

# Perceived Barriers, Benefits, and Motives for Physical Activity: Two Primary-Care Physical Activity Prescription Programs

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This study examined whether perceived barriers, benefits, and motives for physical activity differed based on allocation to 2 different types of primary-care activity-prescription programs (pedometer-based vs. time-based Green Prescription). Eighty participants from the Healthy Steps study completed a questionnaire that assessed their perceived barriers, benefits, and motives for physical activity. Factor analysis was carried out to identify common themes of barriers, benefits, and motives for physical activity. Factor scores were then used to explore between-groups differences for perceived barriers, benefits, and motives based on group allocation and demographic variables. No significant differences were found in factor scores based on allocation. Demographic variables relating to the existence of chronic health conditions, weight status, and older age were found to significantly influence perceived barriers, benefits, and motives for physical activity. Findings suggest that the addition of a pedometer to the standard Green Prescription does not appear to increase perceived motives or benefits or decrease perceived barriers for physical activity in low-active older adults.

**Keywords:** Green Prescription, older adults, aging

Regular physical activity for individuals age 65 years and older can help facilitate healthy aging by lowering the risk of chronic disease, disability, and dependency in later life (DiPietro, 2001; McMurdo, 2000; Nelson et al., 2007). A large number of older adults, however, are low-active or sedentary, engaging in levels of physical activity insufficient for health gain (Drewnowski & Evans, 2001; Mummery, Kolt, Schofield, & McLean, 2007; Westerterp & Meijer, 2001). Recent data from a New Zealand population-based survey indicated that 66% of older adults did not meet national physical activity guidelines and 24% of older adults were classified as sedentary (Mummery et al., 2007; Sport and Recreation New Zealand, 2008a).

The Green Prescription program was developed as an initiative to address low levels of physical activity on a nationwide basis in New Zealand (Pringle, 1998). It is a primary-care intervention whereby physicians and practice nurses

(registered nurses who work at a primary-care practice) prescribe physical activity to low-active and sedentary patients, including those who have a stable medical condition. The Green Prescription is based on national guidelines that recommend achieving 30 min of moderate-intensity physical activity on 5 or more days of the week. A Green Prescription runs for a 3-month period, during which time the patient receives monthly telephone-based support for physical activity (Sport and Recreation New Zealand, 2006). A number of randomized controlled trials have demonstrated the efficacy of the Green Prescription in increasing physical activity and health-related gain in previously low-active and sedentary individuals, including older adults (Elley, Kerse, Arroll, & Robinson, 2003; Kerse, Elley, Robinson, & Arroll, 2005; Kolt et al., 2012; Lawton et al., 2008; Swinburn, Walter, Arroll, Tilyard, & Russell, 1998).

Research also indicates that individuals receiving the Green Prescription perceive the program to be helpful in increasing their physical activity (Elley, Dean, & Kerse, 2007; Sport and Recreation New Zealand, 2007). This may reflect the fact that the Green Prescription is individually tailored to accommodate for a variety of demographic factors. This is important, as older adults are a diverse group and there is strong evidence that demographic factors relating to gender, ethnicity or cultural factors, age, weight status, and the existence of chronic health conditions can influence perceived barriers, benefits, and motives for physical activity initiation and maintenance (Belza et al., 2004; Kalavar, Kolt, Giles, & Driver, 2004; Kirkby, Kolt, Habel, & Adams, 1999; Kolt, Driver, & Giles, 2004). To encourage physical activity participation in later life, information is required about the subjective barriers and motives that older adults as a group can face, to ensure that interventions such as the Green Prescription are successful on a long-term basis and help confer health-related benefits (Cohen-Mansfield, Marx, & Guralnik, 2003).

Evidence suggests that health-related benefits can be conferred by habitual physical activity that encompasses short bouts accumulated throughout the day, ultimately reaching the recommended level of 30 min of daily activity (Boreham, Wallace, & Nevill, 2000; Pescatello & Murphy, 1998; Wong, Wong, Pang, Aziah, & Dass, 2003). A pedometer can be used to monitor habitual step-count physical activity. Using a pedometer to monitor one's accumulation of daily physical activity may be a better motivation and adherence tool for older adults than standard time-based goal setting, as a pedometer provides instant (real-time), objective information regarding an individual's activity level (Lauzon, Chan, Myers, & Tudor-Locke, 2008; Van Wormer, 2004).

