Training care providers to facilitate physical activity of adults with intellectual disabilities: The inclusion of adult learning principles

by

Nathaniel Lamain
B.Kin, University of Toronto – St. George Campus, 2021

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Abstract

By increasing physical activity participation and reducing sedentary time, adults with intellectual disabilities can reduce the risk of preventable negative health outcomes. However, adults with intellectual disabilities often need support from others to optimize these health promoting behaviours. Care providers that work in community support organizations often lack knowledge and skills to support physical activity participation. In response, researchers and organizations that support individuals with intellectual disabilities have developed professional training to enhance care providers' capabilities to enable physical activity participation. Centring the learner in the learning process and using principles of adult learning in the training design are important for intervention effectiveness. The aim of this thesis was twofold 1) to synthesize and evaluate the extant literature on physical activity-specific professional development training for care providers for the presence of adult learning principles, and 2) to pilot an intervention for care providers using existing Special Olympics resources supplemented by professional training that incorporates adult learning principles. The thesis is comprised of four manuscripts. The first two manuscripts (Chapters 2 and 3) are the systematic review protocol and the systematic review which address the first aim. Manuscripts 3 and 4 (Chapters 4 and 5) address the second aim. Manuscript 3 is the mixed-methods evaluation of the pilot study and manuscript 4 is a knowledge translation article conveying the intervention and lessons learned to practitioners.

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Dedication

To Shannon. You said I could be whatever I wanted to be, so I chose to be a bit more like you. This is for you. Thank you.

Chapter 1. Introduction

In relation to the International Classification of Functioning, Disability and Health (World Health Organization, 2001), getting enough physical activity is a component of the life roles of self-care and participation in recreation and leisure. However, physical activity participation among adults with intellectual disabilities is low (Diaz, 2020). This is of concern, given that adults with intellectual disabilities are at high risk for negative health outcomes such as osteoporosis (Srikanth et al., 2011) and hypertension (Lin et al., 2010). Risks of these health outcomes can be mitigated by increasing physical activity participation and reducing sedentary behaviour.

Physical inactivity among adults with intellectual can be explained by personal factors influencing participation. For example, some adults with intellectual disabilities lack interest to engage in physical activity (Dixon-Ibarra et al., 2018) and prefer to engage in sedentary activities (Frey et al., 2005). Independent physical activity participation (i.e., without external support) among adults with intellectual disabilities can also be very challenging (Taliaferro & Hammond, 2016) given a lack of personal knowledge (Hawkins & Look, 2006) and skill (Taliaferro & Hammond, 2016) specific to physical activity. In turn, adults with intellectual disabilities may rely upon their proximal support network for assistance with physical activity.

Community support organizations that provide housing and direct support to adults with intellectual disabilities play a pivotal role in supporting the physical activity participation of supported individuals. Adults with intellectual disabilities in supported residential settings can have access to ongoing and around-the-clock supports to engage in activities relevant to daily living. However, living in congregate care settings such as a group home is a predictor of low physical activity among adults with intellectual disabilities (Finlayson et al., 2009).

Care providers of adults with intellectual disabilities may lack the necessary skills to support physical activity participation among supported individuals (Sundblom et al., 2015). Care providers' attitudes towards physical activity can also play a large part in promoting physical activity among supported individuals. Dixon-Ibarra and colleagues (2017) suggested that care providers may actually hinder physical activity opportunities for adults with intellectual disabilities. Organizationally, care providers may lack the time and resources to enable physical activity participation among supported individuals (Taliaferro & Hammond, 2016). Work routines can often be unpredictable and staffing is frequently inconsistent in community support organizations (Taliaferro & Hammond, 2016).

Professional development training for care providers have been previously developed to help them improve their personal capabilities to promote physical activity among adults with intellectual disabilities. Theories of behaviour change (e.g., Social Cognitive Theory, and the Theory of Planned Behaviour) have been considered in the rationale for training design and implementation (Bergström et al., 2013), but there has been a lack of emphasis placed upon centring the learner who is participating in the professional development. Mukhulalti and Taylor (2019) recommended that professional development training for healthcare professionals should be underpinned by adult learning theories. Knowles and colleagues' (2020) *The Adult Learner* is considered the primary work in the field of andragogy (the method and practice of teaching adult learners). Knowles and colleagues posit six principles of adult learning: (1) the learner must know why they need to learn something before learning it, (2) the self-concept of the learner is dependent upon movement towards self-direction, (3) the learning is relevant to the prior experiences of the learner, (4) learning is in response to a need to cope with a life situation or to perform a task, (5) the orientation to the learning is life-centred with the purpose of developing

competence, and (6) motivation is internal. What is unclear is how these principles have been incorporated into care provider training focusing on how to support physical activity of adults with intellectual disabilities in residential settings.

The aim of this thesis was twofold 1) to synthesize and evaluate the extant literature on physical activity-specific professional development training for care providers for the presence of adult learning principles, and 2) to pilot an intervention for care providers using existing Special Olympics resources supplemented by professional training that incorporates adult learning principles. The thesis is comprised of four manuscripts. The first manuscript is the protocol for a systematic review to evaluate existing training for their alignment with adult learning principles, as well as the effects of training on relevant outcomes for care providers and supported individuals. In the second manuscript, I report the results of the systematic review. The third manuscript is the pilot evaluation of a professional development training for care providers underpinned in Special Olympics' Fit 5 resource. In the fourth and final manuscript I describe the components of the training, as well as the successes and challenges related to connecting care providers with Special Olympics resources.

Chapter 2: Use of adult learning principles in physical activity interventions for care providers of adults with intellectual disabilities: A mixed methods systematic review protocol

Preamble

This manuscript is a description the rationale and protocol for a systematic review of professional development training for care providers of adults and older adults with intellectual disabilities. The training needed to involve deliberate efforts to train care providers only or alongside adults with intellectual disabilities.

My roles for this study were to design the search protocol, create the data collection instrument, register the protocol with PROSPERO, write and edit the manuscript. I would like to acknowledge my two co-authors Dr. Zahra Premji and Dr. Viviene Temple. Dr. Premji supported me with the initial development of the search protocol as well as with editing the final manuscript. She also hosted a 3-session webinar specific to conducting systematic reviews, which I attended. Dr. Temple supported me with writing and editing the manuscript.

The contribution of this manuscript to my overall thesis was to outline the systematic process of retrieving relevant training for care providers, with the goal of determining whether existing training align with principles of adult learning. My personal goal was to learn how to conduct a systematic review of the literature. This chapter is closely related to Chapter 3, which reports the results of the systematic review.

Abstract

Care providers often lack the skills to support physical activity of people with intellectual disability in their care. Ideally, adult learning principles should be incorporated into professional training to optimize the development of care providers' capabilities. Our objective is to understand how adult learning principles are used in the design of professional development training for care providers to support adults or older adults with intellectual disabilities' participation in physical activity.

Searches will be conducted using PsycInfo and SportDiscus (EBSCOhost) and Medline (Ovid). Full-text review will be conducted by two review authors against the inclusion criteria. Bibliographic information, population characteristics, intervention characteristics, and methods and measures of significant change or effect will be extracted. Methodological quality will be evaluated using JBI's critical appraisal instruments. Extracted data will then be synthesized according to the Joanna Briggs Institute mixed-methods review protocol using a convergent segregated approach to synthesis and integration.

Keywords: Care providers; intellectual disability; physical activity; professional development training

Key points

- Demonstrates the design of a Mixed Methods Systematic Review and establishes a search strategy, study selection, and data extraction process for a systematic review of physical activity professional development for care providers of adults with intellectual disabilities.
- A rationale of why the professional development pedagogy for care providers of adults with intellectual disabilities should be included in training design.

- Background on the importance of care providers in the facilitation of physical activity for health of adults with intellectual disability.

Conflicts of Interest

The authors declare no conflict of interest.

Ethics Statement

Not applicable.

Use of adult learning principles in physical activity interventions for care providers of adults with intellectual disabilities: A mixed methods systematic review protocol

Introduction

Both higher levels of physical activity and lower levels of sedentary behaviour, in combination or as independent predictors (Rezende et al., 2014), are associated with more favourable physical and mental health outcomes (World Health Organization, 2021). Despite this, levels of physical activity among people with intellectual disabilities tend to be low and levels of sedentary behaviour tend to be high (Finlayson et al., 2011; Melville et al., 2017). A systematic review of sedentary behaviour among adults with intellectual disabilities revealed that levels ranged from 8 ½ hours to 10 ½ hours per day (Melville et al., 2017). These estimates are high and not in accordance with the World Health Organization's strong recommendation of limiting sedentary behaviour (World Health Organization, 2021), or the recent Canadian guideline of eight hours or less of sedentary behaviour per day (Ross et al., 2020). Physical activity participation estimates among people with intellectual disabilities also tend to be low. Dairo and colleagues' (2016) systematic review of physical activity levels of adults with intellectual disability led them to estimate that, on average, only 9% of participants achieved the minimum public health guideline of 150 minutes of moderate to vigorous physical activity per week or more than 10,000 steps per day (World Health Organization, 2021). The small proportion of adults with intellectual disabilities meeting the minimum guideline is of concern as participation in physical activity is associated with a decreased risk of negative physical and mental health outcomes such as osteoporosis, hypertension, type-2 diabetes, depression and anxiety (Marks & Heller, 2003).

Physical activity participation among adults with intellectual disabilities is a dynamic process resulting from the complex relationship between personal factors and the environment (Temple, 2009). Personal factors influencing participation include the individual's health condition (Bergström et al., 2014), challenging behaviours (Aherne & Coughlan, 2017), physical activity knowledge (Savage & Colombo-Dougovito, 2023), and/or a lack of skill (i.e., to participate in physical activity independently) (Taliaferro & Hammond, 2016). Environmental barriers to participation for adults with intellectual disabilities include an inadequate built environment (i.e., facilities, transportation), a lack of support from others, and negative social influence (Frey et al., 2005). These environmental factors directly influence personal factors leading to participation, such as self-efficacy or physical activity attitudes (van der Ploeg et al., 2004). Bossink and colleagues (2017) recommend that in order to address the personal barriers experienced by adults with intellectual disabilities, it is important to first address environmental barriers. For example, Lynnes and colleagues (2009) sought to overcome environmental barriers to physical activity participation among Special Olympics athletes by reducing the need to travel to an exercise venue and through the provision of equipment to allow participation in strength activities at home. By reducing these environmental barriers, Special Olympics athletes were then able to overcome personal barriers to exercise such as their intention to exercise.

Training Care Providers

Previous research has emphasized the importance of training care providers to improve their professional skills, thereby improving standards of primary healthcare. Training efforts have emphasized improvements in personal care practices (i.e., hygiene, medication administration) (Selick et al., 2022; Wilson et al., 2023) as well as care providers' social skills with clients/residents (Nagra et al., 2017). Care providers participating in these training efforts have

gained confidence (Nagra et al., 2017), knowledge (Wilson et al., 2023), and awareness of their care approach (Nagra et al., 2017). Care providers have also participated in training efforts to enhance physical activity participation of clients with intellectual disabilities. These efforts include programs such as Menu-Choice (Dixon-Ibarra et al., 2018), Focus-Health (Bergström et al., 2013), and TAKE 5 (Melville et al., 2011). To date, training efforts in the physical activity domain have not been consistent in terms of content, delivery approaches, and the use of adult learning theories. A systematic examination of those interventions will benefit those who design and participate in the training.

Adult-Learning

Mukhalalati and Taylor (2019) recommend that healthcare professional education should be underpinned by adult learning theories because these theories can guide the selection of instructional strategies and the interpretation of learning. Humanistic theories, such as those of Knowles and colleagues' (2020), promote individual learner-centred approaches. Knowles and colleagues articulated six principles of andragogy, which are pedagogical assumptions that emphasize the active role of an adult learner during the learning process. These principles are (1) the learners need to know why they need to learn something before learning it, (2) the self-concept of the learner is dependent upon movement towards self-direction, (3) the learning is relevant to prior experiences of the learner, (4) learning is in response to a need to cope with a life situation or to perform a task, (5) the orientation to the learning is life-centred with the purpose of developing competency, and (6) motivation to learn is internal. This review will examine how principles of andragogy are embedded in training of care providers designed to enhance physical activity provision for adults with intellectual disabilities.

Review Question(s)

To what extent do physical activity training efforts for care providers align with Knowles and colleagues' (2020) principles of adult learning? Do the interventions lead to positive change in care providers' knowledge of physical activity, attitude toward physical activity, intentions to implement physical activity with supported individuals, or physical activity outcomes of adults/older adults with intellectual disabilities?

Inclusion Criteria

Participants

Paid care providers of adults and older adults with intellectual disabilities.

Intervention

Studies that involve deliberate training efforts to improve care providers' ability to support physical activity implementation among adults or older adults with intellectual disabilities will be included.

Outcomes

The following outcome measures will be included: care providers' physical activity knowledge, intention to implement physical activity with adults/older adults with intellectual disabilities, attitudes toward physical activity, or physical activity outcomes of adults/older adults with intellectual disabilities.

Phenomena of Interest

The quantitative and qualitative components of this review will consider studies that investigate the use of training interventions to improve care providers' ability to support adults or older adults with intellectual disabilities to participate in physical activity.

Context

Studies must take place in community or residential settings; studies will be excluded if they take place in laboratory settings.

Types of Studies

This review has no limitations with respect to study design and will include quantitative, qualitative, and mixed-methods studies.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses' guidelines were used to frame the reporting for this study (Page et al., 2021). The Joanna Briggs Institute Manual for Evidence Synthesis: Mixed Methods Systematic Review (Chapter 8.4.2 MMSR questions that take a convergent segregated approach to synthesis and integration) was used to frame the methodology for this study (Aromataris & Munn, 2020). This systematic review was registered with PROSPERO in August 2023 (Registration number: CRD42023382483).

Search Strategy

Searches of electronic literature databases will be conducted. The databases to be used for searches include PsycInfo (EBSCOHost), Medline (OVID), and SportDiscus (EBSCOHost). Initial scoping searches began with identification of seed papers (articles that met inclusion criteria) through a pre-scan of the literature, using Medline, on professional development interventions for paid care providers to promote physical activity for adults and older adults with intellectual disabilities. Seed papers and individual database thesauruses were examined and mined for relevant searchable concepts. The searchable concepts chosen for this systematic review were (a) people with an intellectual disability, (b) physical activity, and (c) intervention. Text words for relevant searchable concepts, including synonyms and alternate spellings, were compiled along with the relevant subject headings from database thesauruses to form concept

blocks. Concept blocks are a combination of text words and subject headings that are relevant to an identified concept in a seed paper. Within these concept blocks, text words and subject headings were combined using the OR function. Concept blocks were then combined using the AND function. One search was designed per database for a total of three searches. (see Appendix A for the Medline search).

Study Selection

All articles identified by searches will be exported to Covidence software. Duplicates will be removed, and titles and abstracts will be reviewed by one author to remove articles that clearly do not meet the inclusion criteria. Full-text review will be conducted by two review authors to confirm that studies met the inclusion criteria. A second round of full text review will be conducted to confirm that there were deliberate efforts to training care providers independently or in tandem with adults or older adults with intellectual disabilities. Disagreements between reviewers will be resolved through a discussion. If no consensus was reached, the article will not be included for review. Reference lists for included studies will also be reviewed for articles that could potentially meet the inclusion criteria. The results of the database and supplementary searching will be reported in the final review and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRIMSA) flow diagram.

Assessment of methodological quality

All articles identified will be critically appraised using the Johanna Briggs Institute critical appraisal instruments for qualitative, quantitative, and mixed-method studies (Joanna Briggs Institute, 2017). Studies will be assessed by two review authors for methodological validity prior to inclusion in the review. For qualitative studies, methodological quality will be based on the congruity between the methodology and philosophical perspective, objectives,

methods, analysis, and results of the study. The positionality of the researchers, the adequate representation of participants, ethical considerations, and flow will also be considered when evaluating methodological quality in qualitative studies. The evaluation of quantitative studies will vary according to the design of the study. For randomized controlled trials, studies were evaluated for bias in selection, administration of the intervention, assessment of outcomes, and participant retention. The validity of the statistical conclusions will also be considered. For quasi-experimental studies, clarity between cause and effect, similarities between participant groups, outcome measurements between groups, and treatment aside from the intervention of interest will be considered. The reliability of the measures, the presence of a control group, the use of repeated measures, and the appropriateness of the method of analysis will also be considered. Regardless of methodological quality, all identified articles will undergo data extraction and synthesis.

Data Extraction

Data extraction will be conducted by two review authors. Data extraction efforts will not explicitly use the JBI data extraction tool in JBI SUMARI, but includes similar elements for extracting information from qualitative, quantitative and mixed-methods studies (see Appendix B). Bibliographic information, the country the study took place, methodology, population characteristics for participants with an intellectual disability, population characteristics for care providers, intervention characteristics (what the physical activity intervention involved, and the involvement of care providers in the process), and method and measures of significant change and/or effect will be extracted. Disagreements between investigators regarding extraction processes will be settled through a discussion between the authors to achieve consensus. If a consensus is not reached, a third investigator will be asked to review the extracted data. The

majority decision will determine if the data was included. The extracted information from the articles will be recorded on Covidence and exported to a Microsoft Excel spreadsheet.

Data Synthesis and Integration

This review will follow a convergent segregated approach to synthesis and integration according to the JBI methodology for MMSR using JBI SUMARI (Aromataris & Munn, 2020). This will involve separate quantitative and qualitative syntheses followed by integration of the resultant quantitative evidence and qualitative evidence.

Quantitative Synthesis

The physical activity training pedagogy for care providers will be evaluated for alignment with Knowles and colleagues' (2020) principles of adult learning. Alignment with principles of adult learning will be evaluated based on the description of care provider involvement in physical activity implementation, and the training pedagogy applied in each article. Inclusion and consistency will be represented using a frequency count. Frequency counts may range from 0 to 6 based on the number of adult learning principles represented in the intervention, specifically:

1. An adult needs to know why they are learning something before learning it.
2. There must be a movement towards self-direction in the learning process.
3. The learning must be relevant to the prior experiences of the learner.
4. The learning must be centred around a need to cope with a life situation or to perform a task.
5. The learning process is life-centred, where education is a process of developing competency to achieve full potential.
6. Motivation to learn is internal.

For quantitative data specific to the outcomes of interest, effect sizes will be pooled and expressed as odds ratios or weighted final post-intervention mean differences with a 95% confidence interval. Odds ratios or weighted final post-intervention mean differences will be conducted for each outcome of interest. Heterogeneity will be assessed statistically using the standard χ^2 and I^2 tests.

Qualitative Synthesis

For qualitative data, findings will be pooled where possible using JBI SUMARI with the meta-aggregation approach. This involves the synthesis of findings based on similarity in meaning. The categories are the synthesized together to produce a set of synthesized findings. Where statistical or textual pooling was not possible, the findings will be presented in narrative form.

Integration of Quantitative Evidence and Qualitative Evidence

The findings from the quantitative and qualitative synthesis will be organized into a line of argument to produce an overall configured analysis. Each outcome of interest was synthesized separately. Within each outcome, quantitative and qualitative findings will first be described separately and then integrated together to create the line of argument (Aromataris & Munn, 2020).'

Conclusion

Relevance for Clinical Practice

This paper demonstrates the development of a mixed-methods systematic review protocol. The paper is an outcome of a collaboration between an Advanced Research Services Librarian and physical activity content area experts; and could be used as a protocol model for

nursing and health sciences systematic review protocol development. The paper also highlights the importance of including adult learning principles in the development of professional training.

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Wilson, N. J., Barratt, M., Jorgensen, M., Limbu, B., Donley, M., Buchholtz, M., Smith, V., & Deb, S. (2023). Training support workers about the overmedication of people with intellectual disabilities: An Australian pre–post pilot study. *Journal of Intellectual Disability Research*, *67*(6), 519-530. https://doi.org/10.1111/jir.13023

World Health Organization. (2021). *Physical activity*. https://www.who.int/news-room/fact-sheets/detail/physical-activity

Appendix A: Search strategy

Medline All (Ovid)

1	exercise/ or cool-down exercise/ or muscle stretching exercises/ or physical conditioning, human/ or endurance training/ or plyometric exercise/ or resistance training/ or preoperative exercise/ or running/ or jogging/ or swimming/ or walking/ or stair climbing/ or warm-up exercise/	230,823
2	(Physical activit* or exercise or fitness or obesity prevention or motor activit* or walking or ((activit* or sedentary or exercise) adj3 (behavior* or behaviour* or education or level*)) or ((light or moderate or vigorous or moderate to vigourous) adj1 activit*) or MVPA or ((balance or flexibility or endurance or resistance or weight*) adj1 training) or ((cardiovascular or cardiopulmonary) adj1 fitness)).kf,ti,ab.	712,386
3	1 or 2	771,678
4	intellectual disability/ or down syndrome/ or mental retardation, x-linked/ or fragile x syndrome/ or prader-willi syndrome/ or williams syndrome/	94,747
5	(((people or person or individual* or child* or adolescent* or youth or adult or adults or seniors or elder*) adj4 (ID or ASD or FAS)) or Intellectual disabilit* or Down* Syndrom* or "Trisomy 21" or Learning Disab* or ASD or Autis* or Apert Syndrom* or "Fragile	180,233

	X Syndrom*" or Martin-Bell Syndrom* or Phenylketonuria or FASD or Fetal alcohol spectrum disorder or Fetal alcohol syndrom* or Williams Syndrom* or Prader-Willi Syndrom* or Mental* retard*).kf,ab,ti.	
6	4 or 5	215,587
7	clinical study/ or clinical trial/ or controlled clinical trial/ or exp randomized controlled trial/ or "Physical Education and Training"/ or Education/ or Pilot Projects/ or Program Evaluation/	1,153,334
8	(intervention* or program* or program evaluation or workshop* or education* or randomised controlled trial or randomized controlled trial or RCT or training* or trial* or pilot*).kf,ab,ti.	4,172,931
9	7 or 8	4,709,470
10	3 and 6 and 9	2,017

Appendix B: Data extraction instrument

Title: _____

Author(s): _____

Country in which the study was conducted:

- United States
- UK
- Canada
- Australia
- Other: _____

Characteristics of Included Studies
Methods
Aim: _____
Study Design:

- Randomized controlled trial
- Non-randomized experimental study
- Cohort study
- Cross sectional study
- Case control study
- Systematic review
- Qualitative research
- Prevalence study
- Case series
- Case report
- Diagnostic test accuracy study
- Clinical prediction rule
- Economic evaluation
- Text and opinion
- Other: _____

Intervention Characteristics: _____

Involvement of Care Providers in Training/Implementation Process:
_____

Participants – Adults/Older Adults with Intellectual Disability
Participant Characteristics

	Sample Size	**Age range, Mean (SD)**	**Classification of Disability**	**Sex**
Adult/Older Adult with Intellectual Disability				

Participants – Care Providers
Participant Characteristics

	Sample	**Age range, Mean**	**Sex**
Care Providers			

Alignment With Principles of Adult Learning

	Yes/No	**Justification**
Principle 1 – A learner needs to know why they need to learn something before learning it		
Principle 2 – Self-concept dependent upon movements towards self-direction.		
Principle 3 – Learning relevant to prior experiences of the learner.		
Principle 4 – In response to a need to cope with a life situation or to perform a task.		
Principle 5 – Life centred with the purpose of developing competency.		
Principle 6 – Motivation is internal.		

