.3 (38)	33.0 (97)	26.3 (41)	31.3 (94)	29.5 (135)
To feel good physically ^{c,m}	32.5 (53)	53.4 (157)	51.9 (81)	43.0 (129)	46.0 (210)
To feel good mentally ^m	36.8 (60)	48.3 (142)	48.1 (75)	42.0 (126)	44.2 (202)
Other reasons ^e	4.9 (8)	3.4 (10)	5.8 (9)	3.0 (9)	3.9 (18)

χ^2 (15, n=643) = 84.97, p<0.001 (by organisation)

χ^2 (15, n=643) = 45.77, p<0.001 (by sex)

Note. For individual motivators statistical significance ($p \leq 0.05$) of demographic differences are shown as superscripts. Abbreviations: age: a, country of birth:

c, marital status: m, area live in: d, education level: e, housing situation: h, living situation: l, financial status: f.

Table 3 Factors motivating those participating in a RT program

Motivational Factors % (N)	Home Care Org	Seniors' Organisation	LLLS	Male	Female	Total Sample
Health professional advice ^e	40.0 (14)	29.5 (56)	25.8 (95)	29.9 (61)	26.7 (104)	27.8 (165)
To feel fit ^{a,m,d}	54.3 (19)	72.1 (137)	76.1 (280)	73.5 (150)	73.5 (286)	73.5 (436)
Medical reasons ^a	51.4 (18)	33.2 (63)	35.6 (131)	36.3 (74)	35.5 (138)	35.8 (212)
Doctor's advice	37.1 (13)	25.8 (49)	31.8 (117)	27.5 (56)	31.6 (123)	30.2 (179)
Enjoyment	28.6 (10)	48.4 (92)	54.1 (199)	42.6 (87)	55.0 (214)	50.8 (301)
To be social ^a	14.3 (5)	31.1 (59)	40.8 (150)	20.6 (42)	44.2 (172)	36.1 (214)
To prevent falls ^m	65.7 (23)	43.7 (83)	53.5 (197)	33.8 (69)	60.2 (234)	51.1 (303)
To be more independent ^l	54.3 (19)	28.4 (54)	27.4 (101)	22.1 (45)	33.2 (129)	29.3 (174)
To lose weight	5.7 (2)	19.5 (37)	25.8 (95)	25.5 (52)	21.1 (82)	22.6 (134)
To maintain weight ^a	22.9 (8)	32.1 (61)	40.8 (150)	34.3 (70)	38.3 (149)	36.9 (219)
Competition/challenge	2.9 (1)	7.4 (14)	6.5 (24)	4.4 (9)	7.7 (30)	6.6 (39)
To feel strong ^a	37.1 (13)	46.3 (88)	54.6 (201)	37.3 (76)	58.1 (226)	50.9 (302)
To feel good physically ^a	62.9 (22)	83.2 (158)	82.1 (302)	79.9 (163)	81.7 (318)	81.3 (482)
To feel good mentally ^a	40.0 (14)	65.3 (124)	63.9 (235)	63.2 (129)	62.7 (244)	62.9 (373)
Other reasons ^e	8.6 (3)	4.2 (8)	7.3 (27)	7.4 (15)	5.9 (23)	6.4 (38)

χ^2 (30, n=614) = 102.40, p<0.001 (by organisation)

χ^2 (15, n=614) = 116.29, p<0.001 (by sex)

Note. For individual motivators statistical significance (p≤0.05) of demographic differences are shown as superscripts. Abbreviations: age: a, country of birth:

c, marital status: m, area live in: d, education level: e, housing situation: h, living situation: l, financial status: f

Table 4 Barriers to participating in a RT program

Barriers % (N)	Home Care Org	Seniors' Organisation	Male	Female	Total Sample
Too hard ^{m,l}	17.9 (43)	8.3 (28)	12.4 (22)	12.3 (49)	12.3 (71)
No time	2.5 (6)	18.7 (63)	12.4 (22)	11.8 (47)	12.0 (69)
Class not available	5.4 (13)	7.4 (25)	2.8 (5)	8.3 (33)	6.6 (38)
Class times not suitable ^h	2.1 (5)	5.9 (20)	1.1 (2)	5.8 (23)	4.3 (25)
Don't like these activities ^{m,e}	7.5 (18)	16.3 (55)	11.2 (20)	13.3 (53)	12.7 (73)
Medical advice ^d	7.5 (18)	6.2 (21)	6.7 (12)	6.8 (27)	6.8 (39)
You feel you are too old ^{a,e}	31.3 (75)	14.2 (48)	21.9 (39)	21.1 (84)	21.3 (123)
Ongoing injury/illness ^{a,f}	42.9 (103)	21.7 (73)	28.1 (50)	31.7 (126)	30.5 (176)
Temporary injury/illness	15.8 (38)	13.4 (45)	12.4 (22)	15.3 (61)	14.4 (83)
Pain ^{a,d,f}	42.1 (101)	24.0 (81)	26.4 (47)	33.7 (134)	31.5 (182)
Too tired ^m	12.1 (29)	8.6 (29)	10.1 (18)	9.8 (39)	10.1 (58)
Not interested	13.8 (33)	21.4 (72)	23.0 (41)	16.1 (64)	18.2 (105)
Cost ^{a,f}	10.0 (24)	13.6 (46)	7.3 (13)	14.3 (57)	12.1 (70)
Lack of transport ^c	8.3 (20)	4.5 (15)	2.8 (5)	7.5 (30)	6.1 (35)
Nobody to do it with	10.8 (26)	12.5 (42)	8.4 (15)	13.3 (53)	11.8 (68)
No where to do it ^a	3.3 (8)	6.8 (23)	3.9 (7)	6.0 (24)	5.4 (31)
Don't know how ^a	1.3 (3)	4.7 (16)	0.6 (1)	4.5 (18)	3.3 (19)
Other reasons ^a	10.4 (25)	14.2 (48)	15.2 (27)	11.6 (46)	12.7 (73)

χ^2 (18, n=643) = 162.71, p<0.001 (by organisation)

χ^2 (18, n=643) = 43.49, p=0.001 (by sex)

Note. For individual barriers statistical significance (p≤0.05) of demographic differences are shown as superscripts. Abbreviations: age: a, country of birth: c, marital status: m, area live in: d, education level: e, housing situation: h, living situation: l, financial status: f.