THE IMPLEMENTATION OF PHYSICAL ACTIVITY INTERVENTIONS IN LONG-TERM CARE

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A DISSERTATION SUBMITTED TO
THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

GRADUATE PROGRAM IN KINESIOLOGY AND HEALTH SCIENCE
YORK UNIVERSITY
TORONTO, ONTARIO

April 2025

Abstract

Background: Canada's population is aging and with it so is the demand for long-term care (LTC). Older persons living in LTC facilities can benefit from increasing their levels of physical activity however the majority of older residents spend most of their time engaged in sedentary activities and are inactive.

Objective: The overarching purpose of this dissertation is to examine the implementation of physical activity interventions in LTC settings.

Methods: To achieve this objective, a three-manuscript style dissertation was undertaken. Study One involved a scoping review that summarized the current use of implementation strategies and their related outcomes in the implementation of physical activity interventions in LTC. This study identified how interventions are being implemented. Study Two, focused on understanding the perspectives and experiences of researchers who have led the implementation of physical activity interventions in LTC. As part of this study, six semi-structured interventions were conducted with researchers who were involved in the interventions identified through the scoping review. Study three explored the role and contribution of allied health professionals during implementation efforts through a secondary analysis of the Safer Care for Older Persons in (residential) Environments (SCOPE) trial.

Results: The scoping review identified both the implementation strategies and related outcomes that have been reported in the implementation of physical activity interventions. A consultation exercise conducted as part of this review revealed unreported implementation strategies and offered further insight into the implementation of physical activity interventions. Results from researcher interviews, conducted as part of Study Two, provided new and novel insights into the experiences and perspectives of researchers, who despite being very involved in implementation

efforts have historically not been included as participants in this type of research. The third and final study explored the role and contributions of allied health professionals, another group of professionals who have similarly been underrepresented in implementation research on this topic, during implementation efforts.

Conclusion: Collectively, this dissertation provides new and novel insights to the understanding of physical activity intervention implementation in LTC settings. While implementation is inherently complex, these findings highlight opportunities for future research, practical implications for implementation efforts, considerations for policy development which supports activity, and broader societal implications regarding how we view and understand aging.

Acknowledgements

First and foremost, I would like to thank Dr. Brad Meisner. It has been a privilege to be supervised by you, as both a master's and PhD student. It is difficult to describe how much your presence in my life over the last decade has impacted me. I have found in you a mentor, a colleague, and a friend. You are patient, kind, welcoming, generous, and brilliant. Thank you for going above and beyond for me (and all your other students), for opening so many doors, and for connecting me with people in the aging research community across Canada. The opportunities you created for me and the trust you placed in me are the reasons I am in the position I am today. Your voice will remain eternally in my head, to the benefit of all those I will encounter.

I would also like to thank Drs. Liane Ginsburg and Chris Ardern for their support and feedback on this dissertation. A special thank you to Liane for involving me in the SCOPE project as a research assistant. It was an incredibly enriching experience that steered my research interests in a new and exciting direction. I look forward to crossing paths with both of you in the future.

To my mother Suzanne, thank you for everything you've given me in order to finally complete this work; housing, childcare, financial and emotional support, and above all, unconditional love. We might be *Massie Crazy*, but we did it. I would also like to thank my brother Jonathan, my sister-in-law Vyna, my cousin/sister Alex, my dad Paul, and stepmom Tanya who journeyed with me throughout this process and who gave me hope by believing in me.

I am grateful for, and would like to thank, the friends and the lab mates I met along the way. In particular, I would like to thank Deanna, Heather, and Tia. Your presence in the lab made this process immensely more fun. I look forward to continuing to collaborate in the years

to come. To my friends, Émilie, Mikaëlle, Nicolas, and Pascale, who listened with interest when shared I my ideas, and with kindness when I shared my fears and insecurities about this process – thank you. A warm thank you to the team at the CIHR Institute of Aging for giving me a supportive work environment during the final stretch of my dissertation and a place to work and grow in the field I love.

Lastly, I would like to thank Éloïse. Being your mom is the greatest gift. You are my world and my reason. Since you came into my life, everything I've done – I've done for you. You're only two at the moment, but I hope one day you read this and know that your little face gave me the strength I needed to persevere.

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List of Abbreviations

AHP – Allied Health Professional

ERIC – Expert Recommendation for Implementing Change

LTC – Long-Term Care

PA – Physical Activity

PRISMA-ScR – Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews

SCOPE – Safer Care for Older Persons in Residential Environments

WHO – World Health Organization

Chapter One: Dissertation Introduction

Canada is on the verge of becoming a super-aged country. Estimates suggest that by 2035, more than one in five people living in Canada will be over the age of 65 years (Statistics Canada, 2022). This trend represents a significant shift in the age structure of the Canadian population, with the highest proportion of older persons in Canadian history. Without a proactive government response, such a shift has important societal impacts, such as placing an increased strain on the healthcare system that was not originally designed to meet the needs of this aging population (Canadian Institutes of Health Research, 2023).

The Canadian healthcare system was established at a time when the mean age of Canadians was significantly lower than it is today. In 1966, when the Medicare Act was passed, the median age in was 27.2 years. Since then, it has risen significantly. In 2024, the median age was 40.3 years (Government of Canada, 2009; 2024). Compared to younger individuals who seek care mostly for acute medical needs, older persons typically require ongoing care for chronic and more medically complex conditions, which leads to the higher demand for care. The current efforts to adapt the healthcare system to meet the needs of the aging population reflects the inherent challenges of transforming complex systems, which is an issue explored in greater detail later in this chapter and in this dissertation.

Long-term care (LTC) facilities, and other care institutions with residents who are typically older persons, are an important part of the healthcare system. In Canada, LTC is referred to by various terms depending on the province or territory and the level of care services provided. For this dissertation, the term LTC refers to care institutions that provide 24/7 nursing and personal care for individuals with complex medical needs. Currently, 30% of Canadians over the of age of 80 reside in LTC facilities (Rochelle et al., 2018). As the aging population increases, so too does the demand for LTC. It is expected that, by 2030, the current LTC bed

capacity will have to nearly double its current numbers to accommodate this forecasted requirement (Conference Board of Canada, 2017).

Physical Activity in LTC

The World Health Organization (WHO) (2022) describes physical activity (PA) as, "any bodily movement produced by skeletal muscles that requires energy expenditure" and highlights the significant benefits that result from PA for physical and mental health. While the terms PA and exercise are often used interchangeably, they refer to distinct concepts (Dasso, 2019). Exercise is a subcategory of PA, and is defined as planned, structured, repetitive, and purposive activity that is done with the goal of maintaining or improving specific aspects of physical fitness (CDC, 2017; Dasso, 2019). PA is a broader, more inclusive designation to bodily movement that is often promoted as a way to remain healthy and independent as one ages. PA is also beneficial for older persons who can no longer live independently, including institutionalized older persons who experience health and mobility challenges (Izquierdo et al., 2021).

In LTC, both PA and exercise are shown to benefit residents across various aspects of health and wellness. However, due to the high heterogeneity among residents as well as different intervention designs, evaluation instruments, and measures, it is difficult to identify the most beneficial way to deliver and/or provide PA and exercise to LTC residents. While formal guidelines do not exist, a group of clinical researchers established recommendations for increasing PA and exercise for older persons living in LTC. The recommendations emphasize the use of strategies that enhance resident motivation, pleasure, and enjoyment rather than focusing merely on physiological benefits. For example, simple strategies (e.g., visual cues, regular encouragement by staff) are endorsed to increase PA when residents can engage in such activities without pain or breathlessness, rather than aiming for specific amounts of moderate to

vigorous intensity PA levels. These recommendations offer two avenues for implementing PA in LTC: The first is leveraging daily activities, and the second is through structured exercise programming (de Souto Barreto et al., 2016). While these recommendations are useful to guide PA interventions and practice in LTC, it is notable that there is limited evidence on the negative impacts of sedentary behaviour for older residents as well. The following paragraphs offer a brief overview of the evidence on PA and exercise programs and their effectiveness to support the health and well-being of older residents.

Multicomponent PA interventions that target various aspects of physical fitness have been found to enhance mental health and cognition, particularly among residents without dementia (Da Silva et al., 2022). Among residents with dementia, improvements are more often seen in functionality related to activities of daily living. For this group, the overall length of engagement in PA programs appears more critical than the frequency or duration of individual sessions (Borges-Machado et al., 2021).

The impact of exercise interventions on fall prevention remains contested. A Cochrane review reported that exercise participation results in little or no difference in falls risk within care facilities (Cameron et al., 2018). In contrast, a systematic review and meta-analysis by Wang and Tian (2022) found that, compared to routine daily life, participation in physical exercise, particularly long-term and balance-focused activities, may reduce the risk of falls, especially among those with recurrent falls.

PA in LTC also encompasses recreational activities involving movement, such as walking, dancing, tai chi, yoga, and ball games. When performed regularly, and at moderate intensity, these activities can improve functional mobility, autonomy, balance, and reduce anxiety, while also providing valuable opportunities for social interaction (Wang & Tian, 2022).

However, multicomponent exercise interventions that include strength and balance components tend to yield greater improvements in physical function than walking programs alone (Rezola-Pardo et al., 2020).

For residents with physical limitations who cannot participate in standard exercise programs, chair-based exercise programs, delivered in a seated position, offer an effective alternative. These programs, which can include multicomponent exercises, yoga, range-of-motion activities, and equipment-based exercises, have been associated with positive physical, cognitive, and psychological outcomes (Cordes et al., 2021).

Function-oriented PA programs, which integrate movement into daily routines, have also been studied. A systematic review by Barrett et al. (2021) found that these programs can improve psychological outcomes, though evidence regarding their impact on cognitive and physical health is mixed. Importantly, they have been shown to be safe for residents with dementia and functional limitations.

Both PA and exercise interventions are shown to enhance quality of life, particularly when delivered in group settings that foster collaboration and social engagement (Baldelli et al., 2021). Given the heterogeneity among LTC residents, including differing preferences and attitudes toward activity, an individualized approach is essential (Maurer et al., 2019). Incorporating tailored behavior change techniques, such as goal setting and self-monitoring, can further boost resident engagement (Shi et al., 2024).

Finally, although most research emphasizes resident-level outcomes, emerging evidence suggests that PA programs may also benefit staff and organizations. For example, qualitative accounts from healthcare aides indicate that while supporting residents' engagement in function-focused activities can initially increase their workload, it may ultimately reduce resident

dependency over time and, in turn, lighten workloads longer term (Kagwa et al., 2018). Lighter staff workloads are linked to greater job satisfaction and better work-life balance, which are important factors in reducing staff turnover (Holland et al., 2019).

Despite these reliable evidence-based benefits, LTC residents spend the vast majority of their awake time in sedentary activities and are highly physically inactive (Proctor et al., 2013). It is also common for residents to decrease their level of activity upon entry to LTC, which contributes to a sharp decline in physical functioning and a continued physical decline throughout their stay (Jerez-Roig et al., 2017).

This may the result of multiple colliding factors including, but not limited to, persisting negative perceptions about the suitability of PA for LTC residents particularly for those with dementia (Gebhard & Mir, 2021). Low staff levels, availability of resources, a lack of time (Kuk et al., 2017) and LTC facilities being bound by legal requirements and audits that value and reward safety indicators (e.g., falls numbers), and therefore implement measures to minimize or avoid risk. As such, there is a need to better understand how to support the implementation of PA as a health promoting behaviour in LTC.

PA is an evidence-based intervention that remains underused in LTC for supporting the health and wellbeing of residents. Insights from implementation science and complexity science can help advance the uptake of PA interventions in all their forms in LTC.

Complexity Science in LTC

Complexity science recognizes that systems consist of many interconnected parts that self-organize, adapt, and evolve over time through non-linear and unpredictable interactions between system components (Braithwaite et al., 2021; Chandler et al., 2016). Complexity science is increasingly being embraced in healthcare as it emphasizes, in contrast to traditional

reductionist approaches, an understanding of whole systems, their patterns of behavior, and how changes in one component or part of the system can create unpredictable ripple effects throughout the entire system (Braithwaite et al., 2021; Holmes et al., 2017; Khan et al., 2018). From this perspective healthcare organizations can be described as complex adaptive systems (Begun et al., 2003). LTC facilities have been described as complex adaptive systems (e.g., Ander et al., 2003; Begun et al., 2003) due to the interdependent relationships among its components. For example, when a new resident is admitted to a LTC facility, the interactions they have with members of the care team are influenced not only by the intrapersonal qualities of the resident, but also by the interpersonal dynamics they have with staff. Additionally, the quantity and quality of care received and provided are shaped by the care provider's position within the hierarchical structures of the health care system, as well as by the organizational procedures, service delivery models, available resources, and the broader institutional culture of care within a given LTC setting.

For these reasons, it is often difficult to pinpoint cause-and-effect change within this system as it is not linear or directly predictable. Rather, the system is dynamic and reactive, which makes it adaptive (Anderson et al., 2003; Begun et al., 2003; Khan et al., 2018). Adaptability is driven by self-organization among system actors (e.g., residents, nursing staff, allied health professionals' administrators, dietary staff), which is a defining feature of complex adaptive systems, and is essential for supporting sustainable transformation. These properties are also what make system change so challenging, as changes to one component of the system will inevitably impact, often in unpredictable ways, other aspects of the system (Begun et al., 2003). Applying a complexity science lens to understanding and improving healthcare is becoming increasingly common in research (Braithwaite et al., 2021; Olsson et al., 2019). There is also a

growing call from the research community to recognize and work within complexity science frameworks to strengthen knowledge mobilization in health systems (Holmes et al., 2017).

A recent scoping review by Carroll et al. (2023), which mapped and described research using complexity theory in health and social care, found that complexity theory was most often applied to improve health or social care practices—aligning with the aims of this dissertation to provide evidence-informed recommendations for enhancing activity implementation in LTC settings. Indeed, complexity theory has been used to explore various aspects of LTC. For example, Cammer et al. (2014) introduced the Hidden Complexity of Long-Term Care model, which highlights how organizational context shapes knowledge application in LTC settings. The framework identifies eight interrelated categories: physical environment, resources, flux, ambiguity, relationships, philosophies, experiences and confidence, and leadership and mentoring. These categories, taken together, demonstrate how their dynamic interplay creates persistent challenges in care delivery.

Other studies applying a complexity lens to nursing homes have examined management practices and resident outcomes (Anderson et al., 2003; Rantz et al., 2010), the role of climate and communication in reducing staff turnover (Anderson et al., 2004), culture change initiatives (Sterns et al., 2015), working conditions in high- and low-performing facilities (Forbes-Thompson et al., 2007), and factors contributing to effective supervisory performance (Escrig-Pinol et al., 2019). Overall, research adopting a complexity science framework in LTC settings highlights the relational aspects of complexity, as well as the nonlinear and emergent properties of organizational behavior. These insights that can lead to more effective implementation strategies.

Implementation Science

Implementation science is the study of methods and strategies that support the adoption, integration, and sustainability of evidence-based practices, programs, and policies in particular settings (Eccles & Mittman, 2006). Implementation science complements complexity science in understanding system-level change by providing a practical approach to facilitating the uptake of evidence into practice (Braithwaite et al., 2018). Many implementation science frameworks emphasize the complexity of implementation environments, and the uncertainty of how different factors interact to generate outcomes across multiple and different levels (Wang et al., 2023). Overall, implementation science focuses on understanding how evidence-based interventions, which are already shown to be effective, can be widely adopted, and on identifying strategies to overcome barriers to their implementation (Bauer & Kirchner, 2020; Curran, 2020; Wilson & Kislov, 2022).

Implementation strategies refer to the specific methods and techniques that are designed to promote the adoption and long-term sustainability of interventions (Powell et al., 2015; Proctor et al., 2013). These strategies can be customized to address the distinct challenges of interventions and their implementation associated with different contexts. Implementation strategies vary widely in complexity, from simple single approaches to multifaceted efforts, and can be applied across various points and phases of intervention implementation. Moreover, these strategies are intended to capture some of the complexity of implementation by addressing multilevel contextual factors and engage multiple stakeholder groups (Proctor et al., 2013). A key role of implementation strategies is to help stakeholders recognize potential barriers and develop actionable solutions (Proctor et al., 2013). Advancing the identification, development, and evaluation of implementation strategies remains a major focus within the field of implementation science (Beidas et al., 2022; Eccles et al., 2009).

Despite the recognized importance of implementation strategies, there remains a lack of thorough reporting on their use, limiting both reproducibility and the ability to inform future interventions (Albasha et al., 2023; Powell et al., 2019). Incomplete reporting also hinders efforts to understand the mechanisms through which strategies influence the adoption of evidence-based practices (Beidas et al., 2022; Garner et al., 2020; Kislov et al., 2019).

In addition to implementation strategies, implementation outcomes are critical for evaluating whether interventions are successfully integrated into practice (Proctor et al., 2011). These outcomes provide valuable insights for researchers, practitioners, evaluators, and policymakers by extending the assessment beyond intervention efficacy. Key implementation outcomes include acceptability, adoption, appropriateness, cost, feasibility, fidelity, penetration, and sustainability (Proctor et al., 2011). Monitoring and assessing these outcomes deepen the understanding of how strategies contribute to successful implementation and identifies areas for refinement to better support the uptake and maintenance of evidence-based practices (Lengnick-Hall et al., 2022; Proctor et al., 2011).

The growing recognition of implementation science as a crucial pathway to accelerate the adoption of evidence-based practices in LTC settings underscores its relevance (Byrne, 2021). However, persistent gaps in the reporting of implementation strategies and outcomes remain a significant barrier. Addressing these gaps is a priority for the field and presents a promising opportunity to enhance implementation effectiveness and ultimately improve the quality of care provided to LTC residents (Powell et al., 2019).

Barriers and Facilitators to the Implementation of PA Interventions in LTC

Based on a comprehensive literature review, only two systematic reviews were identified to examine the barriers and facilitators of implementing PA programs for residents in LTC. The

first, by Andrews et al. (2024), focused specifically on programs for residents with dementias and, the second, by Hirt et al. (2024), focused on nurse-led interventions. The findings of these two studies are described and discussed below, organized according to resident-, interpersonal-, institutional-, and programmatic-level factors.

Resident-Level Factors

Resident-related barriers to the implementation of PA interventions in LTC include fatigue, lack of motivation, distrust in staff, and fear of injury (Andrews et al., 2024). Additional barriers cited include limited mobility, misunderstanding of tasks, unwillingness to participate, refusal to take part, and a lack of desire to return after initial PA participation (Andrews et al., 2024, Hirt et al., 2024). Some residents also expressed a dislike for certain aspects of the PA programs (e.g., technology-supported games) or experienced pain, which further decreased PA participation (Hirt et al., 2024).

Facilitators included the observable benefits of PA, which encouraged resident participation (Andrews et al., 2024). Additionally, feeling safe while engaging in PA also played a key role in encouraging resident involvement (Hirt et al., 2024).

Interpersonal-Level Factors

At the interpersonal level, caregiver and staff-related challenges influenced PA participation. Barriers included difficulties in motivating residents to walk, caregivers' lack of enjoyment in leading PA programs, and high staff workloads that limited their ability to provide adequate support to residents (Andrews et al., 2024; Hirt et al., 2024). Additionally, insufficient knowledge of the importance of, and efforts to, encourage activities as well as and miscommunication from program facilitators about program tasks further discouraged resident participation (Hirt et al., 2024).

Facilitators at the interpersonal level included providing additional training sessions for caregivers and interdisciplinary consultations, which helped staff feel more confident in delivering PA interventions (Hirt et al., 2024). Opportunities for social interaction during group PA, as well as the involvement of family members or other volunteers also supported implementation by motivating residents (Andrews et al., 2024; Hirt et al., 2024). Lastly, providing real-time and personalized feedback helped residents engage more meaningfully in PA (Hirt et al., 2024).

Institutional-Level Factors

Institutional barriers were primarily related to the structure and resources available within care institutions. Understaffing and a lack of scheduled time for PA were major limitations. Further, high workloads and work pressure also restricted staff's ability to integrate PA into daily routines (Andrews et al., 2024; Hirt et al., 2024).

Facilitators at this level included strong organizational support, leveraging existing group sessions to integrate PA, and emphasizing the benefits of PA (Hirt et al., 2024) Additionally, the integration of PA into routines care practices helped ease implementation and foster a more supportive environment for PA participation (Hirt et al., 2024).

Programmatic-Level Factors

Programmatic aspects also played a role in successful implementation of PA programs. Barriers included suboptimal frequency of PA sessions, which limited residents' ability to establish a routine and experience long-term benefits (Andrews et al., 2024). Programs that ran outdoors faced additional challenges, such as extreme temperatures that made PA participation more uncomfortable (Andrews et al., 2024). Similarly, programs that required travelling to

another location (e.g., a public swimming pool) introduced additional challenges, including time needed for preparation and travel (Hirt et al., 2024).

Regarding the facilitators of implementation, structured and consistent PA protocols, along with tailored programming that accounted for residents' specific needs (Andrews et al., 2024), were identified as key enablers.

Implementation Strategies for PA Interventions in LTC

Implementation strategies are, "methods or techniques used to enhance the adoption, implementation, and sustainability of a clinical program or practice" (Proctor et al., 2013, p. 2). Ideally, these strategies should be carefully selected in the development and execution of intervention delivery to anticipate and mitigate potential obstacles (Grol et al., 2013; Pimentel et al., 2020). However, this is often not the case in practice. Many program designs and implementation efforts fail to adequately consider or address barriers such as institutional culture, which can significantly impact intervention outcomes (Bosch et al., 2007; Pimentel et al., 2020). Further, there is often limited documentation and reporting on the rationale behind the selection and use of specific implementation strategies (Powell et al., 2017).

To date, only one systematic review has examined implementation strategies for promoting PA in LTC settings (Lee et al., 2019). That review focused on the effectiveness of, and the implementation strategies used for, function-focused care interventions, an approach that emphasizes the continuous promotion of PA. That study identified several strategies associated with positive outcomes, including interactive learning for caregivers, educational content, consideration of residents' preferences, customized approaches based on functional status, and the use of function-focused care conceptual frameworks.

While these findings provide useful insights for designing future function-focused care interventions, the review was limited in scope in that it focused on a single approach to PA promotion and did not explore guiding implementation theories or the decision-making process behind strategy selection. Given the ongoing challenges of physical inactivity among LTC residents, there is a pressing need for a comprehensive review that synthesizes the use of implementation strategies and their related outcomes.

Roles and Perceptions of PA Implementation from Key Actors in LTC

While the sections above highlight the various factors influencing the implementation process of PA interventions in LTC across multiple levels, it is important to consider the multiple actors involved as well. PA programs in LTC are delivered by various actors, including researchers and members of the larger research team, including graduate and undergraduate students (some who have been trained by the researchers), facility staff members (who have been trained by a research nurse or a member of the research team), and/or qualified health professionals such as physiotherapists, trained instructors, or exercise professionals external to the LTC facility (Shakeel et al., 2015; Wylie et al., 2022).

This dissertation aims to fill existing knowledge gaps by exploring in greater detail two groups of actors whose contributions and experiences in PA implementation has yet to be fully explored. The first group consists or researchers who have conducted PA implementation efforts in LTC, and the second group consists of allied health professionals (AHPs).

Researchers who conduct PA implementation projects have a wealth of knowledge on both implementation and PA. They can offer unique insights and identify theoretical perspectives to help guide implementation efforts. Given that implementation occurs in particular settings (e.g., LTC facilities), researchers often need to develop meaningful connections with individuals

working in these settings, and get to know the settings themselves, to better understand contextual elements that might impact implementation (Graham, 2022). While researchers are often not employed by the facilities or within the implementation settings, many are very involved in these efforts and may take on facilitative roles, provide training, or offering ongoing implementation support (e.g., Fien et al., 2019; Galik et al., 2014; Resnick et al., 2009).

However, researchers' contributions typically remain confined to their published academic work, which prioritizes objectivity and avoids personal insights. This typical reporting creates a knowledge gap regarding their experiences and perspectives on the implementation science process and resulting outcomes. Addressing this knowledge gap is particularly valuable as it could inform more integrated implementation approaches where evidence generation and application function as interconnected processes rather than detached activities conducted by separate groups (Holmes et al., 2017). Moreover, this exploration is especially timely given the increasing recognition of the need to embed implementation scientists within healthcare environments to strengthen the field and bridge the gap between research and practice (Churruca et al., 2019; Vindrola-Padros et al., 2019).

Much of the research on the implementation of PA programming in LTC has been conducted with nursing staff as they are often the group primarily involved in these efforts. However, research has yet to explore the specific roles and contributions of AHPs during these implementation efforts. This is an important knowledge gap as AHPs not only provide PA-related care to residents but also play a critical role in supporting implementation efforts to increase PA in these settings (e.g., Henwood et al., 2017; Hurley et al., 2020; Johnson et al., 2005; Koskela et al., 2017). Additionally, extending the scope of AHPs to include more involvement in implementation processes has been proposed as a solution to meet the increasing

care demands of the aging population (Downie et al., 2025; Hartley, 2019; Saxon et al., 2014). As such, a deeper understanding of how AHPs support implementation efforts in LTC is needed to inform the creation of more effective solutions and strategies to support PA in these settings.

Building on this foundation, the broad objective of this dissertation was to examine the implementation of PA interventions in LTC settings. More specifically, this dissertation sought to address the following research questions:

1) What implementation strategies are employed during the implementation of PA interventions in LTC?
2) What are the experiences and perspectives of researchers who have experience implementing PA interventions in LTC?
3) What are the roles and contributions of allied health professionals (AHPs) in the implementation of PA intervention efforts?

This dissertation comprises three studies, each providing unique perspectives on different aspects of the implementation process. This introductory chapter, Chapter One, offers a brief literature review focused on the implementation of PA in LTC, followed by the purpose and objectives of this dissertation. Chapter One ends with an overview of this dissertation, emphasizing how the three studies are connected.

Dissertation Purposes

Increasing participation PA in LTC has the potential to support residents' overall health and wellbeing while also improving staff and organizational outcomes. However, important gaps remain in the understanding of implementation efforts that aim to increase PA in LTC. While many studies report on implementation of PA interventions, a comprehensive synthesis of the

strategies used to implement these programs—and whether the strategies result in their intended outcomes—is needed to improve uptake and long-term sustainability.

Such a synthesis would not only help identify implementation strategies that have successfully supported implementation in this context but also highlight those that have yet to explored and could be leveraged in future efforts. Additionally, the literature suggests that documentation and reporting during implementation are often insufficient, with important aspects of the process not being captured (Pinnock et al., 2017; Powell et al., 2019; Slaughter et al., 2015). Moreover, many implementation strategies and other aspects of implementation, such as adaptions, go unreported that limits the ability of published materials to effectively inform future implementation efforts (Powell et al., 2019; Slaughter et al., 2015). To fill in these gaps, there is a need to synthesize the available information on implementation strategies and their intended outcomes.

As mentioned earlier, many individuals contribute to PA implementation efforts. However, two key groups of professionals remain understudied. The first group consists of researchers who have conducted PA implementation interventions in LTC. Despite their expertise and experience on the topic in the field, there experiences and perspectives have yet to be explored. Understanding their views on this topic is particularly relevant and valuable given the growing call for more implementation scientists to work within healthcare settings to drive meaningful and sustainable change.

The second group consists of AHPs, an important multi-professional segment of healthcare delivery, who play an important role in providing PA-related care and supporting implementation efforts in LTC. However, their contributions within implementation teams have not yet been explored. As such, gaining a better understanding of their roles could help inform

more effective implementation strategies and, ultimately, support increased PA among LTC residents.

Dissertation Studies and Objectives

Based on the details outlined above, the three research studies in this dissertation aim to fill the following research gaps: **Study One** (Chapter Two): To synthesize the published literature and identify the use of implementation strategies in the implementation of PA interventions in LTC, including a consultation exercise with researchers in the field to validate and expand the findings; **Study Two** (Chapter Three): To explore the experiences and perspectives of researchers involved in implementing PA interventions in LTC, including the challenges and opportunities in this field, as reported by those conducting implementation research on PA in LTC; and **Study Three** (Chapter Four): To examine the contributions of AHPs, an essential understudied group, to better understand their roles during the implementation of PA interventions in LTC settings. Together, these three studies provide new insights into the implementation of PA interventions in LTC.

Dissertation Methods

Researcher Positionality

As a researcher, I approach this work from an interdisciplinary perspective grounded in knowledge from the fields of health promotion, gerontology, kinesiology, and implementation science. My interest in promoting PA in LTC originally stem from my personal experiences and were reinforced through my academic training. I recognize that my background is interdisciplinary which influences how I conceptualize the challenges and opportunities for promoting PA in LTC. It has shaped my view of implementation and my orientation towards complexity science as I come to understand problems by considering the multi-level factors that

interact to shape outcomes. Throughout this dissertation, I have aimed to remain aware of my own assumptions about the need for this research, which shifts focus from understanding what evidence is effective to exploring how to move evidence into practice. I have sought to be reflexive in my interpretation of the literature, as well as in the analysis and findings of the three dissertation studies. Nonetheless, I recognize that my positionality inevitably influences the questions I ask, the theories I prioritize, and the conclusions I draw.

Conceptual Framework

This dissertation is guided by complexity science as its overarching conceptual framework. Complexity science is particularly relevant for understanding healthcare settings and exploring ways to improve them (Carroll et al., 2023). It recognizes that the translation of evidence into real world settings such as healthcare is not linear, healthcare is "probabilistic and stochastic rather than deterministic and causal" (Braithwaite et al., 2018, p.3). This framework provides a lens through which to examine how change occurs in environments characterized by numerous interconnected components that interact in non-linear ways, exhibit self-organization, and demonstrate emergent properties (Plsek & Greenhalgh, 2001).

In this dissertation, complexity science is used as a guiding conceptual framework to clarify the scope of the implementation problem and move beyond reductionist approaches of implementation that focus solely on individual factors. Complexity science is particularly well suited to implementation research, as both share the same theoretical assumptions, woven throughout frameworks and theories, that recognize key features of complexity, such as unpredictability, uncertainty, emergence, and interconnection (Braithwaite et al., 2018; Rapport et al., 2018).

Specifically, in Study One (Chapter Two), which presents a scoping review of implementation strategies and outcomes for PA interventions in LTC, complexity science is reflected in the approach used to map implementation strategies to existing taxonomies, thus capturing the wide range of actions, components, and actors involved in implementation. In Studies Two and Three (Chapters Three and Four), complexity science was used to navigate the qualitative data by offering key concepts and relationships identified in these data. Given that the qualitative analyses in Studies Two and Three focus on specific phenomena of interest (i.e., the experiences and perspectives of researchers, and the roles and contributions of AHPs, respectively), the use of theoretical frameworks in qualitative research serves as a useful guide, helping to direct the focus of the analysis toward a deeper, richer understanding (Miles et al., 2020). Overall, the complexity science lens offers a more comprehensive view, which is valuable for understanding system transformation and explaining why certain intervention change efforts fail while others succeed (Forbes-Thompson et al., 2007; Khan et al., 2018).

Research Design

This dissertation uses a multi-method approach to comprehensively synthesize, explore, and examine the complex challenge of implementing PA interventions in LTC settings. The research design follows a logical progression, which begins with a broad assessment of the existing literature, followed by an exploration of implementation experiences, and concludes with a focused analysis of specific implementation factors. Each of the three studies in this dissertation use distinct methods to observe different aspects of the implementation process and to create a more complete understanding of PA intervention implementation in LTC. Research ethical considerations relevant to each study are detailed within the respective chapters.

Study One (Chapter Two) employs a scoping review method following the framework outlined by Arksey and O'Malley (2005). This approach was selected to systematically document the range of PA intervention implementation strategies and outcomes in LTC previously found and to identify gaps in reporting and knowledge. Building on the insights identified from the scoping review, **Study Two** (Chapter Three) is a qualitative analysis of semi-structured interview data with the first key actor group, who are researchers involved in the implementation of PA interventions in LTC. The interview guide was informed by findings from the scoping review. This method was chosen to acquire a more in dept, and nuanced understanding of implementation experiences that could not be obtained through the scoping review alone.

Study Three (Chapter Four) presents a secondary analysis of data collected during the implementation of complex interventions in multiple LTC facilities. This method provides an opportunity to examine the unfolding of PA-related implementation within an existing relevant dataset from a new perspective and a specific focus on AHPs, who represent the second key actor group in this dissertation. Together, these multiple methods create a comprehensive approach to understanding PA intervention implementation in LTC settings. Each study informs the next and provides a unique knowledge contribution, that results in a cohesive body of work that addresses the overarching research objectives from multiple complementary perspectives.