Measure of Significant Change – Quantitative

	Method of Data Collection	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	Effect Size	P Value
Physical Activity					
Physical Activity Knowledge					
Physical Activity Attitudes					
Physical Activity Intention					

Measure of Significant Change – Qualitative

	Method of Data Collection	Method of Analysis	Results
Physical Activity			
Physical Activity Knowledge			
Physical Activity Attitudes			
Physical Activity Intention			

Chapter 3: Use of adult learning principles in physical activity interventions for care providers of adults with intellectual disabilities: A systematic review

Preamble

The actual systematic review is the second study included in my thesis. I report the results of the systematic review described in the protocol provided in Chapter 2 in this manuscript. The aim of the systematic review was to evaluate professional development training for care providers of adults with intellectual disabilities for alignment with principles of adult learning. The professional development needed to involve deliberate efforts to train care providers to support physical activity participation among adults with intellectual disabilities. Physical activity knowledge, attitudes, and intentions for care providers, as well as physical activity participation for adults with intellectual disabilities were the relevant outcomes of interest for this review.

My role for this study was to design and conduct the search protocol, conduct the data extraction and critical appraisal, perform the analyses, write, and edit the manuscript. I would like to acknowledge my co-author Dr. Viviene Temple. Dr. Temple supported with data extraction for each included article using Covidence, writing, and editing the manuscript.

This manuscript outlines the components of existing training for care providers, the involvement of care providers in the training process, the effects of training on relevant outcomes, and the alignment of existing training with adult learning principles. This manuscript will be submitted to the Journal of Intellectual and Developmental Disability.

Abstract

Background: We examined how principles of adult learning were included in training to enhance care providers' abilities to facilitate physical activity of adults with intellectual disabilities.

Method: A Joanna Briggs Institute mixed-methods approach to study synthesis was used. Medline, PsycInfo, and SportDiscus were searched. Inclusion criteria were: participants were paid care providers, the intervention was designed to improve abilities to support physical activity participation of adults intellectual disabilities, and outcome measures were knowledge, attitudes, or intention to implement physical activity; or physical activity levels.

Results: Of the 5,045 search results, 12 articles were included. The modal number of adult learning principles included in the training was 4 (of 6). All interventions focused on developing competencies and 11/12 encompassed coping with life situations. Care providers' internal motivation to participate was least evident.

Conclusions: Deliberate attention to, and reporting of, adult learning principles in intervention design would enhance the reproducibility of professional development initiatives.

Use of adult learning principles in physical activity interventions for care providers of adults with intellectual disabilities: A systematic review

Introduction

People with intellectual disabilities are at high risk for adverse health outcomes such as hypertension (Lin et al., 2010), osteoporosis (Srikanth et al., 2011) and type-2 diabetes (Vancampfort et al., 2022). Although engaging in physical activity and minimizing sedentary time can reduce these risks, the levels of physical activity among people with intellectual disabilities are generally low (Finlayson et al., 2011) and levels of sedentary time are high (Melville et al., 2017). Diaz (2020) reported that 67.3% of adults with intellectual disabilities in the U.S. had poor levels of physical activity, while 15.0% had intermediate levels, and 17.7% had “ideal” levels. This is concerning given that ideal levels of physical activity reflect health guidelines for physical activity participation among adults, namely 150 minutes of moderate to vigorous physical activity per week (World Health Organization, 2021).

Many adults with intellectual disabilities face barriers that impede opportunities to engage in meaningful physical activity. These barriers include a lack of knowledge, skill, and experience with physical activity (Taliaferro & Hammond, 2016) and support or guidance from others if often needed for participation (Nijhof et al., 2024b). This support includes providing transportation (Temple & Walkley, 2007a), access to facilities and equipment (Rana et al., 2024), or direct physical activity support such as reminders and modeling (Nijhof et al., 2024b).

Paid care providers of adults with intellectual disabilities can find facilitating physical activity of those they support challenging. Care providers can lack the skills and confidence to plan and implement physical activity with individuals they support (Sundblom et al., 2015; Temple & Walkley, 2007a) and may not be aware of available resources (Tromans et al., 2020). Dixon-Ibarra and colleagues (2017) indicated that care providers may have negative

perceptions of physical activity for supported individuals, and may actually discourage physical activity. Care providers also experience institutional barriers such as a lack of policies to drive physical activity programming (Elinder et al., 2018), little time and few resources dedicated to physical activity (Taliaferro & Hammond, 2016; van Schijndel-Speet et al., 2014), and an absence of leadership to guide implementation efforts (Sundblom et al., 2015).

Previously published interventions have emphasized the importance of professional development of care providers to promote positive health behaviours and outcomes among adults with intellectual disabilities. These interventions include a focus on improving care providers' knowledge and confidence in relation to standards of personal care (Selick et al., 2022), medication administration (Wilson et al., 2023), and supported individuals' social skills (Nagra et al., 2017). Community support organizations have also implemented training to foster physical activity participation among adults with intellectual disabilities. These training programs have been implemented directly with individuals with an intellectual disabilities (van Schijndel-Speet et al., 2017), with care providers only (Bergström et al., 2013), and with both care providers and adults with intellectual disabilities (Salomon et al., 2023). In general, training for care providers to facilitate physical activity programing with individuals with an intellectual disability focuses on improving care providers' knowledge (van Schijndel-Speet et al., 2017), skills (Bergström et al., 2013), and confidence (Marks et al., 2019). However, the content of the training and how the training is delivered is less apparent in the extant literature.

To promote the success of training among healthcare professionals it is recommended that training are underpinned by adult learning theories (Mukhalalati & Taylor, 2019). Knowles and colleagues' (2020) *The Adult Learner* has been a seminal work on adult learning for over forty years, with the ninth edition having been cited over twenty thousand times. Knowles eta

al. outline six principles of andragogy, which are pedagogical assumptions that create the ideal learning environment for an adult learner. These principles are (1) the learners needs to know why they need to learn something before learning it, (2) the self-concept of the learning is dependent upon movement towards self-direction, (3) the learning is relevant to prior experiences of the learner, (4) learning is in response to a need to cope with a life situation or to perform a task, (5) the orientation to the learning is life centred with the purpose of developing competency, and (6) motivation to learn is internal. Evaluating how existing training has incorporated principles of adult learning and whether that training has been effective, is important in the development of efficacious professional development for the future. The aim of this review was to examine how principles of andragogy are including in training designed to enhance care providers' abilities to facilitate physical activity of adults and older adults with intellectual disabilities.

Method

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses' guidelines were used to guide the reporting of this study. The Joanna Briggs Institute Manual for Evidence Synthesis: Mixed Methods Systematic Review (Chapter 8.4.2 MMSR questions that take a convergent segregated approach to synthesis and integration) was used to frame the methodology for this study. The protocol for this systematic review has been submitted for publication elsewhere (Lamain, Temple, & Premji, in review) and was registered with PROSPERO in August 2023 (Registration number: CRD42023382483). The protocol was developed in collaboration between an Advanced Research Services Librarian (ZP) and experts in physical activity (NL and VT).

Review Questions

The specific research questions addressed in this review were:

1. To what extent do physical activity professional development for care providers reflect Knowles and colleagues' (2020) principles of adult learning?
2. Do interventions lead to positive change in care providers' knowledge of physical activity, attitude toward physical activity, intentions to implement physical activity with supported individuals, or physical activity outcomes of adults/older adults with intellectual disabilities?

Inclusion Criteria

The inclusion criteria for this review was developed using the PICO framework (Richardson et al., 1995). The inclusion criteria for this review were 1) the participants were paid care providers of adults and/or older adults with intellectual disabilities. 2) Studies were an intervention involving deliberate efforts to improve care providers' abilities to support physical activity participation among adults or older adults with intellectual disabilities. 3) The outcome measures included were care providers' physical activity knowledge, attitudes, and intention to implement physical activity with adults or older adults with intellectual disabilities; as well as whether the intervention affected participation in physical activity outcomes of adults or older adults with intellectual disabilities. 4) The context of the study needed to be a community or residential setting. Laboratory or university settings for interventions were excluded, and 5) quantitative, qualitative, and mixed-methods studies were included.

Search Strategy

Searches of electronic literature databases were conducted using PsycInfo (EBSCOHost), Medline (OVID), and SportDiscus (EBSCOHost). Scoping searches were conducted to identify seed papers involving the deliberate training of care providers of adults

or older adults with intellectual disabilities, with the aim of improving the skills of care providers to support physical activity participation among supported individuals. Seed papers were mined for relevant searchable concepts. The concepts selected for this review were (a) people with an intellectual disability, (b) physical activity, and (c) intervention. Text words and relevant subject headings from database thesauruses were combined to form concept blocks. Concept blocks were formed for each relevant concept, after which they were combined using the AND function. One search was conducted per database for a total of three searches.

Study Selection

Identified articles were exported to Covidence (Veritas Health Innovation, 2023), which is software for screening and extracting articles relevant to the study's inclusion criteria. Once entered into Covidence, duplicate articles were removed, and titles and abstracts were reviewed by NL to remove articles that clearly did not meet the inclusion criteria. Full text review was conducted independently by NL and VT against the inclusion criteria. A second round of full text review was conducted to confirm that there were deliberate efforts to training care providers specifically. This included studies where only the care providers participated in training and studies where both the care providers and adults or older adults with intellectual disabilities participated in tandem. Studies were excluded if there was inadequate reporting of the training. Disagreements between the reviewers were resolved through a discussion to achieve consensus. Reference lists of the included studies were also reviewed for articles that could potentially meet the inclusion criteria.

Assessment of Methodological Quality

Articles for this review were critically appraised using Johanna Briggs Institute critical appraisal instruments for qualitative and quantitative studies (Joanna Briggs Institute, 2017). Studies were assessed by one review author for methodological quality prior to

inclusion in the review. Regardless of quality, all identified articles underwent data extraction and synthesis. For quantitative studies, RCTs could earn a maximum score of 13, and non-randomized experimental studies could score a maximum score of 9. Qualitative studies could earn a maximum score of 10. Mixed-methods studies were evaluated in accordance with the critical appraisal tools for non-randomized experimental studies. The maximum score they could earn was 9 (see Table 1).

Data Extraction

Data extraction was conducted by NL and VT. Elements extracted were guided by the Joanna Briggs Institute (JBI) data extraction tool in JBI SUMARI for qualitative and quantitative studies (Aromataris & Munn, 2020). Bibliographic information (i.e., title, authors), the country the study took place, methodology (i.e., aim, design), population characteristics for participants with an intellectual disability (i.e., number of participants, age, sex, disability status), population characteristics for care providers (i.e., number of participants, age, sex), training characteristics (i.e., what exactly did the training involve, how were care providers involved in the training), and relevant outcome measures (i.e., physical activity participation amongst participants with an intellectual disability, care providers' physical activity-related knowledge, attitudes, and intentions to implement with supported individuals) were extracted for this review. Disagreements between investigators regarding extraction processes were settled through a discussion between the authors to reach consensus. The extracted information from the articles was recorded on Covidence and exported to a Microsoft Excel spreadsheet.

Data Synthesis and Integration

This review used a convergent segregated approach to synthesis and integration in accordance with the JBI methodology for mixed-method systematic reviews using JBI SUMARI (Aromataris & Munn, 2020). This involves separate syntheses of qualitative and

quantitative findings, after which they are integrated together to create a line of argument based on similarity of meaning.

Quantitative Synthesis

Each manuscript's description of the training was evaluated for the inclusion of andragogical activities consistent with with Knowles and colleagues' (2020) six principles of adult learning. A frequency count (range 0 – 6) was computed. There were insufficient data to conduct a meta-analysis (i.e., pooled effect size, heterogeneity), therefore these data have been presented in narrative form.

Qualitative Synthesis

Qualitative data was pooled using the meta-aggregation approach (Munn et al., 2019). This process was conducted separately for each outcome of interest. The meta-aggregation approach involves the synthesis of findings based on similarity in meaning. Individual study findings are assigned to broader categories, after which those categories are synthesized together to produce a wider set of findings that can be used for evidence-based practice. This was conducted by NL. Where textual pooling was not possible, the findings were presented in narrative form.

Integration of Quantitative and Qualitative Evidence

The findings from the quantitative and qualitative synthesis were compiled to create a line of argument for each outcome of interest. Within each outcome, the results for the quantitative and qualitative outcomes were described separately and then integrated together to create the line of argument for the outcome.

Results

Study Inclusion

Searches of electronic databases yielded 5,045 articles for screening. After duplicates were removed, 4,043 titles and abstracts were screened, and 287 were moved to full-text

review. From the 287 articles, 275 were excluded. The primary reasons why studies were excluded are presented in Figure 1. Each study's reference list was examined for articles that could also potentially meet the inclusion criteria. Sixteen studies were retrieved and underwent full-text review for eligibility, but none met the inclusion criteria. Ultimately the search protocol yielded twelve studies; 6 were quantitative studies, 3 were qualitative, and 3 used a mixed-methods approach.

Methodological Quality

Quantitative Studies

Critical appraisal scores are reported in Table 1. Among included quantitative studies, scores for RCTs (n = 3) ranged from 9 to 10 (out of 13). The reasons the RCTs did not score higher was that the assessors, participants, nor those who conducted the intervention were blind to the group/treatment status (Bergström et al., 2013; Ptomey et al., 2018; van Schijndel-Speet et al., 2017). Additionally, one study did not include any follow-up (Bergström et al., 2013). For nonrandomized experimental studies scores ranged from 6 to 8 (out of 9). These studies lacked control groups and did not use multiple measures for outcome variables (Marks et al., 2019; Overwijk et al., 2022; Valbuena et al., 2019). Two studies (Overwijk et al., 2022; Valbuena et al., 2019) did not include follow-up.

Mixed-Method Studies

Mixed-method studies were appraised in accordance with the critical appraisal tools for nonrandomized experimental studies (Joanna Briggs Institute, 2017). Scores for mixed method studies ranged from 5 to 7 (out of 9). All included mixed-method studies lacked a control group as well as multiple measures for outcome variables (Dixon-Ibarra, Driver, Vanderbom, et al., 2017; Elinder et al., 2018; Salomon et al., 2023). One study did not use follow-up (Salomon et al., 2023).

Qualitative Studies

Critical appraisal scores for qualitative studies (*n* = 3) ranged from 7 to 9 (out of 10). The philosophical perspective of the researchers was not reported in any of these studies (Dixon-Ibarra et al., 2018; Sundblom et al., 2015; Umb Carlsson, 2021) and the positionality of the researchers was not reported in 2 of the 3 studies (Dixon-Ibarra et al., 2018; Umb Carlsson, 2021).

Study Characteristics

Study characteristics were reported in Table 1. The included studies were process evaluations of physical activity interventions (*n* = 4), effectiveness trials (*n* = 4), efficacy trials (*n* = 1), feasibility trials (*n* = 2), and sustainability trials (*n* = 1).

Participant Characteristics

Ten studies reported the raw sample sizes for care providers. The total number of participating care providers from those studies was 824. One study reported the average number of care providers per residence (Elinder et al., 2018), and the other did not report any participant characteristics for care providers (van Schijndel-Speet et al., 2017). Three of the studies had sample sizes over 100, while the remaining studies had sample sizes between 1-32. Among studies that reported the sex of the care providers (*n* = 7), 19 were male, and 112 were female. One study represented sex using percentage of male carers (12.9%), which was also low in comparison to female carers (Elinder et al., 2018). Four studies did not report the sex of the participating care providers. Reported ages of care providers ranged from 18-65 years. For studies that reported mean age, care providers were in their middle to late thirties. Another study reported the single care provider they worked with as middle aged (Valbuena et al., 2019). Seven studies did not report the age of the participating care providers.

Table 1 also documents participants with an intellectual disability (*n* = 698) involved in these studies. Most participants were adults (mean age = 41.1 years, range 35.5-58.2) with low support needs. Where studies reported sex (*n* = 10), the split between male and female

was relatively even. Adults with intellectual disabilities were included in these studies in several ways: as recipients of care providers' facilitation efforts following training (Dixon-Ibarra et al., 2017; Dixon-Ibarra et al., 2018; Elinder et al., 2018; Overwijk et al., 2022), as study partners who participated in health interventions with their care provider (Marks et al., 2019; Ptomey et al., 2018; Valbuena et al., 2019) or in parallel with care providers (Bergstrom et al., 2013; Sundblom et al., 2015; Umb Carlsson, 2021; van Schijndel-Speet et al., 2017), and as peer mentors (Marks et al., 2019).

Intervention Characteristics

Intervention characteristics were displayed in Table 2. Most interventions involved training and a subsequent implementation period for care providers and adults with intellectual disabilities to test their skills. Ten of the included studies were focused on improving nutrition and physical activity participation concurrently, and the other two studies were focused primarily on physical activity participation. The four studies conducted in Sweden (Bergström et al., 2013; Elinder et al., 2018; Sundblom et al., 2015; Umb Carlsson, 2021), all used the same health intervention called "Hälsofrämjande gruppbostad", which translates to health-promoting group home. The aim of the intervention was to improve upon the knowledge and skills of group home residents and their care providers to promote health behaviours. The intervention had 3-components including a health course for group home residents with intellectual disabilities, the appointment of internal health ambassadors in group homes to guide physical activity opportunities, and study circles for care providers to increase their knowledge and skills about health promotion.

Both studies conducted by Dixon-Ibarra (Dixon-Ibarra, Driver, Vanderbom, et al., 2017; Dixon-Ibarra et al., 2018) used 'Menu-Choice' which involved the training of group home managers, who subsequently trained their staff members. Staff then worked together to plan physical activity for residents. Marks and colleagues (2019) used 'Health Messages'

which included an introductory webinar for adults with ID and care providers, as well as the provision of resources to support implementation efforts. Van Schinjdel-Speet and colleagues (2017) used ‘Health Matters’, which was derived from Marks (2010) and focused primarily on physical activity participation among adults with ID. Ptomey and colleagues (2018) compared the effects two dietary approaches and increased physical activity participation on weight loss among adults with intellectual disabilities. Care providers attended an orientation session with supported individuals, during which they developed a physical activity plan for participating adults with intellectual disabilities. The three remaining studies created their own theory-driven interventions for pilot testing.

For the components of the training efforts, eight studies included orientation sessions before the implementation period. In-person training time ranged between 1 and 3 hours. Two studies also included an online learning component (~75-minutes) (Marks et al., 2019; Overwijk et al., 2022). Seven studies provided ongoing training, that lasted for between 3-12 sessions. The studies conducted in Sweden included 10 study circles of 90 minutes for care providers (Bergström et al., 2013; Elinder et al., 2018; Sundblom et al., 2015; Umb Carlsson, 2021). Salomon (2023) engaged with participants 3 hours per week (1 hour related to nutrition, 2 hours related to physical activity) for a total of 12 weeks. Marks et al. (2019) held 10 trainings with care providers, which lasted 30 minutes each. Three studies provided tangible resources to emphasize self-monitoring during implementation efforts (Dixon-Ibarra, Driver, Vanderbom, et al., 2017; Dixon-Ibarra et al., 2018; Marks et al., 2019). Seven studies implemented check-in meetings or consultations to navigate challenges that care providers were experiencing, and four studies implemented group discussions to discuss outcomes and strategize ways to adjust the training program (Bergström et al., 2013; Elinder et al., 2018; Sundblom et al., 2015; Umb Carlsson, 2021). One study implemented take-home assignments about physical activity (Overwijk et al., 2022).

Involvement of Care Providers

The primary involvement of care providers in the included interventions were as support networks for participating adults with intellectual disabilities to comply with each study protocol. Five studies trained care providers independently, while the rest provided training to both care providers and supported individuals together (n = 7). Care providers attended orientation sessions (n = 8), supported with implementation efforts (n = 10) and tracking (n = 4), consulted with research groups to monitor compliance with study protocols (n = 7), and engaged in training efforts to either support engagement among supported individuals (n = 2) or to train more care providers that they worked with (n = 2).

Review Findings

Synthesized quantitative findings include the reflection of adult learning principles in included interventions as well as information relevant to outcomes of interest. Synthesized qualitative findings and the integration of qualitative and quantitative findings were focused on relevant outcomes of interest.

Reflection of adult learning principles in included study intervention

The number of adult learning principles evident in the 12 extracted studies ranged from 2 to 6 (M = 4.16; SD = 1.11) (see Table 3). The principle of developing competency was central to all of the study's training efforts (n = 12) and 11 of the interventions in the studies emphasized coping with a life situation or performing a task. Self-direction was vital in almost all interventions for care providers (n = 10), as well as consideration into the prior experiences of the care providers in supporting adults with intellectual disabilities (n = 9). There was less consideration into the importance of the care providers knowing why they needed to learn about physical activity promotion among adults with ID (n = 6). Only two studies involved care providers who were internally motivated to participate in intervention

components. When there was ambiguity about the presence of an adult learning principles, the study was assigned a 0 for that principle.

