

Literature Review

Many studies have been conducted that examine facilitators and barriers to sustained exercise and physical activity in older adults; however, few examine the Otago program specifically. The Otago Exercise Program is a strength and balance exercise program which has been shown to be effective in reducing falls and injuries associated with falls in high risk older adults and has been recommended by the Centers for Disease Control as an effective program to prevent falls.^{1,2} The proposed project will examine participation, adherence, and associated facilitators and barriers for individuals who participated in one of two Otago programs delivered in continuing care retirement community (CCRC) settings. One utilized the full Otago program which includes progressive strength and balance exercises performed at home in addition to a walking program. The second program was an Otago-based group exercise class that was led and supervised by facility staff members.

Very few studies that address exercise facilitators and barriers in older adults include individuals residing in CCRCs. In reviewing prior literature available regarding facilitators and barriers for regular exercise in older adults, there are some similarities that emerge from prior qualitative studies depending on the setting and patient population. McInnes and Askie performed a systematic review of 24 studies, both qualitative and quantitative, that examined the experience of older adults who had participated in falls prevention programs.³ They found 24 studies that met their inclusion criteria and examined the facilitators and barriers associated with participation in falls prevention programs. In general, they found that falls prevention programs that excluded a behavior change component were preferred by participants.³ They also noted the importance of determining what factors contribute to participants' desire to avoid physical activity and finding a way to address those, as well as working to promote the value of programs that prevent future falls. They examined studies that included both fallers and nonfallers, as well as community-dwelling residents, patients in rehabilitation wards, and individuals residing in nursing home facilities.³ Participants in these studies were between 50 and 97 years old. The authors note the superior methodological quality of the qualitative studies compared to the quantitative studies which were reported as having low to fair quality. The authors concluded that there is frequently a disconnect between the falls prevention interventions that are seen as most effective by providers (balance and strengthening exercises) and the ones that are more likely to be accepted by older adults (home modifications, assistive devices, and low-intensity exercise).³ Additionally, the authors highlighted the need to confirm with participants what elements of their lifestyle and usual activities they would be willing to change in order to prevent falls, so that participants can be matched to programs that are likely to be beneficial to them.³ Some studies examined also found that program content sometimes made the participants feel alienated due to a lack of non-English language resources and stereotyping of older adults.³ They emphasize the importance of addressing barriers, such as fear of exertion or fear of falling, before beginning a program to prevent falls. The social aspect of the programs was frequently reported as one of the strongest motivators for participation, specifically by participants without a prior history of regular physical activity.³ Results of qualitative studies revealed that programs that included a peer role model, were home-based, low intensity, supervised via telephone, occurred with moderate frequency, and were perceived as beneficial, fun, and relevant were likely to have greater participation.³ Barriers reported in these studies included illness,

embarrassment, low self-efficacy, unawareness or denial of personal risk of falling, and fear of falling.³

A systematic review conducted by Finnegan et al. examined qualitative and mixed method studies analyzing the experience of community-dwelling individuals, 65 years of age or older, pertaining to their participation in an exercise-based falls prevention program, and their ongoing exercise behaviors.⁴ All studies examined group-based exercise interventions. One study only included male participants. The authors categorized the themes that emerged as matters of identity, motivators and deterrents, and the nature of the intervention.⁴ Participants often did not identify themselves as “fallers” despite the fact that they may have fallen in the past. Many individuals also did not identify as “old” because they considered themselves to be active and busy, therefore not seeing themselves as an appropriate recipient for a falls prevention intervention. Participants that identified as “exercisers” and espoused the benefits of exercise to maintain function and general health were more likely to be active in order to retain independence.⁴ They also demonstrated improved confidence and ability to complete the exercises following their participation in exercise interventions, and were better able to transition from exercises that were highly supervised, to an environment with a lower level of supervision for exercising. In contrast, individuals that identified as “non-exercisers” reported themselves to be too lazy, not in need of exercise, that they did not enjoy or were not in the right mood for exercising, or would rather complete a different activity, such as walking, as reasons for not continuing with their exercises.⁴ In terms of motivators and barriers, the desire to maintain good health or the presence of ill health were cited as reasons for continued or curtailed exercises respectively.⁴ Time was also frequently given as a reason for not exercising with older adults reporting that they were too busy with responsibilities of caring for others, or other time constraints that they prioritized over continuing their exercises. Support from family and friends was reported as a motivator when individuals were able to continue exercising with someone following the conclusion of their program; however, in some cases family members were reported to be a barrier when their concerns about the safety of the exercise led to activity restrictions.⁴ Some participants reported that they discontinued their exercises after the completion of their program as they had reached their goal and/or felt that their normal level of activity was sufficient exercise, or because they felt the benefit of exercising was no longer greater than the risk (falling, pain). The group setting of the exercise programs functioned as either a motivator or barrier for some individuals.⁴ Some participants were more likely to continue to exercise after the program ended because they continued working out with a friend from the exercise group, while other individuals reported that a negative experience during one of the groups sessions later discouraged them from continuing the exercises.⁴ Poorly defined transitions following the completion of a falls prevention program were also seen as a barrier to continued exercising as it was unclear to participants what opportunities there were for exercise classes in their community; alternatively, clearly defined transitions provided by other programs were deemed a facilitator for continued exercise. Lastly, some individuals simply did not want to pay for access to ongoing exercise opportunities.⁴