Dissertation Overview

Overall, this dissertation is the culmination and combination of three studies, each making a unique contribution towards a greater understanding of PA intervention implementation in LTC. **Chapter Two** (Study One) presents a scoping review that synthesizes the information on the use of implementation strategies and outcomes in the implementation of

LTC PA interventions. Additionally, a consultation exercise with a subset of six (6) authors from the reviewed studies provides validation of the scoping review findings and offers insights into the use and reporting of implementation strategies.

Chapter Three (Study Two) builds on Chapter Two (Study One) by exploring the experiences and perspectives of researchers who have conducted and reported on PA intervention implementation in LTC settings. The same six (6) authors from the consultation exercise participated in a semi-structured interview to further explore their experiences and perspectives of PA intervention implementation in LTC. Despite their critical role in implementation, researchers' contributions typically end with their published work, resulting in their experiences and evolving perspectives on the topic being unreported and unexplored over time.

Chapter Four (Study Three) provides insights into another key group of actors critical to the implementation of PA interventions in LTC— AHPs—who have received very little attention in the literature on this topic. As such, this chapter and study focuses on AHPs as represented in a secondary analysis of the Safer Care for Older Persons in residential Environments (SCOPE) project data, that involved AHPs and examined the roles and contributions that AHPs make during the implementation of complex interventions in LTC.

Lastly, **Chapter Five** offers a discussion overview of the dissertation's main findings and evaluates the implications of the main findings for implementation, PA, and LTC research, institutional practices and policy, as well as broader social policies relevant and critical to the Canadian aging population.

References

Albasha, N., Ahern, L., O'Mahony, L., McCullagh, R., Cornally, N., McHugh, S., & Timmons, S. (2023). Implementation strategies to support fall prevention interventions in long-term care facilities for older persons: A systematic review. *BMC Geriatrics*, *23*(1), 47. https://doi.org/10.1186/s12877-023-03738-z

Amidei, C. B., Trevisan, C., Dotto, M., Ferroni, E., Noale, M., Maggi, S., Corti, M. C., Baggio, G., Fedeli, U., & Sergi, G. (2022). Association of physical activity trajectories with major cardiovascular diseases in elderly people. *Heart*, *108*(5), 360–366. https://doi.org/10.1136/heartjnl-2021-320013

Anderson, R. A., Issel, L. M., & McDaniel, R. R. (2003). Nursing homes as complex adaptive systems: relationship between management practice and resident outcomes. *Nursing Research*, *52*(1), 12–21.

Andrews, M., Cheema, B. S., & Siette, J. (2024). Barriers and facilitators to implementation of physical activity programs for individuals with dementia living in aged care homes: A systematic review. *Archives of Gerontology and Geriatrics*, *126*, 105535. https://doi.org/10.1016/j.archger.2024.105535

Baldelli, G., De Santi, M., De Felice, F., & Brandi, G. (2021). Physical activity interventions to improve the quality of life of older adults living in residential care facilities: A systematic review. *Geriatric Nursing*, *42*(4), 806–815. https://doi.org/10.1016/j.gerinurse.2021.04.011

Barber, S. E., Forster, A., & Birch, K. M. (2015). Levels and patterns of daily physical activity and sedentary behavior measured objectively in older care home residents in the United

Kingdom. *Journal of Aging and Physical Activity*, *23*(1), 133–143. https://doi.org/10.1123/JAPA.2013-0091

Barrett, E., Casey, B., Dollard, M., McCarthy, B., & Casey, D. (2021). Effectiveness of functionally based physical activity programs on physical, psychological, cognitive, and adverse outcomes in older adults living in nursing homes: Systematic review. *Activities, Adaptation & Aging*, *45*(4), 306–347. https://doi.org/10.1080/01924788.2020.1794352

Bauer, M. S., & Kirchner, J. (2020). Implementation science: What is it and why should I care? *Psychiatry Research*, *283*, 112376. https://doi.org/10.1016/j.psychres.2019.04.025

Begun JW, Zimmerman B, Dooley KJ. Health care organizations as complex adaptive systems. In: Mick SS, Wyttenbach ME, editors. Advances in health care organization theory. San Francisco: Jossey-Bass; 2003. p. 253–88.

Beidas, R. S., Dorsey, S., Lewis, C. C., Lyon, A. R., Powell, B. J., Purtle, J., Saldana, L., Shelton, R. C., Stirman, S. W., & Lane-Fall, M. B. (2022). Promises and pitfalls in implementation science from the perspective of US-based researchers: Learning from a pre-mortem. *Implementation Science*, *17*(1), 55. https://doi.org/10.1186/s13012-022-01226-3

Borges-Machado, F., Silva, N., Farinatti, P., Poton, R., Ribeiro, Ó., & Carvalho, J. (2021). Effectiveness of multicomponent exercise interventions in older adults with dementia: A meta-analysis. The Gerontologist, 61(8), e449-e462. https://doi.org/10.1093/geront/gnaa091

Braithwaite, J., Churruca, K., Long, J. C., Ellis, L. A., & Herkes, J. (2018). When complexity science meets implementation science: A theoretical and empirical analysis of systems change. *BMC Medicine*, *16*(1), 63. https://doi.org/10.1186/s12916-018-1057-z

Braithwaite, J., Ellis, L. A., Churruca, K., Long, J. C., Hibbert, P., & Clay-Williams, R. (2021). Complexity science as a frame for understanding the management and delivery of high quality and safer care. In L. Donaldson, W. Ricciardi, S. Sheridan, & R. Tartaglia (Eds.), *Textbook of Patient Safety and Clinical Risk Management* (pp. 375–391). Springer International Publishing. https://doi.org/10.1007/978-3-030-59403-9_27

Burge, E., Kuhne, N., Berchtold, A., Maupetit, C., & von Gunten, A. (2012). Impact of physical activity on activity of daily living in moderate to severe dementia: A critical review. *European Review of Aging and Physical Activity*, *9*(1), 27–39. https://doi.org/10.1007/s11556-011-0092-y

Cameron, I. D., Dyer, S. M., Panagoda, C. E., Murray, G. R., Hill, K. D., Cumming, R. G., & Kerse, N. (2018). Interventions for preventing falls in older people in care facilities and hospitals. Cochrane database of systematic reviews, (9).

Centers for Disease Control and Prevention. Glossary of terms. https://www.cdc.gov/nchs/nhis/physical_activity/pa_glossary.htm. 2017. Accessed April 26, 2025.

Chandler, J., Rycroft-Malone, J., Hawkes, C., & Noyes, J. (2016). Application of simplified Complexity Theory concepts for healthcare social systems to explain the implementation of evidence into practice. *Journal of Advanced Nursing*, *72*(2), 461–480. https://doi.org/10.1111/jan.12815

Churruca, K., Ludlow, K., Taylor, N., Long, J. C., Best, S., & Braithwaite, J. (2019). The time has come: Embedded implementation research for health care improvement. *Journal of Evaluation in Clinical Practice*, *25*(3), 373–380. https://doi.org/10.1111/jep.13100

Cordes, T., Schoene, D., Kemmler, W., & Wollesen, B. (2021). Chair-based exercise interventions for nursing home residents: A systematic review. *Journal of the American Medical Directors Association, 22*(4), 733-740.

Curran, G. M. (2020). Implementation science made too simple: A teaching tool. *Implementation Science Communications*, *1*(1), 27. https://doi.org/10.1186/s43058-020-00001-z

Da Silva, J. L., Agbangla, N. F., Le Page, C., Ghernout, W., & Andrieu, B. (2022). Effects of chronic physical exercise or multicomponent exercise programs on the mental health and cognition of older adults living in a nursing home: A systematic review of studies from the past 10 years. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.888851

Dasso N. A. (2019). How is exercise different from physical activity? A concept analysis. *Nursing forum*, *54*(1), 45–52. https://doi.org/10.1111/nuf.12296

de Souto Barreto, P., Morley, J. E., Chodzko-Zajko, W., H. Pitkala, K., Weening-Djiksterhuis, E., Rodriguez-Mañas, L., Barbagallo, M., Rosendahl, E., Sinclair, A., Landi, F., Izquierdo, M., Vellas, B., & Rolland, Y. (2016). Recommendations on physical activity and exercise for older adults living in long-term care facilities: A taskforce report. *Journal of the American Medical Directors Association*, *17*(5), 381–392. https://doi.org/10.1016/j.jamda.2016.01.021

den Ouden, M., Bleijlevens, M. H. C., Meijers, J. M. M., Zwakhalen, S. M. G., Braun, S. M., Tan, F. E. S., & Hamers, J. P. H. (2015). daily (in)activities of nursing home residents in their wards: An observation study. *Journal of the American Medical Directors Association*, *16*(11), 963–968. https://doi.org/10.1016/j.jamda.2015.05.016

Downie, S., Gavaghan, B., D'Atri, M., McBride, L.-J., Kirk-Brown, A., & Haines, T. P. (2025). The what, the when and the how: A qualitative study of allied health decision-maker

perspectives on factors influencing the development and implementation of advanced and extended scopes of practice in Australia. *The International Journal of Health Planning and Management*, *40*(1), 130–155. https://doi.org/10.1002/hpm.3850

Eccles, M. P., & Mittman, B. S. (2006). Welcome to Implementation Science. *Implementation Science*, *1*(1), 1. https://doi.org/10.1186/1748-5908-1-1

Eccles, M. P., Armstrong, D., Baker, R., Cleary, K., Davies, H., Davies, S., Glasziou, P., Ilott, I., Kinmonth, A.-L., Leng, G., Logan, S., Marteau, T., Michie, S., Rogers, H., Rycroft-Malone, J., & Sibbald, B. (2009). An implementation research agenda. *Implementation Science*, *4*(1), 18. https://doi.org/10.1186/1748-5908-4-18

Escrig-Pinol, A., Corazzini, K. N., Blodgett, M. B., Chu, C. H., & McGilton, K. S. (2019). Supervisory relationships in long-term care facilities: A comparative case study of two facilities using complexity science. *Journal of Nursing Management, 27*(2), 311-319. https://doi.org/10.1111/jonm.12681

Fien, S., Henwood, T., Climstein, M., Rathbone, E., & Keogh, J. W. L. (2019). Exploring the feasibility, sustainability and the benefits of the GrACE + GAIT exercise programme in the residential aged care setting. *PeerJ*, *7*, e6973. https://doi.org/10.7717/peerj.6973

Forbes-Thompson, S., Leiker, T., & Bleich, M. R. (2007). High-performing and low-performing nursing homes: A view from complexity science. *Health Care Management Review*, *32*(4), 341. https://doi.org/10.1097/01.HMR.0000296789.39128.f6

Galik, E. M., Resnick, B., Holmes, S. D., Vigne, E., Lynch, K., Ellis, J., Zhu, S., & Barr, E. (2021). A cluster randomized controlled trial testing the impact of function and behavior focused care for nursing home residents with dementia. *Journal of the American Medical Directors Association*, *22*(7), 1421-1428.e4. https://doi.org/10.1016/j.jamda.2020.12.020

Galik, E., Resnick, B., Hammersla, M., & Brightwater, J. (2014). optimizing function and physical activity among nursing home residents with dementia: Testing the impact of Function-Focused Care. *The Gerontologist*, *54*(6), 930–943. https://doi.org/10.1093/geront/gnt108

Garner, B. R., Patel, S. V., & Kirk, M. A. (2020). Priority domains, aims, and testable hypotheses for implementation research: Protocol for a scoping review and evidence map. *Systematic Reviews*, *9*(1), 277. https://doi.org/10.1186/s13643-020-01535-y

Gebhard, D., & Mir, E. (2021). what moves people living with dementia? exploring barriers and motivators for physical activity perceived by people living with dementia in care homes. *Qualitative Health Research*, *31*(7), 1319–1334. https://doi.org/10.1177/10497323211002822

Government of Canada, Statistics Canada (2009). *Median age in Canada, 1956 to 2006* [Figure]. https://www12.statcan.gc.ca/census-recensement/2006/as-sa/97-551/figures/c3-eng.cfm

Government of Canada, Statistics Canada. (2024, September 25). *The Daily — Canada's population estimates: Age and gender, July 1, 2024*. https://www150.statcan.gc.ca/n1/daily-quotidien/240925/dq240925a-eng.htm

Government of Canada, Canadian Institutes of Health Research (2023, March 24). *CIHR Institute of Aging Strategic Plan 2023-2028*. https://cihr-irsc.gc.ca/e/53417.html

Government of Canada, Statistics Canada (2022, August 22). *Population Projections for Canada (2021 to 2068), Provinces and Territories (2021 to 2043)*. https://www150.statcan.gc.ca/n1/pub/91-520-x/91-520-x2022001-eng.htm

Graham, A. K. (2022). Thinking like an implementation scientist and applying your research in practice. In D. Kwasnicka & A. Y. Lai (Eds.), *Survival Guide for Early Career*

Researchers (pp. 241–252). Springer International Publishing. https://doi.org/10.1007/978-3-031-10754-2_21

Grol, R., Bosch, M., & Wensing, M. (2013). Development and selection of strategies for improving patient care. In *Improving Patient Care* (pp. 165–184). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118525975.ch10

Hartley, S. E. (2019). Re-imagining the role of the physiotherapist when managing people with long-term conditions. *Physiotherapy Theory and Practice*, *35*(11), 1005–1014. https://doi.org/10.1080/09593985.2018.1467989

Henwood, T., Neville, C., Baguley, C., & Beattie, E. (2017). Aquatic exercise for residential aged care adults with dementia: Benefits and barriers to participation. *International Psychogeriatrics*, *29*(9), 1439–1449. https://doi.org/10.1017/S104161021700028X

Holland, P., Tham, T. L., Sheehan, C., & Cooper, B. (2019). The impact of perceived workload on nurse satisfaction with work-life balance and intention to leave the occupation. *Applied Nursing Research: ANR*, *49*, 70–76. https://doi.org/10.1016/j.apnr.2019.06.001

Holmes, B. J., Best, A., Davies, H., Hunter, D., Kelly, M. P., Marshall, M., & Rycroft-Malone, J. (2017). Mobilising knowledge in complex health systems: A call to action. *Evidence and Policy*, *13*(3), 539–560. https://doi.org/10.1332/174426416X14712553750311

Hurley, M. V., Wood, J., Smith, R., Grant, R., Jordan, J., Gage, H., Anderson, L. W., Kennedy, B., & Jones, F. (2020). The feasibility of increasing physical activity in care home residents: Active Residents in Care Homes (ARCH) programme. *Physiotherapy*, *107*, 50–57. https://doi.org/10.1016/j.physio.2019.06.007

Izquierdo, M., Duque, G., & Morley, J. E. (2021). Physical activity guidelines for older people: Knowledge gaps and future directions. *The Lancet Healthy Longevity*, *2*(6), e380–e383. https://doi.org/10.1016/S2666-7568(21)00079-9

Jakovljevic, D. G. (2018). Physical activity and cardiovascular aging: Physiological and molecular insights. *Experimental Gerontology*, *109*, 67–74. https://doi.org/10.1016/j.exger.2017.05.016

Jerez-Roig, J., de Brito Macedo Ferreira, L. M., Torres de Araújo, J. R., & Costa Lima, K. (2017). Functional decline in nursing home residents: A prognostic study. *PLoS ONE*, *12*(5), e0177353. https://doi.org/10.1371/journal.pone.0177353

Johnson, C. S. J., Myers, A. M., Jones, G. R., Fitzgerald, C., Lazowski, D.-A., Stolee, P., Orange, J. B., Segall, N., & Ecclestone, N. A. (2005). Evaluation of the restorative care education and training program for nursing homes. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement*, *24*(2), 115–126. https://doi.org/10.1353/cja.2005.0065

Kagwa, S., Boström, A.-M., Ickert, C., & Slaughter, S. (2018). Optimising mobility through the sit-to-stand activity for older people living in residential care facilities: A qualitative interview study of healthcare aide experiences. *International Journal of Older People Nursing*, *13*(1), e12169.

Khan, S., Vandermorris, A., Shepherd, J., Begun, J. W., Lanham, H. J., Uhl-Bien, M., & Berta, W. (2018). Embracing uncertainty, managing complexity: Applying complexity thinking principles to transformation efforts in healthcare systems. *BMC Health Services Research*, *18*(1), 192. https://doi.org/10.1186/s12913-018-2994-0

Kislov, R., Pope, C., Martin, G. P., & Wilson, P. M. (2019). Harnessing the power of theorising in implementation science. *Implementation Science*, *14*(1), 103, s13012-019-0957–4. https://doi.org/10.1186/s13012-019-0957-4

Koskela, S. A., Jones, F., Clarke, N., Anderson, L., Kennedy, B., Grant, R., Gage, H., & Hurley, M. V. (2017). Active Residents in Care Homes (ARCH): Study protocol to investigate the implementation and outcomes of a whole-systems activity programme in residential care homes for older people. *Physiotherapy*, *103*(1), 113–120. https://doi.org/10.1016/j.physio.2015.12.001

Kuk, N. O., Zijlstra, G. A. R., Bours, G. J. J. W., Hamers, J. P. H., Tan, F. E. S., & Kempen, G. I. J. M. (2017). Promoting Functional Activity Among Nursing Home Residents: A Cross-Sectional Study on Barriers Experienced by Nursing Staff. *Journal of Aging and Health*, *30*(4), 605-623. https://doi.org/10.1177/0898264316687407

Lee, S. J., Kim, M. S., Jung, Y. J., & Chang, S. O. (2019). The effectiveness of function-focused care interventions in nursing homes: A systematic review. *The Journal of Nursing Research*, *27*(1), 1–13. https://doi.org/10.1097/jnr.0000000000000268

Lengnick-Hall, R., Gerke, D. R., Proctor, E. K., Bunger, A. C., Phillips, R. J., Martin, J. K., & Swanson, J. C. (2022). Six practical recommendations for improved implementation outcomes reporting. *Implementation Science*, *17*(1), 16. https://doi.org/10.1186/s13012-021-01183-3

Livingston, G., Huntley, J., Liu, K. Y., Costafreda, S. G., Selbæk, G., Alladi, S., Ames, D., Banerjee, S., Burns, A., Brayne, C., Fox, N. C., Ferri, C. P., Gitlin, L. N., Howard, R., Kales, H. C., Kivimäki, M., Larson, E. B., Nakasujja, N., Rockwood, K., … Mukadam, N. (2024). Dementia prevention, intervention, and care: 2024 report of the Lancet

standing Commission. *The Lancet*, *404*(10452), 572–628. https://doi.org/10.1016/S0140-6736(24)01296-0

Maurer, C., Draganescu, S., Mayer, H., & Gattinger, H. (2019). Attitudes and needs of residents in long-term care facilities regarding physical activity—A systematic review and synthesis of qualitative studies. *Journal Of Clinical Nursing, 28*(13-14), 2386-2400. Https://doi.org/10.1111/jocn.14761

Miles M. B., Huberman A. M., Saldanã J. (2020). Qualitative data analysis: A methods sourcebook (4th ed.) Sage.

Moyle, W., Jones, C., Murfield, J., Draper, B., Beattie, E., Shum, D., Thalib, L., O'Dwyer, S., & Mervin, C. M. (2017). Levels of physical activity and sleep patterns among older people with dementia living in long-term care facilities: A 24-h snapshot. *Maturitas*, *102*, 62–68. https://doi.org/10.1016/j.maturitas.2017.05.015

Olsson, A., Thunborg, C., Björkman, A., Blom, A., Sjöberg, F., & Salzmann-Erikson, M. (2020). A scoping review of complexity science in nursing. *Journal of Advanced Nursing*, *76*(8), 1961–1976. https://doi.org/10.1111/jan.14382

Parry, S., Chow, M., Batchelor, F., & Fary, R. E. (2019). Physical activity and sedentary behaviour in a residential aged care facility. *Australasian Journal on Ageing*, *38*(1), E12–E18. https://doi.org/10.1111/ajag.12589

Pimentel, C. B., Mills, W. L., Snow, A. L., Palmer, J. A., Sullivan, J. L., Wewiorski, N. J., & Hartmann, C. W. (2020). Adapting strategies for optimal intervention implementation in nursing homes: A formative evaluation. *The Gerontologist*, *60*(8), 1555–1565. https://doi.org/10.1093/geront/gnaa025

Pinnock, H., Barwick, M., Carpenter, C. R., Eldridge, S., Grandes, G., Griffiths, C. J., Rycroft-Malone, J., Meissner, P., Murray, E., Patel, A., Sheikh, A., & Taylor, S. J. C. (2017). Standards for Reporting Implementation Studies (StaRI) Statement. *BMJ*, *356*, i6795. https://doi.org/10.1136/bmj.i6795

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., ... & Kirchner, J. E. (2015). A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation science*, *10*, 1-14. https://doi.org/10.1186/s13012-015-0209-1

Powell, B. J., Beidas, R. S., Lewis, C. C., Aarons, G. A., McMillen, J. C., Proctor, E. K., Khinduka, S. K., & Mandell, D. S. (2017). Methods to improve the selection and tailoring of implementation strategies. *The Journal of Behavioral Health Services & Research*, *44*(2), 177–194. https://doi.org/10.1007/s11414-015-9475-6

Powell, B. J., Fernandez, M. E., Williams, N. J., Aarons, G. A., Beidas, R. S., Lewis, C. C., McHugh, S. M., & Weiner, B. J. (2019). Enhancing the impact of implementation strategies in healthcare: A research agenda. *Frontiers in Public Health*, *7*. https://www.frontiersin.org/articles/10.3389/fpubh.2019.00003

Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., ... & Hensley, M. (2011). Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Administration and policy in mental health and mental health services research*, *38*, 65-76. https://doi.org/10.1007/s10488-010-0319-7

Proctor, E. K., Powell, B. J., & McMillen, J. C. (2013). Implementation strategies: Recommendations for specifying and reporting. *Implementation Science*, *8*(1), 139. https://doi.org/10.1186/1748-5908-8-139

Resnick, B., Cayo, J., Galik, E., & Pretzer-Aboff, I. (2009). Implementation of the 6-Week Educational Component in the Res-Care Intervention: Process and Outcomes. *The Journal of Continuing Education in Nursing*, *40*(8), 353–360.

Rezola-Pardo, C., Rodriguez-Larrad, A., Gomez-Diaz, J., Lozano-Real, G., Mugica-Errazquin, I., Patiño, M. J., ... & Gil, S. M. (2020). Comparison between multicomponent exercise and walking interventions in long-term nursing homes: A randomized controlled trial. *The Gerontologist, 60*(7), 1364-1373. https://doi.org/10.1093/geront/gnz177

Rochelle, G., Peter, T., Douglas, G. M., & Claudia, S. (2018). *Health reports: Transitions to long-term and residential care among older Canadians*. Statistics Canada.

Saxon, R. L., Gray, M. A., & Oprescu, F. I. (2014). Extended roles for allied health professionals: An updated systematic review of the evidence. *Journal of Multidisciplinary Healthcare*, *7*, 479–488. https://doi.org/10.2147/JMDH.S66746

Shakeel, S., Newhouse, I., Malik, A., & Heckman, G. (2015). Identifying feasible physical activity programs for long-term care homes in the Ontario context. *Canadian Geriatrics Journal*, *18*(2), 73–104. https://doi.org/10.5770/cgj.18.158

Shi, Y., Xie, T., Xie, X., Shao, L., Lao, A., & Zhang, J. (2024). Behavior change techniques to increase physical activity among older adults living in long-term care facilities: A systematic review. *Journal of Health Psychology*, 13591053241270491.

Slaughter, S. E., Hill, J. N., & Snelgrove-Clarke, E. (2015). What is the extent and quality of documentation and reporting of fidelity to implementation strategies: A scoping review. *Implementation Science*, *10*(1), 129. https://doi.org/10.1186/s13012-015-0320-3

Vindrola-Padros, C., Eyre, L., Baxter, H., Cramer, H., George, B., Wye, L., Fulop, N. J., Utley, M., Phillips, N., Brindle, P., & Marshall, M. (2019). Addressing the challenges of

knowledge co-production in quality improvement: Learning from the implementation of the researcher-in-residence model. *BMJ Quality & Safety*, *28*(1), 67–73. https://doi.org/10.1136/bmjqs-2017-007127

Wang, F., & Tian, B. (2022). The effectiveness of physical exercise type and length to prevent falls in nursing homes: A systematic review and meta-analysis. *Journal of Clinical Nursing, 31*(1-2), 32-42. https://doi.org/10.1111/jocn.15942

Wang, Y., Wong, E. L.-Y., Nilsen, P., Chung, V. C., Tian, Y., & Yeoh, E.-K. (2023). A scoping review of implementation science theories, models, and frameworks—An appraisal of purpose, characteristics, usability, applicability, and testability. *Implementation Science*, *18*(1), 43. https://doi.org/10.1186/s13012-023-01296-x

World Health Organization. (2022). *Physical activity*. Physical Activity. https://www.who.int/news-room/fact-sheets/detail/physical-activity

Wilson, P., & Kislov, R. (2022). Implementation Science. *Elements of Improving Quality and Safety in Healthcare*. https://doi.org/10.1017/9781009237055

Wylie, G., Kroll, T., Withnam, M., & Morris, J. (2022). Increasing physical activity levels in care homes for older people: A quantitative scoping review of intervention studies to guide future research. *Disability and Rehabilitation.* 1–17. https://doi.org/10.1080/09638288.2022.2118869

Chapter Two: Implementation Strategies and Implementation Outcomes for Physical Activity Interventions in Long-Term Care Facilities: A Scoping Review

This is a manuscript in preparation for submission.

Abstract

Background: Physical activity (PA) is a low-cost, effective intervention that improves multiple health outcomes for long-term care (LTC) residents. Despite known benefits, residents spend up to 80% of waking hours being sedentary and are inactive. Implementation science methods can help understand how to better integrate PA interventions in LTC settings. This scoping review examined implementation strategies and outcomes used to increase PA among LTC residents.

Methods: Following Arksey and O'Malley's framework and PRISMA-ScR guidelines, we searched 6 databases for studies reporting on PA intervention implementation in LTC. Implementation strategies were categorized using the Expert Recommendations for Implementing Change (ERIC) compilation, and implementation outcomes using Proctor's taxonomy. A consultation exercise with study researchers validated findings and provided additional implementation insights.

Results: Thirty papers reporting on thirteen unique implementation projects were included. Twenty-nine distinct implementation strategies across 9 thematic clusters were identified. The most common strategies were educational (10/13), followed by evaluative and iterative strategies (8/13). Feasibility was the most reported implementation outcome (8/13), only one study reported on sustainability. Most studies showed positive associations between implementation strategies and outcomes. However, reporting on outcomes was limited. The consultation exercise revealed unreported implementation strategies and greater insights into effective approaches.

Conclusion: This review provides a comprehensive synthesis of implementation strategies and outcomes for PA interventions in LTC, with educational strategies being most

prevalent. Findings highlight the need for standardized reporting of implementation strategies and outcomes to improve intervention reproducibility. By addressing these gaps, researchers and practitioners can improve the adoption and impact of PA interventions and improve the health and well-being of LTC residents.

Introduction

The world's population is aging rapidly, and the number of people aged 80 and over is projected to triple by 2050 (WHO, 2021). As the global population ages, so too does the need for long-term care (LTC). In Canada, the number of LTC beds required is projected to more than double by 2040 (Gibbard, 2017). Despite these projections and the rising acuity of resident care, facilities are often underfunded and under-resourced (Grabowski, 2021). Given these challenges, it is crucial for policymakers and healthcare providers to prioritize the implementation of evidence-based interventions and practices that address the complex needs of the aging population.

Physical activity (PA) is a low-cost and effective intervention to improve resident outcomes across multiple domains of health. Engaging in PA can reduce the prevalence of frailty, an important predictor of all-cause mortality among LTC residents (Zhang et al., 2019). Additionally, increasing levels of PA can improve functional independence and mobility (Crocker et al., 2013), as well as cognitive function (Groot et al., 2016), decrease the likelihood of multiple chronic health conditions commonly seen in LTC residents such as diabetes (Colberg et al., 2010), fecal and urinary incontinence (Musa et al., 2019; Tak et al., 2012), osteoarthritis (Daste et al., 2021), and hypertension (Pescatello et al., 2019). PA also leads to positive psychosocial outcomes, such as improved quality of life (Cohen et al., 2016; Ferreira et al., 2022) and reduced loneliness (Hoang et al., 2022). Importantly, PA is beneficial even for the most vulnerable residents, including those with dementia (Bowes et al., 2013; Groot et al., 2016; Lam et al., 2018; Pitkälä et al., 2013), and who are severely frail (Godin et al., 2020).

Furthermore, the benefits of increasing levels of PA among residents of LTC are demonstrated to extend beyond individual-level health outcomes and also include organizational

benefits. For example, increasing PA opportunities in aged care settings has been shown to be cost-effective as improving resident mobility can reduce the number of staff needed to assist residents in care tasks, resulting in labor cost savings (Gideon Asuquo et al., 2021). Likewise, resident participation in exercise programs can improve balance and lower the risk of falls and injuries, ultimately reducing medical care costs (Stanmore et al., 2019). Lastly, it has been shown that facilities that advertise well-organized PA programs are perceived positively (Baert et al., 2016), which could result in increased resident admissions, higher satisfaction, and improved staff recruitment and retention. Yet, despite the multi-level benefits of PA in this setting, residents spend most of their waking hours (upwards of 80%) engaged in sedentary activities and are highly inactive (Barber et al., 2015; Lee et al., 2020; Parry et al., 2019).

Therefore, supporting the application of evidence into practice in this setting is valuable and merits further investigation. There is a pressing urgency to gain a better understanding of *how* PA interventions are currently implemented to inform future efforts. To do so, we can turn to the field of implementation science. Implementation science is the "scientific study of the methods to promote the uptake of research findings into routine healthcare in clinical, organisational, or policy contexts" (Wensing, 2015, p. 98). This field of study aims to understand the processes by which an established evidence-based practice becomes adopted into practice.

There are several barriers ranging from the individual- to the organizational-levels that hinder the successful implementation of PA interventions in LTC facilities. At the individual level, many residents experience some level of cognitive impairment that affects their memory and attention, making it difficult for them to engage fully in PA interventions (van Alphen et al., 2016). On an organizational level, a lack of teamwork and insufficient support for implementation present additional challenges. For instance, care aides provide the majority of

resident care and make up most of the LTC workforce, yet they have limited opportunities to express their views and offer solutions to the issues they encounter (McArthur et al., 2021; Slaughter et al., 2015a; von der Warth et al., 2021). Additionally, facilities are often understaffed and under-resourced, leaving limited opportunities for staff to facilitate resident activity in addition to other care tasks (McArthur et al., 2021; Mills et al., 2019). Lastly, facilities are bound by legalities and audits that value and reward safety indicators (e.g., falls indicators) and avoid risk, creating hesitancies towards PA because it is often falsely perceived to be associated with higher rates of falls and injury (Halligan et al., 2014).

To address these challenges, implementation strategies play a crucial role in ensuring successful intervention implementation. Implementation strategies refer to the methods and techniques used to support the adoption and sustainability of interventions over time (Powell et al., 2015; Proctor et al., 2013). They can be tailored to address the unique challenges of implementing interventions in different contexts, such as LTC facilities. Strategies can range from simple and straightforward to complex and multifaceted, can be used at all phases of implementation, and address multilevel contextual factors while targeting various invested parties (Proctor et al., 2013). Importantly, implementation strategies can guide stakeholders to identify barriers and develop plans to overcome them (Proctor et al., 2013). Identifying, developing, and testing implementation strategies are top priorities for implementation science (Beidas et al., 2022; Eccles et al., 2009).

Generally, reporting on implementation strategies is lacking, which hinders their reproducibility and potential to contribute to successful interventions in the future (Albasha et al., 2023; Powell et al., 2019). In addition, insufficient reporting of implementation strategies creates a challenge in identifying possible mechanisms of change needed to understand how

strategies influence the uptake of evidence-based practices (Beidas et al., 2022; Garner et al., 2020; Kislov et al., 2019). To help address this issue, compilations of implementation strategies, such as the Expert Recommendation for Implementing Change (ERIC) compilation, were created (Powell et al., 2015). The ERIC compilation was generated by a panel of experts in implementation who identified, through a Delphi process, a list of 73 conceptually distinct implementation strategies. These strategies were then further mapped into nine broader thematic clusters (Waltz et al., 2015). By creating common terminology, this compilation can improve the reporting of implementation strategies, enhance their reproducibility, and ensure their contribution to future implementation efforts.

Implementation outcomes capture whether implementation strategies have led to their desired outcomes (Proctor et al., 2011). These outcomes capture valuable information for researchers, evaluators, practitioners, and policy makers, about the success of an intervention beyond efficacy or effectiveness (Proctor et al., 2011). Implementation outcomes include intervention *acceptability* among multiple stakeholders, the *adoption* rate of a new practice, intervention *appropriateness* for a specific setting or context, *implementation cost*, implementation *feasibility* and *fidelity*, the *penetration* or integration of a new practice into a setting, and the overall *sustainability* of an intervention or practice (Proctor et al., 2011). Tracking and measuring implementation outcomes enables the assessment of the effectiveness of implementation strategies and allows researchers to identify areas for improvement to optimize the adoption and sustainability of evidence-based practices (Lengnick-Hall et al., 2022; Proctor et al., 2011).