The current study was a substudy of the larger Healthy Steps study. The Healthy Steps study was a randomized controlled trial designed to compare the efficacy of a modified pedometer-based versus standard time-based Green Prescription in increasing and maintaining physical activity in 330 low-active, community-dwelling older adults. The aims of the current study were threefold: first, to identify perceived barriers, benefits, and motives for physical activity as encountered during the course of the Healthy Steps intervention; second, to determine if perceived barriers, benefits, and motives differed based on allocation to either the pedometer-based or time-based Green Prescription; and third, to examine if perceived barriers, benefits, and motives differed as a function of demographic factors pertaining to gender, age, chronic health conditions, and weight status. We hypothesized that participants in the pedometer-based intervention would report more motives and benefits and fewer

barriers for physical activity participation. We also hypothesized that participants with multiple chronic health conditions and those who were overweight or obese would perceive more barriers and fewer motives for physical activity participation.

## Methods

### Design and Participants of the Current Study

The current study was cross-sectional in design. Eighty participants were recruited from the larger Healthy Steps study to take part in the current study. Recruitment criteria are described elsewhere (Kolt et al., 2012; Kolt et al., 2009). In brief, to have been eligible to participate in the larger Healthy Steps study, potential participants had to be 65 years or older, engage in less than 150 min of physical activity per week, not have health conditions that would contraindicate physical activity, be community-dwelling, and reside in the Auckland, New Zealand, region over the 12-month period of the Healthy Steps study. Table 1 provides a summary of participant demographic information.

### The Healthy Steps Study

The Healthy Steps study was a 12-month randomized controlled trial with a 3-month intervention period (see Kolt et al., 2009, for a description of the intervention). Briefly, participants received one of two physical activity prescriptions from their physician. Those who received the standard time-based Green Prescription were

**Table 1 Participant Demographic Information**

	Time-based, <i>N</i> = 40		Pedometer-based, <i>N</i> = 40	
	<i>n</i>	(%)	<i>n</i>	(%)
Gender				
male	14	(35)	18	(45)
female	26	(65)	22	(55)
Age (years)				
65–75	23	(57)	32	(80)
76+	17	(43)	8	(20)
Chronic health conditions				
0	3	(7)	4	(10)
1 or 2	24	(60)	26	(65)
3 or more	13	(33)	10	(25)
Weight status				
normal weight	11	(27)	4	(10)
overweight	21	(53)	20	(50)
obese	8	(20)	16	(40)

instructed to engage in their prescribed physical activity for a set period of time on most or all days of the week (e.g., a daily 30-min session of walking). Participants in the pedometer-based group received a pedometer (Yamax Digi Walker SW-200) with their Green Prescription and were instructed to accumulate steps (that could be monitored by their pedometer) through their prescribed activity, with an emphasis on walking (e.g., using the stairs instead of the elevator). During the 3-month intervention period, participants in both groups received a monthly phone call from the same physical activity counselor (also referred to as a patient support counselor). Phone calls were designed to provide the participant with ongoing external support for physical activity.

## Procedure

At the 12-month follow-up point for the Healthy Steps study (i.e., 9 months after completion of the formal intervention), 40 participants from the time-based Green Prescription group and 40 participants from the pedometer-based Green Prescription group were invited to participate in the current study. To obtain the 80 participants, information sheets detailing the current study were mailed out to the first 106 participants who completed the Healthy Steps study (response rate 75%). Potential participants were contacted by telephone a week after they had received the information sheet to ascertain if they wanted to participate in the current study. The Healthy Steps: Barriers and Motivators to Physical Activity Questionnaire was administered via a telephone interview by a member of the research team who had experience in conducting interviews with older adults. The interviewer read out each question and recorded each participant's responses onto the individual questionnaire for that participant. Questionnaires were coded by identification numbers that were used as part of the participant identification for the larger Healthy Steps study. Informed written consent was obtained from each participant. Ethical approval for the current study was obtained from Auckland University of Technology's ethics committee.