De Lacy-Vawdon et al. published a synthesis of the literature regarding factors that influence attendance and adherence in group physical activity interventions for older adults.⁵ Their search produced 8 quantitative and 13 qualitative studies that met their inclusion criteria. Of the studies that reported details regarding participant gender, race, and age, the participants were primarily

female, White, and were in their mid-50s and up in terms of age.⁵ One study primarily included African-American participants. The physical activity interventions included walking programs, falls prevention programs, cardiac rehabilitation, low-intensity physical activity, chair-based exercises, Tai Chi, line dancing classes, sports (e.g. badminton, cycling), combined treadmill and resistance band exercises, endurance and strengthening programs, general exercises classes, and flexibility and stretching programs.⁵ Group cohesion and companionship were associated with greater adherence in physical activity programs both at short- and long-term evaluation points. Having a “good,” conscientious, and knowledgeable instructor for the physical activity class or intervention was associated with increased adherence over time.⁵ Individualized interventions and attention from the instructor also increased participation and adherence especially with participant groups classified as frail.⁵ Exercise intensity that was deemed inappropriate (either too high or too low) was reported as a barrier to adherence by participants. Two studies reported that lower intensity workouts had lower adherence and a higher dropout rate.⁵ One study found that their female participants preferred moderate exercise intensity while their male participants noted a preference for vigorous intensity physical activity. Another reported that adherence was improved in groups that were smaller, separated by gender, and where challenging goals were established.⁵ One study that examined exercise classes developed to address specific medical conditions found that classes for individuals with diabetes and arthritis had high dropout rates (75% and 71%), while osteoporosis and general strengthening classes reported the lowest dropout rates (27% and 22%).⁵ Classes that were offered two times per week were shown to improve adherence when compared to classes held three times per week, and individuals that participated in two or more classes, either one following the other or during the same stretch of time, were more likely to still be physically active at a 3 year follow up point.⁵ Two studies reported that meeting personal goals or seeing progress was also associated with increased adherence. Observable physical and mental health benefits also led to increased adherence in multiple studies.⁵ Convenience and accessibility for attending the program, onsite medical screening, transportation assistance, and low-cost were all associated with improved adherence. Receiving a follow-up call after missing a class also improved adherence overtime.⁵ Generally, group classes were preferred over home-based exercise programs with the opportunity to socialize being highly valued in multiple studies. One study that examined falls prevention programs found that stretching, floor exercises, and exercise bikes were disliked by the participants who preferred Tai Chi, walking, arm and leg movements, balance exercises, water-based activities, and exercises using gym equipment.⁵

Sandlund et al. examined uptake and adherence for exercise-based falls prevention programs for community-dwelling older adults in Sweden.⁶ They note that according to prior literature approximately 77% of the participants in studies that examine falls prevention exercise programs are women. They conducted six, 2.5-hour workshops that included focus groups, balance and strength exercises, and other activities. Their participant group was comprised of 10 women and 8 men, including two couples, that had enrolled in an exercise-based falls prevention program.⁶ One female dropped out before the end of the program. These participants were primarily well educated, retired individuals that had worked in white-collar industries. They report that motivators for starting to exercise included treating an injury or medical condition, preserving health, information, and the encouragement of family or a medical provider.⁶ Barriers reported to inhibit exercise included lack of self-discipline, societal expectations, barriers from the environment, poor health, and the feeling of being fragile or vulnerable. Many people reported