The value of implementation science as a means to accelerate the rate of adoption of evidence-based practices in the LTC setting is recognized (Byrne, 2021). However, the lack of

reporting on implementation strategies and their outcomes is a noted research gap and priority area in this field, which, if filled, could improve implementation effectiveness and enhance resident quality of care (Powell et al., 2019). Current research reporting on PA interventions in LTC lacks sufficient intervention description (Wylie et al., 2022), and reporting on implementation strategies is minimal (Albasha et al., 2023). As such, the objectives of this review are to synthesize and examine both the use of implementation strategies and their associated implementation outcomes for PA interventions in LTC.

Methods

This scoping review followed the six steps of the Arksey and O'Malley framework (2005), which are: 1) identifying the research question, 2) identifying relevant studies, 3) study selection, 4) charting the data, 5) collating and, summarizing and reporting the results, and 6) conducting a consultation exercise. The results are reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018).

Information Source and Search Strategy

A systematic search and scoping review following the PRISMA-ScR guidelines requires a well-defined search strategy (Tricco et al., 2018). The search strategy for this review was developed with the assistance of a research librarian specializing in knowledge synthesis and was further refined through conversations between the research team to better capture concepts related to the search (Bown & Sutton, 2010). The research team searched for documents containing concepts related to "aging", "long-term care", "physical activity", and "implementation". Six databases relevant to PA and LTC were searched: Ovid, CINAHL, Embase, PsychINFO, SportDISCUS, and Web of Science. The search was limited to studies

published in English or French (the primary languages of the research team) prior to March 2021, when the databases were last searched. The final search strategy is found in Appendix A.

Inclusion and Exclusion Criteria

Studies were included if they: (a) were conducted in LTC settings; (b) reported on an intervention (program or approach to care) that focused partially or exclusively on resident PA or mobility; and (c) examined processes of implementation.

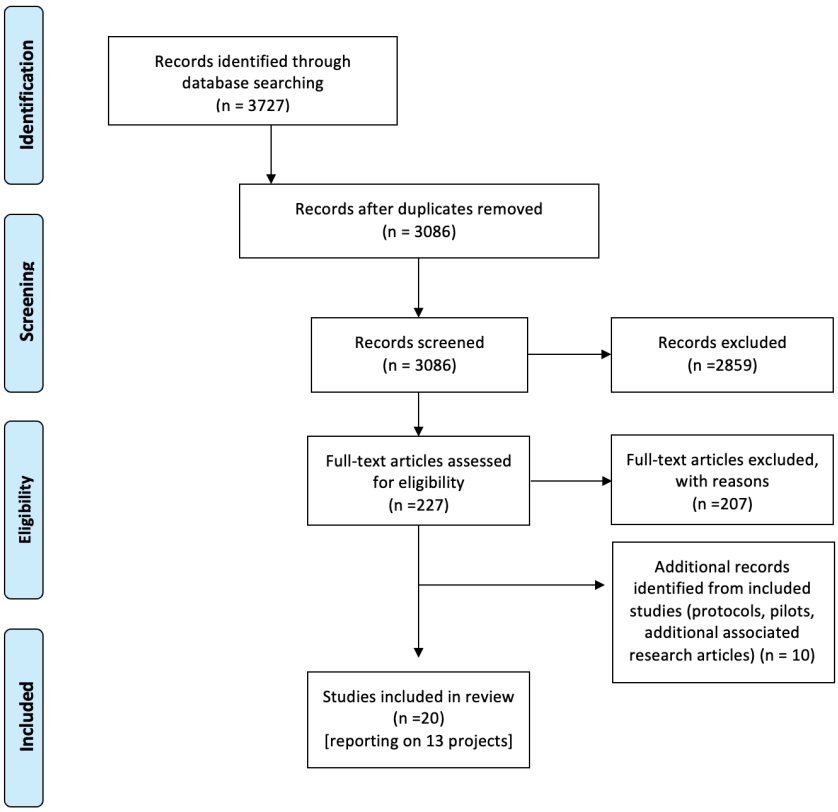
Studies were excluded if they (a) reported solely on intervention effectiveness (did not report on implementation strategies or outcomes), (b) did not have PA or mobility as an outcome measure (e.g., reported solely on falls, cognition, incontinence), (c) reported on a PA intervention in which residents were not conducting activity independently (e.g., range of motion intervention where residents were assisted in activity/movement), (d) were conducted with younger adults (mean age <65). Evidence syntheses were excluded; however, their reference lists were searched for relevant studies. Publications with no peer-reviewed data were excluded (commentaries, grey literature, editorials).

To account for variation in terminology, the LTC context was defined as any care institution that provides 24-hour nursing care, personal care, and other therapeutic and support services (LTC, continuing care, residential care, nursing home). We considered PA to be "any bodily movement produced by skeletal muscles that requires energy expenditure" (WHO, 2022) and mobility to include the following activities "moving by changing body position or location or by transferring from one place to another, by carrying, moving, or manipulating objects, by walking, running, climbing, and by using various forms of transportation" (WHO, 2018). Lastly, studies that included both approaches to care that optimize activity and PA programs (group and individually based) were captured in this search.

Selection of Sources of Evidence

We identified 3,727 papers from the database search. After removing duplicates, 3,086 studies remained. Of these, 227 remained after screening titles and abstracts. Following a full-text review against the inclusion and exclusion criteria, 20 studies remained. An additional 10 papers were identified through reference searches of included studies, as they provided further information on the intervention implementation. In the end, 30 papers reporting on 13 unique implementation projects were included (Figure 1).

Figure 1
PRISMA flow diagram



PRISMA flow diagram of study selection and inclusion process. From: Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *BMJ*, *372,* 71. (Silva et al., 2013)

Two reviewers (AG and AA) screened all titles and abstracts identified in the initial search. When disagreements occurred, AG made the final decision on whether to advance the study to full-text review. Two reviewers (AG and AA, or DV and AG) screened full texts against inclusion/exclusion criteria. Disagreements were resolved through discussion until consensus was reached.

Data Charting Process

Results from most interventions (10/13 – 77%) were published across more than one publication (e.g., protocol paper, pilot study, full-scale implementation). All studies reporting on the same intervention were reviewed and charted together. For example, there are two publications resulting from the *Exercise Physiology in Aged Care Program* (Parfitt et al., 2020; Post et al., 2020). The first reports on the evaluation of a 12-week accredited exercise physiologist-led exercise program. From this publication, the research team charted implementation strategies and relevant resident outcomes from this publication (Parfitt et al., 2020). The second publication reports on the perceptions and acceptability of partners-in-care, which was used to chart implementation outcomes (Post et al., 2020).

Data were charted by two independent reviewers (AG and DV). Reviewers met weekly to discuss study findings, reach consensus on charted data, and iteratively update the data charting form. The opinion of a third reviewer (BAM) was sought when disagreement occurred.

The two independent reviewers charted data on implementation strategies according to the compilation of 73 discrete implementation strategies found in the ERIC compilation (Powell et al., 2015) and within their larger thematic cluster (Waltz et al., 2015). Data on implementation outcomes were charted using the Proctor et al. (2013) Taxonomy for Implementation Outcomes.

When strategies were found that did not reflect language found in the ERIC compilation, we charted them using the equivalent terminology. For example, a restorative care intervention placed a poster about the new approach in the rooms of participating residents to serve as a visual cue for nursing aides to engage in the activities (Resnick, Cayo, et al., 2009; Resnick, Gruber-Baldini, et al., 2009). This was charted under the discrete strategy *remind clinicians*.

Consultation Exercise

The final step of the Arksey and O'Malley framework (2005) for scoping reviews is the addition of a consultation exercise to inform and validate review findings. We conducted a consultation exercise with researchers from the studies included in this review. Six researchers accepted our invitation to participate in a semi-structured interview to validate preliminary findings of the review, and to explore with greater depth and breadth their perceptions and experiences with the implementation of PA interventions in LTC. Interview results pertaining to implementation strategies are included in the results section of this review, the complete analysis of the interview findings is published elsewhere [Geerts et al., working manuscript].

Results

Study Characteristics

Study characteristics can be found in Table 1, including the: name of the first author and publication year, study design, approach to PA, program details, length of the implementation, number of participating LTC facilities, and associated publications. Studies were published between 2008 and 2021. Results from 10 out of the 13 implementation projects were reported across more than one publication. Seven studies reported on the implementation of a PA program (Henwood et al., 2017; Hurley et al., 2020; Johnson et al., 2005; Schnelle et al., 2003) and six reported on interventions that embedded PA within care (Galik et al., 2014; Hurley et al., 2020;

Johnson et al., 2005; Jung et al., 2020; Resnick, Cayo, et al., 2009; Slaughter et al., 2015a). Studies were from Germany (1) (Bischoff et al., 2021), Taiwan (1) (Chen et al., 2016), Australia (3) (Fien et al., 2019; Henwood et al., 2017; Parfitt et al., 2020), United States (3) (Galik et al., 2014; Resnick, Cayo, et al., 2009; Schnelle et al., 2002), United Kingdom (1) (Hurley et al., 2020), Canada (2) (Johnson et al., 2005; Slaughter et al., 2015a), Korea (1) (Jung et al., 2020), and Italy (1) (Venturelli et al., 2011). The number of participating facilities per intervention ranged between one (Bischoff et al., 2021; Fien et al., 2019; Parfitt et al., 2020; Venturelli et al., 2011) and 12 (Johnson et al., 2005; Resnick, Cayo, et al., 2009). Interventions lasted between six weeks (Jung et al., 2020; Resnick, Cayo, et al., 2009) to a year (Chen et al., 2016; Hurley et al., 2020).

Only one study reported the use of an implementation science framework (Slaughter et al., 2015a). In this study, the PARIHS framework provided structure to guide the research process from question development to the presentation of findings.

Implementation Strategies

Of the 73 discrete strategies in the ERIC compilation, only 29 were employed as part of the implementation of these interventions. Strategies from all nine implementation strategy thematic clusters were identified. All but two studies (Bischoff et al., 2021; Schnelle et al., 2002) (10/12, 83%) employed more than one implementation strategy. The following paragraph outlines the use of strategies from the most commonly used thematic cluster to the least. Table 1 provides a summary of the study characteristics included in this review and Table 2 provides an analysis of the use of implementation strategies.

Training and Educating Stakeholders

The most reported thematic cluster was *Training and Educating Stakeholders* (10) (Chen et al., 2016; Fien et al., 2019; Galik et al., 2014; Henwood et al., 2017; Hurley et al., 2020; Johnson et al., 2005; Jung et al., 2020; Resnick, Cayo, et al., 2009; Slaughter et al., 2015a; Venturelli et al., 2011). Within this thematic cluster the following implementation strategies were used: *Conduct educational meetings* (6) (Chen et al., 2016; Fien et al., 2019; Galik et al., 2014; Henwood et al., 2017; Jung et al., 2020; Slaughter et al., 2015b; Venturelli et al., 2011); *Distribute educational materials* (5) (Chen et al., 2016; Galik et al., 2014; Johnson et al., 2005; Jung et al., 2020; Resnick, Cayo, et al., 2009); *Conduct ongoing training* (5) (Galik et al., 2014; Hurley et al., 2020; Johnson et al., 2005; Jung et al., 2020; Resnick, Cayo, et al., 2009); *Develop educational materials* (2) (Henwood et al., 2017; Slaughter et al., 2015b); *Make training dynamic* (2) (Johnson et al., 2005; Resnick, Cayo, et al., 2009); *Use train the trainer strategies* (1) (Hurley et al., 2020); *Create a learning collaborative* (1) (Johnson et al., 2005); *Provide ongoing consultation* (2) (Galik et al., 2014; Resnick, Cayo, et al., 2009); *Shadow other experts* (1) (Resnick, Cayo, et al., 2009); and *Conduct educational outreach visit* (1) (Resnick, Cayo, et al., 2009).

Use Evaluative and Iterative Strategies

Eight studies used strategies within the *Use Evaluative and Iterative Strategies* (Chen et al., 2016; Fien et al., 2019; Galik et al., 2014; Henwood et al., 2017; Hurley et al., 2020; Parfitt et al., 2020; Resnick, Cayo, et al., 2009; Slaughter, Wagg, et al., 2015b). As part of this cluster the following strategies were used: *Stage implementation scale-up* (7) (Chen et al., 2016; Fien et al., 2019; E. Galik et al., 2014; Henwood et al., 2017; Hurley et al., 2020; Resnick, Cayo, et al., 2009; Slaughter et al., 2015b); *Develop and organize quality monitoring systems* (3) (Galik et al., 2008; Resnick, Cayo, et al., 2009; Slaughter et al., 2015b); *Assess for readiness and identify*

barriers and facilitators (2) (Galik et al., 2014; Parfitt et al., 2020); and *Audit and provide feedback* (1) (Slaughter et al., 2015b).

Develop Stakeholder Interrelationships

Six studies used strategies housed within the *Develop Stakeholder Interrelationship* thematic cluster (Galik et al., 2014; Henwood et al., 2017; Hurley et al., 2020; Johnson et al., 2005; Resnick, Cayo, et al., 2009; Slaughter et al., 2015a). As part of this cluster the following strategies were used: *Identify and prepare champions* (2) (Galik et al., 2014; Hurley et al., 2020); *Use advisory board and workgroups* (1) (Henwood et al., 2017); *Use train the trainer strategies* (1) (Slaughter et al., 2015b); *Obtain formal commitments* (1) (Johnson et al., 2005); and *Organize clinician implementation team meetings* (1) (Resnick, Cayo, et al., 2009).

Engage Consumers

Five studies used strategies within the *Engage Consumers* thematic cluster (Bischoff et al., 2021; Chen et al., 2016; Galik et al., 2014; Schnelle et al., 2002; Venturelli et al., 2011). As part of this cluster the following strategies were used: *Involve patients/consumers and family members* in the implementation (4) (Chen et al., 2016; Galik et al., 2014; Schnelle et al., 2002; Venturelli et al., 2011); and *Intervene with patients/consumers to enhance uptake an problem solve around adherence* (1) (Bischoff et al., 2021).

Change Infrastructure

Four studies used strategies within the *Change Infrastructure* thematic cluster (Galik et al., 2014; Hurley et al., 2020; Jung et al., 2020; Slaughter et al., 2015a). Three studies employed the strategy *Change physical structure and equipment* (Galik et al., 2014; Hurley et al., 2020; Slaughter et al., 2015) and one study used *Mandate change* as a strategy (Slaughter et al., 2015).

Utilize Financial Strategies* and *Support Clinicians

Three studies used strategies within the *Utilize Financial Strategies and Support Clinicians* thematic cluster (Galik et al., 2014; Henwood et al., 2017; Resnick, Cayo, et al., 2009). One study *Developed resource sharing agreements* (Henwood et al., 2017), and two studies implemented strategies to *Remind clinicians* (Slaughter et al., 2015; Resnick et al., 2009)

Engage Consumers

Three studies used strategies within the *Engage Consumers* thematic cluster (Bischoff et al., 2021; Chen et al., 2016; Galik et al., 2014; Schnelle et al., 2002; Venturelli et al., 2011). Two studies used the strategy *Alter incentive/allowance structures* (Galik et al., 2014; Resnick, Cayo, et al., 2009), and one used the strategy *access new funding* (Henwood et al., 2017).

Adapt and Tailor to Context

Two studies used strategies within the *Adapt and Tailor to Context* thematic cluster (Galik et al., 2014; Hurley et al., 2020). Both studies used the strategy *Tailor strategies* (Galik et al., 2014; Hurley et al., 2020).

Provide Interactive Assistance

Only one discrete strategy was used within the larger *Provide Interactive Assistance* (1) thematic cluster (Slaughter et al., 2015b). Slaughter et al., (2015) used *Facilitation* to implement a function-focused care approach.

Implementation Outcomes

Table 3 provides an overview of implementation outcomes measured in these studies. *Feasibility* was the most reported implementation outcome (8) (Bischoff et al., 2021; Chen et al., 2016; Fien et al., 2019; Henwood et al., 2017; Hurley et al., 2020; Johnson et al., 2005; Schnelle et al., 2002; Slaughter et al., 2015b; Venturelli et al., 2011). *Fidelity* was measured in five studies (Galik et al., 2014; Johnson et al., 2005; Resnick, Galik, et al., 2009; Slaughter et al., 2015b;

Venturelli et al., 2011), followed by *Implementation Cost* (2) (Hurley et al., 2020; Schnelle et al., 2003). Only one study reported measures of *Adoption* (Johnson et al., 2005), *Appropriateness* (Hurley et al., 2020), and *Sustainability* (Fien et al., 2019). No studies measured *Penetration.*

Associations Between Implementation Strategies and Implementation Outcomes

Overwhelmingly, studies reported positive associations between implementation strategies and outcomes. Two studies reported a negative association between implementation strategies and implementation outcomes (Henwood et al., 2017; Schnelle et al., 2003), and two studies found mixed results with both positive and negative implementation outcomes (Hurley et al., 2020; Johnson et al., 2005).

Two studies examined implementation cost as an implementation outcome, and neither found a positive association (Hurley et al., 2020; Schnelle et al., 2003). Hurley et al. (2020) implemented a whole-systems program using multiple implementation strategies (*Assessing for readiness and identifying barriers and facilitators, Changing physical structure and equipment, Conducting ongoing training, Using train the trainer approaches,* and *Identified and prepared champions*) but found no indication that the program was associated with reduced health or social care utilisation. However, they did note that the costs were not prohibitive. Similarly, Schnelle et al. (2003) implemented a single strategy walking program (*Involve patients/consumers and family members*) and found no reduction in the incidence and costs of selected acute health conditions (dermatological, genitourinary, gastrointestinal, respiratory, endocrine, neurological, and cardiovascular systems; falls; pain; and psychiatric and nutritional disturbances).

Two studies found challenges to intervention feasibility (Henwood et al., 2017; Johnson et al., 2005). Despite pilot work demonstrating the feasibility of an aquatic exercise program for

residents with dementia using multiple strategies (*Staging implementation scale up, Accessing new funding, Developing educational materials, Conducting educational meetings, Using advisory board and workgroup,* and *Developing resource sharing agreements*). Henwood et al., (2017) reported undulating participation across sites and no participants attending all sessions. Johnson et al., (2005) implemented a multifaceted function-focused care program *(Assessing for readiness and identifying barriers and facilitators, Conducting ongoing training, Making training dynamic, Distributing educational materials, Creating a learning collaborative, and Obtaining formal commitments)*. While this program found positive results for measures of adoption, acceptability, and fidelity, multiple barriers to implementation were identified placing the feasibility of the program into question.

Associations Between Implementation Process and Resident Outcomes

Intervention Factors

This section reflects aspects of the implementation process (e.g., the intervention itself, adaptations to the intervention, and choice of outcome measures) that were suggested to have influenced activity and mobility outcomes. Slaughter, Wagg et al. (2015a) credited the simplicity of the sit-to-stand intervention for overcoming challenges of implementation fidelity and sustainability. It was suggested that without this simplicity, residents may not have benefited from participation. Similarly, Venturelli et al. (2011) credited reliance on caregivers and walking in a habitual environment for greater fidelity compared to similar walking programs. Additionally, evidence for a dose-response in Parfitt et al. (2020) indicated the importance of the one-to-one sessions led by accredited exercise physiologists versus group sessions in facilitating changes in resident performance. Bischoff et al. (2012) discussed adaptations made during the intervention including, reducing cognitive complexity, walking distance, and separating walking

and strength exercises, as supporting participant program acceptance and adherence. Lastly, Henwood et al. (2017) reported that the facilities that were most supportive of the program had higher attendance and suggested that this led to a positive feedback loop whereby facilities with higher intervention fidelity led to increased resident benefits as well as a greater willingness to continue participating in the program.

Activity Measures

Studies suggested certain PA and mobility measures are less feasible or appropriate for capturing changes in activity among residents. Bischoff et al. (2021) implemented a multi-component, progressive exercise program using music as a playful and motivational tool. Although there were noticeable improvements in the Short Physical Performance Battery (SPPB) test, the gait parameters did not show similar enhancements. The researchers attributed this to the low feasibility of the gait measurements conducted with the residents. The measurements were time-consuming, taking over an hour to complete, which resulted in a low resident participation rate. Similarly, Johnson et al., (2005) found that a third of residents were unable to complete the Timed Up and Go test, and that staff may be unwilling to routinely administer these measures, limiting their feasibility. Additionally, Hurley et al., (2020) discontinued the use of the EQ-5D-5L and the Assessment of Physical Activity due to difficulties with the appropriateness of the measures as both residents and researchers found them difficult to understand and apply. Lastly, Galik et al., (2014) emphasized that implementation takes time, and noted that seeing results could take six months or longer. Table 4 presents the activity measured used in these studies and provides a general overview of the results.

Consultation Exercise

As part of a consultation exercise, we conducted semi-structured interviews with six researchers who were involved in the projects included in this review. Interviews were analyzed thematically to validate the findings of this review and to explore in greater depth and breadth their perspectives and experiences with implementation in LTC. The following paragraphs provide additional information on implementation strategies gathered from these interviews. The complete analysis is reported elsewhere [Geerts et al., working manuscript].

During interviews, the researchers provided additional insights into their use of implementation strategies. Four of the six researchers shared that they had used implementation strategies that were not reported in their published work. Three researchers described their process of *Conducting educational outreach visits* to initiate connections with partnering institutions and relevant stakeholders. For some, this approach required the researchers to create "multiple levels of connections," starting with high-level stakeholders and working their way down to the care providers responsible for overseeing the provision of care by health care aides. For others, connections were already established, as they were part of a research centre that was already in a partnership with a large residential care provider. In addition, one researcher reflected on how this was a part of research "no one's really saying anything about," and they would have benefitted from resources on how to conduct these initial meetings.

Two researchers discussed sustainability strategies not reported in the published manuscripts. One researcher described an educational manual containing all program exercises and instructional cues, and the other explained how the use of portable equipment was intended to facilitate individual exercise sessions with residents following intervention completion.

Researchers also shared detailed information about what they perceived to be effective components of educational approaches, which was the most used implementation strategy. For

example, three researchers emphasized the importance of clearly highlighting the intervention's benefits for each stakeholder group. In addition, one researcher stressed the value of involving staff in the development of educational materials to foster project ownership, while another discussed the use of role play as an effective approach.

Notably, all researchers shared that with each implementation, they "got better over time", became more proficient with their approach, and gained valuable insights that influenced their strategies in future intervention iterations. One researcher shared that they had created an implementation model from "years and years" of qualitative work and exploration of various theories. This model is now used in implementation studies across various settings.

In addition, two researchers shared how they incorporated specific learnings from pilot work into later studies. For instance, one researcher realized that care staff had little control over certain environmental barriers to PA, such as locked doors. Consequently, they later placed more effort on gaining buy-in from the facility to address such issues. Similarly, another author learned the importance of planning for sustainability after participants in the PA program went on hunger strike demanding their exercise class be reinstated when a pilot intervention ended without a clear plan for sustaining the intervention. As a result, they emphasized measures of sustainability in future iterations of the program.

Discussion

This scoping review examined the use of implementation strategies and implementation outcomes to increase PA among LTC residents. Since implementation strategies are commonly not reported using uniform language, we charted this information according to two recognized classifications: the ERIC compilation and Proctor's Implementation Outcome Taxonomy (Powell et al., 2015; Proctor et al., 2013; Waltz et al., 2015). In addition, this review sought to

provide insights into the associations between implementation strategies and implementation outcomes, as well as between implementation factors (strategies and outcomes) and resident outcomes. A consultation exercise with study researchers validated findings and provided additional details on the use of implementation strategies. Overall, this review provides a comprehensive overview of the use of implementation strategies and outcomes support activity levels among LTC residents.

This review identified 29 implementation strategies across the nine thematic clusters of the ERIC compilation (Powell et al., 2015; Waltz et al., 2015). Strategies within the theme training and educating stakeholders were used most frequently (10/13). This finding is consistent with other reviews that examined implementation strategies in the LTC setting. Specifically, educational strategies are the most commonly used approaches in interventions for fall prevention, oral care, and palliative care (Albasha et al., 2023; Collingridge Moore et al., 2020; Weening-Verbree et al., 2013). Among the educational strategies identified in this review, the most frequently used were conducting educational meetings, distributing educational materials, and conducting ongoing training.

It is important to note that, although educational strategies were the most frequently reported, this does not necessarily mean they are the most effective. To illustrate, previous implementation research has identified that ‘relationships’ are critical to successful implementation (Metz et al., 2021). As such, novel contribution of the current study is the new insight provided by the consultation exercise regarding what constitutes an effective educational approach. Specifically, researchers emphasized the relational dimension of educational strategies, highlighting the importance of tailoring education to show each stakeholder what they

stand to gain from engaging in the implementation effort, rather than focusing solely on benefits for residents.

The second most used strategies fell within the evaluative and iterative strategies thematic cluster (8/13). Within this larger cluster, the most frequently used strategy was scaling-up interventions from a pilot study to a larger scale implementation (7/13). Scaling-up provided an opportunity to learning by doing, as researchers shared insights gained from early implementation work that informed later iterations. This finding supports the "call to arms" of Rapport (2022) who suggests that implementation scientists should embed themselves in healthcare settings. By doing so, they can foster stronger partnerships, advance implementation science forward from theory to action, and ultimately improve patient outcomes (Rapport et al., 2022).

Additionally, ingratiating themselves with those working within facilities can facilitate the development of meaningful relationships an implementation strategy used often in these studies. It is important for facilities to be interested in, and recognize the value of, implementation projects in order to establish successful partnerships (Baier et al., 2021). However, introducing the concept of research must be done tactfully, as the term may carry negative connotations for some, who associate with increased workload (Levy et al., 2022). Gaining buy-in from invested stakeholders is, as they possess valuable contextual knowledge that can help identify appropriate implementation strategies (Levy et al., 2022).

This review also examined implementation outcomes and the associations between implementation strategies and implementation outcomes. While most studies reported positive implementation outcomes, neither of the two studies that evaluated implementation cost found a cost benefit to PA interventions (Hurley et al., 2020 and Schnelle et al., 2003). Given that

healthcare costs are a crucial factor in implementation, it is essential to thoroughly investigate the financial impact of PA interventions in LTC. However, assessing implementation costs is challenging, and future research should explore a broader range of cost categories across all phases of implementation (Gold et al., 2022; Powell et al., 2012).

Notably, only one study reported on intervention sustainability (Fien et al., 2019). Longer-term follow-up studies are an opportunity for researchers to demonstrate the lasting impact of implementation projects (Beidas et al., 2022). Intervention sustainability should be a top priority, as a quantitative scoping review of PA interventions for older care home residents found that programs are rarely implemented using existing facility resources, which lessens the likelihood of program sustainability (Wylie et al., 2022).

Importantly, reporting on implementation outcomes remains inconsistent and incomplete. Studies rarely provided clear measures of implementation outcomes or articulated how they achieved their results. Therefore, improving the quality and transparency of reporting is essential. Future studies should clearly define implementation outcome measurements and their analysis process to enhance transparency and facilitate the identification of effective implementation strategies (Lengnick-Hall et al., 2022).

As part of the consultation exercise, researchers shared implementation strategies that were not reported in published work and/or provided valuable additional details not reported in published work. Many researchers did not report on conducting educational meetings with participating facilities, a strategy that occurs in the planning stage of implementation (Powell et al., 2012). To improve standardisation of reporting, future studies should adhere to existing recommendations for reporting on implementation strategies including naming, defining, and specifying the strategy according to the actor, action, action target, temporality, and dose (Powell

et al., 2015). Additionally, researchers can turn to the Standards for Reporting Implementation Studies (StaRI) guidelines and checklist for reporting on implementation research (Pinnock et al., 2017). Including reports on specific learnings and how they were used in future intervention iterations would be valuable for researchers and practitioners alike. In addition, it has been suggested that implementation strategies could be presented as packages in intervention protocols and/or manuals (Powell et al., 2015). Future studies on PA interventions in LTC should consider including an 'implementation strategy package' as part of published work to facilitate reproducibility. This may bring us closer to developing a modular implementation approach (e.g., menu of strategies) for PA interventions in LTC and facilitate the enactment of such interventions (Beidas et al., 2022).

Lastly, future work on implementation strategies should consider examining how and why implementation strategies lead to intended outcomes. This would require researchers to think more critically about how to embed the cause-and-effect aspect of implementation strategies to health outcomes in study design and to formally/informally theorize about mechanism of change (Garner et al., 2020; Kislov et al., 2019).

Limitations

The results of this review should be considered alongside the following limitations. Firstly, our inclusion criteria were restricted to institutions for the aged that provide 24hr nursing care. While this encompasses a wide range of LTC residents, including those with dementia and who are wheelchair bound, it excluded implementation research conducted in other institutionalized settings that house older adults such as hospital or assisted living facilities. Additionally, we only reviewed interventions that measured aspects of mobility/activity. While this understanding of activity should be considered a strength of this study by capturing a

comprehensive understanding of activity, PA interventions are known to improve multiple domains of health. Therefore, studies reporting on the implementation of PA interventions that did not measure change in activity/mobility but captured other aspects of health (e.g., quality of life, depression, cognitive impairment) are not included in this synthesis. Grey literature was also not included in this review which may have contributed to a potential publication bias. Overall, a broader inclusion criterion could result in a more extensive understanding of the implementation of interventions that aim to increase activity among institutionalized older adults.

Secondly, implementation strategy compilations such as the one used in this review (ERIC) can be helpful for labeling and categorizing strategies (Powell et al., 2015). However, definitions of implementation strategies are often broad, and inferences were made to label strategies according to existing categories. We attempted to validate the findings of this review with all researchers, however, only six accepted our invitation for an interview. Given that these participants acknowledged that overlap in implementation strategies can occur (e.g., educational materials placed in strategic locations can also act as a reminder to clinicians) it is possible that some strategies were miscategorized. We used these taxonomies as a tool to move towards a unified language, not as exhaustive and/or absolute categories (Beidas et al., 2022).

A strength of this review is the contribution of the consultation exercise as many scoping reviews lack adequate reporting of the aims and value of the consultation exercise (Buus et al., 2022). However, while the consultation exercise provided novel findings on the use of implementation strategies, there is a possibility of recall bias. This is because researchers spoke about projects that occurred in the past, some over a decade ago, which could lead to inconsistencies or inaccuracies in their recollection of events.

Conclusion

Overall, this study has synthesized the use of implementation strategies and outcomes used for PA interventions in the LTC setting, with educational strategies being the most used. Additionally, novel perspectives from implementation researchers on the use of implementation strategies were found and could help inform future implementation efforts in LTC. This review highlights an opportunity for implementation scientists to use common language and terminology when charting implementation strategies and implementation outcomes. In doing so, they could improve the transparency and reproducibility of interventions and subsequently, levels of activity among residents of LTC.