Selected Study Outcomes

To provide a sense of whether the training of the care providers was effective, we extracted four intervention outcomes 1) the physical activity participation of adults/older adults with intellectual pre- and post- care provider training; and changes in care providers' 2) knowledge of physical activity, 3) attitude toward physical activity, and 4) intentions to implement physical activity with supported individuals. We segregated the quantitative and qualitative findings for these outcomes in the next section, and then integrated the findings together in the following section.

Physical activity – Adults/older adults with intellectual disability

Physical activity outcomes of adults with intellectual disabilities were assessed in 8/12 studies (see Table 4), with objective measures having been used in 7 studies (accelerometers, $n = 3$ and pedometers, $n = 4$). Two of those studies (Bergstrom et al., 2013; Dixon-Ibarra et al., 2017) used a questionnaire with managers and/or care providers to document changes in work routines and Valbuena et al. (2019) included one question on a questionnaire to document care providers' belief that "participants engage in more physical activity now than before participating in the study" (p.196). There were no significant changes in accelerometer measured physical activity and Dixon-Ibarra et al. (2017) had insufficient data to compare pre- and post-intervention pedometer measured steps. Bergstrom et al. (2013) found that the intervention group's physical activity increased by 1,608 steps/day over a period of 12-16 months, which was significantly greater increase than their control group ($p = .045$). The final study using an objective measure was Valbuena et al. (2019). Using an ABAB reversal design, the authors reported a noticeable increase in steps per minute during a Life Skills program; and they also noted that the care provider was able to

implement the program established by the research team with 96.9% accuracy across 10 sessions. A subjective measure of physical activity was used in two studies (Marks et al., 2019; Salomon et al., 2023). Marks and colleagues reported a significant positive increase in the frequency (days per week) of exercise and physical activity over 12 weeks. Salomon et al., however, had a low response rate when using the proxy respondent version of the International Physical Activity Questionnaire (Christian-Jones, 2013) and therefore did not include these data in their analyses.

Physical activity participation of adults with intellectual disabilities was investigated qualitatively in four studies (see Table 5). Two studies used semi-structured interviews to evaluate physical activity outcomes (Dixon-Ibarra et al., 2018; Salomon et al., 2023), one used focus group discussions (Umb Carlsson, 2021), and one used weekly tracking sheets that documented physical activity participation (Dixon-Ibarra, Driver, Vanderbom, et al., 2017). Among reported findings were improvements in participation, outcomes of participation (i.e., strength, flexibility), and type of physical activity. There were mixed results with respect to improvements in participation. One study reported that adults with intellectual disabilities had increased levels of physical activity (Salomon et al., 2023), while another reported that improvements varied according to the group home where the intervention took place (Dixon-Ibarra et al., 2018). Two studies indicated that despite starting the study protocol and seeing initial improvements in physical activity, they were unsustainable as old habits for adults with intellectual disabilities continued to govern everyday life (Umb Carlsson, 2021). For outcomes related to participation, adults with intellectual disabilities indicated that they enjoyed participating in physical activity efforts (Umb Carlsson, 2021), and that participation was associated with positive health outcomes such as improved flexibility and aerobic capacity (Dixon-Ibarra et al., 2018). Results also indicated an increased commitment to healthy lifestyles among adults with intellectual

disabilities (Salomon et al., 2023). The specific type of physical activity engaged in was reported qualitatively in 2 studies. Participants in Dixon-Ibarra and colleagues' (2017; 2018) studies indicated that residents engaged in walking, biking, arm/leg lifts, boxing, and dancing (i.e., light-intensity physical activity). There was also a lack of emphasis placed upon planning strength exercises. Flexibility was emphasized for people who were non-ambulatory, and motor activity was implemented rather than aerobic activity for people with severe limitations.

Physical activity knowledge – Care providers

One study evaluated the physical activity knowledge of care providers quantitatively (Overwijk et al., 2022). In response to their participation in an e-learning training that aimed to increase their knowledge and awareness of physical activity and nutrition, care providers' knowledge was evaluated using a 5-point Likert scale questionnaire. Analyses indicated significant improvements from pre- to post-intervention ($p = 0.003$).

Three studies evaluated the physical activity knowledge of the care providers using qualitative methods. Two studies used semi-structured interviews (Dixon-Ibarra et al., 2018; Sundblom et al., 2015), and one used focus group discussions (Umb Carlsson, 2021). In response to increased discussion about healthy lifestyles, focus group results from Umb Carlsson (2021) indicated that care providers' thinking about health had broadened. A staff member from Dixon-Ibarra and colleagues' (2018) study felt more knowledgeable after participating in training efforts. Two studies indicated that care providers felt more competent (Umb Carlsson, 2021), one of which reported that this was essential for developing the self-efficacy of the care providers to implement physical activity with supported individuals (Sundblom et al., 2015).

Physical activity attitudes – Care providers

Among the included studies, one evaluated the physical activity attitudes of care providers quantitatively (Overwijk et al., 2022). A 5-point Likert scale questionnaire was developed by Overwijk and colleagues (2023) that evaluated physical activity attitudes. The questionnaire holds favourable psychometric properties. Internal consistency measured using Cronbach's Alpha was good (0.87, 95% CI)). (Overwijk et al., 2023). Significant improvements were observed in physical activity attitudes from pre- to post-intervention (3-months) ($p = 0.04$) (ES = 0.3).

Two studies evaluated the physical activity attitudes of the care providers using qualitative methods (Dixon-Ibarra et al., 2018; Sundblom et al., 2015). Both studies used semi-structured interviews to evaluate outcomes. Both studies indicated that the attitudes of care providers can positively or negatively influence physical activity participation of supported individuals. Dixon-Ibarra and colleagues (2018) indicated that care providers' negative attitudes negatively influenced participation. Care providers expressed concern about how they would implement their physical activity programmes into practice after learning about the program. One care provider reported that their fellow staff members "looked at each other like how is this (programme) going to happen?" (p. 104). Sundblom et al. (2015) indicated that the professional attitudes towards health-related issues were affecting implementation efforts. However, care providers from Dixon-Ibarra et al. (2018) also said that when physical activity was considered a priority amongst care providers, implementation and participation came much easier. Care providers also reported that when they perceived physical activity as valuable for themselves and for clients, that it was helpful for implementation. Sundblom and colleagues (2015) reported the importance of having a specific individual on the support team with deeper interest and motivation for the issues (i.e., health ambassador).

Physical activity intention – Care providers

One study evaluated the physical activity intentions of care providers quantitatively (Valbuena et al., 2019). This was evaluated using one question from their social validity questionnaire, which indicated that the care provider felt confident in their ability to implement the physical activity program independently (5/5). Open-ended question responses also indicated that the care provider that the program was great, that she would recommend the program to fellow care providers, and that there was nothing she did not like about the program (Valbuena et al., 2019).

Two studies evaluated the physical activity implementation intentions of care providers using qualitative methods (Dixon-Ibarra et al., 2018; Elinder et al., 2018). Both studies used semi-structured interviews to evaluate intentions. One study indicated that when carers perceived a high demand for physical activity among supported individuals, and were committed to support participation, motivation to provide physical activity support was higher (Elinder et al., 2018). Care providers also reported that when their management was engaged with the materials themselves, that support came easier (Elinder et al., 2018). Both studies reported negative intentions for care providers. Elinder and colleagues (2018) reported that when there was no perceived need of physical activity, motivation to support, and supports themselves lessened. Dixon-Ibarra and colleagues (2018) reported reluctance of the staff to change routines and to support implementation. Staff from one group home reported that the mere “thought of exercise” made participation difficult (Dixon-Ibarra et al., 2018).

Integration of Quantitative and Qualitative Evidence

Physical activity – Adults/older adults with intellectual disability

Integration of quantitative and qualitative evidence provides insight into to why objectively measured physical activity (i.e., accelerometry and pedometry) did not

significantly improve in response to training for care providers. Qualitative results indicated participation was home-dependent, which was attributed in part to shared resident characteristics in each home such as age, mobility, symptoms of dementia, and severity of physical or intellectual limitations (Dixon-Ibarra et al., 2018). This manifested in the selection of appropriate exercises based on the preliminary abilities of participants with intellectual disabilities. Umb Carlsson's (2017) study also indicated that despite that care providers started implementing with supported individuals, it was not sustainable over the long term, which could mean that other factors are continuing to influence physical activity participation aside from the access to support from trained care providers. However, the enjoyment observed by participants with intellectual disabilities reflected the interest of supported individuals to participate in physical activity (Dixon-Ibarra et al., 2018).

Physical activity knowledge – Care providers

In terms of changes in care providers' knowledge of physical activity, the quantitative and qualitative data complemented each other in demonstrating an improved knowledge base (Dixon-Ibarra et al., 2018; Overwijk et al., 2022; Sundblom et al., 2015; Umb Carlsson, 2021). Care providers articulated their improved knowledge encouraged them to think more broadly about their care strategy and helped them feel more competent (Umb Carlsson, 2021).

Attitudes toward physical activity – Care providers

In the case of attitudes toward physical activity, the qualitative findings provided insight into the importance of higher and lower attitude scores. Overwijk and colleagues (2022) demonstrated that training improved the attitude scores of participating care providers. The qualitative studies demonstrated that negative attitudes towards physical activity (Dixon-Ibarra et al., 2018) and health-related issues (Sundblom et al., 2015) reduced the physical activity participation of adults with intellectual disabilities. However, when physical activity

was prioritized (Dixon-Ibarra et al., 2018), perceived as valuable (Dixon-Ibarra et al., 2018), and was supported by an engaged group home manager (Sundblom et al., 2015), physical activity participation for supported adults with intellectual disabilities improved.

Physical activity intention – Care providers

Integration of quantitative and qualitative results involving care providers' intentions to support physical activity participation among support individuals revealed important antecedents for intentions. Care providers' perceived value of physical activity (Elinder et al., 2018), and confidence to support implementation efforts (Valbuena et al., 2019) were vital for formulating intentions to support participation. The involvement of management was also vital for formulating intentions to implement (Sundblom et al., 2015). Care providers expressed apprehension about changing care practices to include physical activity participation in their care strategies (Dixon-Ibarra et al., 2018).

Discussion

Adult learning principles were reflected in most training efforts. However, principles one and six were reflected less in comparison to the remaining principles. Principle 1, which reflects the need for a learner to understand why they are learning something before they learn it, needs to be addressed by adequately informing care providers about what the benefits of engagement in physical activity are for supported individuals, as well as how it could benefit care providers, specifically their work routines. Some studies that did not receive a score for principle 1, but it was possible that the intervention could have informed care providers about the rationale for participation, but this wasn't adequately reported in the manuscripts (Salomon et al., 2023; van Schijndel-Speet et al., 2017). Valbuena and colleagues (2019) conducted introductory meetings that outlined the protocol for the study, but not why it was important, and two other studies reported that no information was given to care providers prior to participation (Dixon-Ibarra, Driver, Vanderbom, et al., 2017; Dixon-

Ibarra et al., 2018). Future training efforts must consider the adequate reporting of antecedent information provided to care provides before engaging with training efforts, and to ensure that care providers understand the benefit of participation for themselves as care providers, as well as for adults with intellectual disabilities that they support.

Principle 6, which reflects the internal motivation of care providers to engage in training efforts, was reflected in few interventions (Marks et al., 2019; Salomon et al., 2023). Recruitment for some of the included training used a top-down approach, which reduced the agency of the care providers to choose for themselves whether they wanted to participate (Dixon-Ibarra, Driver, Vanderbom, et al., 2017; Dixon-Ibarra et al., 2018; Elinder et al., 2018; Overwijk et al., 2022; Umb Carlsson, 2021). For other training, despite participation being voluntary, the care providers' skills were not the focus of the study (Ptomey et al., 2018). In these cases, they served as a support network for adults with intellectual disabilities in training efforts designated to them. For other studies, participation of care providers was contingent upon the involvement of adults with intellectual disabilities in training efforts, and they were recruited as a support network to help supported individuals with study protocols (Bergström et al., 2013; Sundblom et al., 2015). Future studies should consider prioritizing the professional development of participating care providers, and to provide them the agency to choose whether they want to participate, in order to bolster the learning environment for care providers who engage in training efforts. By not considering care providers' internal motivation or helping them understand why they are learning something, their agency to act is limited.

After evaluating the effectiveness of the training to increase physical activity participation among adults with intellectual disabilities, it was somewhat concerning that physical activity participation increased in studies that used self-report questionnaires to evaluate participation, but not in studies that used more objective measures of physical

activity. Systematic reviews comparing direct and self-report measures of physical activity have consistently shown variability in the findings (Marasso et al., 2021; Prince et al., 2008); and Marasso et al. concluded that the different approaches measure different aspects of the same construct and that using both approaches provides a deeper understanding of the behaviour. The qualitative responses from care providers in this review indicated that after they tried to implement the program, personal and environmental constraints were influencing the sustainability of participation. Environmentally, care providers attributed this to the context of a group home which have a complex mix of personal, group, and organizational constraints (Dixon-Ibarra et al., 2018). Further care providers reported that old habits (i.e., sedentary behaviour preferences) continued to govern everyday life (Umb Carlsson, 2021), which implies that ongoing maintenance may be required to sustain implementation efforts and motivation of individuals with intellectual disabilities to participate.

Few studies evaluated the physical activity knowledge of care providers after participating in training efforts. However, positive effects on physical activity knowledge were reported for care providers in both qualitative and quantitative studies. Care providers' conceptualization of their care strategy had broadened (Umb Carlsson, 2021), and they indicated that they gained self-efficacy (Sundblom et al., 2015) and competence (Umb Carlsson, 2021) from engaging in training efforts. It was promising that training efforts resulted in positive changes in personal factors for care providers that have previously been reported as barriers for participation among adults with intellectual disabilities (Sundblom et al., 2015; Temple & Walkley, 2007a). It was also interesting to consider that care providers' care strategy had broadened, which implies that physical activity was not considered a care method before training efforts were initiated (Umb Carlsson, 2021). Ultimately, professional development training is a viable option for improving the knowledge base of care providers

to support physical activity participation amongst supported adults with intellectual disabilities.

Quantitative results related to physical activity attitudes indicated that training efforts significantly improved care providers' attitudes towards physical activity participation (Overwijk et al., 2022). This is an essential finding given that qualitative studies indicated that the attitudes of care providers can positively or negatively influence participation among supported individuals. For example, care providers expressed concerns about the practicality of physical activity implementation for supported adults with intellectual disabilities, which reduced participation (Dixon-Ibarra et al., 2018). Furthermore, when care providers had negative attitudes towards healthy behaviours for supported individuals, supports lessened (Sundblom et al., 2015). Training efforts may be an effective way to address negative attitudes of care providers by contextualizing physical activity to something that can be seen as practical and efficient for care providers, as well as beneficial to supported individuals. This is appropriate justification given the environmental barriers (i.e., burnout) experienced by care providers of adults with intellectual disabilities (Søndenaa et al., 2015).

Very few studies evaluated care providers' intentions to support participation among adults with intellectual disabilities. Results indicated that when the perceived need for physical activity was high, support efforts for physical activity increased; and when perceived need was low, support efforts were also low (Elinder et al., 2018). Moreover, the role of management in fostering intentions to implement were evident in the included studies. When management teams were involved in the implementation efforts, supports increased (Sundblom et al., 2015). This may be attributed to the power dynamic between care providers and their management team, as it is the latter who makes the choice to implement new aspects of care into practice. Care providers also reported reluctance to change care routines. This power dynamic was limiting for creating the optimal learning environment for care

providers participating in training efforts, which was indicative of a low frequency for Knowles and colleagues' (2020) 6th principle of adult learning, which postulates that motivation is internal. Ultimately, management teams must be involved with future training interventions, given their role in guiding the support efforts for care providers that they work with.

Limitations of this study may be attributed to the search protocol. The inclusion criteria for the search protocol may have omitted physical activity training for care providers of adults with intellectual disabilities. Given that care provider outcomes were reported less than was physical activity participation among supported individuals, it may be beneficial to consider including articles with more inclusion criteria specific to adults with intellectual disabilities (i.e., biometrics). Moreover, with respect to reflection of Knowles and colleagues' (2020) principles of adult learning, there was some ambiguity of whether principle/s were aspects of the intervention design. This can be attributed to a lack of reporting of care provider recruitment, or because the learning experience for care providers was not prioritized over the learning experience for supported individuals. Training efforts specific to care providers may be an important place to start, given the heavy influence of their attitudes, knowledge, and perceived value of physical activity on participation among supported individuals.

Conclusion

Overall, physical activity training for care providers reflected principles of adult learning. Future training efforts should consider the agency of care providers to support participation among supported individuals. Developers of professional training should ensure that care providers are adequately informed about the importance of physical activity participation for supported individuals, and for themselves as care providers. Training efforts improved the knowledge and attitudes of care providers towards participation in physical

activity for supported individuals. They were also effective in initiating physical activity participation, but not maintaining it. It was clear that the personal skills of care providers to support participation was not the only barrier. Environmental barriers for care providers and personal barriers for supported adults continued to limit the extent to which these interventions could be implemented. Future interventions aiming to improve physical activity participation should consider a more holistic approach to physical activity promotion where the personal and environmental factors for all relevant parties can be addressed concurrently.

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771 **Table 1**

772 Study and participant characteristics and outcomes extracted.

Author(s) Country	Aim	Design	Critical Appraisal Score Score/Max (%)	Participant Characteristics – Care Providers	Participant Characteristics - AWID	Study outcome measures extracted			
						Care providers			AWID
						Knowledge	Attitudes	Intention	PA
Quantitative studies									
Ptomey et al. (2018) United States	To compare the effectiveness of an enhanced stop light diet (eSLD) and a Conventional Diet (CD) as part of a multicomponent intervention for both weight loss (6 months) and maintenance (12 months).	RCT	10/13 (76.9%)	eSLD: *n* = 58 Control: *n* = 58 Age: Not provided Sex: Not provided	All participants were overweight or obese eSLD: *n* = 77, MAge = 36.1y (*SD* = 12.0); DS *n* = 15, Autism n = 6, Other *n* = 56; Sex: Male = 59.7% Control: *n* = 54, MAge = 37.0y (SD = 12.5) DS n = 11, Autism n = 14, Other *n* = 47; Male = 61.1%	No	No	No	Yes Quantitative, accelerometry
Bergstrom et al. (2013) Sweden	To investigate the effectiveness of a novel and complex intervention to improve diet and physical activity, targeting both caregivers and residents, in community	RCT	9/13 (69.2%)	Mean number of staff per residence: Intervention = 6.8 (2.6), Control = 7.3 (3.5) Age and sex not provided	Intervention *n* = 64 MAge: = 36.2y, *SD* = 10.1, range 20-66y Disability status: Mild to moderate ID; Male = 42.2% Control *n* = 66 MAge: = 39.4y, *SD* = 11.3 Male = 43.9%	No	No	No	Yes Quantitative, pedometry and tracking sheets

	residences for people with ID.								
van Schijndel-Speet et al. (2017) Netherlands	Efficacy trial of program on PA (steps) and health parameters (fitness, cardiorespiratory fitness, morphologic and metabolic fitness, instrumental ADL (IADL), cognitive functioning and depressive symptoms) of older adults	RCT	9/13 (69.2%)	Not reported.	Intervention *n* = 66 Age: M = 58.2, 44-83 Disability Status: Mild ID (n =14), Moderate ID (n = 38), Severe ID (n = 13). Down syndrome (n = 10), Autism (n = 10); Male = 42.4% Control *n* = 65 Age: M = 57.9, 42-78 Disability Status: Mild ID (n =9), Moderate ID (n = 42), Severe ID (n = 7). Down syndrome (n = 17), Autism (n = 3); Male = 47.7%	No	No	No	Yes Quantitative pedometry
Marks et al. (2019) United States	Examined the effectiveness of a peer-led health promotion program for people with IDD.	NRES	7/9 (77.7%)	*n* = 35 Age: Not provided, Sex: Female = 88.6%	Peer health coaches *n* = 33, MAge = 35.5y (*SD* = 13.9), range 18-73y Conditions: Not provided, Male = 27.3% Peer Participants *n* = 311, MAge = 41.2y (*SD* = 16.1), range 18-86y Conditions: Not provided, Male = 50.2%	No	No	No	Yes Quantitative survey with peers, days/week PA
Overwijk et al. (2022) Netherlands	To evaluate the preparation, implementation, and preliminary outcomes of a theory-based training and E-learning education program for direct support professionals (DSPs)	MM	6/9 (66.6%)	n = 32 Age: MAge = 34, *SD* = 11 Sex: M = 7, F = 25	*n* = 24 Age: M = 38, *SD* (17) Disability Status: Moderate ID: *n* = 9, Severe ID: *n* = 8, Profound ID, *n* = 7. 3 participants used wheelchairs. Male = 66.7%	Yes	No	No	Yes Quantitative. accelerometry

	to learn how to support people with moderate to profound ID to live a healthy lifestyle.								
Valbuena et al. (2019) United States	To evaluate the effects of self-monitoring and monetary reinforcement for increasing the rate of walking among adults with ID; and to evaluate the sustainability of the intervention when implemented by staff rather than experimenters.	NR ES	7/9 (77.7%)	n = 1 Age: Middle-aged Sex: F = 1 Worked at facility for many (>1) years	n = 5 Age: M = 46.8, SD = 2.6, 37-51 Disability Status: Mild (n = 2) to moderate (n = 3) ID. Ambulatory. All had a range of secondary and associated mental and physical health conditions. Sex: M = 5	No	No	Yes	Yes Quantitative pedometry, interviews.
				Qualitative Studies					
Dixon-Ibarra et al. (2018) United States	Process evaluation of the Menu-Choice physical activity program.	Qu al	7/10 (70%)	*n* = 22, Age range: 18-65y, Sex: Female = 100%	*n* = 18 in intervention, *n* = 5 in interviewed Age range 45-59y Conditions: Not provided. Male = 20% interviewed	Yes	Yes	Yes	Yes Qualitative interviews
Umb Carlsson (2021) Sweden	Explore residents', staff members' and rehabilitation professionals' experiences of how a health-promotion intervention affected the habits of people living in a group home regarding	Qu al	8/10 (80%)	n = 6 Age: Not provided Sex: M = 3, F = 3	n = 5 Age: Not provided Disability Status: ID not specified. Could communicate verbally or use assistive technology, ambulatory. Sex: M = 2, F = 3	No	No	No	Yes Qualitative group discussions

	eating habits, PA, and staffs' ways of working.								
Sundblom et al. (2015) Sweden	To understand managers' and health ambassadors' perceptions of the implementation of a health intervention (as per Elinder et al. (2010) and Elinder et al. (2018)).	XS	7/9 (77.7%)	n = 12 Age: 30-60 Sex: M = 2, F = 10	N/A	No	No	No	Yes Quantitative survey
Mixed-Methods Studies									
Salomon et al. (2023) Australia	To assess the feasibility and preliminary efficacy of a tailored healthy lifestyle intervention, Get Healthy! with adults with mild-moderate ID.	NR ES	5/9 (55.5%)	n = 2 Age: Not provided Sex: F = 2	n = 6 Age: M = 46, SD = 13, 28-62 Disability status: Moderate ID. Independently ambulatory (5), or with cane (1). Comorbidities: Obese (3), overweight (2), Autism (1), impaired glucose tolerance (1), ventricular septal defect, and valvular heart anomalies (1). Sex: M = 4, F = 2	No	No	No	Yes Qualitative interviews and quantitative survey
Dixon-Ibarra et al. (2017) United States	To examine preliminary program outcomes and the feasibility of implementing the Menu-Choice Physical Activity program.	NR ES	7/9 (77.7%)	n = 22 Age: M = 38.7, SD = 15.1 Sex: M = 3, F = 18	n = 18 Age: M = 59.4, SD = 7.5 Disability status: Not reported Sex: M = 5, F = 13	No	No	No	Yes Quantitative pedometry and tracking sheets
Elinder et al. (2018)	1) to evaluate the effectiveness of a structural	NR ES	6/9 (66.6%)	Intervention: *n* = 387	Intervention: *n* = 53, 7.6 residents per home	No	No	Yes	Yes Quantitative survey