## Measures

***The Healthy Steps: Barriers and Motivators to Physical Activity Questionnaire.*** The Healthy Steps: Barriers and Motivators to Physical Activity Questionnaire was constructed for this study to identify perceived barriers, benefits, and motives for physical activity participation in older adults. The questionnaire contained 13 questions from the Participation Motivation Questionnaire for Older Adults (Kirkby, Kolt, & Habel, 1998; Kirkby et al., 1999), adapted questions from the TeleWalk study (Kolt et al., 2006), and questions from the Sport and Recreation New Zealand Obstacles to Action Survey (Sport and Recreation New Zealand, 2003). The reliability and content validity of the Participation Motivation Questionnaire for Older Adults has been demonstrated to be high in previous studies that examined motives for physical activity participation in older adult populations (Kalavar et al., 2004; Kirkby et al., 1999; Kolt et al., 2004). The TeleWalk study (Kolt et al., 2006) was similar in design to the Healthy Steps study and had a similar sample (i.e., low-active older adults). The Sport and Recreation New Zealand Obstacles to Action Survey (Sport and Recreation New Zealand, 2003) was designed to identify probable barriers to physical activity participation in the adult New Zealand population, which also encompassed older adults.

The Healthy Steps: Barriers and Motivators to Physical Activity Questionnaire consisted of three sections. Section 1 contained 14 questions relating to perceived motives for physical activity participation, Section 2 contained 12 questions relating to perceived beneficial outcomes, and the final section consisted of 26 questions relating to perceived barriers for physical activity participation. Participants were asked to answer questions relating to their physical activity engagement during the course of their Green Prescription program, not their current (i.e., postintervention follow-up) physical activity participation. They were informed that the questions were designed to provide information about how they felt during the time they were participating in the Green Prescription program (e.g., barriers Question 1: "I found it hard to stick to a routine") and also the effect that the Green Prescription had had on their health status (e.g., perceived outcome benefits Question 9: "I now sleep better"). Participant responses were recorded on a 5-point Likert scale that ranged from 1, *strongly disagree*, to 5, *strongly agree*.

To establish the internal reliability of the Healthy Steps: Barriers and Motivators to Physical Activity Questionnaire, Cronbach's alpha coefficients were calculated for each factor and are as follows: motives Factor 1, enjoyment reasons = .66; motives Factor 2, health and medical reasons = .67; motives Factor 3, engagement-based reasons = .52; benefits Factor 1, personal benefits = .85; benefits Factor 2, physical benefits = .70; barriers Factor 1, personal barriers = .73; barriers Factor 2, perceptual barriers = .53; and barriers Factor 3, time constraints = .72. With the exception of motives Factor 3 and barriers Factor 2, the Cronbach's alpha coefficients were adequate. Briggs and Cheek (1986) indicate that with short scales (e.g., scales that have 12 or fewer items), Cronbach's alpha values of .50 can be common.

**Demographic Information.** Demographic information pertaining to participants' gender, age, number of chronic health conditions, and weight status were extracted from the Healthy Steps database. For the purpose of the current study, participants were placed into one of two age categories: 65–75 years of age or 76 years and older. A chronic health condition was defined as a long-term condition or a recurring condition that was biologically based, such as hypertension, arthritis, osteoporosis, cardiovascular disease, and Type II diabetes (Ministry of Health, 2008a). For the purpose of data analysis, chronic health conditions were divided into zero conditions, one or two conditions, and three or more conditions, a process consistent with other studies (Guerin, Mackintosh, & Fryer, 2008; Resnick & Spellbring, 2000). Participants were placed into weight categories based on calculation of body-mass index (BMI). BMI was calculated by weight in kilograms divided by height in meters squared. Three categories were used, these being normal weight with a BMI range from 18.5 to 24.9, overweight with a BMI of 25.0–29.9, and obese with a BMI of 30 or above (Ministry of Health, 2008b).

## Statistical Analysis

Data were analyzed with SPSS version 15.0. Factor analysis was carried out separately for each section of the questionnaire. Principal-components analysis (with varimax rotation) of the Healthy Steps: Barriers and Motivators to Physical Activity Questionnaire was used to group highly correlated items into common themes. Kaiser's criterion and a scree test (Catell, 1966) were used to determine the number of factors to retain (extract) for further investigation. Kaiser's criterion involved only retaining factors that had an eigenvalue of 1.0 or higher.