Table 1
Study Characteristics

First Author, Publication Year, Country	Study Design	Approach to Physical Activity	Program details	Length of Program Implementation	Participating LTC facilities (N)	Associated Publication(s)
Bischoff et al., 2021, Germany	Feasibility trial	Program (group-based)	Multicomponent Training Program	16 weeks (4 months)	1	N/A
Chen et al., 2016, Taiwan	Cluster randomized controlled trial	Program (group-based)	Elastic Band Exercise Program using Wheelchairs	52 weeks (12 months)	10	Chen, 2015
						Chen, 2013
Fien et al., 2019, Australia	quasi-experimental design, two-groups	Program (group-based)	Two phase progressive exercise intervention	24 weeks (6 months)	1	Fien, 2019
Galik et al., 2014, United States	Cluster randomized controlled trial	Approach to care	Function-Focused Care for the Cognitively Impaired	24 weeks (6 months)	4	Galik et al., 2009
						Galik et al., 2008
Henwood et al., 2017, Australia	Controlled trial	Program (group-based)	Dementia specific aquatic exercise program	12 weeks (3 months)	7	Henwood et al., 2015
						Neville et al., 2014
						Neville et al., 2013
Hurley et al., 2020, United Kingdom	Feasibility study	Approach to care	Whole systems program using meaningful activity as way of	52 weeks (12 months)	9	Koskela et al., 2017

			encouraging physical activity			
Johnson et al., 2005, Canada	Evaluation	Approach to care	Restorative care	16 weeks (4 months)	12	N/A
Jung et al., 2020, Korea	Quasi-experimental repeated measures	Approach to care	Function-Focused Care	6 weeks (1.5 months)	2	N/A
Parfitt et al., 2020, Australia	Evaluation	Program (group-based and individual)	Individually specific exercise physiologist intervention	12 weeks (3 months)	1	Post et al., 2020
Resnick et al., 2009, United States	Randomized controlled trial	Approach to care	Educational program on restorative care	6 weeks (1.5 months)	12	Resnick et al., 2009b
						Resnick et al., 2009c
						Resnick et al., 2009d
Schnelle et al., 2002, United States	Randomized controlled trial	Program (individual)	Exercise and incontinence care program	34 weeks (8 months)	4	Schnelle et al., 2003
Slaughter et al., 2015, Canada	Quasi-experimental pilot study	Approach to care	Integrated sit-to-stand activity	24 weeks (6 months)	7	Slaughter et al., 2018
						Slaughter & Estabrooks, 2013
						Slaughter et al., 2011

Venturelli et al., 2011, Italy	randomized control trial	Program (individual)	Walking program	24 weeks (6 months)	1	N/A

Table 2
Use of Implementation Strategies

Thematic cluster	n	%	Projects	Discrete strategy	n	Projects
Use evaluative and iterative strategies	8	62	Chen et al., (2016) Fien et al., (2019) Galik et al., (2014) Henwood et al., (2017) Hurley et al., (2020) Slaughter et al., (2015) Resnick et al., (2009) Parfitt et al., (2020)	stage implementation scale-up	7	Chen et al., (2016) Fien et al., (2019) Galik et al., (2014) Henwood et al., (2017) Hurley et al., (2020) Resnick et al., (2009) Slaughter et al., (2015)
				assess for readiness and identify barriers and facilitators	2	Galik et al., (2014) Parfitt et al., (2020)
				audit and provide feedback	1	Slaughter et al., (2015)
				develop and organize quality monitoring systems	3	Galik et al., (2014) Slaughter et al., (2015) Resnick et al., (2009)
Provide interactive assistance	1	8	Slaughter et al., (2015)	facilitation	1	Slaughter et al., (2015)
Adapt and tailor to context	3	23		tailor strategies	3	Hurley et al., (2020) Galik et al., (2014) Parfitt et al., (2020)
Develop stakeholder interrelationships	6	46	Galik et al., (2014) Henwood et al., (2017) Hurley et al., (2020) Johnson et al.,	use advisory board and workgroup	1	Henwood et al., (2017)

			(2005) Slaughter et al., (2015) Resnick et al., (2009)			
				identify and prepare champions	2	Galik et al., (2014) Hurley et al., (2020)
				use train the trainer strategies	1	Slaughter et al., (2015)
				obtain formal commitment	1	Johnson et al., (2005)
				organize clinician implementation team meetings	1	Resnick et al., (2009)
Train and educate stakeholders	10	77	Chen et al., (2016) Fien et al., (2019) Galik et al., (2014) Henwood et al., (2017) Hurley et al., (2020) Johnson et al., (2005) Slaughter et al., (2015) Venturelli et al., (2011) Resnick et al., (2009) Jung et al., (2020)	conduct educational meetings	6	Chen et al., (2016) Fien et al., (2019) Galik et al., (2014) Henwood et al., (2017) Jung et al., (2020) Slaughter et al., (2015) Venturelli et al., (2011)
				develop educational materials	2	Henwood et al., (2017) Slaughter et al., (2015)
				distribute educational materials	5	Chen et al., (2016) Galik et al., (2014) Johnson et al., (2005) Jung et al., (2020)

						Resnick et al., (2009)
				conduct ongoing training	5	Galik et al., (2014) Hurley et al., (2020) Johnson et al., (2005) Jung et al., (2020) Resnick et al., (2009)
				use train the trainer strategies	1	Hurley et al., (2020)
				make training dynamic	2	Johnson et al., (2005) Resnick et al., (2009)
				create a learning collaborative	1	Johnson et al., (2005)
				provide ongoing consultation	2	Galik et al., (2014) Resnick et al., (2009)
				shadow other experts	1	Resnick et al., (2009)
				conduct educational outreach visit	1	Resnick et al., (2009)
Support clinicians	3	23	Henwood et al., (2017) Slaughter et al., (2015) Resnick et al., (2009)	develop resource sharing agreements	1	Henwood et al., (2017)
				remind clinicians	2	Slaughter et al., (2015) Resnick et al., (2009)
Engage consumers	5	38	Bischoff et al., (2021) Chen et al., (2016) Galik et al., (2014)	intervene with patients/consumers to enhance uptake and problem solve around adherehnce	1	Bischoff et al., (2021)

			Schnelle et al., (2002) Venturelli et al., (2011)			
				Involve patients/consumers and family members	4	Chen et al., (2016) Galik et al., (2014) Schnelle et al., (2002) Venturelli et al., (2011)
Utilize financial strategies	3	23	Galik et al., (2014) Henwood et al., (2017) Resnick et al., (2009)	access new funding	1	Henwood et al., (2017)
				Alter incentive/allowance structures	2	Galik et al., (2014) Resnick et al., 2009
Change infrastructure	4	31	Galik et al., (2014) Hurley et al., (2020) Slaughter et al., (2015) Jung et al., (2020) Parfitt et al., (2020)	change physical structure and equipment	4	Galik et al., (2014) Hurley et al., (2020) Jung et al., (2020) Parfitt et al., (2020)
				mandate change	1	Slaughter et al., (2015)

Table 3
Implementation Outcomes Measured

Implementation outcomes	n	Publication	Association
acceptability	4	Bischoff et al., (2021)	positive
		Fien et al., (2019)	positive
		Johnson et al., (2005)	positive
		Parfitt et al., (2020)	positive
adoption	1	Johnson et al., (2005)	positive
appropriateness	1	Hurley et al., (2020)	negative
feasibility	8	Bischoff et al., (2021)	positive
		Chen et al., (2016)	positive
		Fien et al., (2019)	positive
		Johnson et al., (2005)	negative
		Jung et al., (2020)	positive
		Hurley et al., (2020)	positive
		Henwood et al., (2017)	negative (despite feasible pilot)
		Schnelle et al., (2002)	negative
		Slaughter et al., (2015)	positive
		Venturelli et al., (2011)	positive
fidelity	6	Galik et al., (2014)	positive
		Johnson et al., (2005)	positive
		Jung et al., (2020)	positive
		Resnick et al., (2009)	positive
		Slaughter et al., (2015)	variability across sites
		Venturelli et al., (2011)	positive
implementation cost	2	Hurley et al., (2020)	negative
		Schnelle et al., (2002)	negative
penetration	0		
sustainability	1	Fien et al., (2019)	positive

Table 4
Reported PA Outcomes Measures

Publication	**Mobility / Activity outcome** Orange – nonsignificant outcome Grey – unable to measure Green – significant outcome			
Bischoff et al., 2021	Lower extremity functionality (short physical battery test)	Gait Performance		
Chen et al., 2016	Functional fitness (lung capacity, body flexibility, range of joint motion, and muscle strength and endurance)			
Fien et al., 2019	Gait speed	Spatio-temporal parameters (step length, stride length, support base, step time, swing time, stance time, single support time, and double support time)	Sit-to-stand	
Galik et al., 2014	Actigraph	Physical activity survey for long-term care		
Henwood et al., 2017	Timed-Up-and-Go (TUG) test (seconds)	Short Physical Performance Battery (SPPB)		
Hurley et al., 2020	Assessment of Physical Activity (APA)			
Johnson et al., 2005	Timed-Up-and-Go	Functional independence measure (motor)	Hierarchical assessment of balance and mobility	
Jung et al., 2020	Korean version of the physical capability scale (PCS)			

Parfitt et al., 2020	Sit-to-stand test	Timed-up-and-go	Two-minute walk test	Habitual activity behaviour (measured with triaxial accelerometer)
Resnick et al., 2009	Barthel Index (for bathing, walking, climbing stairs)	Tinneti (gait and balance)		
Schnelle et al., 2002	Standing, walking, and wheelchair endurance			
Slaughter et al., 2015	Sit-to-stand test (30second and the time to complete)	Health Utilities Index Mark (mobility attribute of the HUI Mark 2 & 3)		
Venturelli et al., 2011	Physical Performance Test	Barthel Index (transfers, mobility on a level plan, and stairs)	6-minute walking test	

*This tables reports solely on measures related to activity and mobility and does not reflect other measures captured in the studies.

References

Albasha, N., Ahern, L., O'Mahony, L., McCullagh, R., Cornally, N., McHugh, S., & Timmons, S. (2023). Implementation strategies to support fall prevention interventions in long-term care facilities for older persons: A systematic review. *BMC Geriatrics*, *23*(1), 47. https://doi.org/10.1186/s12877-023-03738-z

Baert, V., Gorus, E., Calleeuw, K., De Backer, W., & Bautmans, I. (2016). An administrator's perspective on the organization of physical activity for older adults in long-term care facilities. *Journal of the American Medical Directors Association*, *17*(1), 75–84. https://doi.org/10.1016/j.jamda.2015.08.011

Baier, R. R., McCreedy, E., Uth, R., Gifford, D. R., & Wetle, T. (2021). Nursing home leaders' perceptions of a research partnership. *Aging Clinical and Experimental Research*, *33*(12), 3371–3377. https://doi.org/10.1007/s40520-021-01847-6

Barber, S. E., Forster, A., & Birch, K. M. (2015). Levels and patterns of daily physical activity and sedentary behavior measured objectively in older care home residents in the United Kingdom. *Journal of Aging and Physical Activity*, *23*(1), 133–143. https://doi.org/10.1123/JAPA.2013-0091

Beidas, R. S., Dorsey, S., Lewis, C. C., Lyon, A. R., Powell, B. J., Purtle, J., Saldana, L., Shelton, R. C., Stirman, S. W., & Lane-Fall, M. B. (2022). Promises and pitfalls in implementation science from the perspective of US-based researchers: Learning from a pre-mortem. *Implementation Science*, *17*(1), 55. https://doi.org/10.1186/s13012-022-01226-3

Bischoff, L. L., Cordes, T., Meixner, C., Schoene, D., Voelcker-Rehage, C., & Wollesen, B. (2021). Can cognitive-motor training improve physical functioning and psychosocial wellbeing in nursing home residents? A randomized controlled feasibility study as part of

the PROCARE project. *Aging Clinical and Experimental Research*, *33*(4), 943–956. https://doi.org/10.1007/s40520-020-01615-y

Bowes, A., Dawson, A., Jepson, R., & McCabe, L. (2013). Physical activity for people with dementia: A scoping study. *BMC Geriatrics*, *13*(1), 129. https://doi.org/10.1186/1471-2318-13-129

Bown, M. J., & Sutton, A. J. (2010). Quality control in systematic reviews and meta-analyses. *European Society for Vascular Surgery. 40*. 669-677 https://doi.org/10.1016/j.ejvs.2010.07.011

Buus, N., Nygaard, L., Berring, L. L., Hybholt, L., Kamionka, S. L., Rossen, C. B., Søndergaard, R., & Juel, A. (2022). Arksey and O′Malley's consultation exercise in scoping reviews: A critical review. *Journal of Advanced Nursing*, *78*(8), 2304–2312. https://doi.org/10.1111/jan.15265

Byrne, G. J. (2021). Implementation science in the nursing home. *International Psychogeriatrics*, *33*(9), 865–866. https://doi.org/10.1017/S104161022000383X

Chen, K.-M., Li, C.-H., Huang, H.-T., & Cheng, Y.-Y. (2016). Feasible modalities and long-term effects of elastic band exercises in nursing home older adults in wheelchairs: A cluster randomized controlled trial. *International Journal of Nursing Studies*, *55*, 4–14. https://doi.org/10.1016/j.ijnurstu.2015.11.004

Cohen, A., Baker, J., & Ardern, C. I. (2016). Association between body mass index, physical activity, and health-related quality of life in Canadian adults. *Journal of Aging and Physical Activity*, *24*(1), 32–38. https://doi.org/10.1123/japa.2014-0169

Colberg, S. R., Sigal, R. J., Fernhall, B., Regensteiner, J. G., Blissmer, B. J., Rubin, R. R., Chasan-Taber, L., Albright, A. L., & Braun, B. (2010). Exercise and type 2 diabetes. The

American College of Sports Medicine and the American Diabetes Association: Joint position statement. *Diabetes Care*, *33*(12), e147–e167. https://doi.org/10.2337/dc10-9990

Collingridge Moore, D., Payne, S., Van den Block, L., Ling, J., Froggatt, K., Gatsolaeva, Y., Honinx, E., Pivodic, L., Miranda, R., Onwuteaka-Philipsen, B. D., van Hout, H., Pasman, H. R. W., Oosterveld-Vlug, M., Ten Koppel, M., Piers, R., Van Den Noortgate, N., Engels, Y., Vernooij-Dassen, M., Hockley, J., … Wichmann, A. B. (2020). Strategies for the implementation of palliative care education and organizational interventions in long-term care facilities: A scoping review. *Palliative Medicine*, *34*(5), 558–570. https://doi.org/10.1177/0269216319893635

Crocker, T., Young, J., Forster, A., Brown, L., Ozer, S., & Greenwood, D. C. (2013). The effect of physical rehabilitation on activities of daily living in older residents of long-term care facilities: Systematic review with meta-analysis. *Age and Ageing*, *42*(6), 682–688. https://doi.org/10.1093/ageing/aft133

Daste, C., Kirren, Q., Akoum, J., Lefèvre-Colau, M.-M., Rannou, F., & Nguyen, C. (2021). Physical activity for osteoarthritis: Efficiency and review of recommendations. *Joint Bone Spine*, *88*(6), 105207. https://doi.org/10.1016/j.jbspin.2021.105207

Eccles, M. P., Armstrong, D., Baker, R., Cleary, K., Davies, H., Davies, S., Glasziou, P., Ilott, I., Kinmonth, A.-L., Leng, G., Logan, S., Marteau, T., Michie, S., Rogers, H., Rycroft-Malone, J., & Sibbald, B. (2009). An implementation research agenda. *Implementation Science*, *4*(1), 18. https://doi.org/10.1186/1748-5908-4-18

Ferreira, L. N., Pais, S., Ilchuk, K., & Santos, M. (2022). Ageing, health-related quality of life and physical activity – Evidence based on the EQ-5D-5L. *Ageing International*, *47*(4), 705–723. https://doi.org/10.1007/s12126-021-09445-7

Fien, S., Henwood, T., Climstein, M., Rathbone, E., & Keogh, J. W. L. (2019). Exploring the feasibility, sustainability and the benefits of the GrACE + GAIT exercise programme in the residential aged care setting. *PeerJ*, *7*, e6973. https://doi.org/10.7717/peerj.6973

Galik, E. M., Resnick, B., Gruber-Baldini, A., Nahm, E.-S., Pearson, K., & Pretzer-Aboff, I. (2008). Pilot testing of the restorative care intervention for the cognitively impaired. *Journal of the American Medical Directors Association*, *9*(7), 516–522. https://doi.org/10.1016/j.jamda.2008.04.013

Galik, E., Resnick, B., Hammersla, M., & Brightwater, J. (2014). Optimizing function and physical activity among nursing home residents with dementia: Testing the impact of function-focused care. *The Gerontologist*, *54*(6), 930–943. https://doi.org/10.1093/geront/gnt108

Garner, B. R., Patel, S. V., & Kirk, M. A. (2020). Priority domains, aims, and testable hypotheses for implementation research: Protocol for a scoping review and evidence map. *Systematic Reviews*, *9*(1), 277. https://doi.org/10.1186/s13643-020-01535-y

Gibbard, R. (2017). *Sizing Up the Challenge: Meeting the Demand for Long-Term Care in Canada*. The Conference Board of Canada.

Gideon Asuquo, E., Tighe, S. M., & Bradshaw, C. (2021). Interventions to reduce work-related musculoskeletal disorders among healthcare staff in nursing homes; An integrative literature review. *International Journal of Nursing Studies Advances*, *3*, 100033. https://doi.org/10.1016/j.ijnsa.2021.100033

Godin, J., Blodgett, J. M., Rockwood, K., & Theou, O. (2020). Replacing sedentary time with light or moderate–vigorous physical activity across levels of frailty. *Journal of Aging and Physical Activity*, *28*(1), 18–23. https://doi.org/10.1123/japa.2018-0361

Gold, H. T., McDermott, C., Hoomans, T., & Wagner, T. H. (2022). Cost data in implementation science: Categories and approaches to costing. *Implementation Science*, *17*(1), 11. https://doi.org/10.1186/s13012-021-01172-6

Grabowski, D. C. (2021). The future of long-term care requires investment in both facility- and home-based services. *Nature Aging*, *1*(1), 10-11. https://doi.org/10.1038/s43587-020-00018-y

Groot, C., Hooghiemstra, A. M., Raijmakers, P. G. H. M., van Berckel, B. N. M., Scheltens, P., Scherder, E. J. A., van der Flier, W. M., & Ossenkoppele, R. (2016). The effect of physical activity on cognitive function in patients with dementia: A meta-analysis of randomized control trials. *Ageing Research Reviews*, *25*, 13–23. https://doi.org/10.1016/j.arr.2015.11.005

Halligan, M. H., Zecevic, A., Kothari, A. R., Salmoni, A. W., & Orchard, T. (2014). Understanding safety culture in long-term care: A case study. *Journal of Patient Safety*, *10*(4), 192–201. https://doi.org/10.1097/PTS.0b013e31829d4ae7

Henwood, T., Neville, C., Baguley, C., & Beattie, E. (2017). Aquatic exercise for residential aged care adults with dementia: Benefits and barriers to participation. *International Psychogeriatrics*, *29*(9), 1439–1449. https://doi.org/10.1017/S104161021700028X

Hoang, P., King, J. A., Moore, S., Moore, K., Reich, K., Sidhu, H., Tan, C. V., Whaley, C., & McMillan, J. (2022). Interventions associated with reduced loneliness and social isolation in older adults: A systematic review and meta-analysis. *JAMA Network Open*, *5*(10), e2236676. https://doi.org/10.1001/jamanetworkopen.2022.36676

Hurley, M. V., Wood, J., Smith, R., Grant, R., Jordan, J., Gage, H., Anderson, L. W., Kennedy, B., & Jones, F. (2020). The feasibility of increasing physical activity in care home

residents: Active Residents in Care Homes (ARCH) programme. *Physiotherapy*, *107*, 50–57. https://doi.org/10.1016/j.physio.2019.06.007

Johnson, C. S. J., Myers, A. M., Jones, G. R., Fitzgerald, C., Lazowski, D.-A., Stolee, P., Orange, J. B., Segall, N., & Ecclestone, N. A. (2005). Evaluation of the restorative care education and training program for nursing homes. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement*, *24*(2), 115–126. https://doi.org/10.1353/cja.2005.0065

Jung, D., Lee, H., & Lee, M. (2020). Function-focused care programme for older people in Korean long-term care facilities. *International Journal of Older People Nursing*, *15*(1). https://doi.org/10.1111/opn.12277

Kislov, R., Pope, C., Martin, G. P., & Wilson, P. M. (2019). Harnessing the power of theorising in implementation science. *Implementation Science*, *14*(1), 103, s13012-019-0957–4. https://doi.org/10.1186/s13012-019-0957-4

Lam, F. M., Huang, M.-Z., Liao, L.-R., Chung, R. C., Kwok, T. C., & Pang, M. Y. (2018). Physical exercise improves strength, balance, mobility, and endurance in people with cognitive impairment and dementia: A systematic review. *Journal of Physiotherapy*, *64*(1), 4–15. https://doi.org/10.1016/j.jphys.2017.12.001

Lee, A. M., Sénéchal, M., Hrubeniuk, T. J., & Bouchard, D. R. (2020). Is sitting time leading to mobility decline in long-term care residents? *Aging Clinical and Experimental Research*, *32*(1), 183–186. https://doi.org/10.1007/s40520-019-01148-z

Lengnick-Hall, R., Gerke, D. R., Proctor, E. K., Bunger, A. C., Phillips, R. J., Martin, J. K., & Swanson, J. C. (2022). Six practical recommendations for improved implementation outcomes reporting. *Implementation Science*, *17*(1), 16. https://doi.org/10.1186/s13012-021-01183-3

Levy, C., Zimmerman, S., Mor, V., Gifford, D., Greenberg, S. A., Klinger, J. H., Lieblich, C., Linnebur, S., McAllister, A., Nazir, A., Pace, D., Stone, R., Resnick, B., Sloane, P. D., Ouslander, J., & Gaugler, J. E. (2022). Pragmatic trials in long-term care: Implementation and dissemination challenges and opportunities. *Journal of the American Geriatrics Society*, *70*(3), 709–717. https://doi.org/10.1111/jgs.17698

McArthur, C., Bai, Y., Hewston, P., Giangregorio, L., Straus, S., & Papaioannou, A. (2021). Barriers and facilitators to implementing evidence-based guidelines in long-term care: A qualitative evidence synthesis. *Implementation Science*, *16*(1), 70. https://doi.org/10.1186/s13012-021-01140-0

Metz, A., Albers, B., Burke, K., Bartley, L., Louison, L., Ward, C., & Farley, A. (2021). Implementation Practice in Human Service Systems: Understanding the Principles and Competencies of Professionals Who Support Implementation. *Human Service Organizations: Management, Leadership & Governance*, *45*(3), 238–259. https://doi.org/10.1080/23303131.2021.1895401

Mills, W. L., Pimentel, C. B., Snow, A. L., Allen, R. S., Wewiorski, N. J., Palmer, J. A., Clark, V., Roland, T. M., McDannold, S. E., & Hartmann, C. W. (2019). Nursing home staff perceptions of barriers and facilitators to implementing a quality improvement intervention. *Journal of the American Medical Directors Association*, *20*(7), 810–815. https://doi.org/10.1016/j.jamda.2019.01.139

Musa, M. K., Saga, S., Blekken, L. E., Harris, R., Goodman, C., & Norton, C. (2019). The prevalence, incidence, and correlates of fecal incontinence among older people residing in care homes: A systematic review. *Journal of the American Medical Directors Association*, *20*(8), 956-962.e8. https://doi.org/10.1016/j.jamda.2019.03.033

Parfitt, G., Post, D., Penington, A., Davison, K., & Corlis, M. (2020). Evaluation of an implementation project: The exercise physiology in aged care program. *Geriatrics & Gerontology International*, *20*(6), 595–601. https://doi.org/10.1111/ggi.13923

Parry, S., Chow, M., Batchelor, F., & Fary, R. E. (2019). Physical activity and sedentary behaviour in a residential aged care facility. *Australasian Journal on Ageing*, *38*(1), E12–E18. https://doi.org/10.1111/ajag.12589

Pescatello, L., Buchner, D., Jakicic, J., Powell, K., Kraus, W., Bloodgood, B., Campbell, W., Dietz, S., Dipietro, L., George, S., Macko, R., McTiernan, A., Pate, R., & Piercy, K. (2019). Physical activity to prevent and treat hypertension: A systematic review. *Medicine and Science in Sports and Exercise*, *51*, 1314–1323. https://doi.org/10.1249/MSS.0000000000001943

Pinnock, H., Barwick, M., Carpenter, C. R., Eldridge, S., Grandes, G., Griffiths, C. J., Rycroft-Malone, J., Meissner, P., Murray, E., Patel, A., Sheikh, A., & Taylor, S. J. C. (2017). Standards for Reporting Implementation Studies (StaRI) Statement. *BMJ*, *356*, i6795. https://doi.org/10.1136/bmj.i6795

Pitkälä, K., Savikko, N., Poysti, M., Strandberg, T., & Laakkonen, M.-L. (2013). Efficacy of physical exercise intervention on mobility and physical functioning in older people with dementia: A systematic review. *Experimental Gerontology*, *48*(1), 85–93. https://doi.org/10.1016/j.exger.2012.08.008

Post, D., Corlis, M., Penington, A., & Parfitt, G. (2020). Exercise physiology in aged care: Perceptions and acceptability from the perspectives of family members and care staff in the residential aged care environment. *Dementia*, *19*(7), 2152–2165. https://doi.org/10.1177/1471301218816246

Powell, B. J., Fernandez, M. E., Williams, N. J., Aarons, G. A., Beidas, R. S., Lewis, C. C., McHugh, S. M., & Weiner, B. J. (2019). Enhancing the impact of implementation strategies in healthcare: A research agenda. *Frontiers in Public Health*, *7*. https://www.frontiersin.org/articles/10.3389/fpubh.2019.00003

Powell, B. J., McMillen, J. C., Proctor, E. K., Carpenter, C. R., Griffey, R. T., Bunger, A. C., Glass, J. E., & York, J. L. (2012). A compilation of strategies for implementing clinical innovations in health and mental health. *Medical Care Research and Review : MCRR*, *69*(2), 123–157. https://doi.org/10.1177/1077558711430690

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., Proctor, E. K., & Kirchner, J. E. (2015). A refined compilation of implementation strategies: Results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, *10*(1), 21. https://doi.org/10.1186/s13012-015-0209-1

Proctor, E. K., Powell, B. J., & McMillen, J. C. (2013). Implementation strategies: Recommendations for specifying and reporting. *Implementation Science*, *8*(1), 139. https://doi.org/10.1186/1748-5908-8-139

Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., Griffey, R., & Hensley, M. (2011). Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, *38*(2), 65–76. https://doi.org/10.1007/s10488-010-0319-7

Rapport, F., Smith, J., Hutchinson, K., Clay-Williams, R., Churruca, K., Bierbaum, M., & Braithwaite, J. (2022). Too much theory and not enough practice? The challenge of

implementation science application in healthcare practice. *Journal of Evaluation in Clinical Practice*, *28*(6), 991–1002. https://doi.org/10.1111/jep.13600

Resnick, B., Cayo, J., Galik, E., & Pretzer-Aboff, I. (2009). Implementation of the 6-Week educational component in the Res-Care intervention: Process and outcomes. *The Journal of Continuing Education in Nursing*, *40*(8), 353–360.

Resnick, B., Galik, E., Pretzer-Aboff, I., Gruber-Baldini, A. L., Russ, K., Cayo, J., & Zimmerman, S. (2009). Treatment fidelity in nursing home research: The Res-Care intervention study. *Research in Gerontological Nursing*, *2*(1), 30–38.

Resnick, B., Gruber-Baldini, A. L., Zimmerman, S., Galik, E., Pretzer-Aboff, I., Russ, K., & Hebel, J. R. (2009). Nursing home resident outcomes from the Res-Care intervention: Restorative care. *Journal of the American Geriatrics Society*, *57*(7), 1156–1165. https://doi.org/10.1111/j.1532-5415.2009.02327.x

Schnelle, J. F., Alessi, C. A., Simmons, S. F., Al-Samarrai, N. R., Beck, J. C., & Ouslander, J. G. (2002). Translating clinical research into practice: A randomized controlled trial of exercise and incontinence care with nursing home residents. *Journal of the American Geriatrics Society*, *50*(9), 1476–1483. https://doi.org/10.1046/j.1532-5415.2002.50401.x

Schnelle, J. F., Kapur, K., Alessi, C., Osterweil, D., Beck, J. G., Al-Samarrai, N. R., & Ouslander, J. G. (2003). Does an exercise and incontinence intervention save healthcare costs in a nursing home population? *Journal of the American Geriatrics Society*, *51*(2), 161–168. https://doi.org/10.1046/j.1532-5415.2003.51053.x

Slaughter, S. E., Wagg, A. S., Jones, C. A., Schopflocher, D., Ickert, C., Bampton, E., Jantz, A., Milke, D., Schalm, C., Lycar, C., & Estabrooks, C. A. (2015a). Mobility of vulnerable elders study: Effect of the sit-to-stand activity on mobility, function, and quality of life.

Journal of the American Medical Directors Association, *16*(2), 138–143. https://doi.org/10.1016/j.jamda.2014.07.020

Slaughter, S. E., Wagg, A. S., Jones, C. A., Schopflocher, D., Ickert, C., Bampton, E., Jantz, A., Milke, D., Schalm, C., Lycar, C., & Estabrooks, C. A. (2015b). Mobility of vulnerable elders study: Effect of the sit-to-stand activity on mobility, function, and quality of life. *Journal of the American Medical Directors Association*, *16*(2), 138–143. https://doi.org/10.1016/j.jamda.2014.07.020

Stanmore, E. K., Mavroeidi, A., de Jong, L. D., Skelton, D. A., Sutton, C. J., Benedetto, V., Munford, L. A., Meekes, W., Bell, V., & Todd, C. (2019). The effectiveness and cost-effectiveness of strength and balance Exergames to reduce falls risk for people aged 55 years and older in UK assisted living facilities: A multi-centre, cluster randomised controlled trial. *BMC Medicine*, *17*(1), 49. https://doi.org/10.1186/s12916-019-1278-9

Tak, E. C., van Hespen, A., van Dommelen, P., & Hopman-Rock, M. (2012). Does improved functional performance help to reduce urinary incontinence in institutionalized older women? A multicenter randomized clinical trial. *BMC Geriatrics*, *12*(1), 51. https://doi.org/10.1186/1471-2318-12-51

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, *169*(7), 467–473. https://doi.org/10.7326/M18-0850

van Alphen, H. J. M., Hortobágyi, T., & van Heuvelen, M. J. G. (2016). Barriers, motivators, and facilitators of physical activity in dementia patients: A systematic review. *Archives of*

Gerontology and Geriatrics, *66*(Complete), 109–118. https://doi.org/10.1016/j.archger.2016.05.008

Venturelli, M., Scarsini, R., & Schena, F. (2011). Six-month walking program changes cognitive and adl performance in patients with alzheimer. *American Journal of Alzheimer's Disease & Other Dementias®*, *26*(5), 381–388. https://doi.org/10.1177/1533317511418956

von der Warth, R., Kaiser, V., Reese, C., Brühmann, B. A., & Farin-Glattacker, E. (2021). Barriers and facilitators for implementation of a complex health services intervention in long-term care homes: A qualitative study using focus groups. *BMC Geriatrics*, *21*. https://doi.org/10.1186/s12877-021-02579-y

Waltz, T. J., Powell, B. J., Matthieu, M. M., Damschroder, L. J., Chinman, M. J., Smith, J. L., Proctor, E. K., & Kirchner, J. E. (2015). Use of concept mapping to characterize relationships among implementation strategies and assess their feasibility and importance: Results from the Expert Recommendations for Implementing Change (ERIC) study. *Implementation Science*, *10*(1), 109. https://doi.org/10.1186/s13012-015-0295-0

Weening-Verbree, L., Huisman-de Waal, G., van Dusseldorp, L., van Achterberg, T., & Schoonhoven, L. (2013). Oral health care in older people in long term care facilities: A systematic review of implementation strategies. *International Journal of Nursing Studies*, *50*(4), 569–582. https://doi.org/10.1016/j.ijnurstu.2012.12.004

Wensing, M. (2015). Implementation science in healthcare: Introduction and perspective. *Zeitschrift Fuer Evidenz, Fortbildung Und Qualitaet Im Gesundheitswesen*, *109*(2), 97–102. https://doi.org/10.1016/j.zefq.2015.02.014

World Health Organization. (2018). *International Classification of Functioning, Disability and Health (ICF)*. https://icd.who.int/dev11/l-icf/en#/http://id.who.int/icd/entity/2048203604

World Health Organization. (2022). *Physical activity*. Physical Activity. https://www.who.int/news-room/fact-sheets/detail/physical-activity

Wylie, G., Kroll, T., Withnam, M., & Morris, J. (2022). Increasing physical activity levels in care homes for older people: A quantitative scoping review of intervention studies to guide future research. *Disability and Rehabilitation.* 1–17. https://doi.org/10.1080/09638288.2022.2118869

Zhang, X., Dou, Q., Zhang, W., Wang, C., Xie, X., Yang, Y., & Zeng, Y. (2019). Frailty as a predictor of all-cause mortality among older nursing home residents: a systematic review and meta-analysis. *Journal of the American Medical Directors Association*, *20*(6), 657-663.e4. https://doi.org/10.1016/j.jamda.2018.11.018

Chapter Three: *We've Come a Long Way, But It's Slow, and It's Hard*: Experiences and Perspectives of Researchers Implementing Physical Activity Interventions in Long-Term Care

This is a manuscript in preparation for submission.

Abstract

Background: Physical activity (PA) interventions in long-term care facilities (LTC) facilities remain challenging to implement despite known health benefits for residents. Despite their expertise in implementation, researcher's experiences and perspectives have not yet been explored in research. This qualitative study filled this gap and explored the experiences and perspectives of researchers' who have implemented PA interventions in this setting.

Methods: Semi-structured interviews were conducted with six researchers across Australia, the United States, and Canada. Data were analyzed using reflexive thematic analysis.

Results: Three key themes emerged: (1) Implementing in complexity, highlighting the dynamic interactions across multiple system levels and evolving perceptions of resident activity; (2) Bridging research and implementation, revealing strategies for engaging stakeholders and demonstrating intervention value; and (3) Adopting a more inclusive definition of physical activity beyond traditional exercise programs.