Sweden	intervention on staff health promotion work routines in residences for adults with ID, and 2) to explore barriers and facilitators in implementation process of intervention.	Carers per residence: 7.3 Male carers 12.9% Age and Sex: Not provided Comparison: n = 189 Carers per residence: 6.1 Percentage of male carers: 18.9 (16.5) Age and Sex: Not provided	Age: <35/residence = 31.4% (27.2), 30-50/residence = 29.5% (25.7), >50/residence = 38.3% (29.1) Disability Status: mild ID/residence = 44.7% (27.2), moderate ID/residence = 33.0% (34.2), severe ID/residence = 9.2% (21.8) Sex: Male residents/residence = 55.9% (22.4) Comparisons: N = 31, 6.1 residents per home Age: <35/residence = 23.9% (27.1), 30-50/residence = 29.8% (30.2), >50/residence = 45.7% (37.0) Disability Status: mild ID/residence = 27.7% (27.0), moderate ID/residence = 42.6% (33.9), severe ID/residence = 16.0% (30.4) Sex: Male residents/residence = 56.9% (20.8)

Note: AWID, Adults with intellectual disabilities; NRES, Non-randomized experimental study; RCT, Randomized controlled trial; XS, Cross-sectional; MM, Mixed methods; Qual, Qualitative research; M, Male; F, Female, n, Number; MAge, Mean age; SD, Standard deviation; ID, Intellectual disability; DS, Down Syndrome. Critical appraisal score % calculated by dividing the raw score by the maximum score (for each design) and multiplying by 100.

777 **Table 2**

778 Intervention characteristics for included studies

Author(s)	Intervention Characteristics	Involvement of Care Providers
	Quantitative Studies	
Ptomey et al. (2018)	Multicomponent weight management intervention. Participants (AWID) randomized to one of two dietary approaches: eSLD (Enhanced Stop Light Diet) or CD (Converntional Diet). Behavioural strategy/educational sessions conducted by health educator during monthly home visits with AWID and care providers. Promoting energy-reduced diet, increased physical activity (150 min/week), and self-monitoring.	Care providers served as a study partner for AWID. Asked to attend all meetings between study staff and participants, and to support, encourage, and assist participants in complying with study protocol, including the selection and preparation of foods consistent with the assigned diet, providing opportunities for increased PA, and assisting with self-monitoring. Care providers also participated in a study orientation (60-90 min) that described the procedures for self-monitoring, and follow-up interviews to address any issues 2 weeks after orientation. Developed plan for diet and PA implementation. Monthly meetings with research team to evaluate study compliance.
Bergstrom et al. (2013)	3-component health intervention. Part 1: The appointment of a health ambassador in each community residence who also attended network meetings with other ambassadors. Part 2: A study circle for care providers based on the principles of peer education. Part 3: A health course for residents. Activities included an introductory meeting for managers and care providers, a one-day education for course leaders of the health course for residents, newsletters to the participating residences, and coaching on demand.	Participated in a full-day introductory meeting with managers and staff members. Each home had one ambassador. They were asked to participate in six three-hour network meetings that provided information on health promotion activities they could take back to the home. Ambassadors received newsletters, emailed information materials, and follow-up phone calls. Received coaching on demand by phone or email. All care providers invited to participate in ten 90-minute study circles called “Focus Health”.

van Schijndel-Speet et al. (2017)	Two component intervention. Physical activity and education to affect AWID's PA knowledge (inspired by Health Matters). PA program based on guidelines to affect strength, endurance, balance, and flexibility. 3x per week for 8 months, with 6-month follow-up. PA instructors were responsible for content and correct execution of programme. Duration started at 15-20 minutes and built to 45 minutes. 3x falls and 1x hypoglycemic.	3 agencies and 10 programs. PA instructors and staff received 1-day training about how to execute the PA and education program.
Marks et al. (2019)	Health Messages: 2-phase intervention. Phase 1: 75-minute webinar involving peer health coaches (PHC) and mentor dyads (Both AWID). Coaching manual provided with (1) weekly health message booklets and wristbands, (2) posters), (3) weekly sign-in sheets, (4) peer self-review cards to ask if participants met their weekly goals, and (5) teaching props. Training reviewed the kits and roles of the PHCs and mentors, reviewed lessons, discussed strategies to support participation. Dyads implemented over 12 weeks. 10x30 lessons. Phase 2: implementation with participants.	Care providers attended initial webinar with PHCs. Provided information about how to implement aspects of the resources into practice.
Overwijk et al. (2022)	2-part intervention. Part 1: E-learning (individually or with colleagues) to increase knowledge and awareness of PA and health nutrition for people with moderate to profound ID. Part 2: Three in-person group sessions (2h/session) with the following themes: (a) social/professional role/identity, (b) skills (BCTs), and (c) social influences and environmental context and resources. This was followed by three practical assignments.	Participated in all intervention components. DSPs participated in questionnaires and interviews on environmental changes, dose received, acceptability of the program, and changes after the program.

Valbuena et al. (2019)	Participants attended a life skills development program (Walking program). 1 hour on weekdays. 48 study sessions over 11 weeks. Intervention took place at a day centre for AWID.	After a stable rate of walking was observed in the second intervention phase (after ~36 sessions), the same intervention was implemented by a staff member from the life skills development facility rather than by the investigators. The researchers used behavioral skills training to teach the staff member to implement the intervention. Training lasted 15 min and consisted of instructions, modeling, rehearsal, and feedback until the staff member performed all of the steps correctly in a role play. The task analysis of the intervention was used to assess the accuracy of implementation.
	Qualitative Studies	
Dixon-Ibarra et al. (2018)	Group home managers and program coordinators received training to train support staff to use intervention materials (Menu-Choice) with the aim of developing weekly PA goals. Binders included information on PA, goal setting, guidelines for specific activities, and planning templates. Program coordinators then trained staff. Staff worked with residents to plan each week's PA. Initial training was 3h, staff were asked to use the materials for 10 weeks. During the implementation period, consultation sessions with the primary investigator were implemented to evaluate progress.	Group home managers/program coordinators attended a 3h training session on Menu-Choice. Described how to use the components of Menu-Choice. Coordinators than trained support staff in group homes on Menu-Choice over 2 weeks. Consultation sessions to ask questions about the programme.
Umb Carlsson, (2021)	4-part intervention. Parts 1 & 2 targeted AWID, parts 3 & 4 on staff. Part 1: Sessions for AWID focused on food prep. Part 2: Residents tried 5 new PAs led by rehabilitation specialist. Given pedometer to track steps/week. Part 3: Two staff members appointed as health ambassadors to provide motivation to AWID, and to keep discussion on health issues alive among fellow staff members. Part 4:	Participated in a full-day introductory meeting with managers and staff members. Interventions parts 3 & 4. Not involved in the decision to implement the program. Group discussion (45-90 minutes) at the end of the program.

	Focus Health: 10-session training program to increase staff awareness and knowledge of nutrition, meals, PA, and health.	
Sundblom et al. (2015)	3-component intervention based on SDT. Part 1: Health course for group home residents with ID. Part 2: Health ambassadors placed in group homes to guide efforts for organizing PA opportunities, and to provide relevant health information to their colleagues about PA. Part 3: 10 Study circles with group home care providers to increase knowledge and skills about health promotion, and to empower them to improve work routines. (See Elinder et al., 2018)	Care providers in this study were the health ambassadors. By choice of the manager and care providers, a health ambassador was appointed among the staff in each home. Their role was to provide relevant health information to their colleagues in the residence and to organize activities for the participants. To facilitate knowledge exchange, the ambassadors were invited to six networking meetings to engage in workshop activities that they requested. They also received regular coaching from research team.
	Mixed-Method Studies	
Salomon et al. (2023)	12-week multi-modal PA and health eating program designed to address lifestyle-related risks for adults with mild-moderate ID. Small group program consisting of three face-to-face contact hours per week. One 1-hour session on nutrition per week, and two 1-hour sessions on PA per week. PA sessions were 10% didactic, and 90% practical (40% aerobic exercise, 30% strength based, and 20% balance-based). Healthy eating was 90% didactic. BCTs used from CALO-RE.	Paid care providers involved in program design. Unclear whether the intervention as for care providers. Only two carers regularly attended the programme with participants, and no clear channels of communication were established between programme facilitators and carers who did not attend. Care providers could participate in the full program (i.e., care providers do their own educational sessions), or as a support for participants with ID. No care providers participate in the full program on their own.
Dixon-Ibarra et al. (2017)	3-hour training of agency managers and coordinators on how to use the components of Menu-Choice. Content delivered by PowerPoints, group discussions, and case studies to practice the materials. Coordinators and managers trained care providers within the houses over a two-week period to use	Group home managers/program coordinators attended a 3h training session on Menu-Choice. Described how to use the components of Menu-Choice. Coordinators than trained support staff in group homes on Menu-Choice over 2 weeks. Consultation sessions to ask questions about the programme.

	Menu-Choice. Following baseline assessment, the group homes tried the program materials for 10 weeks. The first author monitored using check-in calls.	
Elinder et al. (2018)	Focus Health. Study circle for care providers in community residences. The aim of the study circles was for care providers to increase knowledge about health-related behaviours, and to discuss and decide on role modelling and work routines to support healthy behaviour including opportunity for physical activity and healthy eating. Ten sessions each of ~90 minutes over 12 months. Ten chapters during which health promotion work was planned.	Internal discussion leader was appointed among the carers in the study circle in each residence to convene the 10 sessions and to lead them. Discussion leader did not receive prior training but was guided by instructions in the study circle material. Documented each session in a logbook. Based on the content of the chapters in Focus Health, care providers made decisions to change work routines which were tailored to local needs.

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Table 3

Reflection of Knowles and colleagues' (2020) principles of adult learning.

	Adult Learning Principles						
Author(s)	Why they need to learn something	Movement toward self-direction	Relevant to prior experience	Coping with a life situation	Developing competency	Motivation is internal	Total Score
Ptomey et al. (2018)	Yes	Yes	Yes	Yes	Yes	No	5
Dixon-Ibarra et al. (2018)	No	Yes	No	Yes	Yes	No	3
Marks et al. (2019)	Yes	Yes	Yes	Yes	Yes	Yes	6
Umb Carlsson (2021)	Yes	Yes	Yes	No	Yes	No	4
Overwijk et al. (2022)	Yes	Yes	Yes	Yes	Yes	No	5
Salomon et al. (2023)	No	No	Yes	Yes	Yes	Yes	4
Sundblom et al. (2015)	Yes	Yes	Yes	Yes	Yes	No	5
Bergstrom et al. (2013)	Yes	Yes	Yes	Yes	Yes	No	5
Dixon-Ibarra et al. (2017)	No	Yes	Yes	Yes	Yes	No	4
Elinder et al. (2018)	No	Yes	Yes	Yes	Yes	No	4
Valbuena et al. (2019)	No	Yes	No	Yes	Yes	No	3
van Schijndel-Speet et al. (2017)	No	No	No	Yes	Yes	No	2
Frequency Score	6	10	9	11	12	2	

Table 4

Quantitative findings for included studies.

Author(s)	Adults with intellectual disabilities physical activity outcome		Care provider training outcome measures related to physical activity					
	Measure	Results	Knowledge Measure	Knowledge Results	Attitude Measure	Attitude Results	Intention Measure	Intention Results
Ptomey et al. (2018)	Actigraph GT1X (MVPA)	No significant differences in MVPA between intervention groups at baseline, 6 or 18 months. ~8% of participants met goal of 150 minutes/week of MVPA.	N/A	N/A	N/A	N/A	N/A	N/A
Marks et al. (2019)	10-Point Likert Scale Questionnaire	Pre: M(SD) = 5.02 (2.47) Post: M(SD) = 5.59 (2.10) $p < 0.01$	N/A	N/A	N/A	N/A	N/A	N/A
Overwijk et al. (2022)	Actigraph wGT3X BT for walking participants, Actiwatch for wheelchair users.	Actigraph: Time 0 (Jan/Feb) to Time 2 (Sep-Nov) % Sedentary = 64.11 (15.53) to 68.78 (19.08), NS % Light PA = 33.25 (14.94) to 28.85 (18.36), NS % Moderate PA = 2.46 (2.70) to 2.29 (2.68), NS % Vigorous PA = 0.17 (0.40) to 0.08 (0.24), NS % Very Vigorous PA = 0.01 (0.04) to 0.00 (0.01), NS Actiwatch: Time 0 (Jan/Feb) to Time 2 (Sep-Nov) % Inactivity = 58.67 (29.54) to 58.60 (33.51), NS % Activity = 41.33 (29.54) to 41.40 (33.51), NS	Self-report questionnaire (5-point Likert scale) Maximum score was 10 T1 (Jul/Aug)	Sign. increase $p = 0.003$ from T0 = 6.6 to T1 = 7.2	Self-report questionnaire (5-point Likert scale)	T0 (3.7) to T1 (3.7), NS ($p = 0.98$) Sign. increase $p = 0.04$ from T1 (3.7) to T2 (4.0)	N/A	N/A
Salomon et al. (2023)	Actigraph GTX3 & IPAQ	Pre-intervention: Sedentary = 643.94 (198.07) Light = 108.02 (78.72) Moderate = 24.96 (13.38) Vigorous = 0.60 (0.97) MVPA = 25.56 (12.98) Post-intervention: Sedentary = 652.74 (128.57) Light = 73.42 (27.08) Moderate = 29.73 (10.21) Vigorous = 0.36 (0.25) MVPA = 20.06 (17.42)	N/A	N/A	N/A	N/A	N/A	N/A

		Did not use inferential stats, not a lot of change. IPAQ data incomplete. Insufficient to conduct meaningful analysis.						
Bergstrom et al. (2013)	Pedometry (Steps/Day), Self-Report Quesionnaire (% of Full Score for Work Routines)	Pedometry: Intervention = 8042 (5524) Control = 6296 (4167) p = 0.045 Work Routines Intervention = 73.8 (11.8) Control = 82.6 (12.1) p = 0.043	N/A	N/A	N/A	N/A	N/A	N/A
Dixon-Ibarra et al. (2017)	Pedometry (Steps/Day), PA tracking sheets (Scheduled Days of PA/Week)	Pedometry = 2374 (740) Tracking Sheet = 2.3 (1.36) Insufficient data to conduct pre-/post-intervention analyses.	N/A	N/A	N/A	N/A	N/A	N/A
Valbuena et al. (2019)	Pedometry Yamax Digiwalker 200; Semi-Structured Interview	For Stan and Alex steps/min were above 100 and staff was able to maintain that. John's steps/day were low (generally less than 20) and did not participate in the staff-implemented sessions. Eric's steps/day improved considerably with intervention (from teens to 70-100). During staff-led sessions averaged 81 steps/min. Drew's did improve with intervention, but highly variable. One staff-led session, did well with 104 steps/min.	N/A	N/A	N/A	N/A	One question on social validity questionnaire	Care provider indicated that she felt confident in her ability to implement the program independently (5/5)
van Schijndel-Speet et al. (2017)	Pedometers: NL-1000, StepWatch	Intervention: NL1000 Baseline = 7215 (2732) Post-Intervention = 8051 (3743) StepWatch Baseline = 5300 (1696) Post-Intervention = 4008 (2168) Control: NL1000 Baseline = 5830 (2444) Post-Intervention = 5462 (2152) StepWatch	N/A	N/A	N/A	N/A	N/A	N/A

							Baseline = 4404 (2904) Post-Intervention = 3934 (3086) Significant improvement in PA for participants with walking speed >3.2 km/h. Not demonstrated using StepWatch.

Note: MVPA, Moderate to vigorous physical activity; M, Mean; SD, Standard deviation; PA, Physical activity; IPAQ, International physical activity questionnaire; NS, Not significant; N/A, Not applicable; *p* represents the threshold for significance (threshold varies according to individual study).

788 **Table 5**

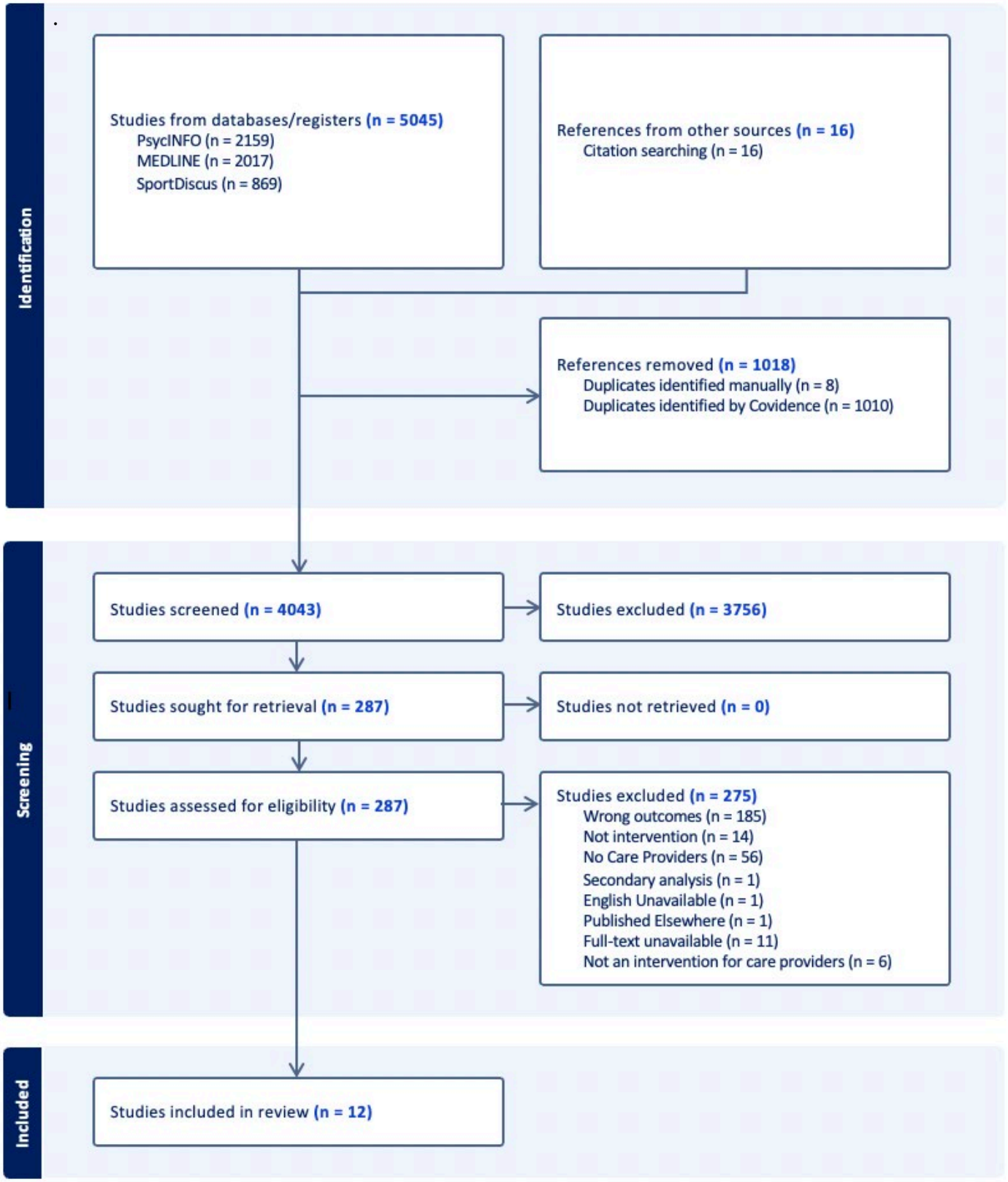
789 Qualitative findings for included studies.