Factor scores were then calculated so that analysis-of-variance tests could be undertaken to compare groups. Factor scores were calculated by summing the average scores of each item that made up an individual factor (e.g., motives Factor 1, which comprised four motive items) and dividing by the number of items in that factor. One-way analysis of variance was conducted to explore between-groups differences for perceived barriers, benefits, and motives based on factor scores for intervention allocation (i.e., time-based or pedometer-based Green Prescription) and demographic variables (i.e., gender, age, number of chronic health conditions, and weight status).

## Results

This section documents the findings of the factor analysis and analysis of variance for the overall sample ( $N = 80$ ).

### Factor Analysis

***Motives for Participation in Physical Activity.*** Principal-components analysis with varimax rotation identified three factors for the motive items. A label was given to each factor based on the common theme that grouped the items together. Factor 1 related to participants being active for enjoyment reasons (e.g., “I liked being active”) and accounted for 17% of the total variance. Factor 2 was related to participants being active for health and medical reasons (e.g., “I wanted to be physically active to keep my joints mobile”) and accounted for 17% of the total variance. Factor 3 was labeled engagement-based reasons, consisted of items that related to how participants engaged in physical activity for the purpose of wanting to be physically active (e.g., “I wanted to be physically fit”), and accounted for 15% of the total variance (see Table 2).

***Benefits of Physical Activity Participation.*** Principal-components analysis identified two factors for the benefits of physical activity participation. Factor 1 (personal benefits) was related to the perceived personal benefits of physical activity participation (e.g., “I have a new or renewed confidence in myself”) and accounted for 32% of the total variance. Factor 2 related to the perceived physical benefits of physical activity participation (e.g., “I feel fitter”) and accounted for 19% of the total variance (see Table 3).

***Barriers to Participation in Physical Activity.*** Principal-components analysis identified three factors for barrier items. Factor 1 demonstrated how personal barriers can impede physical activity (e.g., “I did not feel motivated”), accounting for 16% of the total variance. Factor 2 centered on the theme of perceptual barriers for physical activity (e.g., “I felt too old to be physically active”), which also accounted for 16% of the total variance. The final factor related to how time constraints can act as a barrier to physical activity engagement (e.g., “I had no time due to family responsibilities”), accounting for 13% of the total variance (see Table 4).

### Analyses of Variance

In relation to perceived motives for participation in physical activity, there was one significant difference in relation to motives Factor 2: health and medical reasons and chronic health conditions, whereby participants with three or more chronic

**Table 2    Factor Loadings of Motives for Physical Activity Participation**

<b>Motive</b>	<b>Factor Loadings</b>		
	<b>1</b>	<b>2</b>	<b>3</b>
Factor 1: enjoyment reasons			
The phone support I received helped keep me motivated.	.66		
I liked being active.	.58		
I liked doing something I was good at.	.53		
I wanted to be physically active.	.58		
Factor 2: health and medical reasons			
I wanted to be physically active to alleviate pain.		.67	
I wanted to be physically active to keep healthy.		.63	
I wanted to be physically active for medical reasons.		.58	
I wanted to be physically active to keep my joints mobile.		.42	
Factor 3: engagement-based reasons			
I wanted to be physically fit.			.50
The Green Prescription provided me with an opportunity for social interaction or a way to meet new people.			.47
I liked getting out of the house.			.45
I wanted the challenge.			.45
I had someone to walk/exercise with.			.43
My family/friends/colleagues wanted me to be physically active.			.43

**Table 3    Factor Loadings of Benefits for Physical Activity Participation**

<b>Benefit</b>	<b>Factor Loadings</b>	
	<b>1</b>	<b>2</b>
Factor 1: personal benefits		
I feel more in control of my life.	.89	
I have a new or renewed self-confidence.	.87	
I feel better about myself.	.83	
I feel happier.	.75	
I feel that my memory has improved.	.62	
Factor 2: physical benefits		
I have more energy.		.76
I feel fitter.		.73
I feel more relaxed.		.60
I have maintained my weight.		.55
I felt that the Green Prescription helped to improve my health.		.53
I have lost weight.		.50