Conclusion: Findings underscore the complex, multilevel nature of PA implementation in LTC, emphasizing the need for systems thinking and collaborative approaches. The study contributes novel insights into implementation science for PA interventions, highlighting the importance of holistic, person-centered approaches that recognize activity as fundamental to resident well-being. Recommendations include developing comprehensive, whole-organization strategies that empower residents and integrate activity across all care interactions.

Introduction

In recent years, the demand for long-term care (LTC) services has reached unprecedented levels and continues to grow. In Canada, older age cohorts are growing significantly faster than younger age cohorts, with those aged 95+ being the fastest aging cohort (Canadian Medical Association, 2021). The growth of the aging population is a primary driver of the increased need for LTC services, as older adults experience more complex health conditions that require ongoing care and support (WHO, 2022).

Physical activity (PA) is a known modifiable risk factor for many conditions associated with aging including cognitive impairment, osteoporosis, depression, and cardiovascular disease (Cacciatore et al., 2023; Livingston et al., 2024; Maier et al., 2021; Panahian et al., 2023; Son et al., 2024). Additionally, PA has been found to alleviate unwanted symptoms commonly associated with chronic conditions that are prevalent among LTC residents, such as frailty and dementia (Dent et al., 2019; Groot et al., 2016). Moreover, PA promotes functional independence and enhances overall quality of life (Ferreira et al., 2022).

Prescribing PA as a preventative intervention for older adults is increasingly acknowledged as a necessary practice (Izquierdo et al., 2016, 2021), and there is a growing body of research examining the use of care approaches that optimize PA during care interactions (Lee et al., 2019). Moreover, LTC facilities are adapting their practices and programs to cater to a new generation of residents with different preferences and demands regarding care institutions, one being a greater desire for activity (D'Ambrosio et al., 2019). In line with this increased recognition and demand for PA, recommendations for PA tailored specifically for LTC residents have been developed to promote PA in this setting (de Souto Barreto et al., 2016). However, despite these efforts and known benefits of PA, studies consistently indicate that levels of PA

among residents remain low (Barber et al., 2015; den Ouden et al., 2015; Lee et al., 2020; Parry et al., 2019).

Implementation science offers a valuable approach for bridging the knowledge to practice gap in the uptake of PA for LTC residents. It is "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services" (Eccles & Mittman, 2006). There is a growing recognition of the value of implementation science to improve the quality of care in LTC as this type of research allows a greater understanding of *how* and *why* interventions fail or succeed (Abbott et al., 2022; Byrne, 2021).

There are many barriers to the successful implementation of interventions/programs in LTC, including inadequate resources and staffing, time constraints, implementation cost, as well as lack of teamwork and organizational support (Abbott et al., 2022; Byrne, 2021). Moreover, LTC facilities operate as complex adaptive systems which are composed of multiple interconnected components that interact dynamically, and whose relationships are ever changing (e.g., communication and collaboration among nurses, residents, and administration) (Anderson et al., 2003; Lipsitz, 2012). Consequently, the implementation process in LTC settings is further complicated by the dynamic and interconnected nature of these components.

Researchers play a crucial role in developing and implementing PA interventions, but their perspectives and experiences are not well understood. The implementation of PA interventions in LTC is inherently a collaborative process between researchers and other affected parties (Pérez Jolles et al., 2022, Wilson and Kislov, 2022). Researchers bring expertise in developing evidence-based interventions and evaluating their effectiveness as well as expertise

in implementation. They are knowledgeable about implementation theory and can thoughtfully identify appropriate implementation strategies (Huntink et al., 2014).

Researchers play a vital role in implementation processes, and their perspectives are invaluable (Churruca et al., 2019; Holmes et al., 2017; Pérez Jolles et al., 2022; Rapport et al., 2022). Given their experience in conducting research within these settings, they possess critical insights and experiences that can inform the application of evidence into practice and enhance the quality of care provided to older residents. Ideally, researchers are present throughout the implementation process and provide vital contributions to implementation success. For example, they spearhead research collaborations by identifying and engaging interested parties and ideally work collaboratively with them, bringing forward theoretical knowledge to support the adoption and sustainability of evidence-based interventions. They may also play a prominent role throughout the implementation efforts, such as acting as a facilitator offering implementation support throughout the implementation process.

Furthermore, there is a growing recognition of the importance of integrating implementation scientists within health settings to advance the field of implementation science and facilitate the application of knowledge into practice (Churruca et al., 2019; Vindrola-Padros et al., 2019). Doing so could support a shift towards conceptualizing research and practice as part of an overarching approach linking the generation and application of evidence rather than viewing them as separate endeavors carried out by different groups of individuals (researchers, practitioners, and policymakers) (Holmes et al., 2017).

Although researchers play a key role in implementation, their experiences and perspectives are largely absent from the literature. Typically, their contributions remain confined to academic publications, which prioritize objectivity and exclude personal insights. This study

aims to address this gap by exploring the experiences of researchers who have implemented PA interventions in LTC facilities. In doing so, it aims to provide insights into the challenges and opportunities of this work, as well as recommendations for future research and practice in this area.

Methods

Recruitment and Data Collection

Semi-structured interviews were completed with six researchers who have conducted research on implementation and PA in LTC. Purposive sampling of researchers who contributed to research on implementation and PA in LTC was conducted between January and March 2023. Invitations to participate in this research study were sent by email to the authors of implementation projects included in a scoping review examining the use of implementation strategies and outcomes for PA interventions in LTC [Geerts et al., working manuscript]. Two follow-up emails were sent to those who did not respond: one week after the initial invitation and one week after the follow-up. Seven of 13 authors responded and six agreed to participate (46% recruitment rate). Previous authors have recognized research as a pragmatic activity constrained by factors such as time and available resources (Braun & Clarke, 2021; O'Reilly & Parker, 2013). While a six-participant sample size is seemingly 'small' it represents nearly half of the potential participant pool to which we were constrained.

Semi-structured interviews were conducted virtually via Zoom, and were audio and/or video recorded, and lasted between 45 and 60 minutes. Each participant provided written consent to take part in the study, and the study design was approved by the Office of Research Ethics at York University (Certificate STU #2020-127). Interviews were led by a researcher with experience in undertaking and analysing qualitative interviews, and as part of her PhD

dissertation. Interview questions were developed based on research objectives and on the results of the scoping review (Geerts et al., working manuscript) (Table 1). Probing questions were used to elicit more detailed responses from participants.

Data Analysis

Interview transcripts generated by Zoom were uploaded into NVivo qualitative software and reviewed to ensure accuracy. Data analysis followed the six steps of reflexive thematic analysis as outlined by Braun and Clarke (2016; 2019) : 1) Familiarising yourself with the dataset (listening and editing the transcripts into NVivo – familiarization also occurred while the interviewer conducted the interviews and reviewed them), 2) Coding, 3) Generating initial themes, 4) Developing and reviewing themes, 5) Refining, defining and naming themes, and 6) Writing up the manuscript.

All coding and analysis were completed in the NVivo qualitative software. To increase trustworthiness and research rigor, during the coding process, the researcher engaged in reflexive writing (i.e., keeping research memos in NVivo to examine the evolution of thoughts and codes into themes) and peer debriefing with the supervisor at key stages of data analysis.

Results

Of the six participants, five were female. At the time of the interview, three participants resided in Australia, two in the United States of America, and one in Canada. No additional participant descriptions can be provided due to ethical research considerations and the potential risk of participant identification. The following paragraphs outline three overarching themes and sub-themes that emerged from participant interviews: 1) Implementing in complexity, 2) Bridging research and implementation, and 3) Adopting a more inclusive and open definition of PA.

Implementing in Complexity

The complexity of implementing PA interventions was evident and woven into all conversations. The first theme reflects this complexity through two subthemes. The first subtheme, dynamic interactions between multiple factors across multiple levels, highlights the ongoing consideration for the evolving nature of multi-level factors including: the influence of government(s) and regulatory bodies, and variations across institutional policies and practices. Additionally, this theme captures the dynamic relationships among the many individuals living and working in this setting. The second subtheme, changes in perceptions of PA for LTC residents, recognizes the impact of broader changes occurring in the LTC sector specifically as they relate to the perceived appropriateness of PA for LTC residents.

Dynamic Interactions Between Multiple Factors Across Multiple Levels

The first subtheme reflects the complex nature of implementation through the influence of multiple factors and individuals across multiple levels. At the highest level, participants spoke of the role of governments and regulatory bodies in shaping implementation research. Specifically, participants pointed to the role of government(s) in developing policies that impact resident care and identifying priority research areas that impact the allocation of research funding.

At times, this caused frustration among participants who perceived that government decisions did not reflect the current realities of the LTC sector and did not recognize the benefits of activity for residents. For example, when discussing barriers to implementation, Dr. H. clearly expressed this frustration. He shared that the recent changes made to their country's government funding model for aging care "completely ignored the value of exercise, allied health, therapy, to actually help people mobilize, to push back on loss of independence". He further expressed that

many government policies are not informed by individuals who have experience living or working in this setting, rather they are "informed by academics" who "have never actually worked in residential aged care". He continued by suggesting that including the voices of those who have worked in the LTC sector could "help governments inform better policy".

Furthermore, participants shared that the content of facility audits, set by regulatory bodies and influenced by government priorities, could impact the level to which facilities engaged in implementation efforts. For example, participants noted the overemphasis on safety and falls in audits as deterring facilities from actively engaging in PA implementation efforts to decrease fall risk. This misconception caused frustration among participants, who believed strongly in the benefits of PA interventions but needed to spend a significant amount of time educating facilities that increased resident activity does not lead to increased fall rates. For example, as Dr. G. shared: "We really tried to hammer that point home, that in all the work that we had done in multiple settings, there was never any increase in falls from activating people more". Dr. G. followed up this comment by acknowledging that regulatory bodies are now placing "greater attention on their surveys for unexpected or unplanned decline in function", and that having facilities "getting cited for this raises the attention for everybody else" indicating that regulatory bodies can also facilitate implementation efforts by formally recognizing the value of activity for residents.

The second level of influence came from institutional policies and practices. Despite being influenced by the same government(s) and abiding by the same audits from regulatory bodies, participants emphasized that each facility has a unique implementation context. As Dr. H. explained, "some organizations have more money, some have better governing bodies, some have better policies and practices, and some organizations attract better staff." Many contextual

factors were acknowledged as influencing the implementation process; however, adequate staffing and prior research experience were most often mentioned. While these were primarily associated with facilities that had a higher likelihood of implementation success, this was not always the case, for example, from Dr. R.'s perspective, "lower-resourced and 'worst facilities' tend to be more open" whereas "the best [facilities]" are "more resistant, they just think they're great already". This last quote by Dr. R. highlights the difficulty in assessing facility readiness for implementation.

In addition to considering multilevel factors, participants also shared the complexity of working with and considering the relationships among the multiple individuals working and living in LTC. Researchers discussed the many individuals who were engaged in, or influenced, the implementation process. These included: the residents, family caregivers, direct care staff, nurses, allied health professionals, managerial roles, and other professions within the facility, such as food and educational services. Importantly, the relationships among individuals were understood as complex and changing over time, as reflected in the following quote by Dr. P.:

> It [PA] has that flow on effect where, you know, the ability for them [residents] to be able to lift their arm reduces the load on the care staff, you know for dressing and supporting, and things like that. So, there's that flow on effect. I mean the care staff is also really invested in the people's well-being and so when they're seeing positive effects then has that flow on effect, and you know people are more inclined to try, you know, to do different things.

Overall, the dynamic interplay of factors and evolving nature of relationships was noted as a key consideration in implementation and marked the complexity of implementing in LTC.

Changes in Perceptions of Physical Activity for LTC Residents

In addition to the dynamic interplay of the above-mentioned factors, broader societal changes were discussed as adding to the complexity of implementing PA interventions. Specifically, participants discussed a change in perceptions of PA for LTC residents from the belief that "rest is best" towards a greater recognition of the benefits of activity. This is reflected in the following quote by Dr. R., she shared:

> In the old days people really believed even more so than today that bed rest was what you should do, and nobody should be pushed. And now, you know, it's always amazing to me when families say to me 'what can you do to motivate my mother'.

Similarly, Dr. P. noticed a greater recognition of the benefits of activity for the entire resident population not only for those who are "ambulatory and have no cognitive decline".

This change in perception was discussed as occurring on the heels of a broader shift in LTC towards "less prescriptive" approaches to care, such as person-centered care. Overall, this change was perceived to have eased resistance to PA interventions, as reflected in the following quote:

> Dr. G.: I think this shift [towards person-centered care] has helped as well. So, I'm hopeful. I don't have to try to convince people as much as I used to when I first started this work, and it [PA interventions] seems to catch on a little easier.

Lastly, perceptions of activity were also noted to have changed among residents. For example, Dr. F. shared:

> I think the more that the baby boomers progress into an aged care facility and the more that they already know about exercise that will probably increase the demand. […] I don't think the demand is there for it at this point in time, or maybe it's not necessarily the biggest priority on the facility's list at the same time, I don't know. Sometimes I feel like

> they see exercise, but they also think like, yeah… but there's falls and polypharmacy going on, and they kind of go 'those are more of the red fire right now'. They probably think like a short time fix, or a Band-Aid can be put on, but for exercise - the more you like leave it, the worse it gets.

This last quote from Dr. F. not only points to changes in perceptions of activity among a new generation of residents, but also further underscores the complexity of PA implementation as it reflects the interplay between many factors influencing the prioritization of PA interventions.

While there are recognized positive changes in understandings of the benefits of activity for all residents' rates of activity remain low because change is hard and requires coordinated action across multiple levels and actors. Overall, this first theme underscores the complexity of implementation and therefore highlights the value of adopting a systems thinking perspective when addressing this issue. Successful implementation requires the use of multiple strategies at multiple levels, that target multiple actors. Furthermore, the reception of these interventions will change over time depending on the prevailing needs and perceptions of PA at the time of implementation.

Bridging Research and Implementation

The second theme, bridging research and implementation, represents another level of complexity that arises when researchers and research projects are inserted into LTC facilities. All participants shared a passion for their work and a strong belief that activity was "the best intervention" as it "impacts basically everything" (Dr. R.). Additionally, Dr. H. shared that at times researchers may come in "very one-eyed" and enthusiastic about their projects – "Like 'wow, this is going to work. This is going to change the world". However, this enthusiasm was not always shared with facilities who, at times, were disillusioned with implementing new

interventions and reluctant to engage in yet another intervention that may not be adopted or sustained, as reflected in the following quote by Dr. P.:

> One of the things that the care staff said was around funding and sustainability. So, we [academics] always bring in these great programs, and we want care staff to be involved and to support delivery. And even if we say things that are working well, suddenly the funding runs out, and then the programs not there anymore. And there was that kind of feeling that this was 'just another thing that you want me to do, but it's going to be gone again, so why would I bother'. And these are not the exact words, but that's the idea.

Therefore, participants spoke extensively about the way in which they engaged LTC facilities in the implementation efforts by identifying and demonstrating the direct benefits of increased resident activity for each group of individuals – upper management, care staff and residents, while also capturing implementation outcomes.

This was often a top-down approach, they first engaged higher levels of management and worked collaboratively to identify how they could align the implementation efforts with facilities priorities. This process is reflected in the following quote by Dr. R. who shared:

> We do a brainstorming session with the stakeholders and help them think about why whatever we want to get done is not getting done in their setting, like, what are the barriers to engaging your residents in physical activity. And then we set up goals to address those barriers, and or you know, maybe it's that their real concern is around falls. So, one of our goals is to use PA to decrease falls rates, you know, those are the kinds of things.

Importantly, what was perceived as a valuable intervention outcome differed across individuals. For example, when speaking with staff Dr. R. changed their approach and focused on showing

staff the direct and practical benefits of increasing resident activity. Educating staff might focus on getting them to understand that "if you [care staff] get them [residents] up and take them for a walk instead of saying 'be quiet and sit down, you might fall!' then they will calm down." Dr. H. shared taking a similar approach identifying clear benefits to staff, he shared:

> Dr. H.: I take a very, direct, very pointed approach to education, and I think it's better received. […]. I give it a lot of, you know, - If you want residents to be able to get off the toilet, you don't want to have to wipe their bums, these are the sorts of things that you need to put in place so that they can do that themselves.

Staff was better persuaded to engage residents in activity when they could see the direct and proximal evidence of increased activity, such as reflected in the following quote by Dr. S.:

> Many of them [care staff] care about the residents and want the best for the resident. I can remember. It's very memorable for me. The staff could see the benefit of the sit-to-stand for the people they were caring for.

Similarly, researchers also noted the importance of engaging residents by emphasizing direct benefits that were perceived as desirable for residents, as seen in the following quote by Dr. F.:

> I'd have to think about the different reason why you [the resident] would want to use your dumbbell. You want to be able to write Christmas cards for your grandchildren or you want to be able to still use your own knife and fork versus the nurse feeding you at breakfast, lunch, and dinner, or you want to be able to use your own wheelie walker when you go back to your room rather than getting assistance from the nurse.

Lastly, researchers needed to bridge the needs of the above-mentioned groups with their own (demonstrating implementation effectiveness). For example, Dr. S. shared the additional difficulty of engaging staff in documenting implementation fidelity: "Staff were documenting

with paper and pencil, and so we depended on them to document what they were doing so we could see the intensity of the intervention" (Dr. S.). Additionally, they spoke of the frustration in reporting resident outcome measures that did not adequately reflect the change they saw in residents, such as seen in the following quote by Dr. G.

> The other thing I wanted to say was the changes that we saw in all of the studies were small. It was like a small effect. But for somebody with dementia even something small can be significant like it can mean whether you lay in bed all day, or whether you get out of bed, or whether you have somebody lifting you versus you know you, you know, helping with that process or somebody feeding you, or you can kind of engage in some of the self-feeding. So. These little changes, I think, could make a big difference.

Overall, researchers spoke of their experience identifying different approaches to engage and demonstrate success for upper management, staff, and residents, as well as implementation success.

Adopting a More Inclusive and Open Definition of Physical Activity

The third and final overarching theme reflects a consensus from researchers to espouse a more inclusive and open understanding of PA in LTC. Participants shared that even within the LTC space there is a predefined understanding of what constitutes PA, as Dr F. shared, "the focus is on going to the gym, that's what we call PA, and everything else is nothing" (Dr. F.). Participants discussed how taking a broader, more inclusive approach to activity offered the possibility to identify opportunities in most, if not all, daily activities, even those that might not fit conventional understandings of 'physical activity'. For example, Dr. P. spoke about engaging residents in activities that might seem mundane, such as folding laundry or sweeping, but which

offer an opportunity for movement and meaningful contribution to their surroundings, as reflected in the following quote:

> Dr. P.: There were conversations about a gentleman that might have been quite disruptive, you know, to people. And they found that, you know, all he wanted to do was sweep and clean up, and so, just by giving him a broom and having him engaged in that kind of activity he was having something purposeful. That was his thing. He was still doing physical activity, was still being physically active.

As seen in the quote above, participants signaled the value of movement regardless of the duration, intensity, or type of activity. Accordingly, there was a consensus among participants that relying on implementing PA programming was insufficient, and that efforts should be placed on increasing movement throughout the day (e.g., during care activities). They reflected on group PA programs and shared that while beneficial to improve or maintain physical functioning, these programs were thought to be more beneficial for other outcomes such as social connection and hydration (e.g., “Everybody gets a glass of juice at the end. That's an amazing intervention there” Dr. S.). In fact, many participants shared that “walking to and from” the program was more beneficial to improve and maintain physical functioning and functional independence than participating in the program itself.

Therefore, while more challenging, implementing comprehensive, whole-organization approaches to PA was discussed as more likely to lead to sustainable change and improve rates of activity among residents. Additionally, Dr. F. discussed the importance and potential negative unintended outcomes of short-term PA programs. She shared her experience implementing a PA program in a residential care facility without any plans for sustainability, which led to some negative outcomes when the program wrapped up:

> Dr. F.: What happened was some of the residents went on hunger strike, it was pretty wild. They went on hunger strike. They [the facility] had monthly meetings for residents to voice their opinions, concerns, whatever is happening. So, we had 20 in the [physical activity] class, and pretty much everyone went to this meeting like: 'No, we demand this exercise'. 'We feel better for it', 'We're getting better', We're improving with it.', 'It was doing so well, why can't we continue'. So, I had to go back and forth with the manager. I had never thought about it [sustainability] because I was thinking like we'll do this for 3 months and then we'll like recess and see what's going, and then I'll move on to the next project, so I was like, 'Oh, dear Lord, what have I done?'."

While this might be an extreme and rare example, it reflects the potential unintended outcomes of program implementation.

Additionally, implementing whole-organization approaches was seen to increase accountability for delivery of PA among all individuals, as seen in the following quote by Dr. G.:

> So, when you have a program where it's somebody that it's a designated person or a handful of people you run into the challenge of if there's short staff, that person who does restorative care gets pulled to the floor so then people miss out on it. […] It doesn't work out very well, and I would hear in places the staff would say, oh, we're not going to walk with her, because restorative will come and do it later. It works better when you're trying to change to a philosophy of care like - This is how we do it here - where everybody engages people in this.

Similarly, Dr. R. shared that engaging all individuals into this approach and fundamentally changing the "the philosophy of care, the culture of care within the setting" is crucial, and that "otherwise it's going to go away".

Discussion

This study explored the experiences and perspectives of implementing PA interventions in LTC from the perspective of researchers. Our objective was to gain a better understanding of the challenges and opportunities in improving activity levels among residents of LTCs. Three themes emerged from our analysis: implementing in complexity, bridging research and implementation, and adopting a more inclusive and open definition of PA.

Complexity of Implementation

Previous research recognizes complexity in implementation, and has established systems theory as a valuable theoretical framework for implementation in health care settings, such as LTC facilities (Braithwaite et al., 2018; Peters, 2014; Rantz et al., 2010; Riley et al., 2017). Approaching the implementation of PA interventions from this perspective facilitates an understanding of LTC facilities as interconnected and interdependent systems, where each component (e.g., governments, regulatory bodies, staff, residents, infrastructure, policies, procedures) contributes to the implementation outcome (Anderson et al., 2003; Lipsitz, 2012; Rantz et al., 2010).

The majority of implementation frameworks recognize this complexity. For example, the Consolidated Framework for Implementation Research (CFIR) outlines five domains of consideration for implementation: 1) innovation domain, 2) the outer setting(s) domain (e.g., community or health care system, 3) inner setting(s) domain (e.g., LTC facility or unit within the facility), 4) individuals' domain (e.g., researchers, management, staff, residents), and 5) implementation process (e.g., activities and strategies used to implement the innovation) (Damschroder et al., 2022). While there is great value in using implementation frameworks, few PA interventions in LTC facilities have reportedly relied on an implementations science

framework [Geerts et al., working manuscript]. Future implementation projects for PA in this setting may benefit from using implementation frameworks as a tool to support the implementation process.

A novel finding from this study is the influence of changes in broader societal perceptions of aging and what is appropriate activity for LTC residents. Researchers shared perceived changes towards more positive attitudes toward activity among residents, even those who are immobile and/or with cognitive impairment. Consequently, this eased resistance to the implementation of such interventions within facilities. Challenging aging stereotypes through public health initiatives may have broader implications for the health and wellbeing of older adults (Knight et al., 2022; Massie & Meisner, 2019). Research on age stereotypes, specifically exploring aging beliefs among those delivering exercise to residents of LTC, is an area that merits greater exploration. Additionally, results from this study indicate that engaging in these efforts can contribute to a positive feedback loop by challenging perceptions of aging and demonstrating benefits of resident activity for care staff. Continuing to explore this mechanism of action could have important and beneficial implications for improving levels of activity among residents of LTC.

Bridging Research and Implementation

This study offers the perspective of researchers who have actively contributed to the implementation of PA interventions in the LTC setting. Their perspective is a valuable addition to the existing body of literature by offering insight from implementation science experts on this topic. Specifically, their perspective holds particular importance considering the recent call to action towards embedded implementation research (Rapport et al., 2022). This approach "involves a knowledgeable researcher with, or within, the team responsible for change, adoption,

or take-up" and calls for a strengthening of the collaboration between researchers and implementers (those carrying out the implementation) (Churruca et al., 2019).

Placing researchers within health care settings can facilitate stronger collaborations and mutual benefits. Researchers gain greater understanding of the local context and of how the system works, and implementers benefit from more rigorous approach to change and gain implementation knowledge and skills (Churruca et al., 2019). This can ease reservations towards research, by creating lasting on-site relationships where researchers share responsibility for the success or failure of the research initiative (Vindrola-Padros et al., 2019). Additionally, this approach has a higher likelihood of sustainability, which is valuable considering the current lack of research reporting on sustainability as an implementation outcome (Churruca et al., 2019, Geerts et al., working manuscript).

Changing Understandings of Physical Activity

A novel contribution of this study is a recognition from researchers of the benefits of taking a broader, more holistic, understanding of PA within LTC settings. Given functional capacity limitations of many residents, striving to implement interventions that incorporate activity within care interactions and recognize all forms of movement as activity could lead to greater and longer-lasting changes than one-off, short-term exercise programs. We can draw inspiration from innovative care models and facilities that are reinventing the traditional nursing home environment. For example, facilities that replicate homelike environments and offer functional modifications can positively influence resident activity (Anderson et al., 2003; Krier et al., 2023). Additionally, this shift would lend itself to capturing change in activity through more innovative measures (e.g., life space mobility).

Lastly, as we reimagine LTC systems, implementing innovative approaches holds the potential to reshape the LTC culture by creating environments that empower residents to remain independent and opportunities for social interactions, all the while increasing activity. Overall, recognizing the benefits of all activity across multiple health outcomes and its fundamental role in enhancing overall well-being, we can strive to promote better health and quality of life for LTC residents.

Limitations

The following limitations should be considered when reading the findings. Firstly, this study used purposeful sampling and therefore only reflects the perspectives of a small number of researchers involved in the implementation of PA interventions in LTC. Therefore, this study only represents the perspectives of researchers and does not encompass the experiences of all individuals who contribute to the implementation process. Nevertheless, a notable strength of this study is the inclusion of experts in implementation theory and PA who can provide valuable insight on the topic of interest. Additionally, as participants reflected on past experiences with implementing PA in LTC, there is a potential for recall bias. Thus, the perspectives of participants are specific to the time and context in which the studies were conducted, and their applicability to other settings or time periods may vary.

Conclusion

This study explored the experiences of researchers who have implemented PA interventions in LTC. Our results shed light on the complex nature of implementing PA interventions in LTC settings, the importance and value of collaboration between researchers and other who are implementing, and point to the importance of redefining PA to encompass all activity to improve

the well-being of LTC residents. These findings provide valuable insights for the implementation of future activity interventions in LTC.

References

Abbott, K. M., Douglas, N., & Van Haitsma, K. (2022). A rising tide lifts all boats: equitable nursing home policy through implementation science. *Public Policy & Aging Report*, *32*(1), 6–12. https://doi.org/10.1093/ppar/prab030

Anderson, R. A., Issel, L. M., & McDaniel, R. R. (2003). Nursing homes as complex adaptive systems: relationship between management practice and resident outcomes. *Nursing Research*, *52*(1), 12–21.

Barber, S. E., Forster, A., & Birch, K. M. (2015). Levels and patterns of daily physical activity and sedentary behavior measured objectively in older care home residents in the United Kingdom. *Journal of Aging and Physical Activity*, *23*(1), 133–143. https://doi.org/10.1123/JAPA.2013-0091

Braithwaite, J., Churruca, K., Long, J. C., Ellis, L. A., & Herkes, J. (2018). When complexity science meets implementation science: A theoretical and empirical analysis of systems change. *BMC Medicine*, *16*(1), 63. https://doi.org/10.1186/s12916-018-1057-z

Braun, V., & Clarke, V. (2021). To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. *Qualitative Research in Sport, Exercise and Health*, *13*(2), 201–216. https://doi.org/10.1080/2159676X.2019.1704846

Byrne, G. J. (2021). Implementation science in the nursing home. *International Psychogeriatrics*, *33*(9), 865–866. https://doi.org/10.1017/S104161022000383X

Cacciatore, S., Massaro, C., & Landi, F. (2023). Preventing osteoporosis, sarcopenia and obesity to care about quality of life. *Annals of Geriatric Medicine and Research*, *27*(1), 87–90. https://doi.org/10.4235/agmr.22.0158

Churruca, K., Ludlow, K., Taylor, N., Long, J. C., Best, S., & Braithwaite, J. (2019). The time has come: Embedded implementation research for health care improvement. *Journal of Evaluation in Clinical Practice*, *25*(3), 373–380. https://doi.org/10.1111/jep.13100

D'Ambrosio, J., Faul, A., Fields, M., & Cotton, S. (2019). Baby Boomer Long-Term Services and Supports Expectations. *The International Journal of Health, Wellness and Society*, *9*(3), 13–25. https://doi.org/10.18848/2156-8960/CGP/v09i03/13-25

Damschroder, L., Reardon, C. M., Widerquist, M. A. O., & Lowery, J. C. (2022). *The Updated Consolidated Framework for Implementation Research: CFIR 2.0* [Preprint]. In Review. https://doi.org/10.21203/rs.3.rs-1581880/v1

de Souto Barreto, P., Morley, J. E., Chodzko-Zajko, W., H. Pitkala, K., Weening-Djiksterhuis, E., Rodriguez-Mañas, L., Barbagallo, M., Rosendahl, E., Sinclair, A., Landi, F., Izquierdo, M., Vellas, B., & Rolland, Y. (2016). Recommendations on physical activity and exercise for older adults living in long-term care facilities: a taskforce report. *Journal of the American Medical Directors Association*, *17*(5), 381–392. https://doi.org/10.1016/j.jamda.2016.01.021

den Ouden, M., Bleijlevens, M. H. C., Meijers, J. M. M., Zwakhalen, S. M. G., Braun, S. M., Tan, F. E. S., & Hamers, J. P. H. (2015). Daily (in)activities of nursing home residents in their wards: an observation study. *Journal of the American Medical Directors Association*, *16*(11), 963–968. https://doi.org/10.1016/j.jamda.2015.05.016

Dent, E., Martin, F. C., Bergman, H., Woo, J., Romero-Ortuno, R., & Walston, J. D. (2019). Management of frailty: Opportunities, challenges, and future directions. *The Lancet*, *394*(10206), 1376–1386. https://doi.org/10.1016/S0140-6736(19)31785-4

Eccles, M. P., & Mittman, B. S. (2006). Welcome to implementation science. *Implementation Science*, *1*(1), 1. https://doi.org/10.1186/1748-5908-1-1

Ferreira, L. N., Pais, S., Ilchuk, K., & Santos, M. (2022). Ageing, health-related quality of life and physical activity – evidence based on the EQ-5D-5L. *Ageing International*, *47*(4), 705–723. https://doi.org/10.1007/s12126-021-09445-7

Groot, C., Hooghiemstra, A. M., Raijmakers, P. G. H. M., van Berckel, B. N. M., Scheltens, P., Scherder, E. J. A., van der Flier, W. M., & Ossenkoppele, R. (2016). The effect of physical activity on cognitive function in patients with dementia: A meta-analysis of randomized control trials. *Ageing Research Reviews*, *25*, 13–23. https://doi.org/10.1016/j.arr.2015.11.005

Holmes, B. J., Best, A., Davies, H., Hunter, D., Kelly, M. P., Marshall, M., & Rycroft-Malone, J. (2017). Mobilising knowledge in complex health systems: A call to action. *Evidence and Policy*, *13*(3), 539–560. https://doi.org/10.1332/174426416X14712553750311

Huntink, E., van Lieshout, J., Aakhus, E., Baker, R., Flottorp, S., Godycki-Cwirko, M., Jäger, C., Kowalczyk, A., Szecsenyi, J., & Wensing, M. (2014). Stakeholders' contributions to tailored implementation programs: An observational study of group interview methods. *Implementation Science*, *9*(1), 185. https://doi.org/10.1186/s13012-014-0185-x

Izquierdo, M., Duque, G., & Morley, J. E. (2021). Physical activity guidelines for older people: Knowledge gaps and future directions. *The Lancet Healthy Longevity*, *2*(6), e380–e383. https://doi.org/10.1016/S2666-7568(21)00079-9

Izquierdo, M., Rodriguez-Mañas, L., Casas-Herrero, A., Martinez-Velilla, N., Cadore, E. L., & Sinclair, A. J. (2016). Is it ethical not to prescribe physical activity for the elderly frail?