Author(s)	Adults with intellectual disabilities physical activity outcome		Care provider training outcome measures related to physical activity					
	Measure	Results	Knowledge Measure	Knowledge Results	Attitude Measure	Attitude Results	Intention Measure	Intention Results
Dixon-Ibarra et al. (2018)	Semi-structured interviews. Thematic analysis, inductive coding.	Residents reported walking, biking, arm/leg lifts, boxing, and dancing. Staff reported light-intensity PA. Staff from 3 group homes reported increased flexibility and aerobic exercise, staff from 3 other group homes indicated no change in activity.	Semi-structured interviews. Thematic analysis, inductive coding.	One staff member indicated that they felt more knowledgeable after participation.	Semi-structured interviews. Thematic analysis, inductive coding.	Negative PA attitudes limited implementation. When caregivers had positive attitudes, it was helpful for supporting consistent engagement.	Semi-structured interviews. Thematic analysis, inductive coding.	There was reluctance to change routines and implement the program.
Umb Carlsson, (2021)	Group discussions. Content analysis.	Staff recognized that a health-promoting lifestyle for residents is staff dependent. Residents enjoyed taking part, but old habits continued to govern everyday life.	Group discussions. Content analysis.	Broadened thinking about health from care provider perspective. Changed the relationship between care providers and group home residents, and relationships with relevant professionals. Competence to implement increased.	N/A	N/A	N/A	N/A
Salomon et al. (2023)	Audio-recorded semi-structured exit interviews with carers and adults with ID. Thematic analysis.	Increased commitment to healthy lifestyles. Care providers mentioned increased PA and	N/A	N/A	N/A	N/A	N/A	N/A

		positive healthy outcomes.						
Sundblom et al. (2015)	N/A	N/A	Semi-structured interviews. Content analysis.	Health advisors and managers indicated that the skills and self-efficacy of the staff was crucial. Authors indicated that knowledge was an important component of self-efficacy.	Semi-structured interviews. Content analysis.	Staff's personal interest in and attitudes towards health-related issues, seemed to be issues affecting the process of implementation. Emphasized the importance of having a person on the team with deeper interest and motivation for the issues, and maintaining a positive attitude with resident in order to foster consistent PA.	N/A	N/A
Dixon-Ibarra et al. (2017)	Weekly goal tracking and scheduling sheets. Documented the type of PA, and changes in amount of planned PA opportunities.	Lack of strength activity planned; flexibility strongly encouraged for people who were non-ambulatory. Motor activity replaced aerobic for persons with severe limitations. Variety of activities was minimal.	N/A	N/A	N/A	N/A	N/A	N/A
Elinder et al. (2018)	N/A	N/A	N/A	N/A	N/A	N/A	Semi-structured interviews, content analysis.	Carers perceived high demand for health promotion regarding PA and diet, which increased the motivation to support efforts. In residences where carers did not perceive the same need, motivation was weaker.

790 Note: ID, Intellectual disability; PA, Physical activit

Figure 1. *PRISMA flow chart for included studies*



Chapter 4: An evaluation of professional development to enhance care providers' intention and capability to implement exercise programming: A pilot study

Preamble

An evaluation of professional development to enhance care providers' intention and capability to implement exercise programming: A pilot study is the third study in my thesis. The manuscript describes the formative evaluation of a training for care providers designed to improve their skills to support physical activity participation among supported adults with intellectual disabilities. The evaluation of the training was underpinned in Kirkpatrick's model for evaluating training programs.

My roles related to this study were to draft and submit the ethics proposal to the University of Victoria, liaise with the interested community support organization, recruit interested care providers and supported individuals from a local not-for-profit community support organization, creating and implementing the training with care providers, creating and implementing relevant methods of data collection (i.e., questionnaire, semi-structured interviews), conducting both the quantitative and qualitative analyses, writing and editing the manuscript. I would like to acknowledge my two co-authors Dr. Viviene Temple, and Amanda Merner. Dr. Temple wrote the grant applications, edited the ethics proposal, reviewed and edited the training content, and edited the manuscript. Amanda supported the qualitative data analysis. Amanda collaborated with me on the open and closed coding. They also supported with drafting participant experience statements for member checking as well as with reviewing the semi-structured interview transcripts to ensure they were accurate to the original recordings. This manuscript is closely aligned with Chapter 4, which will describe the results of the training from a practitioner's lens, with the aim of informing future training practices for care providers.

This pilot was funded by Special Olympics Canada and a Mitacs Accelerate grant and this manuscript will be submitted to the Journal of Applied Research in Intellectual Disabilities.

Abstract

Adults with intellectual disabilities face barriers that limit ongoing participation in physical activity. Paid care providers can play a vital role in supporting the physical activity participation of adults with intellectual disabilities who live in congregate care settings (i.e., Group homes). However, care providers may lack skills or knowledge about how to support resident participation. Our aim was to evaluate the efficacy of a professional development training for care providers, in order to enhance their skills to plan and support physical activity participation among adults with intellectual disabilities who live in group homes. A 3-hour workshop introduced the Special Olympics Fit 5 resource to care providers. The evaluation of the training was underpinned in Kirkpatrick's model for evaluating training programs. We used a mixed-methods design. Dependent t-Tests indicated significant improvements in care providers' awareness of Special Olympics, as well as their confidence and perceived competence to plan and implement an exercise routine using Fit 5. Qualitative results indicated that the Fit 5 workshop address care providers' personal needs, namely their knowledge, confidence, and access to programming resources. However, environmental barriers continued to be a problem for care providers' implementation efforts. Care providers indicated that they would recommend the workshop to other care providers. It was promising that a three-hour training and subsequent weekly check-ins addressed knowledge and confidence barriers for care providers. The next step in this study would be to appoint an internal representative in community support organizations to oversee professional development efforts for care providers to improve upon their skills to support resident physical activity.

An Evaluation of Professional Development to Enhance Care Providers' Intention and Capability to Implement Exercise Programing: A Pilot Study

Introduction

The World Health Organization recommends that adults with a disability accumulate a minimum of 150 minutes of moderate-intensity physical activity per week (World Health Organization, 2021)**.** However, authors of a recent systematic review reported that only 9% adults with intellectual disabilities meet this recommendations (Dairo et al., 2016), while 72.5% of adults worldwide meet this guideline (Guthold et al., 2018). These low levels of physical activity among adults with intellectual disabilities contribute to earlier onset and increased rates of adverse health outcomes such as obesity (Wallén et al., 2009), osteoporosis (Srikanth et al., 2011), and hypertension (Schroeder et al., 2020).

A notable barrier to physical activity participation among adults with intellectual disabilities is that independent participation in physical activity is not easily achievable (Taliaferro & Hammond, 2016). Difficulty with independent participation is attributed to a lack of personal exercise skills and experience (Taliaferro & Hammond, 2016), a lack of motivation (Dixon-Ibarra et al., 2018), low levels of health and physical activity related knowledge (Savage & Colombo-Dougovito, 2023), and low physical capabilities among older adults (van Schijndel-Speet et al., 2014).

Challenges with independent participation means that many adults with intellectual disabilities require support from care providers to live physically active lifestyles (Nijhof et al., 2024a; Vlot-van Anrooij et al., 2020). This support includes helping with transportation (Temple & Walkley, 2007b), providing resources (i.e., equipment, exercise programs) to improve accessibility (Rana et al., 2024; Temple & Walkley, 2007b), role modelling behaviours (Vlot-van

Anrooij et al., 2020), and direct physical activity support (Nijhof et al., 2024a; Vlot-van Anrooij et al., 2020). Specifically, encouraging healthy choices, providing reminders about physical activity routines, and demonstrating different types of physical activities (Rana et al., 2024; Vlot-van Anrooij et al., 2020). However, a lack of support is a common barrier to participation in physical activity for many adults with intellectual disabilities (Dixon-Ibarra, Driver, Vanderbom, et al., 2017; Mahy et al., 2010; Melville et al., 2009).

Care providers who work with adults with intellectual disabilities in residential settings (i.e., group homes) can have negative perceptions of physical activity (Dixon-Ibarra et al., 2018; Sundblom et al., 2015) or may lack confidence and skills to support physical activity engagement among clients (Sundblom et al., 2015; Temple & Walkley, 2007b). At an organizational level, professional care providers can experience institutional barriers such as a lack of time and resources (Taliaferro & Hammond, 2016; van Schijndel-Speet et al., 2014), unpredictable work routines (Sundblom et al., 2015), a lack of leadership in the physical activity domain (Sundblom et al., 2015; Temple & Walkley, 2007b), inconsistent staffing (Dixon-Ibarra et al., 2018), and/or a lack of clear policies for physical activity implementation (Elinder et al., 2018).

From the perspective of adults with intellectual disabilities, Anrooij and colleagues (2020) identified support from others as the highest priority for healthy living (nutrition and physical activity) in a residential environment. When participants were asked to identify assets for living healthily, care providers' knowledge and skills of physical activity were specifically identified by people with intellectual disabilities (Anrooij et al., 2020).

Special Olympics

Special Olympics is a global organization that provides physical activity, exercise, and sporting opportunities for people with intellectual disabilities. Special Olympics supports 5.5

million athletes in 193 countries around the world through programing in sport, health, and education across the lifespan (Special Olympics, 2024b). Special Olympics provides several specifically designed and readily available physical activity resources specific for people with intellectual disabilities. One of these resources is Fit 5, a resource developed with support of a grant provided by the U.S. Centers for Disease Control and Prevention. The Fit 5 resource promotes 3 health behaviours “5 times”: specifically, 1) exercising 5 times per week, 2) eating 5 fruits or vegetables per day, and 3) drinking 5 bottles of water per day (Special Olympics, 2023). As a supplement to Special Olympics basketball players’ programs, engaging in Fit 5 resulted in improved systolic and diastolic blood pressures among participants (Niemeier et al., 2021).

The Fit 5 resource “kit” consists of two PDFs (the Fit 5 Guide and Fitness Cards) which are available in English, Spanish, French, Chinese, Russian, and Arabic; as well as instructional fitness videos. The exercise domain of Fit 5, which is the focus of this study, has exercises in four components of fitness: strength, endurance, balance, and flexibility; and five levels of difficulty. The following are provided in the Fit 5 Guide: the definition, purpose, and examples of each fitness component; tips to get active, a one-week sample exercise plan, and weekly and yearly tables to track participation. The Fitness Cards extend on the exercise examples depicted in the Fit 5 Guide. The Fitness Cards have written instructions and pictures of Special Olympics athletes performing each type of exercise at all five levels of difficulty. The Fitness Cards also provide direction on the appropriate number of repetitions and sets for each fitness component, as well as recommendations for making the exercises more challenging.

Resources like Fit 5 are often underutilized or unknown to care providers who are not part of the Special Olympics community (Temple, 2022). During the height of the COVID-19 pandemic, Tromans and colleagues’ (2020) survey of 29 organizations serving individuals with

intellectual disabilities identified a lack of online physical exercise resources as an area of need. The subtext of this finding was that staff in these organizations were unaware of existing online resources that were freely available.

Care providers can lack of confidence, knowledge, and resources to support physical activity among individuals with intellectual disability and they may not be aware of resources that are readily available. Fit 5 was specifically designed for individuals with intellectual disabilities and has some demonstrated health outcomes (Niemeier et al., 2021). Therefore, the aim of this pilot study was to evaluate the efficacy of professional development training for care providers to enhance their awareness of an existing resource, and their ability to plan and implement physical exercise for group home residents with an intellectual disability. The specific research questions are presented in Table 6.

Method

Theoretical framework

The Integrated Model of Physical Activity and Disability (PAD model) (van der Ploeg et al., 2004) is the theoretical framework underpinning this study. The PAD model was chosen for its representation of context-specific personal and environmental factors that could possibly influence physical activity participation among people with disabilities. The PAD model depicts social influence and environmental facilitators/barriers (i.e., transportation, accessibility of facilities, assistance from others, equipment) as key environmental determinants of physical activity participation among people with disabilities (van der Ploeg et al., 2004). These environmental factors interact with personal factors to promote or inhibit participation in physical activity. The authors of the PAD model posit that factors such as self-efficacy, attitudes, health, energy, motivation, time, and skills impact the participation of individuals with a

disability directly, but interact with the individual's context (van der Ploeg et al., 2004). For this pilot study, we aimed to affect an aspect of the physical activity environment of adults with intellectual disabilities by positively influencing care providers' physical activity knowledge, confidence, and skills.

Design

A single-group, mixed-method design was used to evaluate the efficacy of the Fit 5 training. The evaluation was framed according to Kirkpatrick's model for evaluating training programs (Kirkpatrick, 1996). The model has been previously used to evaluate Special Olympics Canada's training of coaches to work with young athletes (Temple & Field, 2023a, 2023b) and organizes the assessment of training effectiveness into four levels: 1) Reaction, which evaluates a participant's initial feelings and reactions to the training; 2) Learning, which examines the advancement of a participant's learning outcome(s) of interest (i.e., skills, knowledge, attitudes), 3) Behaviour, where the application of learning in real-life settings is examined, and 4) Outcome, where the results of the training are evaluated (Kirkpatrick, 1996). For this pilot project, the first three levels of Kirkpatrick's model were evaluated in accordance with our research questions (see Table 6).

The setting for this project was a not-for-profit organization in a mid-sized city in Western Canada providing support services to individuals with intellectual disabilities and their families. The organization provides parent and family support, employment and supported-living services, and community inclusion programing. The sampling frame was all direct care providers who worked in the supported-living service area of the organization. Approval for this study was granted by the University of Victoria Human Research Ethics Board (protocol number 22-0178) and the participating not-for-profit organization.

Another aspect of our design was the inclusion of adult learning principles in this project. Having free on-line availability of the Fit 5 resource addresses a barrier to suitable programing previously mentioned by care providers (Tromans et al., 2020). However, for uptake and implementation to be initiated, care providers must also know how to use these resources in practice and have the confidence to do so (Chow et al., 2020; Dixon-Ibarra, Driver, Vanderbom, et al., 2017). To address the gap between the availability of resources and actual implementation, principles of adult learning (Knowles et al., 2020) were incorporated into the design of the training (see Table 7).

Participants

Of the 104 eligible care providers who worked in the supported-living service area with adults (18-64 years of age) or older adults (65+ years of age) with intellectual disabilities in group homes, 14 expressed an interest in participating in the project. The project was described to care providers as encompassing professional development training to help them plan and implement exercise with residents for three weeks, as well as an evaluation that asked them to complete questionnaires and follow-up semi-structured interviews. Eight (Male = 2) of the 14 care providers from 7 group homes attended the training, completed the pre- and post-workshop evaluations, and implemented the program. Participating care providers worked at the specific not-for-profit organization for 3-17 years, and on average, worked in 3.2 group homes (*SD* = 2.5). Care providers' consent was obtained immediately before participating in the workshop.

Subsequent to training care providers, residents in the seven group homes were invited to participate in the project implementation phase. Fourteen residents agreed to participate, and their informed consent and assent were obtained. Ten of the participating residents were adults (Male = 8), and four were older adults (Male = 2). Of the fourteen residents, one resident had

limited verbal capabilities, and two residents used a wheelchair for mobility. The residents were asked to try the exercises that the trained staff implemented and to provide feedback about their experience of those activities. During the implementation phase, 2 care providers worked with 1 resident, 4 care providers worked with 2 residents, and 2 care providers worked with 4 residents in the same group home.

Procedure

Figure 2 is an overview of the procedure for this study. The study began with a 3-hour workshop for care providers. Self-report pre- and post-workshop questionnaires were used to examine participants' satisfaction with the training and learning. Care providers then engaged group home residents in a 3-week implementation period. During the implementation period, care providers participated in two Zoom meetings to navigate challenges that they were experiencing in their implementation efforts. The meetings were also a source of formative feedback for the project. Immediately following the 3-week implementation period, care providers and group home residents participated in post-intervention semi-structured interviews. Care providers participated in a fourth and final semi-structured interview at a 3-month follow-

Intervention

The intervention was professional development training for care providers to increase their knowledge of exercise and their capability to implement Fit 5 with group home residents. The training consisted of two parts 1) the workshop and resources, and 2) Zoom support and problem-solving during implementation.

1) The Fit 5 Workshop

The 3-hour Fit 5 workshop was specifically developed for this project and is external to Special Olympics, but it incorporates the Fit 5 resources that are readily available online at no

cost (Special Olympics, 2023). The objectives of the workshop were for care providers 1) to understand the importance of implementing physical activity with group home residents, 2) to become familiar with the Fit 5 exercises and how to implement them, 3) to learn how to program an exercise routine, and to encourage care providers to contextualize their implementation plans. Table 7 shows how adult learning principles (Knowles et al., 2020) were considered in the design of the training and Table 8 illustrates how the workshop was organized into three one-hour segments.

2) 3-Week Implementation Period

Care providers were asked to implement the program with a resident, or residents, in each resident's home for three weeks. During the implementation period, care providers engaged residents in the Fit 5 program that they had planned during the workshop and participated in two interviews via Zoom. The first interview took place one week after the implementation period had begun, and the second interview took place one week after the first interview. During the individual semi-structured interviews, the first author and the care provider discussed (a) what had been implemented with clients, (b) the aspects of the Fit 5 resource they used, and (c) the successes and challenges they experienced when trying to implement aspects of the workshop into practice. The interviews also provided an opportunity to strategize about how to navigate the challenges care providers and residents were experiencing. During the implementation period, residents were invited to try the program that staff were putting into practice.

Measures

Level 1: Reaction

Consistent with Kirkpatrick's (1996) guidelines for evaluating professional training, care providers responded to two categorical questions ('Yes', 'No', or 'Unsure') that asked care

providers if they would recommend the Fit 5 training to other care providers and if the training addressed their needs in terms of implementing exercise. Three open-ended questions on the questionnaire allowed care providers to 1) indicate how their training needs were addressed, 2) if there were needs that weren't addressed within the scope of the training and what those needs were, and 3) if there was anything that they would recommend for future workshops. Responses to these open-ended questions were converted into frequency counts.

Level 2: Learning

Care providers completed a questionnaire immediately before and after the Fit 5 workshop to evaluate their awareness of Special Olympics, as well as their confidence and perceived competence to explain, plan, and implement an exercise routine with the residents they work with. The care providers' intentions to implement with clients was also recorded. The questionnaire was underpinned by Bandura's (2006) recommendations for evaluating perceived self-efficacy. The questionnaire consisted of 33 questions that were divided into 5 subsections: 1) Awareness of Special Olympics and their resources (8 questions), 2) Confidence and perceived competence to explain Fit 5 workshop content to clients (6 questions), 3) Confidence and perceived competence to plan and program an exercise routine for residents using Fit 5 (7 questions), 4) Confidence and perceived competence to implement aspects of Fit 5 with clients (6 questions), and 5) Intentions to implement aspects of Fit 5 training with clients (6 questions). Each question was evaluated using a 5-point Likert scale where 5 = Strongly agree and 1 = Strongly disagree. Learning outcomes were also evaluated during the post-intervention semi-structured interviews. Care providers were asked about their awareness of Special Olympics and their resources, their confidence and perceived competence to continue implementing aspects of

the Fit 5 workshop into practice, and if this had changed over the course of the implementation period.

Level 3: Behaviour

Behavioural outcomes of the Fit 5 training were evaluated qualitatively using semi-structured interviews which took place during, immediately following, and 3 months following the 3-week implementation period (Figure 2). These interviews were used to evaluate what aspects of the workshop were used with clients, how they were used, and the successes and challenges that care providers experienced while implementing with clients.

For the semi-structured interviews that took place immediately after the implementation period and 3 months following implementation, care providers were asked about what activities they did with residents and their perspective of residents' personal barriers and facilitators for participating in the exercises. Care providers were also asked to comment on the personal barriers and facilitating factors they experienced themselves in implementing aspects of the Fit 5, any environmental factors that influenced implementation of Fit 5, and how the training may need to be adjusted to better support the care providers' implementation of exercise with clients. During the 3-month follow-up interview, care providers also spoke to whether they continued to implement aspects of Fit 5 with clients.

Data Treatment and Analysis

Data Treatment

Quantitative data were entered into Microsoft Excel. Frequencies from the post-workshop questionnaire were computed to evaluate whether care providers would recommend the Fit 5 training to fellow care providers, whether the training addressed their needs, to evaluate which needs were addressed, if there were needs that still needed to be addressed, and

recommendations for future training. For the pre- and post-training scores related to the learning outcomes of the pilot, scores for each of the five sub-sections of the pre- and post-workshop questionnaires were summed and means and standard deviations were computed.

Semi-structured interviews were conducted and recorded using Zoom. These recordings were uploaded to Echo360 (Version 6), which is software for creating, managing and storing video that uses automatic speech recognition to produce a transcript (Echo360).The first author then reviewed those transcripts for accuracy. Transcripts were then uploaded to Taguette for coding (Taguette Version 1.4.1). Inductive and deductive coding processes were conducted by two separate investigators (NL + AM). Following the coding process, each investigator reviewed their codes to draft a one-page summary of the experiences of each participant for member checking (Birt et al., 2016). Disagreements between the investigators were settled by discussion. There were no instances where consensus was not reached. Interview responses extracted during the coding process were then uploaded to Microsoft Excel for thematic analysis.

Quantitative Analysis

Quantitative analyses of the pre- and post-workshop questionnaires were used to describe care providers' reactions to the Fit 5 workshop, as well as their learning outcomes. A series of paired-t-Tests and effect sizes (Cohen's *d*) (Cohen, 2013) were conducted to look for pre- to post-intervention effects. As there were five sub-sections of the questionnaire, the Bonferroni correction was applied. Specifically, the level of statistical significance accepted was $p < .01$ based on the adjusting the alpha level of .05 for the number of comparisons (i.e., $\alpha = .05/5$ comparisons = .01).

