Understanding Balance Challenge across Canada through Fall Prevention Exercise Programs for Older Adults: A Further Analysis from a Cross-sectional Self-Report Survey

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Background

- As the global population ages at an unprecedented rate, there is a significant need for interventions to prevent **falls** in community-dwelling older adults [1].
- Exercise, specifically **balance training**, is effective in preventing falls in community-dwelling older adults [1][2]. Proposed evidence-based exercise recommendations for fall prevention specify that exercise programs should include 3 or more hours of exercise per week, provide a high challenge to **balance**, and be offered on an ongoing basis [1].

Definitions

Fall
- An event that results in an individual inadvertently coming to rest on the ground, floor, or lower level [3].
- Well known within current literature [1][3][4].

Balance
- The maintenance of the centre of mass over the base of support.

- A previous survey study explored characteristics and design of Canadian fall prevention community-based exercise programs for older adults [5], as these are a potential delivery system for effective evidence-based fall prevention exercise.
- The current study provides a further analysis of the survey data and examines non-verbal indicators of balance challenge as observed by instructors [6].

Objectives

1) Described how instructors reported modifying balance challenge and their perception of how challenged their clients were during balance training exercises.
2) Determined which non-verbal indicators of balance challenge are most commonly observed by instructors.

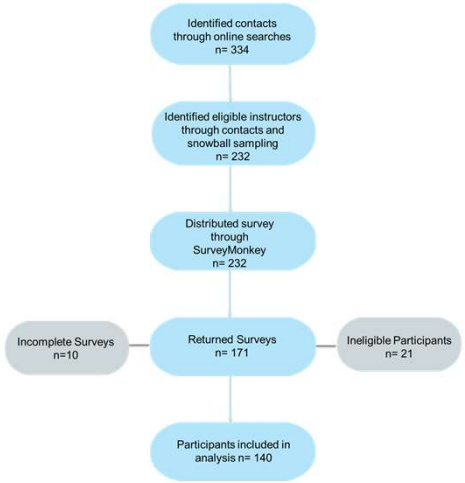
Methods

Design: A cross-sectional self-report questionnaire [5].

Participants: Instructors of fall prevention community exercise programs for community-dwelling older adults (≥50 years). Recruitment of participants was performed using a multi-phase online search, through direct contact with potential programs or through referrals to associated contacts.

Variables of interest in this study :
1. Primary method of determining balance challenge.
2. Instructors' perception of balance challenge in clients.
3. Exercise group clients observed non-verbal behaviours indicative of differentiating balance challenges.

Participant Recruitment



Results

1. The largest proportion of instructors determined balance exercise challenge based on clients' successful performance of previously completed exercises. Most instructors reported that the exercises fully challenged balance in the majority (≥50%) of clients.

Primary Methods of Determining Balance Exercise Challenge as Reported by Instructors

Primary Methods	Number of Instructors n (%)
Based on clients' successful performance of previously completed balance exercises	**58 (41%)**
Based on increases in challenge as weeks progressed	32(23%)
Based on the exercise client's own discretion	32 (23%)
Based on a combination of reported factors	12 (9%)
Other/Unclear	6 (4%)

Instructors' Perception of Balance Challenge in Clients

Perceived Balance Challenge	Number of Instructors n (%)
Exercises fully challenged clients' balance	**108 (77%)**
Exercises did not fully challenge or only challenged clients' balance in a minority (<50%) of exercises	32 (23%)
Exercises never challenge balance	0 (0%)

2. Increased sway, ankle strategies, and reaching were observed by the largest proportion of instructors in the majority of clients.

Non-Verbal Indicators of Balance Challenge

Non-verbal indicators	Seen in majority of exercise clients (≥50%) n (%)	Seen in minority of exercise clients (<50%) n (%)	Not seen n (%)	Skipped n (%)
Increased sway compared with resting position	**68 (49%)**	52 (38%)	17 (12%)	1 (1%)
Ankle strategy	**61 (44%)**	53 (38%)	21 (15%)	3 (2%)
Hip strategy	58 (42%)	**63 (46%)**	17 (12%)	0 (0%)
Step strategy	61 (44%)	**66 (48%)**	10 (7%)	1 (1%)
Reaching (towards something/someone else to hold on to)	**71 (51%)**	52 (38%)	13 (9%)	2 (1%)
Flailing arms	22 (16%)	48 (35%)	**68 (49%)**	0 (0%)
Holding arms, legs, or trunk stiff in any position	29 (21%)	**54 (39%)**	54 (39%)	1 (1%)
Making fist(s)	9 (7%)	28 (20%)	**99 (71%)**	2 (1%)
Pulling/tugging on own clothing	4 (3%)	18 (13%)	**114 (83%)**	2 (1%)

*Note: Two responses were excluded for the non-verbal indicators' analysis due to incompletion (skipping more than 50%) of the survey section.

3. All instructors reported observing at least one of the nine non-verbal indicators, while 14 reported observing all nine indicators.

Total Number of Non-Verbal Indicators Observed by Number of Instructors

Number of non-verbal indicators	Number of Instructors n (%)	Skipped responses n (%)
0	0 (0%)	
1	2 (1%)	7 (5%)
2	3 (2%)	4 (3%)
3	9 (7%)	
4	13 (9%)	
5	25 (18%)	
6	**36 (26%)**	
7	25 (18%)	
8	11 (8%)	
9	**14 (10%)**	

4. The largest proportion of instructors observed three non-verbal indicators in the majority of exercise clients, while only two reported observing all nine in the majority of exercisers.

Number of Non-Verbal Indicators Observed by Number of Instructors

Number of non-verbal indicators	Seen in majority of exercise clients (≥50%) n (%)	Seen in minority of exercise clients (<50%) n (%)
0	25 (18%)	11 (8%)
1	13 (9%)	22 (16%)
2	24 (17%)	12 (9%)
3	**33 (24%)**	30 (22%)
4	13 (9%)	**34 (25%)**
5	19 (14%)	16 (12%)
6	6 (4%)	11 (8%)
7	2 (1%)	1 (1%)
8	1 (1%)	0 (0%)
9	2 (1%)	1 (1%)

Discussion

This analysis described how instructors modify and perceive balance challenge in their clients, explored non-verbal indicators identified as potential markers for balance challenge [6], and prepared the data for additional comparative analysis of methods of assessing balance challenge.

Non-Verbal Indicators

- ✓ The non-verbal indicators may act as a method of assessing the level of challenge experienced by clients during balance exercises.
- ? It can potentially be used as a guide to ensure clients are being fully challenged (i.e., near or at the limits of postural stability) during balance exercises.
- ! With only two instructors observing all nine non-verbal indicators in the majority of clients, findings may suggest that clients are not being fully challenged despite results that the majority of instructors reported that the exercises fully challenged their clients' balance.

However, the lack of a comprehensive measure for balance challenge results in the need of a method of identifying exercises that satisfy recommendations in relation to individuals' abilities.

Limitations

- Self report nature of the survey [5]
- Balance challenge is not well operationalized in current literature and may be inaccurately perceived and reported.

Future Studies

- Observational study to provide further validation of the responses.
- Additional validation of existing scales (i.e. BIS-T and BIS-E).

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