Journal of the American Medical Directors Association, *17*(9), 779–781. https://doi.org/10.1016/j.jamda.2016.06.015

Knight, R. L., Chalabaev, A., McNarry, M. A., Mackintosh, K. A., & Hudson, J. (2022). Do age stereotype-based interventions affect health-related outcomes in older adults? A systematic review and future directions. *British Journal of Health Psychology*, *27*(2), 338–373. https://doi.org/10.1111/bjhp.12548

Krier, D., de Boer, B., Hiligsmann, M., Wittwer, J., & Amieva, H. (2023). Evaluation of dementia-friendly initiatives, small-scale homelike residential care, and dementia village models: A scoping review. *Journal of the American Medical Directors Association*, *24*(7), 1020-1027.e1. https://doi.org/10.1016/j.jamda.2023.03.024

Lee, A. M., Sénéchal, M., Hrubeniuk, T. J., & Bouchard, D. R. (2020). Is sitting time leading to mobility decline in long-term care residents? *Aging Clinical and Experimental Research*, *32*(1), 183–186. https://doi.org/10.1007/s40520-019-01148-z

LEE, S. J., KIM, M. S., JUNG, Y. J., & CHANG, S. O. (2019). The effectiveness of function-focused care interventions in nursing homes: A systematic review. *The Journal of Nursing Research*, *27*(1), 1–13. https://doi.org/10.1097/jnr.0000000000000268

Lipsitz, L. A. (2012). Understanding health care as a complex system. *The Journal of the American Medical Association*, *308*(3), 243–244. https://doi.org/10.1001/jama.2012.7551

Livingston, G., Huntley, J., Liu, K. Y., Costafreda, S. G., Selbæk, G., Alladi, S., Ames, D., Banerjee, S., Burns, A., Brayne, C., Fox, N. C., Ferri, C. P., Gitlin, L. N., Howard, R., Kales, H. C., Kivimäki, M., Larson, E. B., Nakasujja, N., Rockwood, K., … Mukadam, N. (2024). Dementia prevention, intervention, and care: 2024 report of the Lancet

standing Commission. *The Lancet*, *404*(10452), 572–628. https://doi.org/10.1016/S0140-6736(24)01296-0

Maier, A., Riedel-Heller, S. G., Pabst, A., & Luppa, M. (2021). Risk factors and protective factors of depression in older people 65+. A systematic review. *PLOS ONE*, *16*(5), e0251326. https://doi.org/10.1371/journal.pone.0251326

Massie, A. S., & Meisner, B. A. (2019). Perceptions of aging and experiences of ageism as constraining factors of moderate to vigorous leisure-time physical activity in later life. *Loisir et Société / Society and Leisure*, *42*(1), 24–42. https://doi.org/10.1080/07053436.2019.1582903

McArthur, C., Bai, Y., Hewston, P., Giangregorio, L., Straus, S., & Papaioannou, A. (2021). Barriers and facilitators to implementing evidence-based guidelines in long-term care: A qualitative evidence synthesis. *Implementation Science*, *16*(1), 70. https://doi.org/10.1186/s13012-021-01140-0

O'Reilly, M., & Parker, N. (2013). 'Unsatisfactory Saturation': A critical exploration of the notion of saturated sample sizes in qualitative research. *Qualitative Research*, *13*(2), 190–197. https://doi.org/10.1177/1468794112446106

Panahian, M., Yavari, T., Tafti, F., & Faridi, M. (2023). Cardiovascular risk in adults with different levels of physical activity. *Journal of the National Medical Association*, *115*(2), 119–126. https://doi.org/10.1016/j.jnma.2023.01.006

Parry, S., Chow, M., Batchelor, F., & Fary, R. E. (2019). Physical activity and sedentary behaviour in a residential aged care facility. *Australasian Journal on Ageing*, *38*(1), E12–E18. https://doi.org/10.1111/ajag.12589

Pérez Jolles, M., Willging, C. E., Stadnick, N. A., Crable, E. L., Lengnick-Hall, R., Hawkins, J., & Aarons, G. A. (2022). Understanding implementation research collaborations from a co-creation lens: Recommendations for a path forward. *Frontiers in Health Services*, *2*. https://www.frontiersin.org/articles/10.3389/frhs.2022.942658

Peters, D. H. (2014). The application of systems thinking in health: Why use systems thinking? *Health Research Policy and Systems*, *12*, 51. https://doi.org/10.1186/1478-4505-12-51

Rantz, M., Flesner, M. K., & Zwygart-Stauffacher, M. (2010). Improving care in nursing homes using quality measures/indicators and complexity science. *Journal of Nursing Care Quality, 28*(1), 5-12. https://doi.org/10.1097/NCQ.0b013e3181c12b0f

Rapport, F., Smith, J., Hutchinson, K., Clay-Williams, R., Churruca, K., Bierbaum, M., & Braithwaite, J. (2022). Too much theory and not enough practice? The challenge of implementation science application in healthcare practice. *Journal of Evaluation in Clinical Practice*, *28*(6), 991–1002. https://doi.org/10.1111/jep.13600

Riley, B. L., Willis, C. D., Holmes, B., Finegood, D. T., Best, A., & McIsaac, J.-L. D. (2017). *Systems Thinking and Dissemination and Implementation Research* (Vol. 1). Oxford University Press. https://doi.org/10.1093/oso/9780190683214.003.0009

Son, S., Speechley, M., Zou, G. Y., Kivipelto, M., Mangialasche, F., Feldman, H. H., Chertkow, H., Belleville, S., Nygaard, H., Hachinski, V., Pieruccini-Faria, F., & Montero-Odasso, M. (2024). Potentially modifiable dementia risk factors in Canada: An analysis of Canadian Longitudinal Study on Aging with a multi-country comparison. *The Journal of Prevention of Alzheimer's Disease*, *11*(5), 1490–1499. https://doi.org/10.14283/jpad.2024.105

Vindrola-Padros, C., Eyre, L., Baxter, H., Cramer, H., George, B., Wye, L., Fulop, N. J., Utley, M., Phillips, N., Brindle, P., & Marshall, M. (2019). Addressing the challenges of knowledge co-production in quality improvement: Learning from the implementation of the researcher-in-residence model. *BMJ Quality & Safety*, *28*(1), 67–73. https://doi.org/10.1136/bmjqs-2017-007127

Wilson, P., & Kislov, R. (2022). Implementation Science. *Elements of Improving Quality and Safety in Healthcare*. https://doi.org/10.1017/9781009237055

Chapter Four: Allied Health Professionals' Roles and Contributions During the Implementation of Complex Interventions in Canadian Long-Term Care Facilities

This is a manuscript in preparation for submission.

Abstract

Background: Despite the critical role of allied health professionals (AHPs) in long-term care (LTC), their contributions to implementing complex interventions remain underexplored. This study aimed to investigate the roles and contributions of AHPs within interdisciplinary implementation teams and examine their association with implementation fidelity.

Methods: Using a mixed-methods sequential exploratory design, this study first conducted a secondary qualitative analysis of the Safer Care for Older Persons in Residential Environments (SCOPE) intervention. Reflexive thematic analysis was used to analyze the qualitative data. A Mann-U Whitney test was then conducted to assess the association between implementation fidelity and the implementation teams' level of interaction with AHPs.

Results: Qualitative analysis revealed three key themes: (1) AHPs offered complementary expert knowledge in care areas and change measurement, (2) AHPs emerged as recognized leaders, and (3) AHPs supported understanding and collaboration within professional boundaries. Although the quantitative analysis showed no significant relationship between AHP involvement on intervention teams and enactment (implementation) of core intervention components, qualitative findings highlighted AHPs' meaningful contributions to implementation efforts.

Conclusion: This study advances understanding of AHPs' roles in LTC implementation by revealing their unique contributions to knowledge generation, leadership, and interprofessional collaboration. The findings suggest that intentionally including AHPs in implementation efforts can foster collaborative workflows while maintaining professional boundaries.

Introduction

By the year 2030, Canada is projected to become a super-aged country, where one in every five Canadians will be over the age of 65. Currently, Canadians aged 85 and older constitute the fastest-growing segment of the population (Statistics Canada, 2022). As people age, their likelihood of developing chronic conditions including frailty and cognitive impairment increases, leading many to transition from independent living to care institutions that provide the necessary supports for complex care needs (Statistics Canada, 2022). These care institutions, such as long-term care (LTC) facilities, provide medical care and support for activities of daily living such as showering, mobility, meals, and opportunities for recreation and socialization.

As such, ensuring quality of care for older LTC residents requires collaboration among a diverse group of care professionals. This group includes, nursing staff (licensed practical nurses, registered nurses), care aides, dietary staff, custodial staff, administrative staff, volunteers, family and friends, and allied health professionals (AHP), such as recreational therapists, occupational therapists, physiotherapists, rehabilitation therapists and aides, social workers, and psychologists. (Armstrong et al., 2023). Interprofessional collaboration is necessary in these settings to provide comprehensive care to residents.

Despite the critical role AHPs play in supporting residents' well-being, research has largely focused on nursing and primary care staff, leaving a significant knowledge gap regarding the contributions and experiences of AHPs in LTC (Meulenbroeks et al., 2022). This knowledge gap is notable given the increasing recognition of AHPs as integral members of healthcare teams, and their essential role in delivering comprehensive, reliable, and high-quality care. For example, recent post-COVID-19 reports on LTC highlight the importance of an appropriate mix of AHPs to enhance care delivery (Health Canada, 2024; Estabrooks et al., 2024; Health Standards

Organization, 2023). Another example is the recognition of the value of AHP through provincial actions, such as the government of Ontario increasing by 20% AHPs average hours worked (Government of Ontario, 2021).

Emerging evidence frequently reshapes care guidelines, requiring facilities to adapt continually to meet evolving standards of care. However, LTC facilities are inherently complex adaptive systems that are constantly evolving, and this creates a challenge for implementing evidence-based practices (Anderson et al., 2003; Peters, 2014). Additionally, there are many contextual factors to consider and adapt to during implementation such as diverse resident needs, resource constraints, and high staff turnover (McArthur et al., 2021). Therefore, the successful enactment of implementation efforts demands careful coordination across interprofessional teams, emphasizing the need for collaboration to navigate these complexities effectively.

An underexplored aspect of the roles of AHPs in LTC is their involvement in implementing change. Effective implementation relies on interprofessional collaboration, yet little is known about how AHPs contribute to these processes within LTC settings (Aloisio et al., 2018; Cameron et al., 2022; Meulenbroeks et al., 2023). Addressing this gap is essential for fostering a cohesive workforce, enhancing collaboration and improving care outcomes. Understanding the roles and contributions of AHPs during implementation efforts in LTC may also reveal key strategies for applying knowledge into practice and overcoming implementation barriers in these settings.

This study aims to fill this evidence gap by exploring the roles and contributions of AHPs as part of interdisciplinary implementation teams during the implementation of a multicomponent intervention. Additionally, it examines whether features of interprofessional collaboration are associated with fidelity enactment of implementation efforts in LTC.

Methods

Context

This study is a secondary analysis of a subset of data from the Safer Care for Older Persons in Residential Environments (SCOPE) intervention, a pragmatic controlled trial of a multicomponent improvement intervention for nursing homes in Western Canada (Ginsburg et al., 2023; Wagg et al., 2023). The SCOPE intervention, implemented over the course of a year, aimed to empower and equip care aides to lead quality improvement interventions in LTC facilities (Cranley et al., 2011; Ginsburg et al., 2023; Wagg et al., 2023). Teams participating in the intervention focused on achieving improvement in one of three clinical areas: mobility, pain, and responsive behaviours. Teams received ongoing support from a Quality Advisor and engaged in four quarterly congresses featuring learning activities on quality improvement and knowledge exchange with other teams.

Thirty-one facilities participated in this intervention. Interprofessional teams were formed including up to three care aides and two formal leaders: 1) an organizational-level leader (e.g., a Director of Operations), and 2) a unit-level leader (e.g., a Registered Nurse or Licenced Practical Nurse). Leaders aimed to empower care aides to take on leadership roles within the implementation team. While not a requirement of the team composition, AHPs were often included as part of these implementation teams. The inclusion of AHPs in these teams provides an opportunity to investigate their role and contributions within implementation teams. Further details on the primary study and objectives of the SCOPE trial can be found in Cranley et al., (2011), Ginsburg et al., (2023), and Wagg et al., (2023).

Study Design

This study is a secondary analysis that follows an exploratory sequential mixed-method design (Fetters et al., 2013). First, in-depth secondary qualitative data from the SCOPE trial, specifically focusing on teams who engaged with AHPs during the intervention, was explored to understand how the roles and contributions of AHPs influenced implementation. Second, a secondary quantitative analysis was conducted to examine whether engagement with AHPs influenced fidelity enactment scores. Qualitative and quantitative findings were then integrated to elucidate a more comprehensive understanding of the phenomenon.

Ethical Considerations

As a secondary analysis of data, no new data collection was undertaken using human or animal subjects. When conducting secondary qualitative analyses, informed consent is not presumed. Instead, the researcher must assess whether reusing the data for the purpose of the new research question would breach the contract made between the researcher and the participant during the original study (Heaton, 2004; Long-Sutehall et al., 2011).

Ethical approval for the primary study was granted by the Research Ethics Boards of the University of Alberta (Pro00000012517) and the University of British Columbia (H14-03286). Included facilities provided operational approval as required. The data collected as part of the primary study were deidentified prior to the secondary analysis, ensuring confidentiality of the primary data. The York University Research Ethics Review Board reviewed and approved the proposal for the secondary analysis (Certificate STU #2020-127).

Qualitative Methods

Data Source

Data used in the secondary analysis included mixed methods process evaluation data and was collected concurrently with the SCOPE intervention. The data collection process is

described in detail elsewhere (Ginsburg et al., 2023). Data was collected using multiple methods which included quality advisor diaries, observations during learning congresses, quarterly surveys, and focus group. The reliability and validity of the data were established using triangulation across these multiple qualitative data sources (Ruggiano & Perry, 2019).

The longitudinal qualitative data were analyzed according to "action periods" (Ginsburg et al., 2023; Wagg et al., 2023). Four action periods were established for the purpose of this analysis: Action Period 1: Pre-Learning Congress 1, Action Period 2: Learning Congress 1 to Learning Congress 2, Action Period 3: Learning Congress 2 to Learning Congress 3, and Action Period 4: Learning Congress 3 to Learning Congress 4 (End of Intervention).

Qualitative data from the year-long intervention were reviewed to determine teams' level of interaction with AHPs in each action period for a total of four ratings. The average of the four ratings was tabulated as the overall rating of interaction with AHPs. Teams were categorized as "High" if an AHP was formally included as part of the implementation team, as "Medium" if they consulted with an AHP, and "Low" if there was no reported interaction with an AHP (Table 1).

Table 1

Categorization of Interprofessional Collaboration Based on Qualitative Data

Level of Interaction with AHPs	Implementation Team Identifiers	Total
High : Allied health professional(s) formally part of the implementation team	ABN004, ABN025, ABS003, ABS015, FH012, FH017, FH020, FH032, FH045, IH001, IH019, IH007, IH027	13
Medium : Team consulted with Allied health professional(s) during the course of the intervention	ABN009, ABN016, ABN017, ABS002, ABS004, FH014, FH048	7
Low : No reported interaction between team and an allied health professional(s)	ABN007, ABN010, ABS012, FH023, FH042, IH025, IH026, ABC006	8

Removed: Did not complete the intervention as intended	ABC003, FH039, FH040	3
		31

Data Analysis

Given that the qualitative analysis explored the roles of AHPs within implementation teams, only the teams who were categorized as "High" – had an AHP (aide or therapist) as an integral part of the team – or "Medium" – who consulted with an AHP (aide or therapist) during the course of the intervention (20/31 facilities) – were retained for the qualitative analysis (Chatfield, 2020; Heaton, 2004).

Qualitative data were analyzed according to reflexive thematic analysis, in an iterative and recursive six-phase process: familiarising oneself with the data, generating codes, constructing themes, reviewing potential themes, defining and naming themes, and producing the report (Braun & Clarke, 2006, 2019; Terry et al., 2017). The data were analysed by the author of this manuscript as part of their PhD dissertation.

Quantitative Methods

To validate the qualitative findings, the quantitative phase of this study aimed to validate the findings of the qualitative analysis and examine whether the presence of AHPs within implementation teams was associated with fidelity enactment scores.

Data Analysis

Only teams who completed the intervention as intended (i.e., that attended all quarterly learning congresses, a major component of the intervention) were included in the secondary quantitative analysis (28/31). Fidelity enactment refers to the extent to which teams actually carried out (enacted) the core components of the intervention (Bellg et al., 2004). Enactment was measured at the end of the intervention by research team observers using the Overall Fidelity

Enactment Scale for complex interventions (OFES-CI) (Ginsburg, Hoben, et al., 2024b; Wagg et al., 2023) which uses an ordinal scale from 1 (no/very low enactment) to 4 (very high enactment).

For the quantitative analysis, teams with "Low" and "Medium" levels of engagement with AHPs were grouped together and compared to those with "High" engagement (Table 2).

Table 2

Fidelity Enactment Scores

Fidelity Enactment	Implementation Team identifiers	Total
No/very low enactment	FH032, IH007, ABN004, ABN007	4
Borderline unsatisfactory enactment	IH019, IH026, FH039, ABC006, ABS012, ABN009	6
Borderline satisfactory enactment	FH040, FH042, FH014, ABS015, IH025	5
Satisfactory enactment 3	ABN016, ABN017, ABN010, ABN025, FH023, FH048	6
Very high enactment	FH045, ABS003, FH017, ABS002, FH012, IH027, ABS004, IH001, FH020	9
Missing	ABC003	1
		31

To compare differences between these two groups, a Mann-Whitney U test was conducted to examine fidelity enactment scores between teams with "High" levels of interaction with AHPs, and those with "Low/Medium" levels interaction.

Results

Qualitative Results

Overall, the qualitative analysis revealed that AHPs influenced the implementation of complex interventions through to the following three themes. First, by offering *different and complementary expert knowledge* on (a) care areas (pain, responsive behaviour, or mobility) and (b) measuring change. Second, through *recognized leadership* in both formal and informal

capacities. Finally, by fostering a greater understanding of, and collaboration within, professional boundaries. The following paragraphs explore these themes in greater detail.

Different and Complementary Expert Knowledge

As part of the SCOPE intervention, teams made small tests of change using Plan-Do-Study-Act (PDSA) cycles to improve care delivery in their selected clinical area (mobility, pain, or responsive behaviour) and conducted small-scale measurements to gauge improvement (Wagg et al., 2023). The presence of AHPs influenced implementation by offering *different and complementary expert knowledge*, specifically to support (1) the identification of change ideas for targeted clinical areas, and (2) the documentation and measurement of change.

Care Areas. First, AHPs contributed a unique knowledge base to care delivery in the chosen clinical area, complementing the primarily nursing-oriented expertise of team members. Many teams faced challenges in identifying innovative ideas for change, and AHPs supported teams by sharing their distinct yet complementary perspectives, helping to generate new "change ideas" to trial or offering guidance to empower other team members to identify ideas themselves.

For example, team FH014 focused on improving pain management among residents. Early in the intervention, a team member stated that "she didn't know what to do reduce pain in her residents." (QA diary). Consequently, this team engaged their recreation team to "increase the number of diversional opportunities". Similarly, team members in FH020 initially struggled to identify non-pharmacological interventions to decrease pain. To help them generate ideas, they invited the facility's recreation therapist to join their team for the remainder of the intervention.

Measuring Change. Secondly, AHPs provided expertise in developing and implementing change measurement tools and coaching team members on how to document change. AHPs are

experienced in measuring change and routinely apply this knowledge as part of their daily responsibilities. For instance, a physiotherapist might develop a personalized mobility plan for a resident, establish baseline measurements, and implement tracking methods to monitor outcomes, while a recreation therapist might devise an evaluation plan for a new program. The qualitative data suggest that AHPs' familiarity with measurement techniques and tools was particularly advantageous for teams, as care aides, who made up the majority of the team, found it challenging to capture and assess the impact of their interventions.

For example, the following quote from team ABS015 taken from the quality advisory diary, represents how the support of an occupational therapist was integral to this team's progress:

> ABS015: The team struggles with documentation, measurement, and the idea of starting small with new changes. They often have lots of big ideas that they try/implement but don't really track what is being done when/how and often want to use falls as their blanket outcome measure. The support of the occupational therapist has been integral to the progress made over the last few months, and the tracking sheet that the occupational therapist developed, if used, will really help with documentation, measurement, and a better understanding of how the mobility program is working. (Quality Advisor Diary)

This example also demonstrates the importance of support for documenting change, as it allowed this team to better understand how their program led to improved mobility, which was motivating and supported appropriate program adaptations.

While AHPs' involvement in establishing change measures can be very helpful, it impeded team progress when the established measures were too burdensome or difficult to collect by those who documented change. For example, an Occupational Therapist in team

ABN002 established walking distance as a measure of change for their mobility intervention and completed baseline assessments on a number of residents. However, care aide team members did not follow through on measuring change as "it was too hard to watch selected residents walk and then measure, and they were not always present when a resident was walking, or they had other work to do" (Quality Advisory Diary). Because of this challenge, the team's focus moved from mobility more broadly to focusing solely on falls, as they found it easier to capture.

This suggests that it is not sufficient to implement measures but rather it is critical to identify/develop measures that meet the needs, and are appropriate for the context, of those who will be documenting change. It is also worthwhile to note that organizational factors like staff turnover, previous exposure to quality improvement, and leadership support also influenced teams' capacity to document change.

Recognized Leadership

The second theme captures the leadership provided by AHPs throughout the year-long intervention. SCOPE teams were supported by two formal leaders, 1) an organizational level leader (e.g., a director of operations), and 2) a unit level leader (e.g., registered nurse or licensed practical nurse). In a small number of teams AHPs' were assigned to one of these formal leadership roles, however, in the majority of other teams AHPs emerged as informal leaders.

This was most evident in observational data from quarterly learning congresses where non-AHPs team members "often turned to them [AHPs] for answers" (IH027 Observations). For example, at the second learning congress, it was noted in observational data, that the Physiotherapist of Team ABS003 emerged as the leader despite not being the team's formal leader:

- Team member that is a physio is clearly the leader → teaching other people what PDSA is, reminding people of AIM, talking about how aim has been edited.
- Same for talk about tasks + measurement ideas → asking her opinion if this was okay.
- Physio says it's too complicated → she really understands the process but not certain that others do. (Observations)

Additionally, in some instances, when teams lacked momentum, consulting with AHPs provided the direction or impetus needed to move their intervention forward. For example, team ABS015 experienced a slow start to a mobility intervention which was attributed to a lack of leadership from their formally assigned leaders. A quality advisory diary entry reported that after "input and support (leading up to congress) from the facility's occupational therapist, the team seems to have a clearer direction and is making more focused progress." Similarly, team IH001 received significant support from a dental hygienist at the beginning of the intervention, which propelled their initiative forward.

Informal leadership from AHPs was especially beneficial in instances where formal leaders were overwhelmed and/or lacked time and/or resources to support the team. For example:

> ABS003: Team is making great progress. The team success is driven in very large part by the therapy assistant. She really understands the model is passionate about the area of increasing resident mobility and has the capacity to support the team administratively (measurement and documentation). Informally, she really is the lead of the team and has the capacity for leadership. The team has had very little support from the [Formal Leaders] (due to large changes in the organization), I attribute the team's ability to continue with SCOPE to the therapy assistant as a team member. (QA Diary Entry)

However, informal leadership added responsibility and workload to AHPs which could challenge their ability to adequately support teams. For example, team FH017 was co-led by the rec/rehab manager and a registered nurse. According to a QA diary entry the rec/rehab manager "seems very enthusiastic and supportive, but is also VERY busy, and not a direct supervisor". Notably, this team found a way to address this issue as later in the intervention they implemented a shared leadership model, which offered an avenue for team members to benefit from the expertise of the recreation/rehab manager and of the previously established formal leadership support from the nurse manager. Other teams also successfully implemented similar shared leadership models (e.g., Team FH048 and ABS004).

This theme calls back the results from Theme 1 - *Different and Complementary Expert Knowledge*, including having specialized knowledge of care areas and experience and knowledge of change measurement, as factors that position AHPs to be well-suited to take on leadership roles. The emergence of AHPs as informal leaders highlights their role and adaptability in driving change initiatives.

Understanding and Collaborating within Professional Boundaries

The third theme reflects how working in interprofessional implementation teams fostered an understanding among team members of one another's professional roles and responsibilities. In doing so, they identified tasks which could be learned and shared without crossing professional boundaries. For many teams, this process improved workflow by enhancing collaboration.

As part of this process team members "got to know the roles and resources of others on the interdisciplinary team" (FH017 QA Diary). By transferring knowledge from their respective disciplines, they taught their team members "how to deal with other aspects of care" (FH012

Focus Group), and this offered an opportunity to rethink how to approach current care problems. For example, FH012 faced issues related to traffic jams which occurred near the elevator at specific moments in the day. One participant explained:

> This [transporting residents from one floor to another] used to be a rec only job, and there was a lot of pressure and negativity around transport. Now it involves everyone creating a much more positive experience for both staff and residents. (FH012 QA diary)

In this example, work that was previously assigned to AHPs was taken on by others in the facility. Care aides began supporting rolling residents in wheelchairs during high traffic times when it was common to experience a 'traffic jam'. By exercising flexibility in roles and responsibilities, they found a more collaborative approach which fostered a more positive environment for both staff and residents

Similarly, ABS015 implemented an intervention to support mobility. To do so, this team worked collaboratively: "Individualized mobility plans for each resident on the unit were developed with the assistance of an occupational therapist", mobility plans were then "carried out on the unit by other staff (care aides)" (ABS015 QA Diary). This represented a change in workflow as previously, mobility plans would have been developed and executed by occupational therapists (or other AHPs' aides) without the support of care aides.

Other teams however, experienced some resistance from AHPs who were hesitant to involve other staff (e.g., care aides) in activities which they typically carried out. These tensions emerged both between team members as well as with other staff on the unit as they attempted to spread interventions. For example, a team member from FH014 shared having received "push back from the recreation department" who felt that their intervention "infringed on their turf". To address this resistance, FH014 intentionally increased communication and collaboration with the

recreation department by regularly inviting them to their team meetings and generating discussion around where flexibility could be exercised to support their work. Teams that were open and able to identify new ways to approach care delivery while respecting professional boundaries discovered new possibilities for collaboration.

In conclusion, this last theme demonstrates how participants developed a greater understanding of one another's role which allowed them to identify opportunities to support one another and establish new approaches to delivery care without crossing professional boundaries.

Quantitative Results

A Mann-Whitney U test was conducted to validate the findings of the qualitative analysis and examine differences in fidelity enactment between teams with "High" engagement with AHPs and those with "Low/Medium" engagement. The results found no significant difference between the two groups, $U = 63.50, Z = -1.636, p = 0.114.$ The mean rank for the "High" group was 16.96, while the mean rank for the "Low/Medium" group was 12.04. These findings suggest that the level of interaction with AHPs did not significantly affect fidelity enactment in this context.

Discussion

Overall, this study provides novel insights into the roles of AHPs within interprofessional teams during the implementation of a complex intervention. While the quantitative data revealed no statistically significant relationship between AHP involvement on intervention teams and enactment (implementation) of core intervention components, the qualitative findings highlighted meaningful insights that warrant further exploration.

Specifically, the qualitative findings indicate that the presence of AHPs within implementation teams can: 1) support implementation by offering different and complementary

skills and perspective in the implementation of complex interventions; 2) take on leadership roles; and 3) support collaboration and workflow by increasing understanding of professional roles and boundaries.

Different and Complementary Expert Knowledge

The qualitative results indicate that in the context of interprofessional collaboration AHPs supported change efforts by offering different and complementary perspectives in the implementation of complex interventions. By identifying innovative change ideas that were in line with their professional background, AHPs were able to identify innovative and effective solutions for common care concerns.

Additionally, a novel finding of this study was the support AHPs provided in measuring change. Measurement and documentation are featured as critical components of prominent implementation frameworks (e.g., Damschroder et al., 2022; Glasgow et al., 2024; Kitson et al., 1998; Rycroft-Malone et al., 2013). The SCOPE intervention was informed by the Promoting Action on Research Implementation in Health Services (PARIHS) framework (Ginsburg et al., 2023; Wagg et al., 2023), a well-established conceptual framework on implementation (Kitson et al., 1998; Rycroft-Malone, 2004; Rycroft-Malone et al., 2002, 2013), and employed PDSA cycles to drive quality improvement (Cranley et al., 2011; Ginsburg et al., 2023; Wagg et al., 2023).

PDSA cycles rely on robust measurement for iterative learning to adapt and improve interventions (Berwick, 1996), and the PARIHS framework highlights evidence as one of three factors influencing the use of research in practice (Kitson et al., 1998; Rycroft-Malone, 2004; Rycroft-Malone et al., 2002, 2013). While documenting change was a critical component of the SCOPE intervention, results from the SCOPE process evaluation indicate that measuring the

impact of change was the most difficult aspect of this intervention for teams (Ginsburg et al., 2023). Findings from the current study build on the work of the SCOPE process evaluation and provide additional insights into the role that AHPs played in supporting documenting and measuring change. Future research should explore how AHPs can disseminate knowledge on, and support efforts for, measuring change to support implementation. This is particularly important for interventions that align with AHPs scope of practice and care (Luongo et al., 2022).

Recognized Leadership

Results of this study also point to leadership as an additional opportunity to extend the scope of practice of AHPs and further support implementation teams. Specifically, this study found that AHPs emerged as informal leaders – a finding supported by previous research (Bradd et al., 2017; McKeever & Brown, 2019) and adds to the literature presenting effective AHP-led implementation (Feely et al., 2023; Saxon et al., 2014).

The qualitative analysis suggests that AHPs emerged as leaders because of their knowledge of aspects of care and implementation, as outlined in theme one. During SCOPE team members turned to AHPs for intervention support as they appeared as leaders in the eyes of those on their implementation team. Findings of this study indicate that AHPs were viewed as leaders because of : 1) the combination of the make-up of the implementation teams, and 2) the position of AHPs in the institutional hierarchy.

Implementation teams were composed of care aides, with nursing staff in the role of formal leaders. Formal leaders were intended to support and empower care aides to step into leadership positions, however in teams where this did not occur and teams lacked leadership, the role naturally fell to AHPs. The hierarchical positioning of AHPs above care aides and adjacent

to nurses may explain their natural shift into leadership positions. This is supported by results from a study conducted by Rogers et al., (2020) in which AHPs were part of implementation teams led by physicians. In similar situations to those in the SCOPE trial, AHPs in these teams did not take on leadership positions, they were also generally less engaged and had low intervention adoption. The authors attributed their general negative experiences to their being 'silenced by their organized hierarchy'. Overall, these findings emphasize the importance of intentionally identifying and addressing the micropolitical context, including relationships of power, authority, and influence, prior to implementation (Desbiens & Langley, 2024; Rogers et al., 2020).

Building on these findings, it is important to consider how fostering leadership opportunities for AHPs may not only enhance implementation efforts but also contribute to broader professional outcomes. Other research has shown that social capital was found to be a factor which predicts job satisfaction in AHPs working in aged care settings (Aloisio et al., 2018). Therefore, supporting AHPs to take on leadership positions, could increase their social capital and ultimately increase job satisfaction. Additionally, supporting their autonomy by recognizing their knowledge, skills, expertise, and leadership capacity could foster interprofessional collaboration and better support implementation (McArthur et al., 2021; Seaton et al., 2021).

Overall, these results suggest there is value in exploring how to further support leadership capacity in AHPs (e.g., shared leadership models, training, or additional resources). Other research exploring experiences of AHPs working in aged care settings found AHPs feel disconnected and undervalued by other staff (Meulenbroeks et al., 2023). Fostering relationships between AHPs and other staff would likely improve AHPs potential for effective leadership.

These findings additionally extend to the work of previous analyses completed on this dataset which explored how leadership influences the implementation of complex interventions (Ginsburg et al., 2024a). Specifically, that the quality of the relationship between leaders and their followers appeared to be an important factor for leadership more broadly in the SCOPE intervention (Ginsburg et al., 2024a).

Role Clarification, Contributions, And Collaborations

The third theme showed that, by bringing their unique skills and backgrounds to implementation teams, AHPs contributed new perspectives that helped generate a more comprehensive understanding of care challenges. This ultimately enabled implementation teams to identify new ways to support one another while maintaining professional boundaries. Findings from the process evaluation of SCOPE indicated that adopting a work approach favoring reflection and autonomy was SCOPE's biggest benefit (Ginsburg et al., 2023). The findings reported here support and deepened the findings of Ginsburg et al., (2023) by further elucidating the process of shifting work culture around roles/hierarchy in the SCOPE intervention.

Consistent with prior research on interprofessional implementation teams, the qualitative data from the present study found that including representatives from various professions fostered a greater understanding of how each discipline contributes to care, creating new opportunities for improvement (Valaitis et al., 2020). Establishing a greater understanding of one another's professional roles and responsibilities has the potential to lead to greater co-development, better intervention outcomes, and overall improvement in systems of care for residents (Cameron et al., 2022; Montano, 2020).

