# What are the outcomes and views of people with mobility limitations after participating in a community circuit group?

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## ABSTRACT

Increasing services are addressing the needs of people living with long term conditions. The purpose of this observational study was to determine the impact of community circuit classes on balance and mobility of individuals with neurological conditions. Participants were recruited from people interested in or already taking part in circuit classes provided at a private rehabilitation clinic. Outcomes (4-Stage Balance test, 30 Second Chair Stand test and Timed Up and Go (TUG) were assessed before and after a block of circuit classes (at least six weekly sessions). Risk and fear of falling were measured using the Falls Risk Assessment Tool and the Falls Efficacy Scale respectively. Participants completed a self-report questionnaire to provide their views about the class. All 13 participants completed at least six classes. A difference was found in the TUG (p=0.05) but not in other outcome measures. All participants highly rated the organisation, level of staff skill and amount of assistance provided at the classes, but there was less satisfaction on the challenge and frequency of classes. Participating in circuit classes for a short-term period appears to have a positive impact on mobility and is an enjoyable form of exercise for people with neurological conditions.

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Key words: Neurological conditions, Rehabilitation, Exercise, Balance, Mobility

## INTRODUCTION

People living with neurological conditions are at high risk of falling. Those with stroke fall approximately three times within the first six months after discharge from hospital and people with Parkinson's disease (PD) and multiple sclerosis (MS) have at least one significant fall within the first year of diagnosis (Coote, Finlayson, & Sosnoff, 2014). In addition, the injuries caused by falls can often produce further impairments or physical disabilities and lead to reduced confidence, independence and participation in meaningful activities (Sattin, 1992; Tinetti, Doucette, Claus, & Marottoli, 1995).

Exercise not only plays an important role in the rehabilitation and management of the primary impairments of these neurological conditions, but also helps prevent the secondary effects of inactivity (Goodwin, Richards, Taylor, Taylor, & Campbell, 2008; Langhorne, Coupar, & Pollock, 2009; Latimer-Cheung, 2013). Evidence also suggests that well designed exercise programmes can reduce the risk of falls and improve or maintain physical independence and functional mobility (Coote et al., 2014; Eng et al., 2003; English, Hillier, Stiller, & Warden-Flood, 2007; Marigold et al., 2005). One option that offers supervised exercise opportunities for community dwelling people living with a neurological condition is Circuit Class Therapy (CCT). This is defined as a tailored intervention involving the performance or practice of exercises and functional tasks that target specific problems such as balance, strength and walking (English et al., 2007). CCT is provided in a group setting where people move between stations set up in a circuit. It is a practical way of providing structured and repetitive task practice, tailoring the exercises to the individual and progressing them as required, and has been shown to increase mobility and balance (English et al., 2007; Wevers, van de Port, Vermue, Mead, & Kwakkel, 2009).

One facility that delivers CCT is a private rehabilitation clinic based in Auckland, New Zealand. The clinic offers two classes per week, providing CCT for community dwellers who live with neurological conditions and report mobility and balance limitations. These CCT classes are called 'Balance-Fit' and 'Move!' with the latter specifically designed for people living with PD. Each of the CCT classes are offered in six week blocks. At the clinic, 13 stations are set up for each of the CCT classes. The stations comprise elements of resistance training, aerobic training and functional training and are tailored to the patient population. For example, in the PD Move! class, there are dual task stations and flexibility stations. Clients spend three minutes

at each station, after which they rotate to the next station. CCT classes are one hour in duration. Classes are as inclusive as possible with criteria for participation primarily based around participants being able to safely engage and in the perceived benefit in joining.

Supervision is provided by one or two registered physiotherapists. This ratio is improved through the use of undergraduate physiotherapy students who volunteer at the classes. This format provides a learning experience for the student and extra supervision for the client, while keeping costs down, making the classes affordable.

A one-off screening assessment of falls risk, functional ability and balance is performed on registration to the CCT. However, the clinic does not formally re-administer the measures after completion of a CCT block. Although people currently attending these CCT sessions have reported positive changes in their daily life, the objective change as a result of these classes has not been measured, nor has formal feedback on the CCT been recently sought.

Therefore, the aim of this observational study was to evaluate the impact of an existing CCT on community dwellers, living with a neurological condition, at risk of falling due to impaired balance and mobility. At the end of the study, participants had the opportunity to provide feedback in the form of a self-report questionnaire regarding their experience of CCT.