Qualitative Analysis

Deductive and inductive coding strategies were used (Fereday & Muir-Cochrane, 2006; Williams & Moser, 2019) in relation to our open-ended questionnaire questions and the four semi-structured interviews. Initially, a deductive coding strategy using codes specific to the PAD model (i.e., self-efficacy, attitudes, health condition, personal barriers/facilitators, environmental barriers/facilitators, social influence) (van der Ploeg et al., 2004) was applied. Subsequently, an inductive coding strategy was used to allow for codes and themes to emerge as the transcripts were reviewed. The codes from both strategies were synthesized together and reduced to a smaller, more general set of codes. The codes were then transformed into themes by the first author.

Trustworthiness

Steps were taken to enhance the trustworthiness of the data (Shenton, 2004). Firstly, to promote the credibility of the coding process, weekly briefing and debriefing sessions were held between the two investigators responsible for coding. After the coding process was completed, each investigator used the extracted codes to draft a participant experience statement. The investigators reviewed the copies of their statements together to ensure that similar conclusions were drawn from the coding. Disagreements or inconsistencies were settled with a discussion. The relevant statement was then shared with the participating care providers during the 3-month follow-up interview to ensure that the interpretations of the investigators were accurate to their lived experience. It was also important to verify credibility of the interview process. Triangulation was employed by implementing overlapping methods of data collection (i.e., interviews and questionnaires) with different participants (i.e., care providers and group home residents), while addressing the same research question. Research questions were addressed

using overlapping methods to determine if different methods of data collection would yield similar results, thereby promoting the dependability of the data.

Results

The results are organized in relation to our research questions and Kirkpatrick's (1996) model for evaluating training programs, see Table 6. Immediate reactions (Level 1) to the Fit 5 workshop were evaluated quantitatively using self-report questionnaires. Learning (Level 2) outcomes were evaluated using quantitative and qualitative methods. The questionnaire administered immediately before and after the workshop was the source of the quantitative data. Qualitative results were derived from semi-structured interviews that took place during, immediately following, and 3 months prior to the 3-week implementation period. One theme emerged from the qualitative analysis for learning outcomes, *I came in low, I'm leaving high*. Behavioural outcomes (Level 3) of the training were evaluated using semi-structured interviews during the 3-week implementation period. The five themes that emerged from the analysis explored the activities care providers and residents engaged in together, proximal and organizational barriers for care providers and residents, factors that facilitated participation, and the satisfaction of the residents with the program. The titles for these themes are: (1) *We gave Fit 5 a try,* (2) *Things just got in the way*, (3) *I don't feel supported*, (4) *This is what worked for me,* and (5) *I'd like to keep going, it's fun*. For our theme, *We gave Fit 5 a try*, two subthemes emerged, *Easier exercises worked the best* and *We were limited in what we could do*.

Level 1: Reaction

Our first research question asked whether the training addressed the care providers' needs. The initial reaction at the end of the workshop was very positive, with 7/8 care providers indicating that the training addressed their needs. In relation to whether care providers would

recommend the workshop to other care providers, 75% (*n* = 6) indicated they would recommend and 25% (*n* = 2) indicated they may recommend the workshop to others. The other research question focusing on initial reactions asked for ideas to improve the training. Care providers recommended that the training should be expanded to include the nutrition and hydration components of Fit 5 (*n = 3)*. They also indicated that they would like to learn more about behaviour change techniques (*n* = 1).

Level 2: Learning

Table 9 provides the descriptive statistics and the results of the paired t-Tests comparing the pre- and post-workshop questionnaire responses to address our third research question. There were significant positive changes in awareness of Special Olympics, as well as confidence and perceived competence to plan and implement an exercise program using Fit 5. Although care providers' confidence and perceived competence to explain Fit 5 and their intention to implement Fit 5 with residents did not change significantly, the effect sizes were large (Cohen, 2013).

I came in low; I'm leaving high.

Care providers' learning was also evaluated qualitatively using semi-structured interviews during, immediately following, and 3-months following the 3-week implementation period. Care providers indicated that some of the barriers (research question 4) they experienced were addressed by participating in the training. Specifically, their access to exercise programing resources, as well as their personal knowledge and skill to implement physical activity with the residents they work with.

> Had I not learned about Fit 5, I would have not come up with those ideas on my own. I would have continued to find ways to keep [resident's] body moving in a positive form…But what I've done by learning Fit 5, it just put it into context. I've always

> believed that exercise is good. But this just helps me to really understand what it's based on and how it can be used. (Care provider #5)

Care providers also indicated that by participating in the Fit 5 workshop, that they felt more confident in their abilities to implement exercise with group home residents. As care provider #14 commented,

> Before I took the class, I didn't have as much confidence. Your class helped a lot in that department, so that improved. So, then it was very easy for me to implement it. I felt a lot safer, and I really felt like I had the resources [where] all I needed to do was go and look and see what was there and see what I could use.

Several care providers indicated that they felt more confident knowing that Fit 5 came from a trusted source like Special Olympics. Care providers also suggested that seeing fellow care providers engaging in the workshop was empowering for them to commit to engaging in consistent physical activity with group home residents, and that their confidence grew as they supported the residents to participate in the exercises.

> I think it was addressed with the training and I think that it also built with experience. So, every day that we did it, I got more confident… I think just seeing everyone else do it and learning about it, and seeing the information that was handed out, looking at it, and seeing that everybody was doing it or that it could be done, that it wasn't as tough as I thought (Care Provider #2).

Level 3: Behaviour

We gave Fit 5 a try.

Easier exercises worked best.

Behaviour, or application of learning in real-life settings (Kirkpatrick, 1996), was examined in terms of how care providers implemented the program (question 5), the challenges and successes of implementation (question 6), and how the program was received by residents (question 7). Individual-level implementation efforts by care providers derived from the semi-structured interviews are described in Table 10. In general, care providers initiated the easier Level 1 and Level 2 exercises from the Fit 5 resource with residents. Examples of exercises in Level 1 and 2 include quick forward punches, wall push-ups, and leg raises (with a choice of seated or standing, depending on resident physical capabilities and preferences). The frequency and duration of the implementation varied according to the capacity of the care providers and the capabilities of the residents. Care providers placed more emphasis on endurance, strength, and flexibility exercises than balance exercises. Most implementation efforts were conducted in the home, while some care providers and group home residents accessed recreation facilities (i.e., gyms, pools), or outdoor physical activity spaces such as parks and trails.

We were limited in what we could do.

Care providers utilized the same physical activity program that they created during the workshop for the entire 3-week implementation period. They felt that the program they created during the workshop was sufficiently challenging for the resident/s they worked with. Engagement in the program largely continued for the 3-month follow-up period, except for 2 residents. One care provider who discontinued the program explained that the resident was not interested in further participation because it took time away from things that they would rather be doing. The other care provider explained that the work routines of the group home they worked in, coupled with the lack of flexibility from the resident in terms of when they wanted to participate in Fit 5 exercises, made continued participation challenging.

Things just got in the way.

In terms of challenges to implementation (research question 6), a prominent theme among care providers was “Things just got in the way”. Care providers reported that time constraints, feelings of burnout, and the unpredictable nature of their jobs were personal barriers to facilitating exercise with residents. They reported struggling to cope with the current work routines of their position, which became even more challenging when physical activity was implemented in the group homes.

> [At the start of my shift], people are coming home. You have to be unpacking lunches, remaking lunches for the next day, preparing for dinner, cleaning up after dinner. And then there’s following their evening routine. Is it laundry day? Is it someone’s bath day? So, fitting all of those things in, along with administering medications at the right time. And then there’s a chore list we have to complete every day. The challenge that I found was just feeling like my co-worker had to do all of that because I was away exercising with [resident]. (Care provider #1)

To address the barriers that they were experiencing, care providers turned to their coworkers for support. However, some care providers experienced resistance to helping from their coworkers. Furthermore, almost all participating care providers suggested that it may be challenging to get more staff members to engage in a similar workshop in the future given the responsibilities already being placed upon them.

Although comfortable implementing what they had planned during the workshop, care providers said they lacked confidence in their ability to adapt exercises safely to physical capabilities and to try more challenging activities with the residents. As Care provider #14

mentioned, “I’m trying to limit [exercise] because I’m not sure how they’re going to do, and I’m afraid they’re going to fall if I keep pushing it… I am the one who’s afraid.”

I don’t feel supported.

Care providers reported several organizational barriers influencing the extent to which the Fit 5 intervention could improve physical activity participation among residents. Care providers spoke to understaffing and the level of turnover for staff members. They indicated that much of their time is dedicated to training new hires, and that the new hires are often underqualified to work in residential group homes with people with complex needs.

> The human resource team [used to] only hire [staff] who has a Community Support Work certificate, like a social work degree, nursing degree or even like LPN. But nowadays… they don’t have any experience about this field. They’re not qualified. Some of them is good, but for [some] they don’t know basic skill… hygiene, they don’t know the medication. (Care provider #4)

Care providers also indicated that they have little communication with their supervisory team (i.e., directors of care), though they had to rely on their approval to implement aspects of a workshop like the Fit 5 workshop with residents. They reported that they felt powerless to implement aspects of this type of workshop into practice without confirming with the organization. As Care provider #3 commented “It’s very hard for me to come up with anything like that unless I have that power.” Furthering this thought, Care provider #4 said:

> I think it would be good to make it mandatory. That would be a good thing to do for the residents here because people have been here for 20 years. They wouldn’t want to sign on. They wouldn’t want to take more responsibility.

Beyond their immediate experience of facilitating exercise with a resident, care providers reflected more broadly on organizational structures. They expressed that to address organizational barriers to supporting physical activity participation among residents, there would need to be an internal professional (i.e., kinesiologist, health coach, personal trainer) who is interested in overseeing the efforts with respect to training staff members. They also suggested that implementation efforts would be much easier with commitment from all staff members in a group home. This commitment could be facilitated by the organizations' management team given that they hold the power to initiate new care practices. They also suggested that it will take representatives in each designated group home to model exercise behaviour for less confident care providers. "That would take the organization appointing or selecting the people who are really invested in this to go around to each group home and involve the staff" (Care provider #5).

Participants also suggested that care providers who were on the fence when it came to implementing may be more inclined to implement aspects of the Fit 5 workshop into practice if they received an incentive, or additionally, more time at work that was specifically designated to physical activity.

> We don't ask for anything, but we just want to be acknowledged. We're not getting paid for anything, like a few hours a month is also good for us to keep this program going and to keep us motivated and dedicated. (Care provider #3)

This is what worked for me.

Despite reporting several barriers, care providers reported several personal and environmental facilitators that supported implementation efforts. Semi-structured interview responses revealed that care providers found that being provided with a hard copy of the Fit 5 resources during the training was useful in the implementation phase. They found the resources

easy to follow and share with residents. Care providers also indicated that they felt empowered to take the initiative to support residents' participation in physical activity more consistently.

> I really am glad that I've taken the workshop… I think what it comes down to is that we should give [residents] as much opportunity in the real world as anybody else can have. That's what I really get from it. This is the opportunity that we're giving them, the same opportunities as anybody else would have. (Care provider #5)

Care providers also indicated that longstanding relationships with the residents was helpful because they had extensive knowledge of residents' personalities, learning styles, and preferences. This allowed care providers to implement strategies that were specific for the residents they worked with, such as ensuring physical activities were fun, fostering a routine, and encouraging autonomy in decision making processes. "I basically let [them] choose what activities we're gonna do. So, [resident] flips through the cards and then [they'll] choose which one" (Care provider #1).

Care providers commonly noted that when they felt confident to implement the program, residents' confidence to participate and in their own abilities was boosted.

> If they or I didn't feel confident, I would try something different or try a different way and see how they reacted and whether they wanted to continue or whether they looked like they were a little bit more enthusiastic, so I think that had a little bit to do with the modification for sure. (Care provider #2)

Lastly, care providers indicated that when they felt supported by their coworkers and management, that implementation efforts came much easier to them. Care providers reported that the support from their coworkers was contingent on a cultural precedent set by their management

team that emphasizes teamwork to promote opportunities for residents to engage in activities they wouldn't ordinarily engage in without support.

> I work with staff who was really good. We always have good teamwork. Most of the staff here are good on like, sharing the loads, and if they know that me and [resident] are doing something, they're so willing to do something for the other guys. (Care provider #11)

I'd like to keep going, it's fun.

Our final research question focused on residents' experiences of the program during the implementation period. The overarching them was *I'd like to keep going, it's fun.* Residents liked being able to look at the Fit 5 book and especially liked that Fit 5 was a Special Olympics program. Almost all participating residents indicated that they enjoyed participating in the Fit 5 activities with their care providers and indicated that they would like to continue participating after the implementation period. Residents also indicated that the exercises that they participated in were challenging, but that it did not take away from their enjoyment. "It was pretty good. I like to do them because it was pretty good, but it was pretty hard to do" (Resident #12). Group home residents also indicated that they enjoyed participating alongside their housemates. For these residents' context, they participated in a structured exercise program in the mornings with their designated care providers. "I like doing exercise, I like doing exercises with my friends at [group home]. I like push-ups, the punching bag" (Resident #13). Some group home residents indicated that they were motivated to continue participating in Fit 5 exercises because of the health benefits associated with engaging in physical activity. "Yeah, I'd like to continue with the exercise, just in case of my health" (Resident #3).

Discussion

Care providers' reactions to the Fit 5 training and implementation period were positive overall. All but one of the participating care providers indicated that training efforts addressed barriers that they were experiencing, namely their confidence and knowledge base pertaining to physical activity implementation. This was promising given that care providers' pre-training survey responses indicated that they were looking to gain knowledge about how to support resident physical activity participation, and because knowledge and confidence have been previously established as personal barriers for care providers of adults with intellectual disabilities to support physical activity opportunities (Sundblom et al., 2015; Temple & Walkley, 2007b). However, despite that care providers indicated that they would recommend or maybe recommend the training to others, care providers were uncertain whether more care providers would be interested in voluntarily supporting physical activity promotion in the group homes they work in after experiencing resistance from coworkers in supporting resident participation. Their apprehension may have been attributed to their lack of skills, or the capacity of the care providers in the group home (i.e., time constraints, burnout). Given that support for physical activity participation is not universally accepted as a preventive healthcare strategy amongst care providers (Dixon-Ibarra, Driver, Vanderbom, et al., 2017), it may be beneficial to incorporate physical activity training as a component of mandatory, reoccurring professional development training, which was also supported by participating care providers.

Awareness of Special Olympics and their resources improved significantly with the Fit 5 training. This was an important finding given that resources for staff has been identified as a pre-condition in creating healthy settings for people with intellectual disabilities (Vlot-van Anrooij et al., 2020), an important logic model input in healthy diet and physical activity interventions in

community residences (Elinder et al., 2010), and when absent, a barrier to implementation among care providers working in community support organizations (Tromans et al., 2020).

Care providers' confidence and perceived competence to plan and implement an exercise routine with group home residents improved. Care providers attributed their increased confidence to both the Fit 5 workshop and the subsequent implementation period, reflecting the importance of experiential learning for the success of adult learners in this pilot. As care providers with greater self confidence in their professional abilities have more professional satisfaction and the quality of service they provide tends to be higher (Nota et al., 2007), optimizing perceptions of competence with training is important. Importantly, Nota et al. (2007) found that years of service was not a sufficient condition for care providers to increase confidence is their abilities to plan their own interventions. These authors' data supported the need for high levels of training and supervision for care providers who work in close contact with individuals with intellectual disabilities. Our findings support this idea. Although, confidence and perceived competence increased, care providers needed more training to support residents with physical limitations, older adults, and address perceived safety concerns.

Group home residents indicated that they enjoyed participating in Fit 5 exercises during the implementation period. This was a vital aspect for supporting the ongoing participation of the group home residents as personal enjoyment has been consistently reported as a facilitator for physical activity participation among people with intellectual disabilities (Dixon-Ibarra, Driver, Vanderbom, et al., 2017; Temple & Walkley, 2007b; van Schijndel-Speet et al., 2014). Group home residents in this study indicated that they would like to continue participating in Fit 5 exercises with their care providers.

Participating care providers reported ways to improve the Fit 5 training. Care providers said they would benefit from training related to the nutrition and hydration components of Fit 5. Those sections of Fit 5 provide information about different food groups, optimal portion sizes for different foods, and examples for healthy meals, snacks, and beverage choices (Special Olympics, 2023). Both care providers (Hamzaid et al., 2018) and people with intellectual disabilities (Humphries et al., 2004) tend to have limited knowledge of nutrition, which may compromise their ability to plan for healthy meals and choices. Future training interventions should consider including nutrition and hydration aspects of Fit 5, which would involve expanding the training effort to more sessions and the commitment of additional resources.

Care providers from the pilot worked in the support sector for many years and brought knowledge into the residents' contexts, which made it much easier to select appropriate exercises for the residents when developing their initial exercise programs. This aligns with previous work conducted by Nota and colleagues (2007), who reported that care providers' length of service resulted in significant improvements in their confidence to do assessment activities (i.e., activities that involve a level of observation) with supported individuals. Care providers also implemented behaviour change techniques and strategies with consideration into their prior experience in supporting residents to engage in specific behaviours. For example, for one care provider, they felt that participation would come easier to the residents if they did the exercises together as a group. Another care provider indicated that it was helpful when the residents themselves chose the exercises they wanted to participate in. Many care providers indicated that when they positively encouraged the residents to participate, and made the exercises fun, implementation efforts came easy. Most techniques used were person- and home-specific, which implies that implementation efforts and support need to be individualized. Systems for guiding

individualized support, such as person-centred planning, are already embedded in community support organizations. Person-centred planning is a process conducted for selecting and organizing goals, supports and desired outcomes where the perceived receiving support directs support efforts (Administration for Community Living, 2021). Person-centred planning has been shown to improve participation in activities among adults with intellectual disabilities (Ratti et al., 2016). Moreover, older adults with intellectual disabilities spent significantly more time engaged in meaningful activities when person-centred plans were of higher quality (Adams et al., 2006). However, Kreinbucher-Bekerle and colleagues' (2022) survey responses from care providers of adults with intellectual disabilities indicated that strategies to implement physical activity in care settings are missing, and that these constraints could be addressed with the adoption of person-centred plans for physical activity.

Kreinbucher-Bekerle and colleagues' (2022) recommended for care providers to access external support from coaches, trainers, and physiotherapists in developing person-centred physical activity plans, thereby promoting a team with both physical activity knowledge as well as insight into the residents at the centre of the plan. Our findings contribute to this work by recommending for physical activity professionals to be embedded in community support organizations, but for those professionals to be external to the group home. Previous interventions that have aimed to promote the ongoing adoption of physical activity plans have inserted physical activity supports directly into group homes, which may have lacked consideration into the organizational barriers experienced by care providers. For example, Bergstrom and colleagues (2013) introduced internal "health ambassadors" to residential settings for adults with intellectual disabilities who were employees of community agencies in group home settings. These appointees were internal to each group home, which may have increased

the workload for the other workers in the home. Similar organizational barriers were identified in this pilot by participating care providers, but they were not addressed and cannot be addressed with professional development training. Ultimately, it may be important to consider a more holistic approach to physical activity support in community support organizations for future interventions, where the contexts of all parties are considered, and where environmental and personal barriers for both care providers and adults with intellectual disabilities can be addressed. Such interventions will benefit from addressing environmental barriers from the PAD model aside from support from others, given that support from others was contingent upon the presence or absence of other environmental barriers experienced by care providers (i.e., turnover, understaffing).

Despite that the training addressed personal barriers for care providers to support residents to engage in physical activity, the training did not address environmental barriers for care providers aside from access to resources. This is of concern given that the environmental barriers for care providers influence resident participation (i.e., inconsistent staffing, heavy work routines), and because training efforts cannot address such environmental barriers. It is important to note that the aim of our pilot study was not to reduce care providers' environmental barriers; it was to reduce environmental barriers for residents (i.e., support from others) by addressing the personal factors (i.e., knowledge, confidence, skills) of their care providers through training efforts. Though this was successful, the environmental barriers for care providers persisted. A more holistic intervention strategy may be required to address the environmental and personal factors that influence the physical activity participation of people with intellectual disabilities in group homes.

Care providers indicated that group home residents engaged in Fit 5 exercises for the entirety of the implementation period, and all but 2 residents continued to participate at a 3-month follow-up. This was promising given that the initiation of each exercise program was in response to a short 3-hour training and Zoom check-ins, whereas previous training interventions have required a much larger time commitment. For example, Bergstrom and colleagues (2013) training efforts to care providers comprised of ten weekly sessions with care providers lasting 90 minutes. Though their training efforts were effective for significantly improving physical activity participation, it is important that training efforts do not reinforce personal barriers experienced by care providers (i.e., burnout, lack of time) as it can discourage their ongoing support for physical activity participation after the intervention period ends. For the basis of our pilot, uptake for attendance at a 3-hour workshop was already a challenge, as we had multiple participants drop out before attending the training. Brief training efforts may be perceived as a more attainable commitment for care providers, which may encourage their involvement in such efforts. Moreover, the Zoom check-in interviews with the primary investigator during the implementation period were essential for fostering meaningful physical activity support. Many of the recommendations provided to care providers during the sessions were successfully implemented and perceived as helpful to care providers. Given that care providers were still looking for support about how to adapt Fit 5 exercises to resident capabilities, as well as support to implement behaviour change techniques, further consultation sessions would support resident participation.

The main limitation of the study was the care providers could not access help whenever they wanted. As such, implementation efforts were not adjusted until care providers consulted with the research team. Moreover, in all but one group home, only one staff member participated

in the training, which may have increased the burden on the participants that joined the study. It is recommended that the entirety of the group home is trained to promote continuity between shifts for care providers, and to increase opportunities for residents to access support from any care provider working in their group home. Small sample size and recruitment was also a limitation. Initially, 14 care providers agreed to participate in the pilot, but only 8 care providers attended the training and participated in the implementation period. Given that care providers mentioned that implementation came easier when they felt supported by their coworkers, recruiting more care providers would have benefited the ongoing maintenance of this pilot. Future training should consider incorporating different means of recruitment (i.e., recruitment posters in group homes), as well as clearer information relevant to what care providers' participation would involve.