the desire to be able to participate in activities with their grandchildren as a motivational factor.⁶ No clear patterns emerged regarding preferences for level of challenge, intensity, mode of exercise, or social context from the participants. Having an encouraging and knowledgeable instructor, especially one that was similar to the participants in age was deemed a highly motivating factor.⁶ Both genders reported the sense of achievement or accomplishment they received from exercising as motivational. Being able to exercise outside, the inclusion of music, access to specific exercise equipment, and having an element of humor during the exercises were also common motivators that were reported. However, some individuals also noted negative experiences with being unable to keep up with the music during an exercise class, or being unwilling to purchase specific equipment to use at home.⁶ Having a partner, friend, or even a dog to exercise with was also seen as beneficial for continuing to exercise regularly. Fear of falling was reported, primarily by the female participants as a deterrent from exercising, but individuals were also able to provide safety strategies that mitigated the impact of this concern such as using walking poles or bringing their cell phone with them whenever they left the home.⁶ Ultimately, the authors concluded that there was no clear gender divide in the factors discussed and that individual preferences must be assessed and considered when setting up falls prevention programs.⁶

Schoster et al. conducted semistructured telephone interviews with 51 individuals that participated in a trial of the People with Arthritis Can Exercise (PACE) program, to learn about their experiences.⁷ Despite the benefits that can be gained from exercising by individuals with arthritis, enrollment and participation in the program remains low, prompting the authors to look further into the barriers and motivators to participation within this population. Inclusion criteria for participants were self-reported joint pain or arthritis with some limitation of strength, joint motion, or a combination of the two.⁷ The program included an 8-week exercise intervention delivered twice a week for the duration of the program, and participants were categorized as either completers (attended 75% or more of the classes) or noncompleters (attended less than 75% of the classes) for the purpose of the telephone interviews.⁷ Thirty-six completers and 15 noncompleters were interviewed. Questions were asked about the location and schedule of the class, the instructor, and the content of material taught in the course. Noncompleters reported arthritis symptoms or insufficient physical challenge as the main reasons for low levels of participation.⁷ Lack of transportation was also a limiting factor for one participant. Completers were more likely to cite family or personal illness, or scheduling conflicts as the reason for missing a class.⁷ Both completers and noncompleters frequently reported that the social support garnered from both the other participants and the instructor acted as a major motivator to continue attending classes. Both groups also noted the benefit of being able to exercise at their own pace.⁷

Meyer et al. also examined motivators and barriers for participation of a home-based exercise program.⁸ Their study focused on older individuals with mild balance dysfunction. They studied the translation of a randomized controlled trial intervention (Yang et al. 2012) to delivery within the context of community health centers. They utilized the Otago program and VHI Balance and Vestibular kit to provide exercises for the participants.⁸ Physical therapists provided feedback and guidance on exercises at three home visits that took place on week two, four, and ten. Focus groups featuring either the physical therapists or participants were formed to understand their experience of the exercise program.⁸ Because the physical therapists focused primarily on issues

with program recruitment and administration, only the participants' experience with the program will be discussed here. Some participants reported increased confidence and strength with walking after completing their exercises.⁸ Others also noted the social benefit of exercising, reporting that they often met their neighbors when out for a walk. Participants reported that their exercises made them more functionally independent and able to participate in life events like trips or vacations.⁸ Being able to take care of themselves and participate in the activities that they enjoyed was reported as a motivator to continue exercising. Exercising was also seen as a means of early intervention to prevent illness or injury.⁸ Some participants described the activities as boring or tedious while others that were able to translate the exercises into a daily habit were more likely to continue exercising. Having the physical therapists provide individualization, encouragement, and feedback was noted as a motivator for the program.⁸ Some participants also appreciated that the program allowed them to exercise on their own schedule in their own homes. Participants also reported that more time with the therapists with shorter durations between visits would have been preferred, and they also wanted strategies for how to continue to exercise after the program came to an end.⁸

