



# Health behaviour change theory meets falls prevention: Feasibility of a habit-based balance and strength exercise intervention for older adults



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## ABSTRACT

**Objectives:** Habit formation is a proposed mechanism for behaviour maintenance. Very few falls prevention studies have adopted this as an intervention framework and outcome. Therefore, we tested feasibility of a theory-based behaviour change intervention that encouraged women to embed balance and strength exercises into daily life routines (e.g., eating, self-care routines).

**Design:** The EASY LiFE study was a mixed-methods, 4-month feasibility intervention that included seven group-based sessions and two telephone calls.

**Main outcome measures:** We obtained performance-based (i.e., Short-Physical-Performance-Battery) and psychological self-report measures (i.e., intention, self-efficacy, planning, action control, habit strength, quality of life) from 13 women at baseline (T1) and 4-month follow-up (T2). We applied the Framework-Method to post-intervention, semi-structured interviews to evaluate program content and delivery.

**Results:** In total, 10 of 13 women completed the program ( $M_{age} = 66.23$ ,  $SD = 3.98$ ) and showed changes in their level of action control [mean difference<sub>T1-T2</sub> = 1.7, 95% CI (-2.2 to -0.8)], action planning [mean difference<sub>T1-T2</sub> = 0.8, 95% CI (-1.1 to -0.2)], automaticity [mean difference<sub>T1-T2</sub> = 2.5, 95% CI (-3.7 to -1.2)], and exercise identity [mean difference<sub>T1-T2</sub> = 2.0, 95% CI (-3.2 to -0.8)]. Based on the Theoretical Domains Framework we identified knowledge, behavioural regulation, and social factors as important themes. For program delivery, dominant themes were engagement, session facilitators and group format.

**Conclusion:** The theory-based framework showed feasibility for promoting lifestyle integrated balance and strength exercise habits. Using activity and object-based cues may be particularly effective in generating action and automaticity.

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## Introduction

Health behaviours, such as regular physical activity, are well known to positively affect the health of individuals (Warburton, Nicol, & Bredin, 2006). There are several evidence-based guidelines for regular physical activity across the lifespan that include a

number of recommended components; aerobic, muscle-strengthening, flexibility, and balance exercises (Nelson et al., 2007). In particular, for older adults, balance and strength training programs are an effective way to reduce the risk of falling (Sherrington, Tiedemann, Fairhall, Close, & Lord, 2011), maintain mobility and retain autonomy. However despite substantial knowledge regarding the benefits of regular physical activity, many older adults are not meeting the guidelines for physical activity (Ashe, Miller, Eng, & Noreau, 2009). Importantly even fewer older adults partake of recommended balance and/or strength regimens on a regular basis (Kraschewski et al., 2014; Vezina, DerAnanian,

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Greenberg, & Kurka, 2014). Therefore, comprehensive yet feasible, effective programs need to be developed to increase the uptake. Strategies to sustain participation over the longer term also need to be devised if these programs are to benefit older adult health (e.g., improve quality of life, prevent falls etc.).

*New pathways to physical activity promotion among older adults: is less the key to more?*

One promising pathway to promote the uptake and maintenance of physical activity among older adults is to embed activities into daily life. A decline in physical functioning can limit older adults' engagement in physical activity. Thus, it seems imperative to shift attention away from a singular focus on moderate to vigorous physical activity (MVPA) towards acknowledging the potential benefits of simple, low intensity, short-lived activities (i.e., short duration bouts) that can be easily integrated into the lives of older people (e.g., in convenient settings such as at home or immediate neighbourhoods). This may be key to increased uptake and maintenance of physical activity behaviours for older people (Sparling, Howard, Dunstan, & Owen, 2015; White, Ransdell, Vener, & Flohr, 2005). Beginning with "non-exercise activity" (Manns, Dunstan, Owen, & Healy, 2012) and encouraging small, incremental changes (Ashe et al., 2015) can increase experiences of mastery which, in turn, contributes to continuous behaviour engagement and long-term maintenance.