Conclusion

This Fit 5 intervention was effective in improving care providers' confidence and competence to program and implement exercise with for adults with intellectual disabilities in group homes. It also increased their awareness of Special Olympics. The intervention had a positive effect on intention to implement Fit 5, which was evidenced by care providers and residents engaging in the program during both the intervention period and the 3-month follow-up period. Overall, residents enjoyed participating and wished to continue after the intervention period. However, the intervention was less effective in helping care providers progress the program with residents over time or how to adapt the program for residents' activity limitations such as balance issues. During the implementation and follow-up periods, care providers identified that despite gaining confidence and competence from the Fit 5 training, training efforts did not account for the organizational barriers that they were experiencing. Care providers

reported that they require support to help engage residents in physical activity. Future interventions will benefit from addressing personal and environmental barriers concurrently by appointing a representative to training care providers to support resident participation, and to actively address organizational barriers by providing direct support themselves, supporting in the development of person-centred plans, to develop implementation guidelines, to evaluate resident satisfaction and health outcomes, and to provide additional training as issues arise; as per adult learning principles.

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Table 6.

Alignment of Research Questions with Kirkpatrick's Model for Evaluating Training Programs

Level of Evaluation	Research questions
1. Reaction	(a) Did the training address care providers' needs; and would they recommend the training to fellow care providers? (b) What suggestions did care providers have to improve the training?
2. Learning	(c) Did the training increase care providers' awareness of Special Olympics and the Special Olympics' Fit 5 resources; as well as their confidence, perceived competence, and intention to implement programming? (d) Did the training address barriers to implementation?
3. Behaviour	(e) How did care providers implement the Fit 5 program with clients? (f) What were the challenges and successes of implementing Fit 5? (g) How was the program perceived by group home residents?
4. Outcome	Not included in this pilot evaluation.

Table 7

Application of Adult Learning Principles in Fit 5 Training

Adult Learning Principles	Application of Adult Learning Principles
1. Learners must know why they are learning something before learning it.	• Information provision. Background information on physical activity levels among people with intellectual disabilities, risks of physical inactivity, benefits of physical activity to residents and care providers.
2. There must be movement towards self-direction in the learning process.	• Provision of Fit 5 Fitness Cards that care providers could regularly refer to after the Fit 5 training had ended. • Care providers developed an exercise program for residents during the training. • Information provision specific to resources outside of Fit 5.

3. The learning must be relevant to prior experiences.	• Group discussions of
	  o experiences of residents when trying to exercise.
	  o barriers that care providers have experienced trying to encourage exercise.
	• Tailoring exercise plans following discussion of resident capabilities, experiences, and barriers.

4. The learning must be centred around a need to cope with a life situation or to perform a task.	• Group discussion of
	  o the importance of exercise for maintaining independence in activities of daily living.
	  o strategies to support residents' consistent participation.

5. The learning is life-centred with the purpose of developing competency.	• The training was designed to increase confidence and competence in explaining Fit 5 exercises to residents, planning an exercise routine for residents using Fit 5, and implementing their exercise plan into practice with residents.
6. The learners' motivation is internal.	• Care providers were asked what made them interested in attending, and what they hoped to gain by attending.

Table 8

Overview of the Workshop Timing, Intentions, and Content

Time and intention of the segment	Content
Hour 1: To set the stage by providing background information on exercise principles and Special Olympics	• Rationale underpinning Fit 5 workshop • Background information on Special Olympics and Fit 5 • The WHO (2021) weekly physical activity recommendations for people with intellectual disabilities • Benefits of participation for care providers and residents • Exercise principles such as how to progress exercise by changing the frequency, intensity, time, and type of exercises to induce progressive overload, thereby improving physical capabilities
Hour 2: Practical experience with the Fit 5 resource	• Types of exercise and their purposes • Practical implementation of Fit 5 exercises
Hour 3: Planning and implementation	• Understanding how to program appropriate volume and intensity of exercise, as well as rest • Learning how and when to make exercises progressively more challenging • Used templates to plan what they would implement with group home residents over the 3-week implementation period • Created an exercise program for a specific resident

Table 9

Descriptive Statistics and Paired t-Test Results for Care Providers' (n = 8) Pre- and Post-Workshop Questionnaire Responses

	Pre-test		Post-test			
Variable (score range)	*M*	*SD*	*M*	*SD*	Cohen's *d*	*p**
SO Awareness (8-40)	21.50	3.80	34.63	3.42	3.62	<0.01
CPC Explain (6-30)	19.32	6.80	26.63	2.18	1.44	0.02
CPC Plan (7-35)	18.63	7.52	30.50	3.50	2.03	<0.01
CPC Implement (6-30)	15.75	5.95	26.13	2.85	2.22	<0.01
Intention to Implement (6-30)	21.75	4.44	26.38	2.64	1.27	0.02

Note. *M* = Mean; *SD* = Standard deviation; SO = Special Olympics; CPC = Confidence and perceived competence; Cohen's *d* = Effect size, interpreted as small (*d* = 0.2), medium (*d* = 0.5), large (*d* = 0.8) (Cohen, 2013), * with Bonferroni correction, significance level was set at $p < .01$.

Table 10

Specific Implementation Efforts Within Each Group Home

Group Home	Care Providers/ Residents (*n*)	Implementation Efforts
1	1/2	Level 1 and 2 strength, endurance, and flexibility training (2-4 times per week). Implemented in group home and at recreation centre pool. Implementation of group-based dancing.
2	1/2	Level 1 and 2 strength, flexibility training (2-4 times per week). Implemented in group home.
3	1/2	Level 1 and 2 group-based endurance, strength training (2-4 times per week). Implementation of group-based dancing.
4	1/2	Level 1 and 2 strength training (5-7 times per week). Implemented primarily at recreation centre pool, and at group home. Switched some daily activities from sedentary to more physically active (e.g., dancing, gardening, walking in community).
5	1/1	Level 1 and 2 strength and endurance training (5-7 times per week). Implemented in group home.
6	1/1	Level 1 strength and flexibility training (2-4 times per week). Implemented in group home.
7	2/4	Level 1, 2, and 3 strength, endurance, balance, and flexibility training (5-7 times per week). Group based physical activity implemented in group home 5 days a week. Fit 5 resources also used as a warm-up for leisure physical activity opportunities (i.e., flexibility exercises).

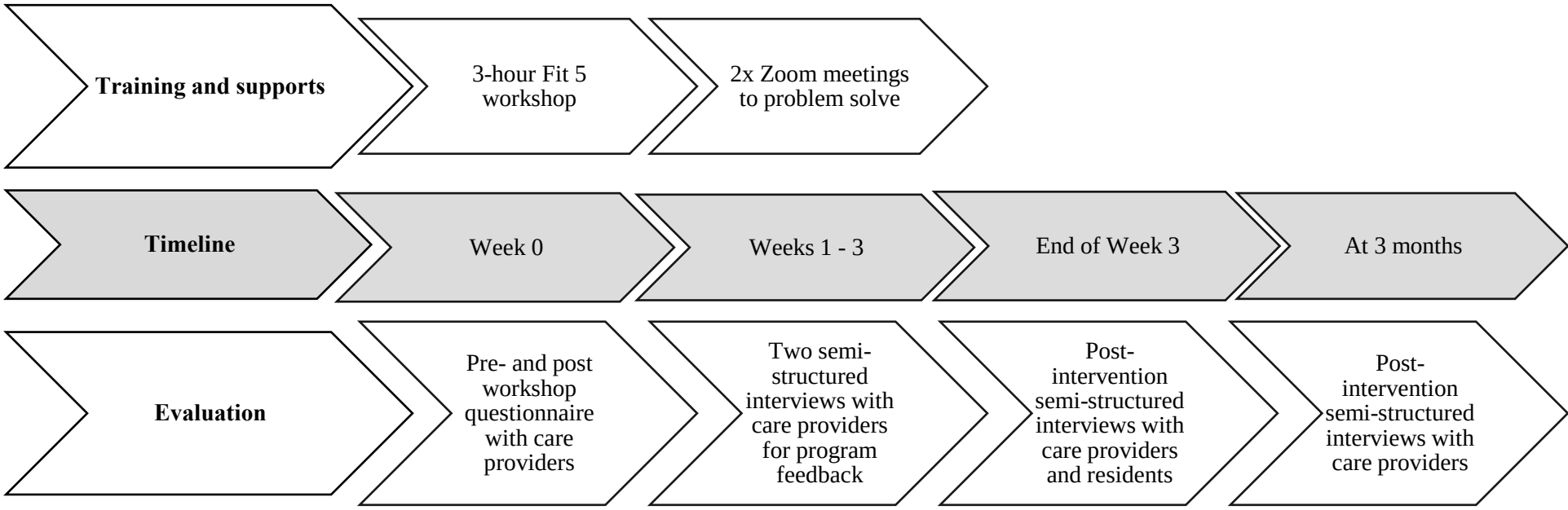

Figure 2. *Timeline of intervention and evaluation points.*

Chapter 5: Connecting community support organization care providers with Special Olympics resources

Preamble

Connecting community support organization care providers with Special Olympics resources is the fourth and final study for this thesis. This paper is a knowledge translation piece which builds on Chapter 4 which described the evaluation of the pilot study of physical activity training for care providers of adults with intellectual disabilities. This manuscript primarily describes the components of the training and lessons learned from the pilot for adapted physical activity professionals.

My roles were conceptualizing the lessons learned section, writing, and editing the manuscript. I would like to acknowledge my co-author Dr. Viviene Temple. Dr. Temple supported the writing and editing of the manuscript and sought permission from Special Olympics International to include images (Figures 3 and 4) from the Fit 5 manual in this manuscript. The contribution of this manuscript for the overall thesis is to show how the Special Olympics' Fit 5 resource can support care providers' and to encourage others to implement similar training in their communities. This manuscript is currently under review in PALAESTRA.

Abstract

Many care providers who support adults with intellectual disabilities in residential settings lack the confidence and skills to enable physical activity opportunities and residents' participation. In this paper, we describe professional development training (workshop and problem-solving check-ins) designed for residential care providers. Our training introduced care providers to existing Special Olympics exercise resources and we aimed to equip them with tools and strategies to implement and progress exercises with adults with intellectual disabilities. We also describe lessons learned from implementing the training with 8 care providers in 8 group homes with 14 residents.

Connecting community support organization care providers with Special Olympics resources

In relation to the International Classification of Functioning, Disability and Health (ICF, World Health Organization, 2001), getting enough physical activity is a component of the life roles of self care and participation in recreation and leisure. However, in congregate housing settings (i.e., group homes), levels of physical activity of adults and older adults with intellectual disabilities are low (Finlayson et al., 2009). As a person's "functioning in a specific domain is an interaction or complex relationship between the health condition and contextual factors (i.e., environmental or personal factors)" (World Health Organization, 2001, p.19), these low levels of physical activity also reflect these relationships.

On a personal level, preference for sedentary behavior (Frey et al., 2005; Temple, 2007), lower levels of motivation or interest (Dixon-Ibarra et al., 2018; Mahy et al., 2010), and a lack of knowledge about physical activity (Hawkins & Look, 2006) are associated with lower levels of physical activity among adults with intellectual disabilities. Conversely, positive feelings of self-efficacy toward physical activity empower participation (Temple, 2009). Environmental factors that are negatively associated with physical activity include not having anyone to participate with, a lack of social connection, and poor weather (Temple, 2010); whereas a recommendation to be more active from supportive personnel such as a physician can foster greater participation (Temple, 2010). Specifically related to congregate care settings, low staff to resident ratios (Dixon-Ibarra, Driver, Vanderbom, et al., 2017), high staff turnover rates (Taliaferro & Hammond, 2016), minimal staff interest (Sundblom et al., 2015), and a lack of expertise (i.e., knowledge, skill) (Temple & Walkley, 2007b) are negatively associated with residents' physical activity levels. Both Dixon-Ibarra and colleagues (2017) and Frey and colleagues (Frey et al.,

2005) went so far as to suggest that some care providers prevent physical activity and can reinforce the health concerns of the residents they work with. However, care providers can be hampered in their efforts to facilitate residents' physical activity by a lack of adequate resources (Taliaferro & Hammond, 2016), clear policies to drive programing (Elinder et al., 2018), and designated personnel to guide physical activity efforts within community support organizations (Sundblom et al., 2015; Temple & Walkley, 2007b). Conversely, when staff display an interest in promoting physical activity and provide support to residents to engage in physical activity, participation among adults with intellectual disabilities in group homes settings is enhanced (Caton et al., 2012; Dixon-Ibarra, Driver, VanVolkenburg, et al., 2017).

Special Olympics and the Fit 5 Resources

Special Olympics is a global organization that provides programing in sport, health, and education for people with intellectual disabilities. In 2021, over 3.5 million athletes in 201 countries participated in a Special Olympics (Special Olympics, 2021). Special Olympics also provides structured exercise programs for Special Olympics athletes, and resources to guide and support exercise efforts. The Special Olympics Fit 5 resource was initially developed as an exercise supplement for athletes who were already participating in a Special Olympics program (Niemeier et al., 2021). When used concurrently as an exercise supplement to participation in Special Olympics basketball, Niemeier and colleagues (Niemeier et al., 2021) found that athletes significantly improved their systolic and diastolic blood pressure after an eight week period.

The Fit 5 resource was designed around three health promotion goals: 1) participating in Fit 5 exercises 5 days per week, 2) eating 5 total fruits and vegetables each day, and 3) drinking 5 bottles of water per day (Special Olympics, 2024a)**.** The exercise section of the resource encompasses four different types of exercise: strength, endurance, balance, and flexibility. The

exercises have been designed with five levels of difficulty, with Level 1 being the easiest exercises. Special Olympics also provided details of the purpose of each type of exercise, written instructions and images of each exercise (see Figures 3 and 4), and physical activity tracking sheets in the resource. There are also "Fitness Cards" that expand upon the Fit 5 guide by providing more examples for each exercise type and level of difficulty as well as instructional videos (see https://resources.specialolympics.org/health/fitness/fit-5).

Aim of this professional development training

In 2017, almost 30,000 Canadian adults with an intellectual disability resided in congregate housing facilities or group homes (Inclusion Canada, 2017) and residents in these homes often rely on their care providers to support community engagement and participation in physical activity (Taliaferro & Hammond, 2016). However, care providers may not feel equipped to support participation and managers of community support organizations may be unaware of existing freely and readily available resources (Tromans et al., 2020). Therefore, our intention was threefold:

1. To design a professional development initiative using principles of adult learning to connect Special Olympics resources with the group home context.
2. To increase care providers' awareness of Special Olympics and exercise resources freely available to them.
3. To increase care providers' intention to initiate exercise with residents and increase their confidence and perceived competence to explain, plan, and implement an exercise program with residents.

Fit 5 Professional Development Training Approach and Content

The first author ([redacted]) has been a community support worker and an employment counsellor for the not-for-profit community support organization serving adults with intellectual

disabilities in this study for more than three years. As such, ([redacted]) has field proximity and some insider perspective (Langley & Klag, 2019) of the needs and challenges of staff working in residential settings. ([redacted]'s) narrative voice is represented in the lessons learned and the stance of both authors is that increasing physical activity of residents with intellectual disabilities is a worthy goal that needs to be advocated for with the research site organization.

Principles of adult learning (Knowles et al., 2020) were used in the design of the professional development for care providers. How the Knowles and colleagues' six principles of adult learning were incorporated into the training is shown in Table 11.

The training, led by ([redacted]), consisted of a 3-hour workshop and two check-ins via Zoom during the implementation period. The workshop was divided into three one-hour subsections.

Hour 1

The first hour began with an opportunity for care providers and the training facilitator to introduce themselves. They spoke to their experience working with people with intellectual disabilities and care providers spoke about what they hoped to gain by participating in the training. Care providers were then informed of the rationale for creating the Fit 5 workshop, what may be gained by participating in the training, information about Special Olympics and the goals of Fit 5, weekly exercise recommendations for people with intellectual disabilities, the benefits of exercise for people with intellectual disabilities, and basic theories of exercise. With respect to theories of exercise, the primary focus was the FITT principle, which represents the frequency (i.e., how many), intensity (i.e., how hard you are working), time (i.e., how long you spend exercising), and type (i.e., what you are actually doing) of exercise. There was also an emphasis placed on the Theory of Overload, which reflects the importance of progressively making an exercise more challenging to improve health-related fitness outcomes (Plotkin et al.,

2022). The first hour of the workshop ended with an opportunity for care providers to share their perspectives of the current physical activity experiences of the residents they work with. For this Fit 5 pilot project, care providers reported that residents' physical capabilities and physical activity levels were generally low. Care providers also noted that no residents were currently meeting the World Health Organization's weekly exercise recommendations for adults with a disability of at least 150–300 minutes of moderate-intensity aerobic physical activity as well as functional balance and strength training to enhance functional capacity and to prevent falls on 3 or more days per week (World Health Organization, 2021).

Hour 2

In the second hour, care providers actively participated in exercises in each domain of Fit 5 (endurance, strength, balance, flexibility) across multiple levels of difficulty. Care providers learned about the purpose of each type of exercise and were provided with common examples of the exercises. Care providers then tried the exercises with guidance of the workshop facilitator ([redacted]). Care providers were also introduced to the Fit 5 exercise videos on the Special Olympics website that could be referred to during the implementing phase.

Hour 3

The final hour of the workshop involved the creation of a tailored exercise program specific to a resident that each care provider was working with. Care providers were given a hard copy of the Fit 5 Fitness Cards with step-by-step instructions and visual examples of each exercise as well as weekly programing templates. Care providers were shown a process of creating an exercise program, including how to choose an appropriate number of each exercise (i.e., repetitions and sets), determine the appropriate amount of rest, and how to progressively increase difficulty over time (i.e., overload). Following the creation of an exercise plan, care

providers discussed potential barriers and challenges they might experience during the implementation process with the workshop leader and brainstormed potential solutions and approaches. Given that the group home residents' physical activity levels were generally low, behaviour change techniques were incorporated into this third hour.

Evaluation of the Professional Development

The Fit 5 workshop and 3-week implementation period was piloted with 8 care providers across different 8 group homes with 14 residents from a not-for-profit community support organization providing services to people with intellectual disabilities. Ethics approval for this evaluation was granted by the [redacted] Human Research Ethics Board (protocol number 22-0178). Care providers' consent was obtained immediately before participating in the workshop and group home residents' consent was obtained prior to the implementation period.

A mixed-methods approach was used to evaluate care providers' reactions to the training, learning outcomes, and the efficacy of initial efforts to implement the program with residents during a 3-week trial. The detailed evaluation findings are detailed elsewhere [redacted]. However, in general, reactions to the training were positive. Care providers indicated that the training addressed barriers to residents' physical activity and that they would recommend the training to other care providers. Pre- and post-workshop survey responses showed that care providers significantly improved their awareness of Special Olympics resources, and their confidence and perceived competence to plan and implement an exercise program using Fit 5 resources. Almost all participating residents indicated that they enjoyed participating in the exercises their care providers implemented and that they would like to continue. At a 3-month follow-up, 12 out of 14 residents continued to participate in Fit 5 exercises with their care providers.

Trying Out Fit 5 for 3 Weeks

In general, care providers planned and implemented similar programs during the 3-week trial. There was an emphasis on the Level 1 and 2 exercises (i.e., less difficult) from the Fit 5 resource, with more focus on strength, endurance, and flexibility, than balance exercises. Care providers felt uncertain about including balance exercises as many residents were perceived as being at risk of falling. Mostly the program was implemented at home, but community facilities such as recreation facilities and parks were occasionally used depending on care provider availability.

Implementation strategies varied considerably from home to home and resident to resident. Because the care providers had insight into residents' preferences and learning styles, they were able to tailor implementation strategies (e.g., providing choice in decision making and implementing group-based physical activities where that was preferred). Care providers also emphasized having fun with the program activities. Care providers reported that work routines and understaffing were major barriers influencing the extent to which they could support the residents to engage in the program. However, implementation was much easier when care providers felt supported by their coworkers.

Zoom check-ins

During the three-week trial period, care providers participated in weekly individual Zoom check-ins to reflect on the aspects of Fit 5 they were using and the successes and challenges of their implementation efforts. The Zoom check-ins were also used to try and address challenges that care providers were experiencing. During these check-ins, care providers indicated that they struggled to adapt Fit 5 exercises to the physical capabilities of the residents, to progress the

difficulty of the programs they created during the workshop, and to navigate organizational barriers in the group home (e.g., work routines).

Lessons Learned

Table 12 outlines the components of the Fit 5 intervention pilot, perspectives on effectiveness of each component in supporting the ongoing participation of the group home residents, and recommendations made by care providers to improve the effectiveness of future training interventions. Despite that care providers' learning outcomes significantly improved with the training, they also recommended more emphasis on how to progress the difficulty of the exercises, adapt the exercises to the physical abilities of the residents, and keep the residents motivated to participate. Care providers indicated that having buy-in from more care providers in each group home would support resident participation. They also felt that care providers new to the organization should participate in Fit 5 training during their onboarding process.

Conclusion

Many care providers and managers in organizations that employ care providers are unaware of existing, freely available exercise resources such as Fit 5 by Special Olympics. The 3-hour workshop of this pilot project was designed to bridge a gap between the freely available Fit 5 resources and actual uptake by a community support organization's direct care staff. These staff were not part of the existing Special Olympics community. The training (workshop and Zoom support during the implementation period) increased care providers' awareness of Special Olympics and the Fit 5 resources. The training also increased care providers' skills and self-efficacy toward facilitating Fit 5. Care providers were able to implement the program they planned for residents during the workshop. However, the training was insufficient to help care providers plan progressions over time or allay fears about fall risks. Care providers suggested

that buy-in from all, or most, staff from each residence would be useful and the training should be incorporated into the onboarding process for new staff. Rather than overloading care providers with more information at the outset, we recommend a series of workshops and support over time as care providers' skills and confidence grow and in response to emerging situations and issues they encounter. Having care providers and residents participating in aspects of the training together is also something we suggest for the future. In particular, learning about the Special Olympics Fit 5 resources and implementation planning.