Welmer et al. examined the motivators, barriers, and meaning behind physical activity in individuals 80 years old and older.⁹ They report that roughly 50% of individuals within this age group require assistance with one or more activities of daily living, and although physical activity can delay or prevent disability due to frailty, many older adults fail to attain the recommended amount of regular exercise.⁹ Like other similar studies, Welmer et al. recruited participants from an exercise-based randomized controlled trial. Participants were community-living individuals, and did not require assistance with activities of daily living.⁹ Twenty of the randomized controlled trial participants agreed to participate in the focus-group interviews. Their discussions regarding what physical activity means to them and what motivates them to be physically active revealed themes such as fear of dependence and disease, "joie de vivre," that physical activity should be embedded into everyday life, and "perceptions of frailty."⁹ In discussing physical activity as part of everyday life, the participants clarified that physical activity was often a consequence or associated with another activity that was more important to them than the physical activity itself, such as social interaction.⁹ They noted that physical activity could also be limited by social connections, for example, by having a significant other that could no longer participate in the same physical activities. Some individuals reported that they preferred to walk alone, because it allowed them to walk at their own speed.⁹ Barriers to physical activity included the inability to complete activities that they could perform in the past, loneliness, and lack of exercise options that are appropriate for older individuals.⁹ Participants repeatedly voiced the opinion that being able to be active and participate was essential to deriving enjoyment from life. Some reported that physical activity was frequently embedded in everyday chores or errands such as washing, cleaning, gardening, and making the bed.⁹ Physical activity was also seen as a way to enjoy the outdoors. When gardening or walking outside, the physical activity was often a secondary consideration next to enjoying the fresh air and the natural beauty of the outdoors.⁹ "Joie de Vivre" or zest for life was another theme that emerged during the focus groups. The participants reported that physical activity increased their energy level and mood, and helped them enjoy life by being more active.⁹ They reported a sense of satisfaction that they were still able to complete certain physical activities, noting that this made them feel "alive and free." Participants also reported a fear of dependence and disease, noting that physical activity helped them prolong their health and mobility.⁹ They discussed the importance

of living independently as long as possible to avoid becoming a burden on their children and family.⁹ Another goal reported by this population group was to retain independence and health rather than improve their physical appearance. Participants reported the need to balance physical activity with what they thought could be accomplished as a result of their self-perceived frailty.⁹ They felt that some physical activity could be dangerous if it provoked discomfort, such as breathlessness, in which case more strenuous activities are avoided and tasks like walking or stairs may be performed more slowly to try and avoid an injury or a fall.⁹ Pain and poor weather were seen as limitations for physical activity. Depression, diagnosis of an illness, or death or sickness of a family member or friend were all noted as barriers to continuing to be physically active.⁹

Arkkukangas et al. performed a qualitative study of motivators and barriers pertaining to a home-based exercise program for older adults including a motivational interviewing component to support behavior change.¹⁰ Individuals that had participated in the Otago Exercise Program as part of a randomized controlled trial were offered the option to participation in one-on-one interviews regarding their experience. Individuals that scored below a 25 on the Mini Mental State Examination, were receiving terminal care, or were participating in physical therapy treatment due to an illness or injury were excluded from the interviews.¹⁰ Five men and seven women agreed to participate. Their ages were between 75 and 86 years, and they were interviewed 3 months after the randomized controlled trial was conducted. Facilitators for regular exercise included having personal goals that could be achieved through exercise, easy access to exercise, a routine that involved regular exercise, and an environment that is supportive of exercising.¹⁰ Individuals that reported personal goals related to their exercises, such as being able to walk to the store or a friend's house, noted these goals as facilitators for regular exercise.¹⁰ Regular routines such as taking a daily walk were also found to increase the likelihood of continuing to exercise, however issues like poor weather could limit the influence of a routine. Supportive environments included living with family members that encouraged exercising, access to an ambulation assistive device if needed, and good weather.¹⁰ Support from the physical therapist and the use of an exercise diary also encouraged compliance with the exercise program by providing safe instruction and reminders for completing the exercises. Some participants reported negative feelings towards the exercise diary when life events kept them from exercising but most noted that this element of the program encouraged them to exercise regularly.¹⁰ The program exercises were considered accessible by the participants as they were easy to perform and could be done at their convenience during the day, with participants in this study reporting that they preferred exercising from home. Individuals also reported that physical gains such as balance and strength improvements that they noticed after performing their exercises motivated them to continue to participate.¹⁰ Functional benefits also motivated the participants to continue exercising, with some reporting that they were better able to stand or walk without assistance. Some participants reported that they felt elated by being more active with their exercises.¹⁰ The lack of soreness or negative side-effects from the exercises further encouraged continued participation in the program. Some individuals reported feeling weak or frail as limiting their daily activities but for some this also supported the need to continue exercising with increased caution and awareness of their surroundings to minimize the risk of falling.¹⁰ Knowledge of the process of aging also motivated some participants to continue exercising in order to remain strong as long as possible.¹⁰