For example, one team addressed a mobility challenge caused by traffic jams in front of elevators by leveraging the support of care aides to assist AHPs. By identifying a task – wheeling

residents – that was within the scope of the care aides work they found an opportunity for increased collaboration and effectively resolved the issue. Similarly, a study by Luongo et al. (2022) found that low attendance in group programming could be mitigated through better collaboration among staff in mobilizing residents to these programs. This demonstrates how increased understanding of one another's roles can support implementation by identifying flexibility points where roles and responsibilities can be shared without crossing professional boundaries.

Limitations

The findings of this study should be considered in light of the following limitations. As this was a secondary analysis, the data explored were not collected to answer the original research questions posed in this study. Consequently, the data may not fully capture the nuances or context required to address the research questions comprehensively (Sherif, 2018). Specifically, information pertaining to the characteristics of the homes that engaged AHPs in leadership positions, versus those that did not, would offer interesting avenues for analysis, but, were unfortunately not available to report on in this study. Nevertheless, this limitation is mitigated (1) by the complementary nature of the research questions posed in the primary study and the current study, (2) through measures to increase the credibility of this analysis, such as prolonged exposure to the dataset, and (3) the ability to triangulate across multiple data sources (Nowell et al., 2017).

Another important consideration of this work, particularly given that it is a secondary analysis, is the researcher's prior experience with the SCOPE trial dataset. Before undertaking this dissertation, the researcher worked as a research assistant on the primary project (Ginsburg et al., 2023). Although not involved at the project's inception, the researcher contributed to

several aspects, including the analysis of the process evaluation to develop a program theory of implementation (Ginsburg et al., 2023), a later publication exploring the broader influence of leadership on implementation within the SCOPE trial (Ginsburg et al., 2024a), and a study that developed and validated a fidelity enactment scale for complex interventions using SCOPE trial data (Ginsburg et al., 2024b). This previous engagement can be seen as a strength, as it allowed the researcher to become deeply familiar with the data and to develop a nuanced understanding of the contextual factors influencing implementation (Nowell et al., 2017). However, it is also important to acknowledge that the analysis and interpretations presented in this dissertation were inevitably shaped by the researcher's prior involvement and insights gained through earlier work on the SCOPE trial. Recognizing this influence is essential for maintaining transparency regarding the lens through which the data were reanalyzed and interpreted.

Another notable limitation of the quantitative analysis is the small sample size, which may have resulted in low statistical power and increased the risk of a false negative result. A larger sample would enhance the ability to detect significant differences. As such, future research using larger, more representative samples is recommended to strengthen the validity and generalizability of these findings.

Lastly, a limitation arises from the absence of a dedicated measure of interprofessional collaboration in the original data. The measure of interprofessional collaboration used in this manuscript was developed by the author based on the available data and informed by existing literature. While this measure accounts for the quantity of interprofessional collaboration, the presence of AHPs within teams, it does not capture the qualitative aspects of these relationships which are known to be important for interprofessional collaboration (Cleary et al., 2019). Despite these limitations, the results of this study are novel, and the analyses performed provide valuable

insights into the roles and contributions of AHPs during the implementation of a complex intervention.

Conclusion

The findings of this study highlight the contributions of AHPs to intervention / QI implementation in LTC settings. The qualitative results revealed that AHPs bring unique knowledge and expertise in their care areas, measurement and documentation knowledge, leadership potential, and adaptability. Although the quantitative analysis did not find a statistically significant relationship between the presence of AHPs on implementation teams and enactment of the core intervention components, the qualitative evidence underscores their important contributions. By intentionally including AHPs in implementation efforts, organizations could foster collaboration and enhance workflow while maintaining professional boundaries and fostering implementation. Future studies should continue to explore the role of AHPs in change implementation, with a focus on how their skills can enhance measurement, documentation, and leadership, and on strategies to support them in these roles.

In conclusion, this study advances understanding regarding implementation in LTC settings by examining the role of AHPs, a group of healthcare professionals whose contributions to resident health and wellness have received considerably less research attention compared to nursing staff. It lays the groundwork for future explorations in this area.

References

Aloisio, L. D., Gifford, W. A., McGilton, K. S., Lalonde, M., Estabrooks, C. A., & Squires, J. E. (2018). Individual and organizational predictors of allied healthcare providers' job satisfaction in residential long-term care. *BMC Health Services Research*, *18*, 491. https://doi.org/10.1186/s12913-018-3307-3

Anderson, R. A., Issel, L. M., & McDaniel, R. R. (2003). Nursing homes as complex adaptive systems: relationship between management practice and resident outcomes. *Nursing Research*, *52*(1), 12–21.

Armstrong, P., Armstrong, H., & Bourgeault, I. L. (2023). Teaming up for long-term care: Recognizing all long-term care staff contribute to quality care. *Healthcare Management Forum*, *36*(1), 26–29. https://doi.org/10.1177/08404704221115811

Bellg, A. J., Borrelli, B., Resnick, B., Hecht, J., Minicucci, D. S., Ory, M., Ogedegbe, G., Orwig, D., Ernst, D., Czajkowski, S., & Treatment fidelity workgroup of the nih behavior change consortium. (2004). enhancing treatment fidelity in health behavior change studies: best practices and recommendations from the nih behavior change consortium. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *23*(5), 443–451. https://doi.org/10.1037/0278-6133.23.5.443

Berwick, D. M. (1996). A Primer on leading the improvement of systems. *BMJ: British Medical Journal*, *312*(7031), 619–622.

Bradd, P., Travaglia, J., & Hayen, A. (2017). Leadership in allied health: a review of the literature. *Asia Pacific Journal of Health Management*, *12*(1), 17–24. https://doi.org/10.24083/apjhm.v12i1.103

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, *11*(4), 589–597. https://doi.org/10.1080/2159676X.2019.1628806

Cameron, N., Fetherstonhaugh, D., Rayner, J.-A., & McAuliffe, L. (2022). How do health and allied health practitioners perceive excellence in residential aged care? An exploratory qualitative study. *Australasian Journal on Ageing*, *41*(4), e364–e370. https://doi.org/10.1111/ajag.13077

Chatfield, S. (2020). Recommendations for secondary analysis of qualitative data. *The Qualitative Report*. https://doi.org/10.46743/2160-3715/2020.4092

Cleary, M., Foong, A., Kornhaber, R., McLean, L., & Visentin, D. C. (2019). Interprofessional collaborations for improved health care. *Issues in Mental Health Nursing*, *40*(12), 1045–1048. https://doi.org/10.1080/01612840.2019.1655367

Cranley, L. A., Norton, P. G., Cummings, G. G., Barnard, D., & Estabrooks, C. A. (2011). SCOPE: Safer care for older persons (in residential) environments: A study protocol. *Implementation Science*, *6*(1), 71. https://doi.org/10.1186/1748-5908-6-71

Damschroder, L., Reardon, C. M., Widerquist, M. A. O., & Lowery, J. C. (2022). *The Updated Consolidated Framework for Implementation Research: CFIR 2.0* [Preprint]. In Review. https://doi.org/10.21203/rs.3.rs-1581880/v1

Desbiens, G., & Langley, A. (2024). The micropolitics of routines and routine "improvement." In *Routine Dynamics: Organizing in a World in Flux* (world; Vol. 88, pp. 83–109). Emerald Publishing Limited. https://doi.org/10.1108/S0733-558X20240000088005

Estabrooks, C., Armstrong, P., Bourbonnais, A., Donner, G., Flood, C., Keefe, J., Pringle, D., Silvius, J., Straus, S., & Wolfson, M. (2024). *An RSC Policy Briefing An update to Restoring Trust: COVID-19 and The Future of Long-Term Care (2020)*.

Feely, K., Edbrooke, L., Bower, W., Mazzone, S., Merolli, M., Staples, J., & Martin, A. (2023). Allied health professionals' experiences and lessons learned in response to a big bang electronic medical record implementation: A prospective observational study. *International Journal of Medical Informatics*, *176*, 105094. https://doi.org/10.1016/j.ijmedinf.2023.105094

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs—principles and practices. *Health Services Research*, *48*(6pt2), 2134–2156. https://doi.org/10.1111/1475-6773.12117

Ginsburg, L., Easterbrook, A., Geerts, A., Berta, W., Van Dreumel, L., Estabrooks, C. A., Norton, P. G., & Wagg, A. (2024a). 'We listened and supported and depended on each other': A qualitative study of how leadership influences implementation of QI interventions. *BMJ Quality & Safety*, bmjqs-2024-017795. https://doi.org/10.1136/bmjqs-2024-017795

Ginsburg, L., Easterbrook, A., Massie, A., Berta, W., Doupe, M., Hoben, M., Norton, P., Reid, C., Song, Y., Wagg, A., & Estabrooks, C. (2023). Building a program theory of implementation using process evaluation of a complex quality improvement trial in nursing homes. *The Gerontologist*, gnad064. https://doi.org/10.1093/geront/gnad064

Ginsburg, L., Hoben, M., Berta, W., Doupe, M., Estabrooks, C. A., Norton, P. G., Reid, C., Geerts, A., & Wagg, A. (2024b). Development and validation of the overall fidelity enactment scale for complex interventions (OFES-CI). *BMJ Quality & Safety*, *33*(2), 98–108. https://doi.org/10.1136/bmjqs-2023-016001

Glasgow, R. E., Trinkley, K. E., Ford, B., & Rabin, B. A. (2024). The application and evolution of the practical, robust implementation and sustainability model (PRISM): History and innovations. *Global Implementation Research and Applications*, *4*(4), 404–420. https://doi.org/10.1007/s43477-024-00134-6

Government of Ontario, Ministry of Economic Development, Job Creation and Trade (n.d.). *Government of Ontario, Canada*. Ontario.ca. Retrieved January 3, 2024, from https://www.ontariocanada.com/registry/view.do?postingId=40508&language=en

Health Canada. (2024, August 29). *Safe Long Term Care Act engagement: What we heard report*. https://www.canada.ca/en/health-canada/services/publications/health-system-services/engagement-what-we-heard-report.html

Health Standards Organization. (2023). *HSO Long-term care standards*. Health Standards Organization

Heaton, J. (2004). *Reworking Qualitative Data*. SAGE Publications Ltd. https://doi.org/10.4135/9781849209878

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence-based practice: A conceptual framework. *Quality and Safety in Health Care*, *7*(3), 149–158. https://doi.org/10.1136/qshc.7.3.149

Long-Sutehall, T., Sque, M., & Addington-Hall, J. (2011). Secondary analysis of qualitative data: A valuable method for exploring sensitive issues with an elusive population? *Journal of Research in Nursing*, *16*(4), 335-344 https://doi.org/10.1177/1744987110381553

Luongo, A., Murray, C., & Girard, D. (2022). An exploration of the perceptions of Allied Health Professionals on their roles within residential aged care. *The Allied Health Scholar*, *3*(1). https://ojs.unisa.edu.au/index.php/tahs/article/view/1620

McArthur, C., Bai, Y., Hewston, P., Giangregorio, L., Straus, S., & Papaioannou, A. (2021). Barriers and facilitators to implementing evidence-based guidelines in long-term care: A qualitative evidence synthesis. *Implementation Science*, *16*(1), 70. https://doi.org/10.1186/s13012-021-01140-0

McKeever, J., & Brown, T. (2019). What are the client, organisational and employee - related outcomes of high quality leadership in the allied health professions? A scoping review. *Asia Pacific Journal of Health Management*, *14*(2), 19–30. https://doi.org/10.24083/apjhm.v14i2.257

Meulenbroeks, I., Raban, M. Z., Seaman, K., & Westbrook, J. (2022). Therapy-based allied health delivery in residential aged care, trends, factors, and outcomes: A systematic review. *BMC Geriatrics*, *22*(1), 712. https://doi.org/10.1186/s12877-022-03386-9

Meulenbroeks, I., Seaman, K., Raban, M. Z., Wabe, N., & Westbrook, J. (2023). Just visiting: A qualitative study of Australian allied health professionals' experiences working in residential aged care facilities during the COVID-19 pandemic. *Australasian Journal on Ageing*, *42*(4), 690–697. https://doi.org/10.1111/ajag.13217

Montano, A.-R. (2020). "All for One" experiences of interprofessional team members caring for older adults: A metasynthesis. *International Journal of Older People Nursing*, *15*(1), e12290. https://doi.org/10.1111/opn.12290

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16,* 1-13. https://doi,org/10.1177/1609406917733847

Peters, D. H. (2014). The application of systems thinking in health: Why use systems thinking? *Health Research Policy and Systems*, *12*, 51. https://doi.org/10.1186/1478-4505-12-51

Rogers, L., De Brún, A., Birken, S. A., Davies, C., & McAuliffe, E. (2020). The micropolitics of implementation; a qualitative study exploring the impact of power, authority, and influence when implementing change in healthcare teams. *BMC Health Services Research*, *20*(1), 1059. https://doi.org/10.1186/s12913-020-05905-z

Ruggiano, N., & Perry, T. E. (2019). Conducting secondary analysis of qualitative data: Should we, can we, and how? *Qualitative Social Work*, *18*(1), 81–97. https://doi.org/10.1177/1473325017700701

Rycroft-Malone, J. (2004). The PARIHS Framework—A Framework for guiding the implementation of evidence-based practice. *Journal of Nursing Care Quality*, *19*(4), 297.

Rycroft-Malone, J., Kitson, A., Harvey, G., McCormack, B., Seers, K., Titchen, A., & Estabrooks, C. (2002). Ingredients for change: Revisiting a conceptual framework. *BMJ Quality & Safety*, *11*(2), 174–180. https://doi.org/10.1136/qhc.11.2.174

Rycroft-Malone, J., Seers, K., Chandler, J., Hawkes, C. A., Crichton, N., Allen, C., Bullock, I., & Strunin, L. (2013). The role of evidence, context, and facilitation in an implementation trial: Implications for the development of the PARIHS framework. *Implementation Science*, *8*(1), 28. https://doi.org/10.1186/1748-5908-8-28

Saxon, R. L., Gray, M. A., & Oprescu, F. I. (2014). Extended roles for allied health professionals: An updated systematic review of the evidence. *Journal of Multidisciplinary Healthcare*, *7*, 479–488. https://doi.org/10.2147/JMDH.S66746

Seaton, J., Jones, A., Johnston, C., & Francis, K. (2021). Allied health professionals' perceptions of interprofessional collaboration in primary health care: An integrative review. *Journal of Interprofessional Care*, *35*(2), 217–228. https://doi.org/10.1080/13561820.2020.1732311

Sherif, V. (2018). Evaluating preexisting qualitative research data for secondary analysis. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *19*(2), Article 2. https://doi.org/10.17169/fqs-19.2.2821

Statistics Canada. (2022, April 27). *A portrait of Canada's growing population aged 85 and older from the 2021 Census*. https://www12.statcan.gc.ca/census-recensement/2021/as-sa/98-200-X/2021004/98-200-x2021004-eng.cfm

Terry, G., Hayfield, N., Clarke, V., & Braun, V. (2017). *The SAGE Handbook of Qualitative Research in Psychology*. SAGE Publications Ltd. https://doi.org/10.4135/9781526405555

Wagg, A., Hoben, M., Ginsburg, L., Doupe, M., Berta, W., Song, Y., Norton, P., Knopp-Sihota, J., & Estabrooks, C. (2023). Safer Care for Older Persons in (residential) Environments (SCOPE): A pragmatic controlled trial of a care aide-led quality improvement intervention. *Implementation Science*, *18*(1), 9. https://doi.org/10.1186/s13012-022-01259-8

Chapter Five: Dissertation Discussion

Physical activity (PA) is known to be beneficial for multiple aspects of health throughout the life course. PA for the purpose of this dissertation refers to the WHO definition which is any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2022). Institutionalized older adults engage in minimal PA and spend the majority of their time sedentary, despite evidence of how activity could help maintain or improve health (Barber et al., 2015; Lee et al., 2020; Parry et al., 2019). Therefore, there is a need to better understand how to support activity in this population through improved implementation efforts.

To this end, the three studies in this dissertation provide new evidence and novel contributions to inform the effective implementation of PA interventions in LTC settings. In Chapter Two, a scoping review was conducted which synthesized and examined the use of implementation strategies and their related outcomes during the implementation of PA interventions in LTC. This first study provides a comprehensive overview of the current knowledge on the implementation strategies that have been used to support activity and whether they are positively associated with their intended implementation outcomes.

Chapter Three and Chapter Four extend the findings of Chapter Two by providing new perspectives on PA in LTC from two groups of individuals who, to date, have been underrepresented in research on this topic, yet who are instrumental to effective implementation. Chapter Three explores the experiences of researchers who have implemented PA interventions in LTC facilities. In this second study, semi-structured interviews were conducted with six researchers who are named authors on the studies included in the scoping review completed in Chapter Two. That chapter provides new perspectives from researchers who are leading efforts to increase activity among LTC residents.

Chapter Four presents a secondary analysis of the SCOPE intervention (Cranley et al., 2011; Ginsburg et al., 2023; Wagg et al., 2023). That chapter explores the roles and contributions of Allied Health Professionals (AHPs) during the implementation of complex interventions and examines whether the presence of AHPs in implementation teams resulted in greater fidelity enactment. Taken together, the three studies in this dissertation provide new and novel information to inform PA implementation in LTC and increase levels of activity among residents.

Key Findings

Chapter Two—*Implementation Strategies and Implementation Outcomes for Physical Activity Interventions in Long-Term Care Facilities: A Scoping Review*

Research has demonstrated that implementation science plays a crucial role in promoting the adoption of evidence-based practices within LTC facilities. When applying evidence into practice, implementation strategies are used to ensure that interventions are taken up and sustained over time (Powell et al., 2015; Proctor et al., 2013). Implementation outcomes are a measure of whether the implementation strategies employed led to their desired results (Proctor et al., 2011). There remains a significant need to enhance the monitoring and documentation of implementation strategies and outcomes to optimize their effectiveness and improve care quality (Pinnock et al., 2017; Powell et al., 2019; Slaughter et al., 2015).

To better understand these strategies in practice, a scoping review following the Arksey and O'Malley Framework (2005) was conducted, resulting in the analysis of 20 papers reporting on 13 implementation projects aimed at increasing levels of activity among older residents of LTC facilities. The review also includes a consultation exercise with six researchers, who are

named authors on the research projects included in this review, to validate and expand on the findings.

Implementation strategies were categorized according to the Expert Recommendation for Implementing Change (ERIC) compilation, which presents 73 implementation strategies organized into nine thematic clusters (Powell et al., 2015). The analysis revealed strategies from all nine thematic clusters of the ERIC compilation, though only 29 of the 73 discrete strategies in the ERIC compilation were employed in implementing these interventions. Notably, strategies focused on training and educating stakeholders emerged as the most frequently used approach, appearing in 10 out of 13 implementations. Implementation outcomes were categorized using Proctor's Implementation Outcome Taxonomy (Proctor et al., 2013). This review found that the reporting of implementation outcomes was often poor or incomplete. As part of the consultation exercise, authors shared implementation strategies that were not reported in published work and/or provided valuable additional details.

This comprehensive review underscores the importance of adopting common language and terminology when documenting implementation strategies and outcomes. Such standardization could enhance the transparency and reproducibility of interventions, ultimately leading to improved levels of activity among residents of LTC. Additionally, this review points to strategies that are being used successfully in LTC to support resident activity.

Chapter Three—"*We've Come a Long Way, But It's Slow, and It's Hard*": *Experiences and Perspectives of Researchers Implementing Physical Activity Interventions in Long-Term Care*

The second step in this dissertation expanded on the scoping review findings in Chapter Two through new knowledge generated from semi-structured interviews with researchers who have led implementation projects in LTC. These researchers possess significant expertise on this

topic. However, despite a growing recognition of the importance of integrating implementation scientists within healthcare settings to advance implementation science and facilitate knowledge uptake into practice, their experiences and perspectives have largely been confined to their academic work (Churruca et al., 2019; Vindrola-Padros et al., 2019). Hence, Study Two aimed to explore the experiences of researchers who have implemented PA interventions in LTC facilities. Specifically, it provides insights into both the challenges and opportunities as well as recommendations for future research and practice in this area.

Three themes emerged from the thematic analysis. First, the results highlighted the complexities of implementation research, reflecting existing literature that emphasizes the dynamic interplay of societal, institutional, and interpersonal factors in implementing change (Braithwaite et al., 2018; Peters, 2014). Second, the analysis identified an additional layer of complexity arising from their presence and the process of conducting implementation research within facilities. Specifically, researchers spoke of the need to balance researcher enthusiasm for increasing resident activity levels with the contextual realities of LTC facilities. Participants shared concrete examples of how they navigated implementation challenges and their impact on implementation efforts. The third theme centered on the need to adopt a broader, more inclusive approach to activity to identify novel ways of engaging residents in activity. Participants emphasized the value of implementation efforts that aim to transform the philosophy of care toward one that prioritizes activity and engagement over short-term interventions.

Together, these findings reinforce the complexity of implementation from the perspective of those who research PA implementation efforts in LTC. Results suggest ways by which PA participation in LTC could be improved through implementation efforts, including improved

integration of implementation science into facilities, as well as changing current perceptions and understandings of PA in LTC to be more inclusive of everyday movement.

Chapter Four—*Allied Health Professionals' Roles and Contributions During the Implementation of Complex Interventions in Canadian Long-Term Care Facilities*

Given the scope of care required for residents, AHPs are essential to the delivery of comprehensive and high-quality care. The last study follows from Chapter Three by providing insights from a group of individuals, in this case AHPs, who despite their contributions to successful implementation in LTC have been understudied (Meulenbroeks et al., 2023). Successful implementation requires careful coordination across all members of the care team, including AHPs. However, little is known about their involvement in change efforts. Study Three fills this gap by exploring the roles and contributions of AHPs during the implementation of complex interventions.

To achieve this objective, a secondary analysis of a subset of data from the Safer Care for Older Persons in Residential Environments (SCOPE), a year-long intervention carried out in 31 LTC facilities in Western Canada, was conducted (Cranley et al., 2011; Ginsburg et al., 2023; Wagg et al., 2023). The thematic analysis outlined the role of AHPs throughout the year-long implementation efforts. The results indicate AHPs supported implementation by offering a different and complementary perspective to implementation, specifically through expert knowledge on care topics as well as knowledge of how to measure change. This is an important and novel finding as documenting and measuring change during implementation efforts is critical and yet remains one of the most difficult aspects of implementation (Ginsburg et al., 2023). These findings suggest that AHPs could support this critical component of implementation efforts.

Furthermore, AHPs were recognized as leaders by care aide members of their team despite not being formally assigned to leadership positions. This finding support previous literature that examines the leadership abilities of AHPs in care settings (Bradd et al., 2017; Feely et al., 2023; McKeever & Brown, 2019; Saxon et al., 2014) and extends the findings of another secondary analysis which specifically examined leadership within the SCOPE intervention (Ginsburg et al., 2024). These findings lead us to consider how the hierarchical structures influence implementation efforts and bring forward the importance of considering micropolitics prior to implementation (Desbiens & Langley, 2024; Rogers et al., 2020).

The qualitative analysis also revealed how AHPs supported collaboration and workflow through increased understanding of professional roles and boundaries. Throughout the implementation process, participants increased their understanding of one another's roles, which supported implementation by identifying flexibility points where roles and responsibilities could be shared without crossing professional boundaries. These results provide additional insights into how work culture can shift during implementation (Ginsburg et al., 2023).

Notably, a further quantitative analysis found no association between the level of involvement of AHPs in implementation teams and fidelity enactment or the level to which the core components of an intervention were implemented as intended (Bellg et al., 2004). These findings suggest that while AHPs play valuable roles in implementation processes, their impact on implementation outcomes is still not fully understood. Future research should continue to explore the specific mechanisms through which AHPs influence implementation success and investigate how their expertise can be better leveraged to enhance implementation outcomes in LTC settings.

Integration of Key Findings Across Dissertation Studies

Complexity science provided a valuable lens within this dissertation for understanding the numerous and evolving factors that influence the implementation of PA interventions in LTC. By examining this topic through a complexity lens, this dissertation adds to the body of research that explicitly adopts a complexity science approach to understand change efforts in LTC (Anderson et al., 2003; Anderson et al., 2004; Cammer et al., 2014; Escrig-Pinol et al., 2019; Forbes-Thompson et al., 2007; Rantz et al., 2010; Sterns et al., 2015). Specifically, it provides novel findings on the implementation of PA interventions in LTC, an area with the potential to improve the health and well-being of older residents.

Complexity Emerging from PA Implementation in LTC as an Inherently Interdisciplinary Problem

Complexity science embodies interdisciplinarity by addressing dynamic, multi-dimensional problems characterized by an interconnected web of relationships and components (Zait et al., 2021). This dissertation highlights such complexity by shedding light on the challenges of bringing together the fields of implementation science and aging research, two inherently interdisciplinary, complex, and multifaceted fields (Ferraro, 2007; Wilson & Kislov, 2022). Although challenging, this intersection is particularly timely given the rapidly aging population and the pressing need for innovative solutions to support older persons' health and well-being.

This dissertation illustrates how the implementation of PA interventions in LTC settings is complicated by the convergence of these fields. Successful implementation requires not only evidence-based knowledge of aging, exercise and PA, but also a critical understanding of implementation science on how change occurs in complex real-world settings. Findings from this dissertation showcase that differences in perspectives of what aspects of implementation efforts

should take priority differ according to the disciplinary backgrounds of the researchers involved. For example, researchers from the physical health sciences, such as kinesiologists or exercise scientists, may have the tendency to place more importance on evidence related to the effectiveness of the PA program being implemented. Therefore, their focus may be on the PA-related content or components, dose, frequency, etc. of PA interventions to reflect the latest evidence in their field. In contrast, researchers grounded in the implementation science perspective would be likely to prioritize evidence from the context of implementation. Their focus may be on the evidence related to what strategies and processes are likely to lead to an interventions' adaptability, feasibility, and sustainability. These disciplinary contexts highlight an important layer of complexity for the uptake of PA in LTC, specifically, what is considered evidence and how said evidence is used, which varies across disciplines (Brownson et al., 2022).

These differing disciplinary perspectives underscore the importance of integrating diverse areas of expertise in the co-design of implementation efforts. Physical health scientists bring deep knowledge of the benefits of movement, which is needed to inform what should be implemented, while implementation scientists offer knowledge on how to embed such interventions effectively into real-world care settings. Further, additional perspectives, such as nursing, allied health, managerial, families, etc. also play a critical role. While multidisciplinary teams are valuable for addressing implementation projects, there is an even greater need to move beyond multidisciplinary work, which draws independently on two or more disciplines, towards interdisciplinary actions which combines knowledge of relevant fields in ways that transcends individual disciplinary perspectives (Choi & Pak, 2006; Rapport et al., 2018). Strengthening collaboration between these already interdisciplinary fields is essential for advancing practical

and translational movement-based interventions that enhance the health and well-being of older LTC residents.

Additionally, this dissertation emphasized the contributions of researchers, illustrating how their involvement adds complexity to the implementation process. While researchers are often present during implementation efforts, their role has not yet been fully considered as part of the complexity of implementation. There is a prevailing academic assumption that researchers can merely observe; however, the presence, along with the knowledge, background, and perspectives researchers bring, inherently influences the systems being studied by introducing another actor. More thoughtful considerations of researchers' roles during implementation are needed.

Use of, and Reporting on, Implementation Strategies

This dissertation also highlighted some important gaps between research and practice, particularly regarding discrepancies between the implementation of evidence-based practices and how these processes are reported in academic literature. This issue is a notable contribution to the field of implementation science, where a major focus is on addressing the complexity of implementation by selecting and tailoring strategies to the unique needs of both the intervention and its context (McHugh et al., 2022; Powell et al., 2017). Identifying this gap is an important first step to generating an understanding of how to move towards increased and effective activity in this setting. For example, findings from the scoping review reported in Chapter Two of this dissertation indicate that what is reported on in published manuscripts is often incomplete and, at times, insufficient. There is lack description on why implementation strategies were chosen and on how they were tailored to address the barriers of their unique implementation setting.

This lacking reporting limits the reproducibility of the intervention and poses barriers to the uptake, spread, and scale of evidence-based practices (Powell et al., 2017). Moreover, little to no information is provided as to whether and why implementation strategies actually lead to their intended outcomes. Recent work by Leeman et al. (2024) proposes a five-step approach for selecting and tailoring implementation strategies, which can be particularly useful for those undertaking PA intervention efforts in LTC settings. The recommended steps are: (1) review available information on the effectiveness of evidence-based interventions and their implementation, (2) tailor the implementation processes currently used within settings, (3) tailor capacity-building strategies currently in place, (4) tailor integration strategies to address intervention-specific determinants, and (5) iteratively tailor processes and strategies over time.

To add to this issue, appropriate reporting is particularly important considering the findings from the consultation exercise of the scoping review completed in Chapter Two, and further insights from researchers who conducted these studies in Chapter Three. Results from these two studies highlight unreported, but crucial, elements of implementation strategies used during implementation. For example, educational strategies were most commonly reported during the implementation of PA interventions; however, new insights through the consultation exercise and research interviews indicated that an unreported aspect of educational approaches was a crucial component of this strategy. Specifically, the ways in which education was approached was tailored in a way to gain buy-in from those who would be implementing the intervention. Researchers did this by highlighting the direct benefits to each stakeholder group. Therefore, what is reported in the published literature as an educational strategy may actually be more closely aligned with strategies that aim to engage consumers or develop stakeholder

interrelationships. These distinctions are crucial and call for greater nuanced and careful reporting from the research community.

These findings are in line with foundational aspects of complexity science that highlight relationships and unpredictability of human factors as crucial to implementation efforts (Braithwaite et al., 2018; Karwoski, 2012). Additionally, these findings support implementation research that places relationships as an important contributor to mechanisms of change, highlighting that change occurs over time and relational aspects, such as the development of supportive learning environments and developing and fostering relationships, are crucial for implementation success (Ginsburg et al., 2024). As such, there is a need for continued research into mechanisms of change to better understand how, and under what circumstances, specific implementation strategies lead to desired outcomes.

Furthermore, this dissertation provides evidence to support the value of demystifying research even further by giving a voice to researchers within their own work and how reflecting on their experiences of implementation can lead to valuable lessons that are worth publishing for others to learn from. It is therefore valuable for researchers to consider what information is provided in published reports and why, or to find alternative ways of disseminating information to practitioners in ways that are complete and accessible for future reproducibility of the intervention. This is an area where capacity can be intentionally or proactively increased to support the implementation process.

When examining the strategies aimed at increasing PA in LTC within the dissertation, it is important to recognize that most efforts remained located at micro-(individual) and meso-(organizational) level factors and rarely extended to broader macro-level factors (e.g., community, policy, and societal influences). Public health scholars have criticized

implementation science for these limitations, arguing that broader systemic factors are often overlooked (McIsaac et al., 2018). Although this dissertation touches briefly on this issue in Chapter Two, specifically, through researchers' accounts of how they perceive governmental influences on PA in LTC, there remains a clear need for a further exploration of strategies that address larger systemic factors. Such an approach could inform the development of audits and policies that support, rather than hinder, exercise, PA, and movement more broadly in LTC settings. For example, strategies could include increasing staff time dedicated to activating residents, allocating greater hours to AHPs to support movement-related initiatives, improving infrastructure to facilitate safe mobilization, and providing more resources to engage care partners in promoting activity. Ultimately, addressing macro-level factors could foster broader cultural shifts toward a model of care that values and prioritizes movement and activity in LTC.

Implications and Future Directions

Research Implications

Beyond suggested possibilities for future research building on the results of this work, this dissertation offers broad implications for future research. Firstly, a key strength of this dissertation is the use of multiple methods, which provides a comprehensive and nuanced understanding of the research topic by capturing diverse perspectives and insights. Chapter Two presents a rigorous review using systematic methods, establishing the current state of knowledge in the literature. Chapter Three explores qualitative accounts on the topic from researchers who have expertise in this field, offering new perspectives through firsthand experiences. Chapter Four conducts a secondary analysis of data gathered as part of a year-long implementation effort, providing insight into how the topic of this dissertation unfolds in real-world settings. Together,

these methods create a well-rounded approach, bridging existing research, expert perspectives, and practical application.

Moreover, this dissertation highlights the value of secondary data analysis as a research method for gaining new insights into how evidence is applied in LTC. Great investments are placed in large-scale longitudinal projects like SCOPE (which capture rich data using multiple methods throughout implementation), however, these datasets remain underused (Dunn et al., 2015; Sharp & Munly, 2022). Secondary qualitative data analysis is often overlooked, despite the significant resource and time investment in data collection. This is especially true in healthcare settings, where gaining ethics approval for research is particularly challenging (Dunn et al., 2015). Failing to maximize the potential of these datasets is a missed opportunity; therefore, exploring additional research questions beyond the original study can yield valuable scientific contributions, and Chapter Four serves as a strong example of this approach.