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Table 11

Application of Adult Learning Principles in Fit 5 Training

Principle of adult learning	How the principle was incorporated into the training
1) a learner must know why they are learning something before learning it	• Information provision specific to the rationale for the Fit 5 pilot, what care providers can hope to gain by participating, who Special Olympics are as an organization, what Fit 5 is, weekly exercise recommendations for adults with intellectual disabilities, and the benefits of exercise participation for residents and care providers.
2) there must be movement towards self-direction in the learning process	• Provision of Fit 5 Fitness Cards and programing templates that care providers could refer to after participating in the Fit 5 training. • Development of exercise program for a specific resident during the workshop. • Training specific to monitoring and changing the difficulty of the program in response to resident participation success. • Provided resources outside of Fit 5 that could support resident participation based on care providers' ideas of residents' physical activity preferences.

3) the learning must be relevant to prior experiences	• Group discussions of
	  ○ Residents' prior exercise experiences and care providers' efforts to support exercising.
	  ○ How to address barriers to exercise.
	• Designated exercise planning and programing during training considering residents' capabilities, experiences, and potential barriers.

4) the learning must be centred around a need to cope with a life situation or task	• Group discussions of
	  ○ The importance of exercise in prolonging independence in activities of daily living.
	  ○ How increasing residents' levels of physical activity could improve the work environment for care providers (e.g., improved resident sleep patterns).
	  ○ Strategies to support consistent participation.

5) the learning is life-centred with the purpose of developing competency	• Group discussions of what care providers were looking to gain from the workshop, as well as the barriers that they have experienced in trying to do exercise with residents in the past.
6) the learners' motivation is internal	• Pre-workshop survey and group discussion of why care providers chose to attend the workshop.

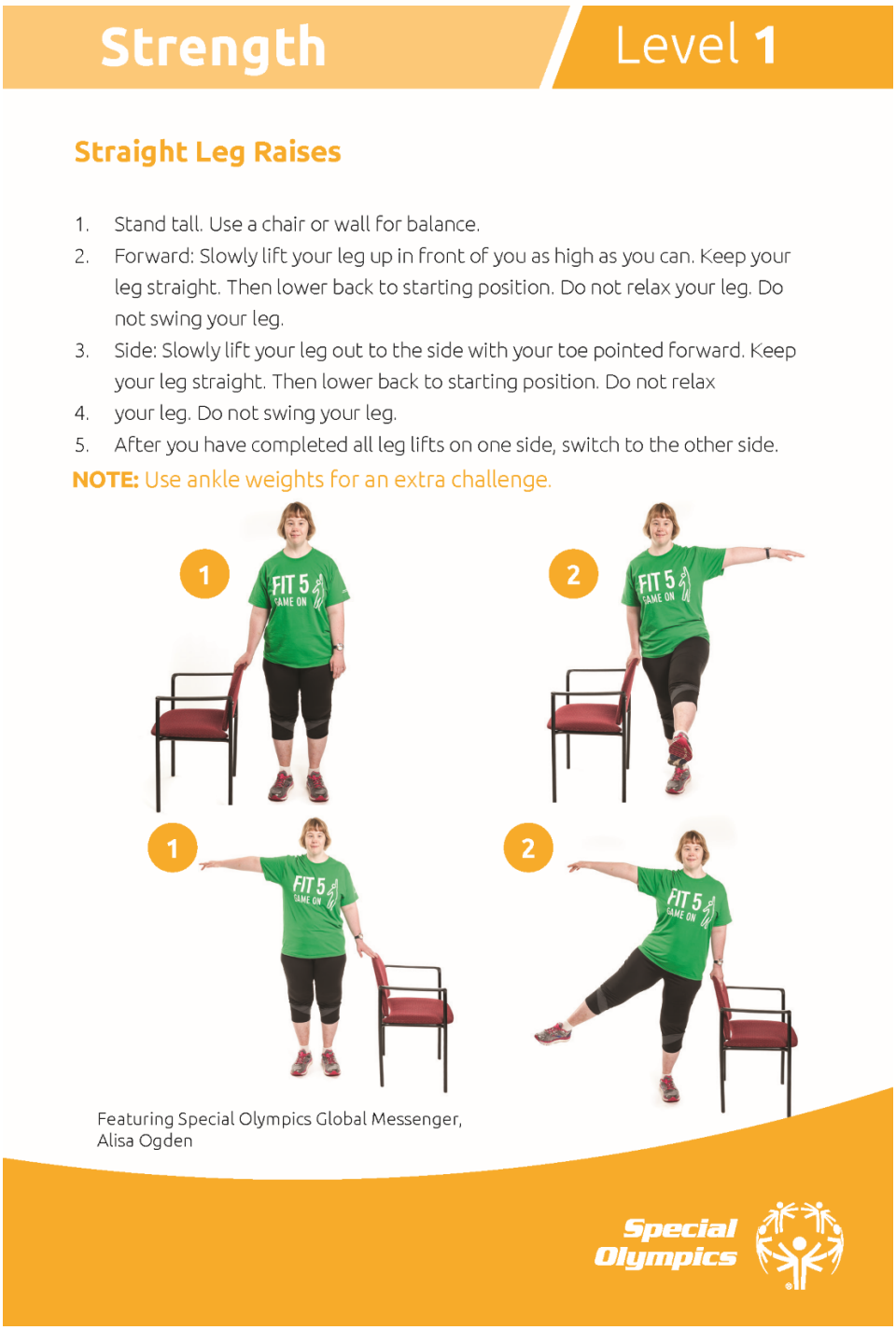
Table 12

Lesson Learned from Implementing the Training with Care Providers

Area	What we did that worked	Suggestions based on this experience
Recruitment of care providers	With the support of Special Olympics Canada, we paid care providers for their time to participate in the workshop and interviews.	We used the usual residence electronic communication channel, but often care providers were too busy to monitor this. A hard-copy recruitment poster to each residence may have been more effective. To attract additional care providers, a more fulsome description of what implementation involves was needed at an initial "interest" meeting.
Ongoing communication with care providers	Zoom was an effective way to interview care providers and provide support (e.g., problem solving) during the implementation period. Using Zoom allowed greater flexibility of location and time.	Email to personal addresses was not an effective way to schedule Zoom meetings. Care providers indicated that communication options (i.e., telephone call, text messaging) would have been preferable.
Special Olympics Fit 5 resources	Using the Special Olympics Fit 5 resource was well received by care providers and residents as Special Olympics was seen as a credible source.	Several care providers indicated that the Level 1 exercises were too difficult a starting point for the resident they worked with. It would be helpful if Special Olympics extended the resource to include easier options of the exercises.
The 3-hour workshop	We developed a training package based on adults learning principles to support implementation of Fit 5 in group home residences (see Table 1). The workshop significantly increased care providers' awareness of Special Olympics and their resources, confidence and perceived competence to plan and implement an exercise routine into practice with group home residents [redacted].	Development of initial exercise plans for a resident the care provider supported was very useful. However, a series of supplemental workshops on how to 1) progress the exercise program, 2) adapt for individual needs, 3) work on balance with individuals at risk of falling, and 4) help motivate residents, would be valuable. Care providers and ([redacted]) who led the workshop felt that it was also important for the workshop leader to gain as much information as they could about the residents that participating care providers worked with so that the leader could better support workshop participants as they were developing their tailored exercise plan for specific residents.

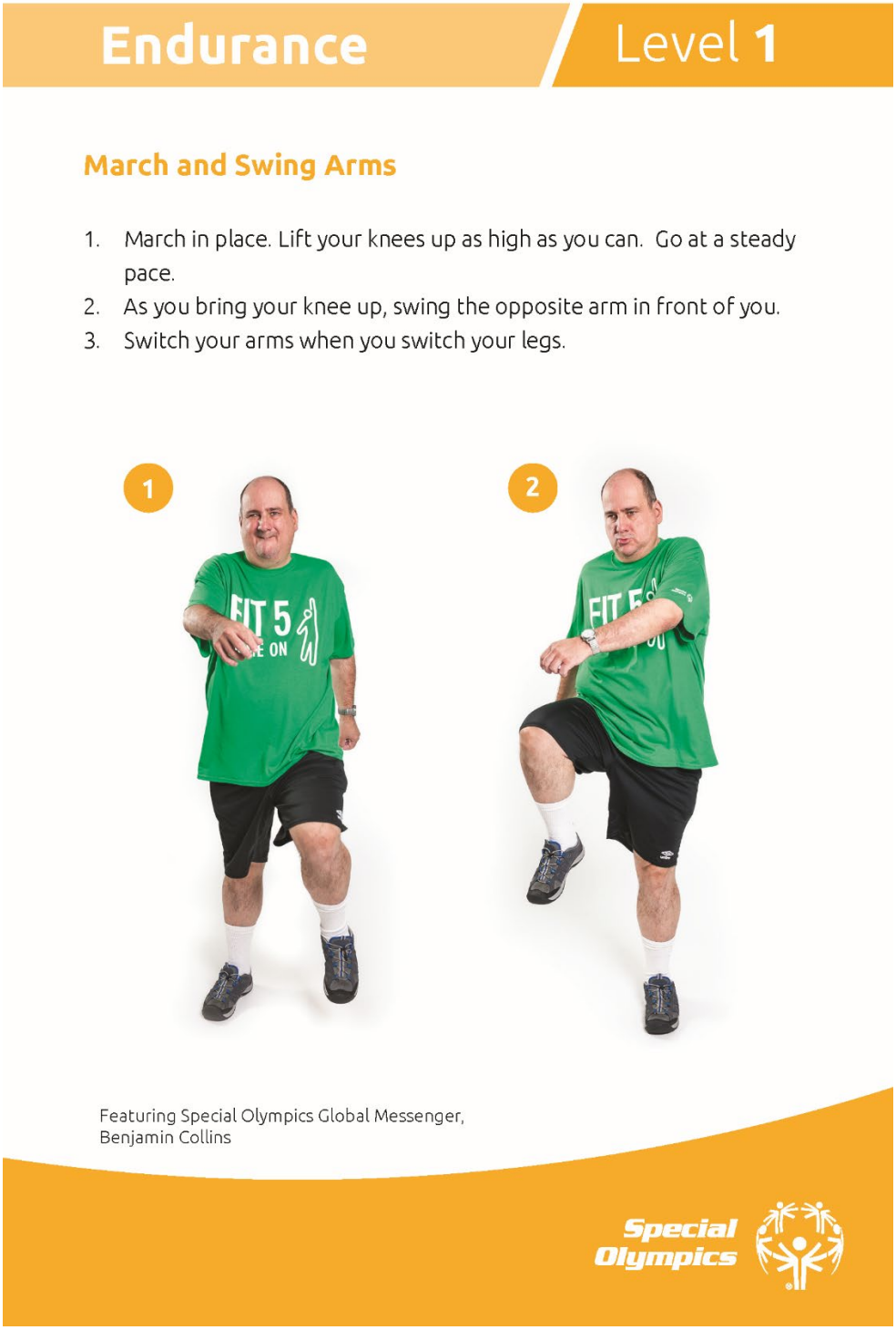
	By virtue of who volunteered to be part of this project, we had care providers with varying degrees experience and of knowledge residents. This blend was very useful in the discussion and planning phases and something that should be encouraged.	Involving residents and care providers in aspects of the training together may also be beneficial. In particular, learning about the Fit 5 resources and implementation planning.
3-week implementation	Care providers were provided with a hard copy of the Fit 5 resource and programing templates. This was useful to the care providers as they reported that they felt confident knowing that they could refer to the resources provided during and after the implementation period. It was also useful for resident participation as care providers indicated that residents enjoyed looking at the resources and selecting exercises that they wanted to try. The once weekly support session was well received and helpful for care providers in terms of the recommended implementation strategies	Care providers indicated that recruiting all care providers in each home would have been beneficial for continuity of care. However, they also felt that many care providers do not see facilitating residents' physical activity as a priority or part of their role. Care providers suggested that this type of training should be part on onboarding new care providers and that the organization should include physical activity as a core component of each resident's care strategy. Group, rather than individual, Zoom check-ins would be a more sustainable model of support. Having a resource person (e.g., adapted physical educator or kinesiologist) embedded within the organization would be useful.

Figure 3. *Example of a Fit 5 Fitness Card: Straight Leg Raises*



Note. Photo credit: Courtesy of Special Olympics.

Figure 4: *Example of a Fit 5 Fitness Card: March and Swing Arms*



Note. Photo credit: Courtesy of Special Olympics.

Chapter 6. Summary

It was clear from the systematic review that most adult learning principles were incorporated into the training developed for care providers. Four of six adult learning principles were present in 75% of the included studies. This was promising given that no studies explicitly set out to report that their training was underpinned by adult learning principles. The interventions were underlain by theories of behaviour change, however, the theoretical underpinnings were focused primarily on fostering behaviour change among adults with intellectual disabilities, not their care providers (Bergström et al., 2013; Dixon-Ibarra, Driver, VanVolkenburg, et al., 2017; Marks et al., 2019). Only one study provided theoretical rationale to centre care providers in training efforts. Overwijk et al. (2022) mentioned that their program was based on Kolb's learning styles (Kolb & Kolb, 2009). The nuances of how the learning styles were incorporated into the online and in-person training for care providers was not evident in the manuscript, thereby hindering replication. As Horton and colleagues (2018) point out, replicating health interventions is difficult, and it is essential that the social components of an intervention are considered alongside the more technical components. Therefore, underpinning future interventions with theory that centres care providers in the learning context and communicating how andragogical have been applied in the intervention would be beneficial.

There was little emphasis placed on centring the learner in the learning experience. Only half of the included studies indicated that care providers were provided with information about the benefits of physical activity before care providers engaged in training efforts, and only two studies indicated that care providers were internally motivated to engage in the professional development. Those designing training in the future should consider providing relevant antecedent information to care providers before they engage in training efforts. As the impetus

for care providers to participate in the professional development was largely stipulated by organization managers and administrators; strides should be taken to ensure that care providers have agency in choosing whether to engage in training efforts.

Overall, the description of interventions was a limiting factor in the systematic review. Further, when a theory underpinning program design and activities was mentioned, the relationship between the theory and the activities was unclear. It was possible that additional learning principles were incorporated into the intervention designs, but those principles were not obvious, or they were simply not reported. I recommend that principles of adult learning are considered in both the design of interventions and when reporting the structure and design of professional development.

Results from the systematic review and the pilot training indicated that professional development can improve personal factors for care providers that limit physical activity participation among adults with intellectual disabilities. Seven of the eight participating care providers in the pilot indicated that their needs were addressed. Specifically, care providers felt they gained physical activity-related knowledge, as well as access to resources, and confidence to support participation among supported individuals. Results from the systematic review align with the findings from the pilot, namely that training efforts improved the knowledge base of the care providers. In a limited way, there was evidence in the systematic review showing that training improved care providers' attitude toward physical activity, and that attitudes were an important predictor of physical (in)activity. Additional research is needed in the area of care providers' attitudes and intentions toward facilitating physical activity for residents. However, my findings are similar to the more robust literature on older adults in long-term care. Hallam and Lewis' (2022) systematic review of care home staff's perceptions regarding physical activity.

These authors found that care staff did not perceive facilitating physical activity of residents as part of their role and that there were too many barriers to encouraging older adults to participate.

It is important to note that other factors continued to limit the extent to which care providers could support adults with intellectual disabilities to engage in physical activity. These factors were environmental and were often attributed to the group home setting (i.e., work routines, understaffing) and the broader context of the organizations that oversee those homes (i.e., lack of oversight, policy to drive implementation efforts). However, the aim of this thesis was not to address environmental barriers for care providers. My aim was to address one specific environmental barrier for adults with intellectual disabilities, namely the skills of care providers to support physical activity participation in those residential settings.

Care providers successfully implemented the exercise programs that they developed during the Fit 5 workshop. However, they struggled to progress and adapt the exercises that they learned about to the residents' contexts. Care providers also indicated that they were struggling to keep the residents motivated to continue with the exercises they had learned about in the workshop and from the resources. This finding was also evident in the systematic review. Umb Carlsson (2021) indicated that the care providers in their study got back into old habits after the intervention had ended. Care providers from the pilot study relied upon the check-in sessions with the primary investigator to navigate the challenges that they were experiencing. This proved effective for addressing the challenges that the care providers experienced. Care providers also expressed an interest in learning more about the nutrition and hydration components of Fit 5. An implication of these findings is that further training and ongoing mentorship may be beneficial to help sustain implementation, bring more participants (care providers and residents) on board, and to help progress and diversify physical activity programs.

An essential component of the pilot study and knowledge translation manuscript was that the resources are readily available at no cost to care providers working at community support organizations around the globe. This addresses a previously reported barrier for care providers, namely, a lack of awareness of online physical activity resources (Tromans et al., 2020). In describing the components of the training in Chapters 4 & 5, I wanted to maximize the reproducibility of the training, so that other community support organizations could implement the training themselves. It was also important to report what was successful about the implementation and what could be improved, so that future training could run more smoothly for program facilitators.

This training is of benefit to existing organizations as it a bridge between two contexts: Special Olympics as a sport and health promoting context and residential support service for individuals with intellectual disabilities. Care providers from the residential support service were satisfied with the training, and residents' perceptions of the implementation period were positive. Both the care providers and residents liked that the resources underpinning the training were from Special Olympics, and they liked having a copy of Fit 5 that they could regularly refer to after the implementation period ended. Care providers also indicated that they would recommend or maybe recommend the training to other care providers. The pilot study findings have been reported back to the community support organization where the study was conducted, and I intend to share the findings with Special Olympics Canada. Chapter 5 was intentionally written for practitioners who may be interested in implementing similar training in their own community support organization; and that chapter and has been submitted to a practitioner journal.

Conclusion

Professional development training related to physical activity is an effective way to improve personal factors for care providers to support resident participation. Although limited, existing training does align with most principles of adult learning as postulated by Knowles and colleagues, though authors did not explicitly report those principles. The training described in Chapters 4 and 5 was an effective bridge between Special Olympics and a residential support service. Care providers' reactions to training efforts were positive and they would recommend the training to care providers. However, care providers would benefit from further training to support the ongoing participation of residents; and future research to enable care providers' capabilities to facilitate physical activity opportunities for residents should focus on both personal and contextual barriers.

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Appendices

Please note that Appendices A and B are at the end of Chapter 2.

Appendix C: Certificate of Ethical Approval

University of Victoria
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Certificate of Approval

PRINCIPAL INVESTIGATOR:	**Viviene Temple** (Supervisor)	**ETHICS PROTOCOL NUMBER** Expedited review - delegated	**22-0178**
PRINCIPAL APPLICANT:	**Nathan Lamain** **Master's student**	ORIGINAL APPROVAL DATE:	16-Jan-2023
		APPROVED ON:	16-Jan-2023
UVIC DEPARTMENT:	**Exercise Science, Physical and Health Education EPHE**	APPROVAL EXPIRY DATE:	15-Jan-2024

PROJECT TITLE: **Using Fit 5 Resources to Increase Care Providers' Awareness of Special Olympics and their Ability to Implement Exercise Programming**

RESEARCH TEAM MEMBERS: **None**

DECLARED PROJECT FUNDING:
Special Olympics Canada (SOCAN), University of Victoria
Mathematics of Information Technology and Complex Systems (MITACS), University of Victoria

DOCUMENTS INCLUDED IN THIS APPROVAL:
TCPS-2 Certificate - UVic - 2022.pdf - 13-May-2022
Fit 5 Pre-Workshop Survey - Special Olympics Canada - 2022.docx - 28-Sep-2022
Fit 5 Post-Workshop Survey - Special Olympics Canada - 2022.docx - 28-Sep-2022
Post-Intervention Semi-Structured Interview (Care Provider) - Special Olympics Canada - 2022.docx - 28-Sep-2022
Fit 5 Workshop Rationale - Special Olympics Canada - 2022.docx - 03-Nov-2022
Pre:Post-Workshop Questionnaire Rationale - Special Olympics Canada - 2022.docx - 03-Nov-2022
Semi-Structured Interview Rationale - Special Olympics Canada - 2022.docx - 03-Nov-2022
Semi Structured Interview (Group Home Resident) - Special Olympics Canada - 2022.docx - 17-Nov-2022
Telephone or email script V3.pdf - 23-Nov-2022
Check in questions VT.docx - 29-Nov-2022
Email to CLV staff from Executive Director V4.pdf - 01-Dec-2022
Communicable Disease Safety Plan - UVic - 2022.pdf - 06-Jan-2023
Group Home Care Provider Consent Form - SOC V3.docx - 10-Jan-2023
Group Home Resident Consent Form - SOC V3.docx - 10-Jan-2023
Group Home Resident Assent Form - SOC V3.docx - 10-Jan-2023
Recruitment Video Description, Talking Points, and Script - Special Olympics Canada - 2023.docx - 13-Jan-2023

Conditions of approval

This Certificate of Approval is valid for the above term provided there is no change in the protocol.

Amendments
To make changes to the approved research procedure in your study, please submit "Amendments" or "Annual renewal with amendments" form. You must receive research ethics approval before proceeding with your amended protocol.

Renewals
Your ethics approval must be current for the period during which you are recruiting participants or collecting data. To renew your protocol, please submit a "Request for Renewal" form before the expiry date on your certificate. You will be sent an emailed reminder prompting you to renew your protocol about six weeks before your expiry date.

Project Closures
When you have completed all data collection activities and will have no further contact with participants, please notify the Human Research Ethics Board by submitting a "Notice of Project Completion" form.

Certification

This certifies that the UVic Human Research Ethics Board has examined this research protocol and concluded that, in all respects, the proposed research meets the appropriate standards of ethics as outlined by the University of Victoria's policies for research involving human participants.

Dr. Sandra Gibbons
Chair, Human Research Ethics Board

Dr. Matthew Murphy
Vice-chair, Human Research Ethics Board

Certificate Issued On: 16-Jan-2023

Appendix D: Link to Fit 5 Workshop Training Materials

Fit 5 Workshop - Special Olympics Canada - 2022.pdf