Maula et al. examined the facilitators and barriers to maintaining physical activity in individuals that participated in a home-based Otago exercise program.¹¹ They compared these results to those of individuals that participated in the Falls Management Exercise program (FaME) arm of the ProAct65+ trial. Participants in this qualitative study were community dwelling, independently mobile with or without the use of an assistive device, and 65 years old or greater.¹¹ Both the FaME and Otago programs are individually tailored to the needs of each participant. The Otago program is based on home-exercises, and the FaME program includes both home-exercises and group exercises. The intervention period for the trial lasted 6-months and the interviews for the qualitative study occurred 4-6 years after the intervention period.¹¹ Individuals that participated in both arms of the program reported improved physical autonomy as a result of maintaining physical activity. Participants noted physical improvements in balance, confidence related to reduced falls, mobility, strength, and suppleness following their participation in the trial interventions which then helped to facilitate maintenance of physical activity.¹¹ Alternatively, if their physical health deteriorated resulting in the development of arthritis, cold, cough, or issues with medication side effects these issues were perceived as barriers to maintenance of physical activity. Individuals that reported the deterioration of a friend's or family member's health reported seeing this process as helping to promote maintenance.¹¹ Participants in the FaME arm of the study reported that the social aspect of the group classes was an important component of their continuing to be physically active, noting that they joined other exercise classes with their friends from the program after the intervention phase had ended.¹¹ Others noted simple enjoyment of the exercise program as a reason that they continued to participate in physical activity. Participants of the FaME program reported that leaving their home to attend classes helped reduce distractions that might prevent them from exercising.¹¹ Individuals in the Otago program reported that living with a partner and encouraging each other increased the likelihood of sustaining their levels of physical activity. The level of physical activity interpreted as "normal" could be modified based on feedback from family and friends in both groups, however continued maintenance of physical activity was most commonly seen in individuals that regularly exercised prior to their intervention.¹¹ Both groups also reported being busy as a barrier to physical activity noting that they had other demands on their time including hobbies, volunteer work, or social events that they prioritized. Positive motivation found through the convenience of the exercises, use of technology, organized activity structures, and measurable activity was reported to contribute to physical activity maintenance in both groups.¹¹ Measurable activity demonstrated through external factors such as using tick charts or pedometers to track participation helped promote the development of a routine for participating in physical activity and increased self-efficacy for the exercises, especially in the Otago group. Some participants reported negative health beliefs that reduced maintenance of physical activity, for example that joint pain would inevitably follow exercise.¹¹ Depression, negative attitudes toward physical activity, and memory impairments were all reported as limiting physical activity maintenance. Having available and accessible exercise programs to transition to following the conclusion of the Otago and FaME programs improved maintenance of physical activity.¹¹ Programs that were well advertised and oriented to an older adult population were the most effective. Transportation issues, poor weather conditions, and inconvenient times for exercise classes were barriers to continuing to be physically active. Cost associated with exercise classes could be both a barrier and a facilitator to maintenance of physical activity seen either as an additional expense, or a financial investment to promote ongoing participation.¹¹

No studies that examine the experience of individuals living in CCRCs who participate in Otago exercises have been identified. CCRCs are a growing industry offering residential opportunities for the expanding older adult population along the continuum of health care needs. There are approximately 2,000 CCRCs nationwide providing services to 700,000 residents, up from 700 CCRCs in 1986.^{12,13} Given that a growing percentage of the older adult population is residing in CCRCs, it is important to know more about how individuals living in these facilities, who may be more limited physically or cognitively, respond to exercise-based interventions and what tools can be used to improve their ongoing participation in exercise-based falls prevention programs, like the Otago program. Examining both a home-based and group-based program utilizing the Otago exercises will provide a better understanding of how exercise setting and social interactions impact the experience of an exercise intervention and adherence over time. Additional research is needed to better understand and promote adherence and participation in programs that prevent falls in individuals living in continuing care retirement communities.

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