**Table 4    Factor Loadings of Barriers for Physical Activity Participation**

Barrier	Factor Loadings		
	1	2	3
Factor 1: personal barriers			
I did not feel motivated.	.71		
I found it hard to stick to a routine.	.69		
Physical activity takes too much effort for me.	.66		
I experienced pain.	.62		
I always felt too tired.	.60		
My health problems kept me from being physically active.	.47		
Factor 2: perceptual barriers			
Others discouraged me from being physically active.		.83	
I felt too old to be physically active.		.64	
It was of no interest to me.		.53	
Fear of injury kept me from being physically active.		.45	
I found my neighborhood to be unsafe for walking.		.36	
Factor 3: time constraints			
I had no time due to work.			.85
I had no time due to family responsibilities.			.76
Housework kept me from being physically active.			.60
I could not find the time to be physically active.			.52

health conditions ( $3.9 \pm 0.42$ ) were motivated to engage in physical activity for health and medical reasons compared with those who reported no chronic health conditions ( $3.3 \pm 0.47$ ),  $F(2, 77) = 4.3$ ,  $p = .02$ , eta-squared = .02.

In relation to perceived benefits of physical activity participation, based on intervention allocation and demographic factors, there were a number of significant differences for perceived benefits as a function of both age and number of chronic health conditions. Analysis of variance indicated that participants age 76 years and older ( $3.4 \pm 0.46$ ) perceived that they received more personal benefits (benefits Factor 1) as a result of engaging in physical activity than did participants in the 65- to 75-year age group ( $3.1 \pm 0.61$ ),  $F(1, 78) = 6.2$ ,  $p = .02$ , eta-squared = .01. Compared with participants with no chronic health conditions ( $2.8 \pm 0.60$ ), participants with three or more chronic health conditions perceived that they experienced more personal benefits (benefits Factor 1) as a result of engaging in physical activity ( $3.5 \pm 0.41$ ),  $F(2, 77) = 6.9$ ,  $p = .002$ , eta-squared = .02. One significant difference was found for benefits Factor 2: physical benefits, whereby older participants (76 years and older;  $3.6 \pm 0.47$ ) reported they experienced more physical benefits as a result of being physically active than did younger participants (age 65–75 years;  $3.3 \pm 0.51$ ),  $F(1, 78) = 5.2$ ,  $p = .03$ , eta-squared = .01.

In relation to perceived barriers to participation in physical activity based on intervention allocation and demographic factors, significant differences were found



in relation to barriers Factor 1: personal barriers and number of chronic health conditions reported and weight status. Participants with three or more chronic health conditions ( $3.0 \pm 0.63$ ) perceived more personal barriers for physical activity than did those who reported no chronic health conditions ( $2.4 \pm 0.57$ ),  $F(2, 77) = 3.9$ ,  $p = .2$ , eta-squared = .02. Compared with normal-weight participants ( $2.5 \pm 0.55$ ), obese participants perceived more personal barriers for physical activity ( $2.9 \pm 0.61$ ),  $F(2, 77) = 3.4$ ,  $p = .04$ , eta-squared = .01.

## Discussion

Contrary to what we had hypothesized, when compared with participants in the time-based condition, participants in the pedometer-based condition did not report more motives or benefits or fewer barriers for physical activity. Our finding is consistent with some but not all studies examining the use of pedometers in promoting increases in physical activity. For example, Mutrie, Wright, Wilson, and Gunnyeon (2004) found that the addition of a pedometer acted as an external aid for physical activity rather than a tool of motivation to achieve 30 min of moderate physical activity on most days of the week in a study with participants age 40 years and older. Specifically, participants in Mutrie et al.'s study who wore a sealed pedometer had step counts similar to those of participants who had access to their daily step-count reading. Participants in both conditions set weekly goals aimed at accumulating 30 min of walking on most days. It therefore appeared that weekly goal setting helped participants increase their walking with or without the aid of pedometer step-count information in Mutrie et al.'s study. Participants in the Healthy Steps study also set goals to accumulate 30 min of physical activity on most days of the week regardless of group allocation, so the lack of effect of the pedometers on the perceptions of the participants in the current study would appear consistent with that found by Mutrie et al.

Pedometer group-based interventions that have used social-support mechanisms with previously low-active individuals including older adults (e.g., group-based support, informational meetings, and group-based physical activities) have been found to be efficacious (Chan, Ryan, & Tudor-Locke, 2004; Croteau, 2004; Jones, Richeson, Croteau, & Farmer, 2009). It appears that pedometer interventions that allow for social contact with other pedometer wearers allow for social connections via a shared sense of purpose (i.e., increasing physical activity through step-count feedback). There is also a sharing of information relating to common barriers encountered and strategies on how to overcome such barriers to physical activity (Jones et al., 2009; Lauzon et al., 2008). The Healthy Steps study was an individually tailored intervention. While some participants may have engaged in group-based physical activities for their Green Prescription (e.g., attending a tai chi class), both time-based and pedometer-based Green Prescriptions were predominantly for individual activities (e.g., walking).

