Walking to the shops: desired but how doable?

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Abstract

The average community walking distance is often cited to be 300 metres and increases if more than one task is performed. On average, disabled older adults complete one task per trip whereas healthy older adults undertake two tasks per trip. There is no published data for community distances in New Zealand. The purpose of this study was to describe community walking distances in the greater Auckland region. Thirty supermarkets were randomly selected. Standardised distances for single-task (supermarket) and two-task (supermarket and pharmacy) were measured using an odometer. Descriptive statistics were used to calculate mean, standard deviation and range of the single-task and two-task distances. Paired t-tests were used to test the difference in distance means. The level of association between each of the distances and number of people living in the suburb was calculated using Pearson's correlation coefficient. Mean distances were 393 (±113) metres and 871 (±276) metres for single-task and two-task distances respectively, which were significantly different (p=0.000). No to low correlation was found between the number of people living in the suburb and the single-task (r=0.186) and two-task (r=0.340) trip distances respectively. The minimum walking distances in New Zealand are greater than previously reported. Assessment and training of distances of 400-1000 metres is recommended for individuals who wish to walk in community locations.

Keywords: walking, environment, disabled persons, rehabilitation

Introduction

Physiotherapy has recently become more focussed on improving walking in community environments, which has been identified as important to patients with a range of neurological conditions (Lapointe et al 2001, Lord et al 2004). Eight domains that are essential to community mobility have been proposed (Patla and Shumway-Cook 1999, Shumway-Cook et al 2003), of which distance and time factors are one domain. Indeed, distance has long been recognised as an important factor for attainment of community mobility. Early textbooks recommended that individuals attain at least 300 metres for community ambulation (Shumway-Cook and Woollacott 1995) based on a key study published 25 years ago (Lerner-Frankiel et al 1986). This study identified a mean community distance of 300 metres, which was based on the distance from a disabled parking space to each of the following destinations: supermarket, pharmacy, bank, doctor's office, post office and a department store in a shopping mall. Two similar studies were conducted subsequently with comparable results (Cohen et al 1987, Robinett and Vondran 1988), but further noted community distances were positively related to the size of the community, so that cities had greater distances than small towns (Robinett and Vondran 1988). These three studies were conducted in the United States over 20 years ago and are still regarded as seminal studies.

In New Zealand, a recent study that measured speed of individuals with stroke described 600 metres as the shortest possible route in a small suburban shopping centre that included entering the supermarket and a

pharmacy (Taylor et al 2006). This statement may indicate that distances for community ambulation have either been underestimated, are greater in New Zealand or have increased over time. In New Zealand, people with stroke identified shopping centres as the most frequently visited destination (Lord et al 2004), a similar finding to older adults in the United States who identified a bank, doctor's office, supermarket, pharmacy and department store as essential community destinations (Brown et al 2010).

Distances have also been shown to be dependent on the number of tasks undertaken whilst in the community. While older adults with disabilities engage in only one activity per community trip, healthy older adults, on average, undertake two activities per community visit (Shumway-Cook et al 2002).

There is a need to determine usual community distances that are current and relevant to New Zealand communities. It is anticipated these data will facilitate appropriate goal setting and focus walking retraining in rehabilitation.

Methods

The specific aims of this project were to:

1. Measure shortest single-task distance (disabled carpark to supermarket return) in 30 settings randomly selected in the Auckland region.

2. Measure shortest two-task distance (disabled carpark to supermarket, chemist, return to carpark) in the same 30 settings in the Auckland region.
3. Test level of association between distances (shortest single-task distance and shortest two-task distance) and the number of people living in the suburb.

The eighty-five supermarkets (New World, Pak ‘n Save, Countdown, Foodtown) of the greater Auckland region were ordered using computer-generated random numbers and the first 30 supermarkets on the list were selected and contacted to invite participation. In the event that a supermarket declined participation, the supermarket directly following on the list was invited to participate.