## METHODS

### Participants

Potential participants were those who were already enrolled in, or eligible to attend one or both of the clinic's two CCT classes. To be eligible, potential participants needed to meet the criteria of the clinic CCT and be able to attend for at least six classes over the data collection period (five months). Ethics for this study was approved by the AUT University Ethics Committee (AUTEC) (approval 15/32).

### Assessment

Participant data were collected at two time periods (Time 1 (T1)) and Time 2 (T2)) midway through 2015. Demographic data and written consent were collected at the first testing session. Participants who joined the CCT prior to 2015 were scheduled for T1 testing when they agreed to participate. For some clients who chose to participate and who had been coming to the classes for a while, Time 1 assessments were repeated before they began a new block of classes. For participants who joined the CCT in 2015, their initial screening data, collected by the physiotherapist at the clinic, were used for T1 data and written consent was obtained before the first CCT class. T2 testing occurred once participants had completed at least six classes of CCT. This involved a re-assessment of the initial measures as well as a questionnaire that asked about participants' views on the CCT itself. See Figure 1 for an overview of the assessment periods in relation to the CCT.

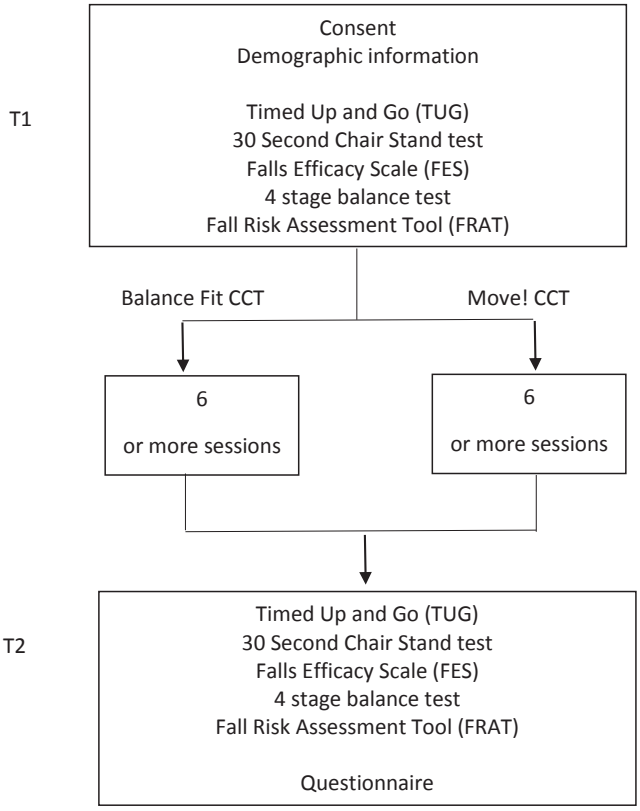


**Figure 1: Overview of assessment periods, assessment content and CCT classes**

### Outcome measures

The Timed Up and Go (TUG), the 30 Second Chair Stand test and the 4-Stage Balance test were used to measure mobility, muscle strength and falls risk (Jones, Rikli, & Beam, 1999; Podsiadlo & Richardson, 1991; Rossiter-Fornoff, Wolf, Wolfson, & Buchner, 1995). Confidence during activities of daily living was assessed with the Falls Efficacy Scale (FES) (Tinetti, Richman, & Powell, 1990) and falls risk was measured using the Falls Risk Assessment Tool (FRAT) (Stapleton et al., 2009).

A questionnaire was developed to ask participants about their perceptions on their abilities as a result of participating in the class and for feedback on the CCT itself. Refer to appendix A for the CCT Questionnaire.

### Analysis

Differences between T1 and T2 data were determined using either paired t-tests (TUG, 30 Second Chair Stand test and 4-Stage Balance test) or Wilcoxon Rank-Sum tests (FRAT and FES). Significance was set at 0.05 (two-tailed) for all tests. Questionnaire results were manually tabulated and summarised using basic frequency statistics. Free-text feedback was collated from the comments section of each questionnaire and categorised by topic.

## RESULTS

### Participants

Thirteen clients attending the CCT classes consented to participate in the study between March and August 2015. The majority of the participants were over 65 years of age and

over half were living with PD. The proportion of people living with PD and MS resulted in 77% of participants living with a progressive neurological condition. Table 1 presents baseline characteristics.