*Daily routines as cues to action: putting habit into older adults' health promotion practice*

Habit formation is a proposed mechanism that supports maintenance of health behaviours. It is particularly desirable for older adults, as it relaxes the demands imposed on memory processes and attention (Danner, Aarts, & de Vries, 2007). In essence, a behaviour is habitual if it exhibits features of automaticity. That is, it is performed efficiently, without awareness, control, and potentially without intention (Bargh, 1994). Similar to other motivational-volitional theories of health behaviour change (e.g., integrated behaviour change model, Hagger & Chatzisarantis, 2014; health action process approach, Schwarzer, 2008), the habit formation framework (Lally & Gardner, 2013) proposes that health practitioners should initially focus on motivating individuals, then support them to translate this intention into action (e.g., through use of action planning, (Hagger & Luszczynska, 2014)). Once motivated, habitual behaviour gradually develops if a person repeats that same behaviour (e.g., one-leg stand) in an unvarying context over and over again (e.g., while brushing teeth) thereby strengthening a mental representation of that cue-behaviour association. Ultimately, a person can rely on contextual cues rather than conscious self-regulation to initiate a behaviour (i.e., automatic process; Lally & Gardner, 2013; Neal, Wood, & Quinn, 2006; Verplanken & Melkevik, 2008). Encountering the environmental cue then becomes sufficient to trigger the previously established cue-behaviour chain.

A novel practical contribution of the lifestyle integrated physical activity approach is that motivated individuals are explicitly encouraged to anchor their physical activities around existing, daily events (e.g., seeing a kettle, being at the grocery store) or activities such as household, eating (Lally, Van Jaarsveld, Potts, & Wardle, 2010) or self-care activities (Judah, Gardner, & Aunger, 2013) rather than specific times (e.g., Fleig, Kerschreiter, Schwarzer, Pomp, & Lippke, 2014; Sniehotka, Scholz, & Schwarzer, 2005). Individuals are encouraged to do so by consistent and repeated practice (i.e., behaviour change strategy habit formation), and also by means of action planning to obtain a clear mental representation of the cue-response link. Theoretically, event and activity cues should be particularly beneficial for promoting context-consistent

behaviour repetitions as individuals encounter them very frequently (i.e., every day) and in close proximity (i.e., in home-based environment or close neighbourhood). Most importantly, in comparison to time-based cues, such external cues do not require 'self-initiated constant monitoring' (Judah et al., 2013, p. 3; McDaniel & Einstein, 2000).

We previously tested feasibility for this lifestyle-integrated, habit-based approach within the Everyday Activity Supports You (EASY) intervention in women at retirement age (Ashe et al., 2015). Our group-based program focused on establishing daily routines (e.g., shopping, household activities) as cues to physical activity (e.g., utilitarian activities of daily living and walking) to maximize habit formation. In our feasibility study, we noted a significant difference between groups in daily activity (steps/day), and selected health outcomes (weight and diastolic blood pressure) at six months that favoured the intervention group (Ashe et al., 2015).

Recently, Clemson et al. (2012) tested a similar approach to assist older adults to engage in more balance and strength exercises for falls prevention. The program called Lifestyle integrated Functional Exercise (LiFE), employs an individually delivered program for older adults that concentrates on using everyday activities as triggers to engage in simple balance and strength exercises, with downstream benefits of falls prevention (Clemson et al., 2012). The original LiFE study was conducted with community-dwelling adults aged 70 years+ who sustained one or more falls in the previous 12 months. Clemson et al. (2012) reported a 31% reduction in the rate of falls. However, the LiFE program has not been tested in a younger group of adults (i.e., lower risk of falls) or delivered within a group setting, to determine outcomes. For example, whether exercises and behaviour change techniques are feasible to deliver and will result in changes in balance and strength, habit strength and related psychosocial determinants.

#### Aims

Therefore, we tested feasibility of this novel behaviour change intervention that encouraged middle aged and older women to embed balance and strength exercises into daily life routines. To our knowledge this is the first mixed-methods study to apply habit formation as an intervention outcome and behaviour change technique to the promotion of lifestyle integrated, functional balance and strength exercises (LiFE) in this age group. Specifically, our objective was to test feasibility of the EASY-LiFE program delivery, and acceptance and utilization of the program content (e.g., uptake of behaviour change techniques) by study participants.

#### Method

##### *Procedure and participants*

We invited study participants who took part in our previous EASY study (Ashe et al., 2015), and who provided written permission for us to contact them about future studies, to enrol. All study participants completed a PAR-Q+ questionnaire (Warburton, Jamnik, Bredin, & Gledhill, 2011) administered by a certified exercise physiologist. Based on their responses, some participants were asked to obtain approval from their family physician prior to commencing this study. Participants received no monetary incentives for study participation.

##### *Intervention*

The EASY-LiFE program duration was four months. We followed the LiFE protocol established by Clemson et al. (2012). Specifically, the intervention consisted of seven two-hour group sessions, and

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