Distances were measured at each supermarket using a handheld odometer that measured distance in metres. Following a distance measurement protocol based on previous studies (Cohen et al 1987, Lerner-Frankiel et al 1986, Robinett and Vondran 1988), a ‘single-task’ distance was measured from the nearest disabled carpark, to the closest accessible supermarket entrance, through half the total number of available aisles and the checkout to return to the disabled carpark. A ‘two-task’ measurement followed a similar protocol to the single-task distance, however the distance included all of the aisles, exiting through the checkout into the closest pharmacy, up to the prescription counter and then returning to the disabled carpark. If the disabled carpark was not the nearest parking space, the carpark closest to the store

entrance was used as the starting and finishing point. If there was no pharmacy within 500 metres of the supermarket, two separate measurements were made. In this instance, the route was modified to return to the carpark, and then travel by car to the nearest pharmacy (this distance was not measured) and walking measurements resumed from the closest or disabled carpark, into the pharmacy to the prescription counter and return to the carpark. In this instance, the two-task distance was derived from adding the two separate walking measurements. The presence of curbs and crossings within the distance measurement and the proximity of the pharmacy were recorded.

The number of people living in each suburb, in which a supermarket was located, was ascertained from the New Zealand 2006 Census data (New Zealand Government 2006).

Analysis

Descriptive statistics were used to calculate mean, standard deviation and range of the single-task and two-task distances. The Shapiro-Wilk test was used to test each distance for normal distribution. Paired t-tests were used to test the difference in the means between the two distances. The level of association between each of the distances and community population was calculated using Pearson’s correlation co-efficient.

Results

The thirty randomly selected supermarkets with the single-task and two-task distances are shown in

Table 1. Mean distances were 393 (±113) metres and 871 (±276) metres for single-task and two-task distances respectively and a normal distribution was confirmed for both (p=0.525 and p=0.327 respectively). The mean distances of the two conditions were significantly different (p=0.000). No correlation was found between the number of people living in the suburb and the single-task trip distance (r=0.186). A low correlation was found between the number of people living in the suburb and the two-task trip distance (r=0.340). Twenty-four pharmacies (80%) were within 500 metres of the supermarket. Curbs and pedestrian crossings were present at 12 (40%) and 14 (47%) locations respectively.

Discussion

The average minimum community distance in Auckland is 393 metres, but the distance is nearly 900 metres if more than one task per trip is completed. This finding confirms that actual community walking distances within the greater Auckland region are further than 300 meters previously reported (Cohen et al 1987, Lerner-Frankiel et al 1986, Robinett and Vondran 1988). It is likely that both distances are conservative estimates. Only half of the aisles were measured during the single-task distance, which likely under-represents a typical supermarket visit where a shopper may need to walk up and down multiple aisles in order to obtain items. Even though all the aisles were included in the two-task trip distance, it is still conceivable this measurement fails to reflect the realities of shopping such as forgetting or not being able to locate items, which will inflate the total distance. In addition, if individuals

undertake more than two tasks per trip, the minimum distance is likely to be farther.

We assumed that people travel by car so all measurements were taken from the closest disabled carpark, based on the finding that 58% of people with stroke are dependent and tend to visit the community with assistance (Lord et al 2004). However, we need to acknowledge that a limitation of this study is not accounting for the use of public transport. We suggest that an individual who uses public transport is likely to walk a greater community distance due to the additional distance walking to and from bus or train stops, again highlighting how conservative our findings are.

It has been recommended that training of longer distances should be included in rehabilitation (Lapointe et al 2001, Shumway-Cook et al 2003), particularly because cardiovascular fitness of patients with neurological conditions is generally poor (Kelly et al 2003). This study supports the need for training longer distances and suggests that distances of 400 to 1000 metres is needed to achieve meaningful community distances, which is considerably farther than is usually assessed and trained in rehabilitation (Mudge and Stott 2007).

Much time in therapy is spent improving gait velocity, negotiating curbs and other perceived obstacles to community walking (Corrigan and McBurney 2008). It was interesting to find that curbs and pedestrian crossings were present at less than half the locations, which may reflect improved accessibility awareness and a reduction in environmental barriers (Clarke et al

2008). Furthermore, unlike distance, individuals can choose to avoid environmental barriers such as curbs and crossing streets (Shumway-Cook et al 2003). It may be worth assessing whether individual patients encounter such barriers in their specific environments in order to target rehabilitation more specifically. An outcome measure such as the Facilitator and Barriers Survey may be helpful for this purpose (Gray et al 2006).