**Table 1: Participant Characteristics**

| Baseline Characteristics | | |
|---|---|---|
| Variable | Number | Percentage (%) |
| Sex | | |
| Male | 7 | 54 |
| Female | 6 | 46 |
| Age (years) | | |
| 60-64 | 2 | 15 |
| 65-69 | 5 | 38 |
| 70-74 | 4 | 31 |
| 75-79 | 2 | 15 |
| Diagnosis | | |
| Parkinson's disease | 8 | 62 |
| Stroke | 2 | 15 |
| Transient ischaemic attack | 1 | 8 |
| Multiple sclerosis | 2 | 15 |
| Classes attended | | |
| Move! | 7 | 54 |
| Balance-Fit | 5 | 38 |
| Both | 1 | 8 |
| Assistive Devices | | |
| Walker | 2 | 15 |
| Walking stick | 2 | 15 |
| None | 9 | 69 |

## Outcome measures

Scores from all tests at both time points (T1 and T2) are shown in Table 2. The mean TUG showed a significant change between T1 and T2 (p=0.05) but there was no change in the other outcome measures (4-Stage Balance, 30 Second Chair Stand, FES and FRAT).

## Questionnaire

Seven of the thirteen participants (54%) reported improved balance after six weeks of CCT and six participants (46%) reported their self-confidence and socialisation had also improved. See Figure 2.

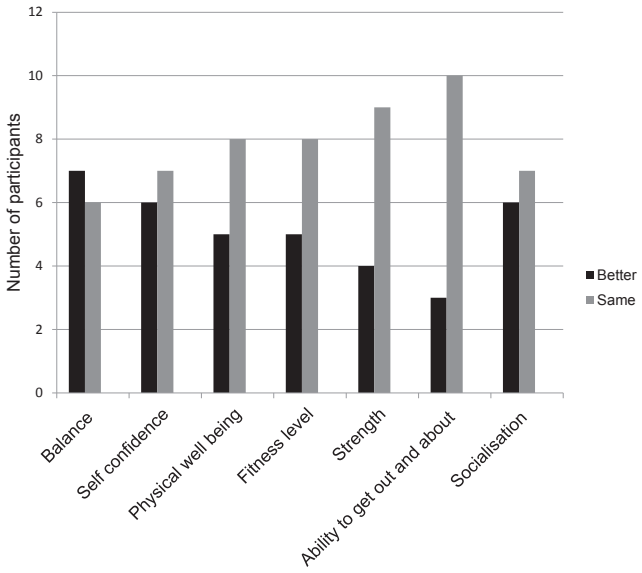


**Figure 2: Participant perceived changes as a result of participating in the CCT as reported in the T2 questionnaire**

Free text comments suggested that socialisation was a valued component of the CCT. Participants specifically stated how valuable and enjoyable it was to exercise alongside others with similar conditions. Comments ranged from, "It is interesting to see how other people with Parkinson's disease are coping." to "Before I felt sorry for myself thinking why did the stroke happen to me? Now I can see other people and I'm not alone, so I have been able to come to terms with my stroke".

**Table 2: Results - Means, Standard deviations (SD) of T1 and T2 measures**

| | Mean and SD | | | | | Significance (P*) |
|---|---|---|---|---|---|---|
| Outcome | T1 | SD | T2 | SD | Mean difference | |
| Timed Up and Go (s) | 19.9 | 13.6 | 15.7 | 9.1 | -4.2 | 0.05* |
| 30 second sit to stand (reps) | 9.4 | 6.7 | 10.4 | 6.2 | 1.0 | 0.2 |
| 4 Stage Balance Test (s) | 30.5 | 9.2 | 31.1 | 0.6 | 0.6 | 0.8 |
| Outcome | T1 | | T2 | | | (P**) |
| Falls Efficacy Scale | 87.5 | 25.9 | 86.5 | 30.5 | -0.9 | 0.2 |
| Falls Risk Assessment Tool | 9.5 | 3.3 | 9.6 | 3.4 | 0.2 | - |

Notes: T1, measurement time point 1; T2, measurement time point 2; SD, standard deviation; *, Paired t-test; **, Wilcoxon Rank Sum

Over two-thirds of participants perceived the CCT organisation, staff skill level and amount of staff assistance provided as excellent. Two out of the thirteen responses rated the frequency and challenge of the classes as average and one response reported that frequency of classes was poor. See Figure 3. Free text comments from some participants spoke about how availability to attend classes was affected by transportation and needing to attend other appointments. Other comments showed differing responses to the question of challenge. For example, "Feel the challenge of exercises improves condition." as well as, "Could be harder." and "Things change, you can never suit everybody."