A limitation of the current study (and some earlier studies) is that we did not obtain information from participants about the daily problems they may have encountered with their pedometer (e.g., forgetting to wear it, misplacing or losing it, continuously dropping it if they could not securely attach it) during the course of the intervention. It is therefore possible that the relative lack of effect of the pedometer on the perceived barriers, benefits, and motives to physical activity in this study reflects some of the challenges older adults may face when using pedometers.

In addition, previous studies (Elley et al., 2003; Lawton et al., 2008; Swinburn et al., 1998) have demonstrated that the components of the standard Green Prescription (e.g., physician-endorsed and -prescribed physical activity with ongoing telephone support) alone are effective in supporting physical activity without the addition of a pedometer (e.g., ongoing access to step-count information). The Green Prescription is underpinned by the transtheoretical model of behavior change (Prochaska & Marcus, 1994), in which the telephone-based counseling that individuals receive is based on their current stage of readiness for physical activity. Participants in an earlier study (Elley et al., 2007) discussed how they found the individual tailoring aspect of the Green Prescription beneficial in aiding their physical activity. The standard Green Prescription may be viewed as highlighting benefits, promoting motives, and reducing barriers to physical activity, as the transtheoretical model uses aspects of motivational interviewing. The patient-support counselor helps individuals identify and problem-solve barriers to physical activity participation. The counselor also discusses the positive aspects of being physically active. Perceived social support and ongoing social contact through a telephone counseling component have been reported to be strong factors in helping older adults adhere to physical activity (Elley et al., 2007; Gillis, Grossman, McLellan, King, & Stewart, 2002; Kolt et al., 2006). In the case of the Green Prescription program, there is also evidence that the telephone counseling acts as an external motive for physical activity (Elley et al., 2007; Sport and Recreation New Zealand, 2008b).

Compared with younger age groups, older adults' perceived barriers, benefits, and motives for physical activity can be strongly influenced by demographic factors such as chronic health conditions and increasing age (Belza et al., 2004; Guerin et al., 2008; Kalavar et al., 2004; Kolt et al., 2004). Both time-based and pedometer-based physical activity were perceived to be beneficial in helping participants manage their chronic health conditions. The existence of multiple chronic health conditions was reported as a stronger motive for physical activity by participants who had three or more chronic health conditions than it was by those who reported none. This finding appears consistent with the literature, wherein physical activity for health and medical reasons has been reported as being a strong motive for physical activity initiation and adherence in older adults (Belza et al., 2004; Kirkby et al., 1999; Mathews et al., 2010; Newson & Kems, 2007; Schutzer & Graves, 2004). While this may be seen as a circular argument, as individuals without multiple chronic health conditions would not need to engage in physical activity to manage multiple chronic health conditions, the current study, as well as previous research (Kirkby et al., 1999; Kolt et al., 2004), found that some older adults engage in physical activity to maintain their health and their mobility (e.g., to keep their joints mobile) irrespective of whether they have a chronic health condition.

Participants who had three or more chronic health conditions and those who were age 76 years and older perceived that they experienced more personal benefits (e.g., renewed self-confidence, feeling happier) as a result of engaging in physical activity than did participants who had no chronic health conditions and those who were in the young-old age group (65–75 years). Participants in the oldest age group (76 years and older) perceived that they experienced more physical benefits as a result of being active than did participants age 65–75 years of age. They perceived physical benefits related to improved health status, weight maintenance, and feeling fitter. An earlier study (Resnick & Spellbring, 2000) found that older adults who experienced improved physical and psychological health as a result of regular

physical activity via walking were more likely to adhere to a 6-month walking program, regardless of age or health conditions.

In terms of perceived psychological benefits, participants in Resnick and Spellbring's (2000) study reported subjective feelings of happiness and feeling good. They felt they had accomplished something by engaging in the walking program, and thus felt an "inner satisfaction with themselves" as a result of engaging in and completing the walking program. Similar perceived benefits of participating in physical activity were also evident in the current study (i.e., "feeling happier," "more in control of my life," "having a renewed self-confidence in myself," and "feeling relaxed") as a result of participating in the Healthy Steps Green Prescription program for both old-old participants (>76 years) and those who had multiple chronic health conditions.