While walking to the supermarket and the pharmacy are considered to be 'essential' tasks , it should be remembered that ambulating in the community may involve other locations of importance, such as the cemetery, library, restaurant or visiting someone in hospital (Brown et al 2010). With the exception of a hospital visit, these community destinations tend to have shorter community distance requirements in the United States (Brown et al 2010). It would be interesting and important to extend this study by including 'non-essential' community destinations in New Zealand.

Contrary to previous findings (Robinett and Vondran 1988), our data indicate that minimum walking distances required to access basic needs in the greater Auckland region is not related to the number of people living in the suburb. However, Robinett and Vondran's study (1988) sampled discrete communities of much larger populations (between 10,000 and 90,000), whereas our study sampled suburban supermarkets in only one city. Although we equated suburbs with communities for the testing of association, the lack of distinction between edges of suburbs of one city is likely to account for our finding of lack of association. It is still possible that walking distances of rural New Zealand

towns are less than Auckland (New Zealand's biggest city) and this would be worth investigating.

Engagement in community mobility is complex and influenced by many environmental factors other than distance (Corrigan and McBurney 2008). Other characteristics of a typical shopping outing such as negotiating crowded places, pushing a trolley, external physical loads, stopping and starting, changing directions and other concurrent tasks all may impact the success of walking in the community and it needs to be acknowledged that this study solely focused on the distance requirements for walking in the community.

Conclusion

Community walking distances appear to have been previously underestimated. The average minimum distance in Auckland is 400 metres, but is over double if more than one task per trip is performed. The implication for physiotherapy is that assessment and training distances in the magnitude of 400-1000 metres is a conservative goal for patients who wish to walk in community locations. Curbs and pedestrian crossings were present in only half of the locations in this study and individuals may avoid these types of environmental barriers so assessment of an individual's unique environmental features is also recommended.

Key Points

- The minimum community walking distance in New Zealand for a single task is 393 metres and 871 metres for two tasks.
- Assessment and training of distances between 400 and 1000 metres is recommended for individuals who wish to walk in community locations in New Zealand.
- Other environmental features vary based on location, so a specific environmental assessment is warranted to specifically target physiotherapy interventions for individuals with a goal of walking in community locations.

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Table 1. Characteristics of supermarkets

Supermarket location	Single-task distance (m)	Two-task distance (m)	Suburb population	Encountered		Pharmacy within 500m
				Curbs	Crossing	
Birkenhead	523	945	4005			✓
Blockhouse Bay	245	808	5859	✓	✓	✓
Browns Bay	198	426	3978			✓
Clendon	286	672	7962			✓
Glen Innes	480	781	13206	✓	✓	
Glenfield	400	733	8604			
Greenlane	451	1621	8049			✓
Grey Lynn	428	935	6498	✓		
Henderson	265	805	11700	✓	✓	✓
Highland Park	476	1078	5064		✓	✓
Howick	350	1228	8463	✓	✓	✓
Kelston	574	922	4257		✓	✓
Lincoln	536	1393	11700	✓	✓	✓
Mangere	286	604	8511	✓		✓
Mangere South	291	726	6789			✓
Manukau	435	986	3009			✓
Manurewa	372	660	6192			✓
Massey	292	653	6264	✓	✓	✓
Mount Albert	464	987	5640			
Mount Roskill	348	526	5301			
Mount Wellington	619	1092	12333			✓
Northcote	353	833	4122	✓	✓	✓
Orewa	266	531	7326		✓	✓
Papakura	487	1288	15096		✓	✓
Point Chevalier	204	498	9255			✓

Pukekohe	412	899	13281			
Pukekohe South	519	1066	13281	✓	✓	✓
St Lukes	481	734	4848		✓	✓
Takapuna	440	698	2811	✓		✓
Waiuku	304	1002	7725	✓	✓	✓