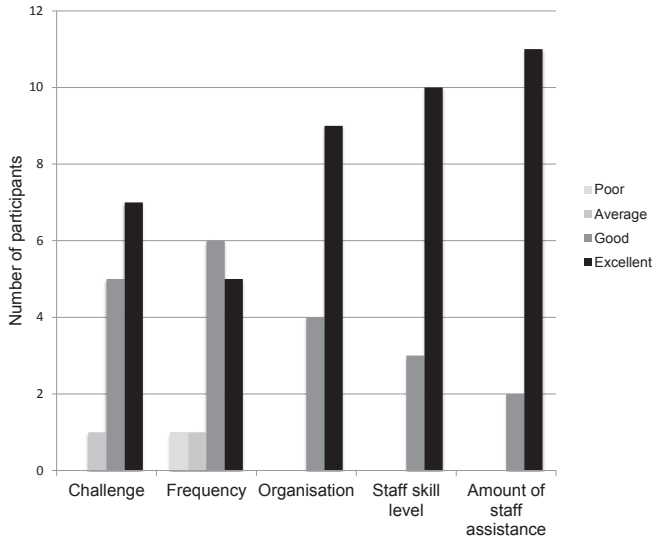


**Figure 3: Participant feedback on CCT components as reported at T2 questionnaire**

## DISCUSSION

An important finding of this study was a significant improvement in the TUG scores following at least six sessions of CCT. The average improvement was 4.2 seconds, which is above the minimally detectable difference for people living with stroke and PD (2.9 seconds and 3.5 seconds respectively) (Flansbjer, Holmback, Downham, Patten, & Lexell, 2005; Huang et al., 2011). The TUG and gait measures have been shown to have higher sensitivity to change than other balance measures (van Iersel, Munneke, Esselink, Benraad, & Olde Rikkert, 2008), perhaps explaining why we may have seen a change in the TUG but not in the FRAT, both of which are measures of falls risk. Because the FRAT is not a physical assessment measure, it may represent different factors contributing to falls risk, which may account for changes in the TUG, but not in the FRAT.

Despite the high proportion (77%) of participants in our study living with a progressive neurological condition, we were able to detect a positive change. The results of both the outcome measures and the questionnaire suggest that even a small amount of exercise can affect a clinically important change in a group of people with a neurological condition with mobility limitations.

Clinically, physical improvement is encouraging for a number of reasons. Firstly, for this population, exercise and physical activity are even more reduced than in people of the same age with no neurological condition (English et al., 2007; Kunkel, Fitton, Burnett, & Ashburn, 2015; Motl, McAuley, & Snook, 2005; van Nimwegen et al., 2011). This group are at even greater risk of secondary complications (Smith, Saunders, & Mead, 2012; Stavric & McNair, 2012; van Nimwegen et al., 2011). As such, the need for accessible and effective exercise opportunities is high. We have demonstrated that exercise, in this form of CCT, can have positive effects.

Secondly, the model of the CCT format allows for exercise that would otherwise be difficult to access. Often, barriers such as inaccessible facilities and/or equipment, anxiety and lack of confidence with exercise and staff without appropriate knowledge prevent people from engaging in exercise or any form of physical activity (Ellis et al., 2013; Kayes, Mcpherson, Taylor, Schlüter, & Kolt, 2011). Therefore, the clinic staff attempted to minimise some of those barriers by providing CCT in an accessible and supportive environment. The feedback from the questionnaires would suggest that the setting was conducive to exercise and socialisation. This is consistent with other studies (Song, Kim, & Park, 2015). The staff also attempted to offer the CCT at a frequency and intensity that is achievable for most of the users. The results from this study would suggest that even a small amount of therapy and exercise can effect changes in mobility.

Thirdly, the participants were already clients who had been participating in the CCT. As such, they would have likely experienced the most dramatic changes when they first began exercising (Swain, 2005). The finding that changes can still be seen in this group is encouraging and shows that improvements can continue as long as the intervention is appropriate in terms of challenge and support.

Lastly, the lack of change (or deterioration) in the remainder of the outcome measures over the course of the study period should be viewed in a positive light. In contrast to much of the previous CCT literature whose participants were living with stroke, the majority of our participants were living with progressive conditions. As such, the goal of rehabilitation, and CCT, may not necessarily be to improve impairment and function but to also maintain function or slow deterioration.