Although participants with three or more chronic health conditions had stronger motives and perceived more benefits from physical activity than did those with no chronic health conditions, they also perceived more personal barriers for physical activity participation. Personal barriers for physical activity for participants with multiple chronic health conditions were centered on health and medical factors (e.g., experiencing pain when engaging in physical activity). Two other studies (Mathews et al., 2010; Newson & Kemps, 2007) also reported that health and medical factors acted as both motives and barriers for physical activity in older adults. It is strongly argued (Newson & Kemps, 2007) that in some cases older adults may be motivated to engage in physical activity to help manage chronic health conditions, although, at the same time, their medical conditions may limit their ability to engage in regular physical activity.

Compared with normal-weight older adult participants, obese participants perceived there to be more personal barriers for physical activity. Such barriers were centered on health and medical reasons and motivational issues. Research indicates that older adults who are obese or overweight are more likely to be inactive, as their excess weight limits their physical functioning (Bruce, Fries, & Hubert, 2008; Milner, 2005). Daily tasks that include walking, reaching, and bending become difficult to perform and thus take more energy and effort (Bruce et al., 2008; Milner, 2005). Research shows that older adults who are obese (BMI >30) and overweight (BMI >25–29.9) are more likely to have mobility problems and chronic health conditions (e.g., diabetes, osteoarthritis and cardiovascular problems) than their normal-weight peers (BMI 18.5–24.9; Milner, 2005; Shah, Wingcum, Lambert, & Villareal, 2008; Yeom, Fluery, & Keller, 2008). There is some evidence that pedometer step-count detection and accuracy may be compromised for obese individuals, as a protruding stomach affects how a pedometer can be placed at the individual's waist (Crouter, Schneider, & Bassett, 2005; Swartz, Bassett, & Moore, 2003). In relation to the current study, if obese participants had low step counts as result of being less physically active because of their excess weight and/or because of inaccurate step-count recordings, these participants may have been less inclined to view their pedometer as a motivational tool to aid their physical activity.

## Strengths and Limitations

A strength of the current study is that it examined perceived barriers, benefits, and motives for physical activity in the context of an existing nationwide physical activity program that had been modified to use with older adults. In relation to

study limitations, the adequacy of the study questionnaire must be taken into consideration. Although it was constructed for the purpose of the current study, most parts (e.g., questions extracted from the Participation Motivation Questionnaire for Older Adults questionnaire) have been validated in earlier studies that examined motives for physical activity participation in older adults. The current study did not examine the effect that ethnic factors had on perceived barriers, benefits, and motives, as most participants were from the same ethnic group.

## Conclusions and Future Directions

One major benefit of the Green Prescription program is that it is an individually tailored physical activity intervention that can be adapted for a variety of demographic variables such as age, number of chronic health conditions, and weight status. The factor-analysis component of this study demonstrated that initially low-active older adults have a variety of perceived barriers, benefits, and motives to increasing their physical activity levels via programs like the Green Prescription. Future research can investigate the efficacy of a group-based pedometer Green Prescription plan based on demographic factors. For example, the findings from this study indicate that low-active older adults who share similar demographic characteristics (e.g., age 76 or older, having multiple chronic health conditions, or being obese) may benefit from group-based physical activity intervention (e.g., a walking group for low-active obese older adults). When grouped together based on a demographic characteristic such as weight status, physical activity participation may be facilitated for obese individuals, as they are likely to share similar perceived barriers and motives for physical activity. Thus, a group-based setting can provide an avenue whereby such individuals can discuss how they overcome certain barriers to physical activity and, likewise, discuss similar shared motives and benefits experienced from engaging in regular physical activity. The results of this study therefore provide further evidence to support the view that many factors can influence the perceived barriers, benefits, and motives to physical activity in older adults and that there can be considerable between-individuals and between-groups differences in the relative importance of these factors. Clinicians and health-promotion specialists should therefore be aware of these similarities and differences when working with older individuals or groups.

## Acknowledgments

We would like to acknowledge and thank the Healthy Steps participants who took part in this study. The study was funded by the Health Research Council of New Zealand (05/279R) and Sport and Recreation New Zealand.

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