A second implication is that this research highlighted some of the barriers created by research to translating research findings into real-world settings. Chapter Two and Chapter Three highlight a need for researchers who are conducting research in this field to: a) use standardized terminology using known taxonomies in order to increase comparability, b) incorporate more rigorous documentation of implementation strategies including considerations for tracking their adaptations and modifications, and c) construct research in a way that not only reports on whether they employed implementation strategies but whether strategies were associated with its intended implementation outcome.

Moreover, although there is increasing emphasis on fostering research collaborations and partnerships between academic institutions and health organizations, research proposals often remain primarily researcher-driven which may limit the responsiveness to the identified needs of

partnering institutions. Effective implementation science necessitates insider knowledge and, in the absence of genuine partnerships, tensions may emerge between the contextual realities of practice settings and the methodological demands of research. For example, researchers may inadvertently control or overlook critical contextual factors, thereby influencing the effectiveness of implementation efforts. Participatory approaches to implementation offer a promising strategy to mitigate these challenges and may contribute to greater implementation success (Berta et al., 2013; Rapport et al., 2021).

Lastly, the three studies included in this dissertation support the importance of espousing complexity science as a conceptual framework when conducting implementation research in LTC (Cammer et al., 2014; Chaffee & McNeill, 2007; Sterns et al., 2010). This framework allows for a nuanced understanding the dynamic, interconnected, and evolving nature of real-world systems (Peters, 2014). By embracing this perspective, researchers can better capture the nuances of how interventions unfold, identify leverage points for sustainable change, and adapt strategies to local needs (Carroll et al., 2023). Complexity is captured in this dissertation as a guiding conceptual framework that informed the research design and analysis across all studies. Additionally, results from Chapter Three add new and novel perspectives on complexity from those who are researching PA change efforts in LTC. Specifically, they highlight not only the complexity of implementation due to the influence of dynamic interactions between individual-interpersonal- and institutional-level factors but also emphasize perceptions of activity for older persons as an important societal-level factor influencing implementation. These findings underscore the necessity of integrating complexity science into implementation research in LTC to foster more responsive, adaptable, and effective interventions.

Institutional Practice and Policy Implications

The findings from this dissertation have institutional implications that can be useful to those working in LTC settings to increase levels of activity among residents. Chapter Two highlighted multiple implementation strategies that have been used in efforts to increase activity in LTC as well as those that have been shown to lead to their intended implementation outcomes. Healthcare practitioners can use these findings to develop interventions and programs.

An ongoing barrier to implementation in aged care settings is chronic understaffing and limited resources (Mills et al., 2019; von der Warth et al., 2021). Findings from Chapter Four suggest that AHPs could play a key role in easing the burden of implementation. As outlined in the scoping review of Chapter Two the use of champions (i.e., key individuals who drive and support implementation efforts) is a well-established strategy for fostering change. Additionally, findings from Chapter Four add to previous work that indicate that AHPs are well positioned to take on a champion role or more formal leadership position (McKeever & Brown, 2019). More research is needed to understand how to best leverage AHPs' leadership skills. AHPs routinely support the implementation of structured exercise programs in LTC and are therefore more likely to be placed in leadership roles as standard practice rather than as an exception. The findings of dissertation suggest that AHPs are well suited to support implementation efforts which support changes as part of residents' daily activities. Expanding their scope of practice to include leadership in change efforts, specifically for efforts that align with their expertise, could have a meaningful impact on increasing resident activity.

Engaging all actors, including AHPs, in the co-design of implementation efforts through collaborative approaches, such as an integrated knowledge translation approach, can leverage their frontline expertise and foster more contextually relevant and sustainable practice changes (Rapport et al., 2018). This approach can ensure that implemented interventions align with their

daily practices, which can help to gain buy-in, and create opportunities for early piloting and adaptations (Braithwaite et al., 2018). Additionally, engaging AHPs, who often feel detached from other staff (Luongo et al., 2022), can support whole organization approach to implementation by fostering linkages and collaboration across disciplines.

Beyond staffing considerations, successful integration of PA efforts requires dedicated efforts in implementation science. Chapter Two and Chapter Three highlight the role of implementation scientists in facilitating change within LTC organizations. One path forward would be for institutional policies to formally embed implementation scientists within organizations to facilitate change (Churruca et al., 2019; Rapport et al., 2022; Vindrola-Padros et al., 2019). These individuals bring expertise in evidence-based strategies, stakeholder engagement, and sustainable implementation which are critical for translating recommendations into practice and fostering a culture that supports activity and is open to adaptations.

Findings from Chapters Three and Four support previous research that highlights the need for more comprehensive documenting of change efforts as well as improved tracking of how and whether implementation strategies lead to their desired outcomes. It has been noted that there is a gap between research on implementation and the use of this research in practice to support successful implementation efforts (Westerlund et al., 2019). Additionally, for the most part, healthcare providers don't possess knowledge on implementation science (Ovretveit et al., 2017). Therefore, there is a need to think of innovative ways to support systems to uptake the evidence into practice. One solution is to strengthen the collaboration between researchers and those who are implementing by embedding implementation scientists within LTC to support efforts (Churruca et al., 2019). Another, albeit likely less effective solution, would be for

implementation researchers to develop easy-to-use tools, such as implementation guides, that demystify the process for those willing to adopt change but unsure where to begin.

Fostering a cultural shift in how we perceive activity and aging is essential to creating a more open and supportive environment within aged care institutions. Importantly, results from this study, particularly those of Chapter Three, point to a societal shift towards a generation of residents who have a greater desire for activity, and a more positive view of activity among those working in LTC settings. This shift was seen as contributing to reduced resistance to implementing PA. There is a need to continue to embrace PA not only for its role in maintaining physical function but also for its significant psychosocial benefits and its potential to support organizational outcomes (Gideon Asuquo et al., 2021; Stanmore et al., 2019). An institutional culture that values and encourages activity for all residents, coupled with broader organizational mindset that is receptive to change, could enhance PA engagement.

Broader Social Policy Implications

Lastly, from a larger perspective, the findings from this dissertation have societal implications that can be useful to inform policy towards increased levels of activity in aged care settings. Chapter Three underscores the critical role of governments in establishing funding models for aging care, and the importance of recognizing the benefits of PA to ensure appropriate financial support for such initiatives. It also examines the role of governments in shaping the content of facility audits and, in turn, influencing institutional priorities. Given this impact, the findings highlight the necessity of incorporating insights from professionals with experience in aged-care settings to inform more effective policy development and funding models.

Over time, societal understandings and perceptions of both aging and activity have changed significantly. For example, it was previously believed that 'slowing down' in later life was best to avoid any risk of injury. However, research now widely supports the idea that the benefits of movement far outweigh the risks, even for those we consider most vulnerable, such as those with cognitive impairment or who are frail (Reid et al., 2022). Even so, the findings of Chapter Three support research which supports the idea that negative perceptions of activity among older residents remain a barrier to fully embracing this perspective in aged care settings (Gebhard & Mir, 2021).

Findings from Chapter Three provide new knowledge on perceptions of activity in LTC. Participant accounts indicate that PA is still often understood and practiced in a programmatic way rather than as an embodied, integral part of daily life. However, they also recognized a shift towards a greater openness to activity, which they attributed to a new generation of residents who are more interested in, and knowledgeable about the benefits of activity, as well as a movement towards person-centred care. This is a novel finding that ties perceptions of aging, activity and care as a contributing factor to easing resistance to implementing activity-based interventions in this setting.

Acting on this finding could include providing educational content on age stereotypes and ageism to healthcare professionals. This is particularly important as healthcare professionals' perception of older persons have been shown to be more negative that the general population (Crutzen et al., 2022), and that this is a current gap in current educational curricula. However, additional research is needed in order to create evidence informed educational modules because there is a current knowledge gap when it comes to perceptions of aging and activity among those working in LTC (Gallo, 2019; Nemiroff, 2022). This is an area for future research.

Research also suggests that continued efforts to bolster activity in these settings can help shift the narrative toward a more realistic understanding of aging and physical ability. Health professionals who observe older people engage in activities they once believed to be unacceptable or unattainable can challenge common misconceptions about aging and physical capability (Gebhard & Mir, 2021; Massie & Meisner, 2019). In a similar way, participation in PA can help older persons challenge self-embodied aging stereotypes by deconstructing learned narratives of aging, reframing the loss of function as being more closely linked to inactivity rather than solely to chronological aging (Massie & Meisner, 2019). At a larger scale, efforts such as public awareness campaigns that address these topics could contribute to a more informed aging population, as well as a new generation of healthcare providers with more nuanced and realistic understandings of activity and aging.

Limitations

While there are many strengths to this dissertation, the following limitations should be considered. For instance, findings from this study reinforce current literature which highlights the complexity of implementation. While this dissertation helps to address knowledge gaps in this area, it does not provide a complete picture. There remains the need to address each implementation effort as unique and bound by its own context. Therefore, while the findings of this study can inform and guide future research and practice, they are not a definitive conclusion.

Another limitation that this dissertation faced was a difficulty in conceptualizing PA to adequately capture its implementation in LTC. The WHO (WHO, 2022) definition, which describes PA as any bodily movement produced by skeletal muscles that requires energy expenditure, was chosen for its broad, non-prescriptive nature. This allowed for the inclusion of a wide range of activities, including activities that may not be typically thought of as PA. For

example, the findings of this dissertation emphasize the value in supporting all movement whether through activities of daily living (e.g., laundry, walking to and from activities) as well as finding opportunities to break up sedentary time such as sit-to-stand interventions. Taking this approach is a strength of this dissertation and was particularly important given that LTC residents are older and have mobility or cognitive impairments. However, broadening understandings of PA to be more inclusive of all movement is valuable individuals with mobility restrictions regardless of age.

To capture the full range of activities implemented in LTC the scoping review in Chapter Two captured the implementation of both approaches to care and structured programmatic efforts aiming to increase activity. However, while both approaches face significant challenges to implementation including having to compete with many other priorities, there are fundamental differences in how these approaches are implemented. True implementation operates at a systems level and aims for the uptake and sustainability of evidence-based practices (Rapport et al., 2018). While programs can be beneficial, the reality is these efforts may not make large system change nor be sustained - particularly in resource constrained settings like LTC facilities. In contrast, integrating movement into daily care requires structural and cultural shifts, which are more difficult to implement but have greater potential for lasting impact. By looking at both approaches together, this dissertation may have missed some key nuances between them.

In addition to the above, there are some methodological limitations that should be acknowledged. This dissertation employs multiple methodologies, which is a strength as it provides diverse perspectives on the problem. However, differences in methodological approaches can make it challenging to integrate findings cohesively, limiting the ability to draw overarching conclusions. Therefore, the three studies in this dissertation offer distinct and novel

insights to contribute to a deeper understanding of different aspects of PA implementation in LTC.

Despite these limitations, the findings of this dissertation provide valuable insight and lay the foundation for future research as well as important implications for both institutional and broader social policies.

Conclusion

While PA is known to be beneficial for overall health and well-being even for those who have impairments in mobility and cognition, older residents are not reaping the benefits of PA as they are not being provided with opportunities for, or care approaches that foster activity. A lack of understanding regarding important aspects of the implementation of PA, including the use of implementation strategies and the perspectives and roles of important players – namely implementation researchers and AHPs – has limited the application of PA knowledge into practice within LTC facilities. To bridge this gap, this dissertation aimed to explore aspects of PA implementation that have yet to receive attention in research.

While the current findings do not offer a comprehensive view of implementation across all levels and from all actors, the individual findings of each of these studies, as well as their findings taken together, have important research implications, as well as implications for institutional and societal policy. Specifically, this research provides valuable knowledge and recommendations to those who have a hand in the implementation of activity in aged care settings including decision and policy makers, healthcare organizations, and healthcare providers including care partners. Additionally, this dissertation calls for improved documentation of change efforts and continued research on this topic that is grounded in complexity theory, capturing the dynamic interplay of factors during implementation including how shifting societal

perceptions of activity and aging influences the adoption and sustainability of PA. Lastly, findings from this dissertation reiterate the importance of broadening understandings of PA to recognize all forms of movement and engagement across different abilities. Encouraging LTC facilities to adopt this perspective is essential for increasing activity levels, reducing sedentary time, and ensuring that residents fully benefit from any amount of movement.

References

Barber, S. E., Forster, A., & Birch, K. M. (2015). Levels and patterns of daily physical activity and sedentary behavior measured objectively in older care home residents in the United Kingdom. *Journal of Aging and Physical Activity*, *23*(1), 133–143. https://doi.org/10.1123/JAPA.2013-0091

Bellg, A. J., Borrelli, B., Resnick, B., Hecht, J., Minicucci, D. S., Ory, M., Ogedegbe, G., Orwig, D., Ernst, D., Czajkowski, S., & Treatment Fidelity Workgroup of the NIH Behavior Change Consortium. (2004). Enhancing treatment fidelity in health behavior change studies: Best practices and recommendations from the NIH Behavior Change Consortium. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *23*(5), 443–451. https://doi.org/10.1037/0278-6133.23.5.443

Berta, W., Ginsburg, L., Gilbart, E., Lemieux-Charles, L., & Davis, D. (2013). What, why, and how care protocols are implemented in Ontario nursing homes. *Canadian Journal on Aging*, *32*(1), 73–85. https://doi.org/10.1017/S0714980813000081

Bradd, P., Travaglia, J., & Hayen, A. (2017). Leadership in allied health: A review of the literature. *Asia Pacific Journal of Health Management*, *12*(1), 17–24. https://doi.org/10.24083/apjhm.v12i1.103

Braithwaite, J., Churruca, K., Long, J. C., Ellis, L. A., & Herkes, J. (2018). When complexity science meets implementation science: A theoretical and empirical analysis of systems change. *BMC Medicine*, *16*(1), 63. https://doi.org/10.1186/s12916-018-1057-z

Brownson, R. C., Shelton, R. C., Geng, E. H., & Glasgow, R. E. (2022). Revisiting concepts of evidence in implementation science. *Implementation Science*, *17*(1), 26. https://doi.org/10.1186/s13012-022-01201-y

Cammer, A., Morgan, D., Stewart, N., McGilton, K., Rycroft-Malone, J., Dopson, S., & Estabrooks, C. (2014). The hidden complexity of long-term care: How context mediates knowledge translation and use of best practices. *The Gerontologist*, *54*(6), 1013–1023. https://doi.org/10.1093/geront/gnt068

Carroll, Á., Collins, C., McKenzie, J., Stokes, D., & Darley, A. (2023). Application of complexity theory in health and social care research: A scoping review. *BMJ Open*, *13*(3), e069180. https://doi.org/10.1136/bmjopen-2022-069180

Chaffee, M. W., & McNeill, M. M. (2007). A model of nursing as a complex adaptive system. *Nursing Outlook*, *55*(5), 232-241.e3. https://doi.org/10.1016/j.outlook.2007.04.003

Choi, B. C., & Pak, A. W. (2006). Multidisciplinarity, interdisciplinarity and transdisciplinarity in health research, services, education and policy: 1. Definitions, objectives, and evidence of effectiveness. *Clinical and investigative medicine.*, *29*(6), 351–364.

Churruca, K., Ludlow, K., Taylor, N., Long, J. C., Best, S., & Braithwaite, J. (2019). The time has come: Embedded implementation research for health care improvement. *Journal of Evaluation in Clinical Practice*, *25*(3), 373–380. https://doi.org/10.1111/jep.13100

Cranley, L. A., Norton, P. G., Cummings, G. G., Barnard, D., & Estabrooks, C. A. (2011). SCOPE: Safer care for older persons (in residential) environments: A study protocol. *Implementation Science*, *6*(1), 71. https://doi.org/10.1186/1748-5908-6-71

Crutzen, C., Missotten, P., Adam, S., & Schroyen, S. (2022). Does caring lead to stigmatisation? The perception of older people among healthcare professionals and the general

population: A cross-sectional study. *International Journal of Older People Nursing*, *17*(5), e12457. https://doi.org/10.1111/opn.12457

Desbiens, G., & Langley, A. (2024). The micropolitics of routines and routine "improvement." In *Routine Dynamics: Organizing in a World in Flux* (world; Vol. 88, pp. 83–109). Emerald Publishing Limited. https://doi.org/10.1108/S0733-558X20240000088005

Dunn, S. L., Arslanian-Engoren, C., DeKoekkoek, T., Jadack, R., & Scott, L. D. (2015). Secondary data analysis as an efficient and effective approach to nursing research. *Western Journal of Nursing Research*, *37*(10), 1295–1307. https://doi.org/10.1177/0193945915570042

Feely, K., Edbrooke, L., Bower, W., Mazzone, S., Merolli, M., Staples, J., & Martin, A. (2023). Allied health professionals' experiences and lessons learned in response to a big bang electronic medical record implementation: A prospective observational study. *International Journal of Medical Informatics*, *176*, 105094. https://doi.org/10.1016/j.ijmedinf.2023.105094

Ferraro, K. F. (2007). Is gerontology interdisciplinary?. *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 62*(1), S2.

Gallo, V. (2019). Ageism in nursing education: A review of the literature. *Teaching and Learning in Nursing*, *14*(3), 208–215. https://doi.org/10.1016/j.teln.2019.04.004

Gebhard, D., & Mir, E. (2021). What moves people living with dementia? Exploring barriers and motivators for physical activity perceived by people living with dementia in care homes. *Qualitative Health Research*, *31*(7), 1319–1334. https://doi.org/10.1177/10497323211002822

Gideon Asuquo, E., Tighe, S. M., & Bradshaw, C. (2021). Interventions to reduce work-related musculoskeletal disorders among healthcare staff in nursing homes: An integrative literature review. *International Journal of Nursing Studies Advances*, *3*, 100033. https://doi.org/10.1016/j.ijnsa.2021.100033

Ginsburg, L., Easterbrook, A., Geerts, A., Berta, W., Van Dreumel, L., Estabrooks, C. A., Norton, P. G., & Wagg, A. (2024). 'We listened and supported and depended on each other': A qualitative study of how leadership influences implementation of QI interventions. *BMJ Quality & Safety*, bmjqs-2024-017795. https://doi.org/10.1136/bmjqs-2024-017795

Ginsburg, L., Easterbrook, A., Massie, A., Berta, W., Doupe, M., Hoben, M., Norton, P., Reid, C., Song, Y., Wagg, A., & Estabrooks, C. (2023). Building a program theory of implementation using process evaluation of a complex quality improvement trial in nursing homes. *The Gerontologist*, gnad064. https://doi.org/10.1093/geront/gnad064

Haley, A. D., Powell, B. J., Walsh-Bailey, C., Krancari, M., Gruß, I., Shea, C. M., ... & Gold, R. (2021). Strengthening methods for tracking adaptations and modifications to implementation strategies. *BMC Medical Research Methodology*, *21*(1), 133

Karwowski, W. (2012). A review of human factors challenges of complex adaptive systems: Discovering and understanding chaos in human performance. *Human Factors, 54*(6), 983-995.

Lee, A. M., Sénéchal, M., Hrubeniuk, T. J., & Bouchard, D. R. (2020). Is sitting time leading to mobility decline in long-term care residents? *Aging Clinical and Experimental Research*, *32*(1), 183–186. https://doi.org/10.1007/s40520-019-01148-z

Leeman, J., Rohweder, C., Lafata, J. E., Wangen, M., Ferrari, R., Shea, C. M., ... & Toles, M. (2024). A streamlined approach to classifying and tailoring implementation strategies:

recommendations to speed the translation of research to practice. *Implementation Science Communications*, *5*(1), 6

Luongo, A., Murray, C., & Girard, D. (2022). An exploration of the perceptions of Allied Health Professionals on their roles within residential aged care. *The Allied Health Scholar*, *3*(1). https://ojs.unisa.edu.au/index.php/tahs/article/view/1620

Massie, A. S., & Meisner, B. A. (2019). Perceptions of aging and experiences of ageism as constraining factors of moderate to vigorous leisure-time physical activity in later life. *Loisir et Société / Society and Leisure*, *42*(1), 24–42. https://doi.org/10.1080/07053436.2019.1582903

McHugh, S. M., Riordan, F., Curran, G. M., Lewis, C. C., Wolfenden, L., Presseau, J., ... & Powell, B. J. (2022). Conceptual tensions and practical trade-offs in tailoring implementation interventions. *Frontiers in Health Services, 2*, 974095.

McIsaac, J. L., Warner, G., Lawrence, L., Urquhart, R., Price, S., Gahagan, J., ... & Jackson, L. A. (2018). The application of implementation science theories for population health: A critical interpretive synthesis. *AIMS public health*, *5*(1), 13.

McKeever, J., & Brown, T. (2019). What are the client, organisational and employee - related outcomes of high quality leadership in the allied health professions? A scoping review. *Asia Pacific Journal of Health Management*, *14*(2), 19–30. https://doi.org/10.24083/apjhm.v14i2.257

Meulenbroeks, I., Seaman, K., Raban, M. Z., Wabe, N., & Westbrook, J. (2023). Just visiting: A qualitative study of Australian allied health professionals' experiences working in residential aged care facilities during the COVID-19 pandemic. *Australasian Journal on Ageing*, *42*(4), 690–697. https://doi.org/10.1111/ajag.13217

Mills, W. L., Pimentel, C. B., Snow, A. L., Allen, R. S., Wewiorski, N. J., Palmer, J. A., Clark, V., Roland, T. M., McDannold, S. E., & Hartmann, C. W. (2019). Nursing home staff perceptions of barriers and facilitators to implementing a quality improvement intervention. *Journal of the American Medical Directors Association*, *20*(7), 810–815. https://doi.org/10.1016/j.jamda.2019.01.139

Moore, G., Campbell, M., Copeland, L., Craig, P., Movsisyan, A., Hoddinott, P., Littlecott, H., O'Cathain, A., Pfadenhauer, L., Rehfuess, E., Segrott, J., Hawe, P., Kee, F., Couturiaux, D., Hallingberg, B., & Evans, R. (2021). Adapting interventions to new contexts-the ADAPT guidance. *BMJ (Clinical research ed.)*, *374*, n1679. https://doi.org/10.1136/bmj.n1679

Nemiroff, L. (2022). We can do better: Addressing ageism against older adults in healthcare. *Healthcare Management Forum*, *35*(2), 118–122. https://doi.org/10.1177/08404704221080882

Ovretveit, J., Mittman, B., Rubenstein, L., & Ganz, D. A. (2017). Using implementation tools to design and conduct quality improvement projects for faster and more effective improvement. *International Journal of Health Care Quality Assurance*, *30*(8), 755–768. https://doi.org/10.1108/IJHCQA-01-2017-0019

Parry, S., Chow, M., Batchelor, F., & Fary, R. E. (2019). Physical activity and sedentary behaviour in a residential aged care facility. *Australasian Journal on Ageing*, *38*(1), E12–E18. https://doi.org/10.1111/ajag.12589

Peters, D. H. (2014). The application of systems thinking in health: Why use systems thinking? *Health Research Policy and Systems*, *12*, 51. https://doi.org/10.1186/1478-4505-12-51

Pinnock, H., Barwick, M., Carpenter, C. R., Eldridge, S., Grandes, G., Griffiths, C. J., Rycroft-Malone, J., Meissner, P., Murray, E., Patel, A., Sheikh, A., & Taylor, S. J. C. (2017). Standards for Reporting Implementation Studies (StaRI) Statement. *BMJ*, *356*, i6795. https://doi.org/10.1136/bmj.i6795

Powell, B. J., Beidas, R. S., Lewis, C. C., Aarons, G. A., McMillen, J. C., Proctor, E. K., & Mandell, D. S. (2017). Methods to improve the selection and tailoring of implementation strategies. The journal of behavioral health services & research, 44, 177-194.

Powell, B. J., Fernandez, M. E., Williams, N. J., Aarons, G. A., Beidas, R. S., Lewis, C. C., McHugh, S. M., & Weiner, B. J. (2019). Enhancing the impact of implementation strategies in healthcare: A research agenda. *Frontiers in Public Health*, *7*. https://www.frontiersin.org/articles/10.3389/fpubh.2019.00003

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., Proctor, E. K., & Kirchner, J. E. (2015). A refined compilation of implementation strategies: Results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, *10*(1), 21. https://doi.org/10.1186/s13012-015-0209-1

Proctor, E. K., Powell, B. J., & McMillen, J. C. (2013). Implementation strategies: Recommendations for specifying and reporting. *Implementation Science*, *8*(1), 139. https://doi.org/10.1186/1748-5908-8-139

Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., Griffey, R., & Hensley, M. (2011). Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, *38*(2), 65–76. https://doi.org/10.1007/s10488-010-0319-7

Rapport, F., Clay-Williams, R., Churruca, K., Shih, P., Hogden, A., & Braithwaite, J. (2018). The struggle of translating science into action: Foundational concepts of implementation science. *Journal of Evaluation in Clinical Practice*, *24*(1), 117–126. https://doi.org/10.1111/jep.12741

Rapport, F., Smith, J., Hutchinson, K., Clay-Williams, R., Churruca, K., Bierbaum, M., & Braithwaite, J. (2022). Too much theory and not enough practice? The challenge of implementation science application in healthcare practice. *Journal of Evaluation in Clinical Practice*, *28*(6), 991–1002. https://doi.org/10.1111/jep.13600

Reid, H., Ridout, A. J., Tomaz, S. A., Kelly, P., & Jones, N. (2022). Benefits outweigh the risks: A consensus statement on the risks of physical activity for people living with long-term conditions. *British Journal of Sports Medicine*, *56*(8), 427–438. https://doi.org/10.1136/bjsports-2021-104281

Rogers, L., De Brún, A., Birken, S. A., Davies, C., & McAuliffe, E. (2020). The micropolitics of implementation: A qualitative study exploring the impact of power, authority, and influence when implementing change in healthcare teams. *BMC Health Services Research*, *20*(1), 1059. https://doi.org/10.1186/s12913-020-05905-z

Saxon, R. L., Gray, M. A., & Oprescu, F. I. (2014). Extended roles for allied health professionals: An updated systematic review of the evidence. *Journal of Multidisciplinary Healthcare*, *7*, 479–488. https://doi.org/10.2147/JMDH.S66746

Sharp, E. A., & Munly, K. (2022). Reopening a can of words: Qualitative secondary data analysis. *Journal of Family Theory & Review*, *14*(1), 44–58. https://doi.org/10.1111/jftr.12443

Slaughter, S. E., Hill, J. N., & Snelgrove-Clarke, E. (2015). What is the extent and quality of documentation and reporting of fidelity to implementation strategies: A scoping review. *Implementation Science*, *10*(1), 129. https://doi.org/10.1186/s13012-015-0320-3

Stanmore, E. K., Mavroeidi, A., de Jong, L. D., Skelton, D. A., Sutton, C. J., Benedetto, V., Munford, L. A., Meekes, W., Bell, V., & Todd, C. (2019). The effectiveness and cost-effectiveness of strength and balance Exergames to reduce falls risk for people aged 55 years and older in UK assisted living facilities: A multi-centre, cluster randomised controlled trial. *BMC Medicine*, *17*(1), 49. https://doi.org/10.1186/s12916-019-1278-9

Sterns, S., Miller, S. C., & Allen, S. (2010). The complexity of implementing culture change practices in nursing homes. *Journal of the American Medical Directors Association*, *11*(7), 511–518. https://doi.org/10.1016/j.jamda.2009.11.002

Vindrola-Padros, C., Eyre, L., Baxter, H., Cramer, H., George, B., Wye, L., Fulop, N. J., Utley, M., Phillips, N., Brindle, P., & Marshall, M. (2019). Addressing the challenges of knowledge co-production in quality improvement: Learning from the implementation of the researcher-in-residence model. *BMJ Quality & Safety*, *28*(1), 67–73. https://doi.org/10.1136/bmjqs-2017-007127

von der Warth, R., Kaiser, V., Reese, C., Brühmann, B. A., & Farin-Glattacker, E. (2021). Barriers and facilitators for implementation of a complex health services intervention in long-term care homes: A qualitative study using focus groups. *BMC Geriatrics*, *21*. https://doi.org/10.1186/s12877-021-02579-y

Wagg, A., Hoben, M., Ginsburg, L., Doupe, M., Berta, W., Song, Y., Norton, P., Knopp-Sihota, J., & Estabrooks, C. (2023). Safer Care for Older Persons in (residential) Environments (SCOPE): A pragmatic controlled trial of a care aide-led quality improvement

intervention. *Implementation Science*, *18*(1), 9. https://doi.org/10.1186/s13012-022-01259-8

Westerlund, A., Nilsen, P., & Sundberg, L. (2019). Implementation of implementation science knowledge: The research-practice gap paradox. *Worldviews on Evidence-Based Nursing*, *16*(5), 332–334. https://doi.org/10.1111/wvn.12403

Wilson, P., & Kislov, R. (2022). Implementation Science. *Elements of Improving Quality and Safety in Healthcare*. https://doi.org/10.1017/9781009237055

Wiltsey Stirman, S., Baumann, A. A., & Miller, C. J. (2019). The FRAME: An expanded framework for reporting adaptations and modifications to evidence-based interventions. *Implementation Science*, *14*, 1-10. https://doi.org/10.1186/s13012-019-0898-y

World Health Organization. (2022). *Physical activity*. Physical Activity. https://www.who.int/news-room/fact-sheets/detail/physical-activity

Zaiț, A., Bratianu, C., Vătămănescu, E. M., Andrei, A. G., & Horodnic, I. A. (2021). Interdisciplinarity: A complexity approach towards academic research. *Systems Research and Behavioral Science, 38*(3), 294-306.

Appendix A

Search Strategy

Database(s): **Ovid MEDLINE(R) and In-Process, In-Data-Review & Other Non-Indexed Citations** 1946 to March 12, 2021
Search Strategy:

#	Searches
1	aged/ or frail elderly/ or institutionalized elderly/ or very elderly/ or nursing home patient/
2	(old* adj2 (person* or people)).mp.
3	(Centenarian* or elder* or Nonagenarian* or Octogenarian* or pension* or senior*).mp.
4	or/1-3
5	Homes for the Aged/ or Long-Term Care/ or Residential Facilities/ or Respite Care/ or Skilled Nursing Facilities/
6	((long-term or resident* or respite) adj2 (care or home)).mp.
7	nursing home*.mp.
8	(home* adj2 aged).mp.
9	skilled nursing facilit*.mp.
10	or/5-9
11	Dance Therapy/ or Endurance Training/ or Exercise Therapy/ or Exercise/ or Gymnastics/ or Jogging/ or Muscle Stretching Exercises/ or Physical Conditioning, Human/ or Resistance Training/ or Running/ or Stair Climbing/ or Swimming/ or Tai Ji/ or Walking/ or Yoga/
12	(climbing or danc* or endur* or exercise* or jogging or walking or gymnastics or stretching or (resistance adj2 train*) or run* or mov* or swim* or tai chi or tai ji or yoga or workout or work*out or physical activit* or mobility).mp.
13	or/11-12
14	"delivery of health care"/ or "diffusion of innovation"/ or Health Plan Implementation/ or implementation science/ or information dissemination/ or learning health system/ or Program Development/ or Quality Assurance, Health Care/ or Quality Improvement/ or quality indicators, health care/ or Total Quality Management/ or Evidence-Based Practice
15	(Implementation adj2 (stage or science)).mp.
16	(implement* or adopt* or quality improv* or complex interven* or disseminat* or innovat* or uptake).mp.

17	or/14-16
18	4 and 10 and 13 and 17

Appendix B

Semi-Structured Interview Guide

Thank you for taking the time to participate in this interview. The purpose of this discussion is to explore your experiences and perspectives on the process of implementing physical activity interviews in long-term care.

This interview is semi-structured, meaning that while we have a set of guiding questions, we encourage open conversation and value any additional thoughts you may wish to share. There are no right or wrong answers—our goal is to learn from your experiences.

Your participation is voluntary, and you are welcome to decline to answer any question or end the interview at any time. With your permission, we would like to record this conversation to ensure accuracy in our analysis. All responses will be kept confidential and used solely for research purposes.

Before we begin, do you have any questions?

1) Can you tell me a little about yourself?
2) Can you tell me about your experience with implementation research?
    a. How did you come across this field of research?
    b. How long have you been engaged in this type of work?
3) What do you find challenging about implementing programs/interventions in long-term care? / What do you find makes implementing programs/intervention in long-term care easier?
4) What do you find challenging about implementing physical activity programs in long-term care? What do you find makes implementing physical activity programs/intervention in long-term care easier?
5) Currently, there is a tendency to favour research that reports on implementation outcomes rather than implementation process. Can you tell me a little about your thoughts on implementation research and its place in health settings.