This study is an example of a real clinical situation attempting to measure the impact of a low cost, low dose intervention that is currently being carried out and may be feasible for other clinical facilities. There was little extra cost to run the study and to analyse the data. However, the process and the results have benefited both the clinicians and participants. They have shown how everyday practice can impact people's function and how this is perceived by clients of a service.

The CCT programme in this study differed to the clinical trials in the literature with respect to dose and setting. Although many studies based in the inpatient setting provided CCT as much as five times per week (Blennerhassett & Dite, 2004; Chisari, Venturi, Bertolucci, Fanciullacci, & Rossi, 2014; English et al., 2007), 85% of our participants reported the frequency of classes as either excellent or good. Free-text comments

related to this question highlighted that participants had other appointments they needed to attend and transportation was a challenge for some. These comments resonate with previous work highlighting the competing factors that impact a person's participation in physical activity (Mudge et al., 2013).

However, we acknowledge that because this was an ongoing clinical programme, our design was limited in that we did not have a control group. We also recognise that we did not control the amount of additional physical activity in which participants engaged. Some participants were involved in more than the minimally required six classes, so the dose of exercise was not uniform. We also recognise the sample size was small; however, it was representative of more than half the participants at the classes.

Lower limb strength did not change over the study period, which is not surprising, as participants were not exercising at sufficient frequency to drive strength improvements (Whaley, Brubaker, Otto, & Armstrong, 2006). The outcome measure used to assess for strength may also not have been responsive to show a change in this time. Selection of an alternative strength outcome measure could have been considered. However, this class is currently running and we wanted to replicate the initial screening that was routinely done. As well, static standing balance (as measured by the 4-Stage Balance test) showed no significant change; however, half the participants scored 100% at T1. This ceiling effect clearly limited the amount of change that could be detected at T2. An alternative standing balance measure such as the Functional Reach test (Weiner, Duncan, Chandler, & Studenski, 1992) may have been a more sensitive test.

The clinical implications of these findings may lead therapists to further explore how to address the frequency and challenge level of intervention delivered in a group setting, as highlighted by the class questionnaire. Reviewing and ensuring the most appropriate outcome measures are used would also help with capturing change. From a research perspective, there may be other questions that do not form part of the clinical situation and that the physical exercise classes will not answer but that could be interesting in the research environment. For example, exploring the impact of these classes on the participants' confidence, independence and participation in meaningful activities would be a natural extension of this study.

## CONCLUSION

In summary, this study found that, for people living with a neurological condition, participating in a small amount of CCT improved their mobility. People participating in these CCT classes also valued them and perceived benefits from them. This study also provides a real world example of performing clinically based research for the benefit of both patient and clinician.

## KEY POINTS

1. A small amount of targeted exercise can improve mobility for people with neurological conditions.
2. Clinically based research is possible with minimal cost.
3. Circuit class groups are enjoyed by participants and provide a low cost alternative physiotherapy intervention.


## DISCLOSURES

No funding was obtained for this study. One of the authors is the Director of the private rehabilitation clinic (provider of intervention).

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# Appendix A

Participant ID:_____ Date: _____

**Circuit Group Class Questionnaire**

1. In thinking about the period since you started this **most recent 6 week course**, please rate the following:

| | Poor | Average | Good | Excellent | Not Applicable |
|---|---|---|---|---|---|
| Challenge of classes | | | | | |
| Frequency of classes | | | | | |
| Organisation of classes | | | | | |
| Skill level of staff | | | | | |
| Amount of assistance provided by staff | | | | | |
| COMMENTS | | | | | |

2. What days and times would suit you the best? Check all that apply.

| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| Mornings | | | | | | |
| Afternoons | | | | | | |
| Evenings (after 4pm) | | | | | | |
| COMMENTS | | | | | | |

3. In thinking about your participation in the group class for this **most recent 6 week course**, have you noticed changes in the following?

| | Better | Same | Worse |
|---|---|---|---|
| Balance | | | |
| Self confidence | | | |
| Physical well being | | | |
| Fitness level | | | |
| Strength | | | |
| Ability to get out and about | | | |
| Socialisation | | | |
| Other: | | | |
| COMMENTS | | | |

4. What do you like most about the group class?

5. What would you like to see changed about the group class?