THE IMPACT OF PATIENT ASSESSMENTS ON NURSE FEARS, PATIENT FALLS, AND FUNCTIONAL ABILITY IN SENIORS WITH DEMENTIA

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In Partial Fulfillment of the Requirements
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by
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Theresa Gloria Fitzgerald, candidate for the degree of Doctor of Philosophy in Clinical Psychology, has presented a thesis titled, *The Impact of Patient Assessments on Nurse Fears, Patient Falls, and Functional Ability in Seniors with Dementia*, in an oral examination held on July 22, 2013. The following committee members have found the thesis acceptable in form and content, and that the candidate demonstrated satisfactory knowledge of the subject material.

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ABSTRACT

Falls are a highly prevalent problem and a leading cause of pain among older adults (Hawk, Hyland, Rupert, Colonvega, & Hall, 2006; Proctor & Hirdes, 2001). For some individuals, actual or potential pain and falls lead to the development of fear of pain and fear of falling. It has been suggested that fears regarding pain and falling increase the likelihood of experiencing a subsequent fall and related pain (Brummel-Smith, 1989). Fear-avoidance models of pain and falls suggest that individuals who are afraid of pain and falling are more likely to engage in avoidance behaviours, which may result in deconditioning. This deconditioning, in turn, may result in increased risk for experiencing pain and falls (e.g., Vlaeyen & Linton, 2000). Support has been found for a direct relationship between fear of falling and falls, suggesting that fear has a negative effect on postural control (Carpenter, 2006). Hadjistavropoulos and colleagues (2004) proposed a modified fear-avoidance model for seniors with dementia in which caregiver fears and worries about their care-recipient experiencing falls and pain are thought to be linked to activity restrictions among care-recipients. Previous research with seniors in long-term care facilities (LTC) has led to support for the extension of the model to caregivers (Dever Fitzgerald, Hadjistavropoulos, & MacNab, 2009). This study extended previous research by examining fall risk in a subset of LTC residents based on a physiotherapy and a cognitive battery and actual fall rate. Seniors with dementia from 26 LTC facilities were randomized to control (care as usual) and experimental (fall risk assessment) groups. For the experimental group, all nursing staff were given resident-specific feedback regarding each care recipient's level of fall risk based on the assessment. Nurses’ fears about patient falls, as well as falls and restraint use were
tracked for the four month periods that preceded and followed the assessment. Prior to the assessment, nurses’ fears about patient falls were found to be related to restraint use in both groups. Given that previous research has established that nurses' fears about patient falls are not always related to physical risk for falls (Dever Fitzgerald et al., 2009), such nurse fears may be excessive and therefore lead to unnecessary restraint use. Post-assessment, no relationship was found between nurses’ fears about patient falls and restraint use in the experimental group, suggesting that nurses may be basing their decisions to restrain residents on more objective criteria rather than their fear. Not surprisingly, restraint use was associated with decreased ability to perform activities of daily living (ADLs). Fall rates did not differ between the two groups. Implications and directions for future research are discussed.
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DEDICATION

This dissertation, and my doctoral degree, belong not only to me but to the many people who have supported me along this journey. Thank you to my parents, Michael and Brenda, to my siblings Alex, Sarah, and Matt, and the rest of my family for your unending and unwavering love and support. I could not have done this without you.

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<tr>
<td>Activities of Daily Living</td>
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<td>American Psychiatric Association</td>
<td>APA</td>
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<td>Canadian Study of Health and Ageing</td>
<td>CSHA</td>
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<td>Comparative Fit Index</td>
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<td>Cognitive Performance Scale</td>
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<td>Diagnostic and Statistical Manual of Mental Disorders IV</td>
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<td>Frontal Behavioural Inventory</td>
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<td>International Association for the Study of Pain</td>
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<td>Instrumental activity of daily living</td>
<td>IADL</td>
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<tr>
<td>Licensed practical nurse</td>
<td>LPN</td>
</tr>
<tr>
<td>Long-term care</td>
<td>LTC</td>
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<td>Medication Quantification Scale</td>
<td>MQS</td>
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<td>Mini Mental Status Examination</td>
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<td>Minimum Data Set</td>
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<td>Analysis of Variance</td>
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<td>Nonsteroidal anti-inflammatory drugs</td>
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<td>Older American Resource Services</td>
<td>OARS</td>
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<td>Post-intervention</td>
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<td>Pro re nata</td>
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<td>Performance Oriented Mobility Assessment</td>
<td>POMA</td>
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<tr>
<td>Regina Qu’Appelle Health Region</td>
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Overview

Falls in older adults are highly prevalent. It is estimated that approximately one in three older adults residing in the community experience at least one fall annually (Bergland, Jarnlo, & Laake, 2003). Prevalence rates of falls among residents of long-term care (LTC) facilities are even higher, with approximately 1.5 falls per resident annually. Fall-related injuries are also common among residents of LTC facilities, with approximately 4% of falls in these residents resulting in fractures, and 12% resulting in head trauma, soft-tissue injuries, or severe lacerations (Rubenstein, 2006; Rubenstein, Josephson, & Osterweil, 1996; Vu, Weintraub, & Rubenstein, 2006). Falls represent a leading cause of pain in this population. Not surprisingly, pain has also been found to be very prevalent among older adults, with estimated rates ranging from 25-80% across epidemiological studies (Edwards et al., 2006; Schofield, 2006). It has been demonstrated that pain is significantly underassessed and undertreated among seniors, particularly in older adults who have difficulty communicating the presence of pain as a result of cognitive impairments.

Fear avoidance models of pain (e.g., Vlaeyen & Linton, 2000) have been developed to explain the development of chronic pain and disability. These models propose that chronic pain and disability are developed through physical deconditioning resulting from an avoidance of activities (Asmundson, Norton, & Norton, 1999; Vlaeyen & Linton, 2000). Fear of falling has been proposed to play a similar role. Specifically, an older adult who develops a fear of falling is more likely to avoid activity, which leads to physical deconditioning, and a paradoxical increase in the risk of falling. Fear of falling has been found to be highly prevalent among older adults, including older adults who
have not previously experienced a fall (Howland et al., 1998). Hadjistavropoulos and colleagues (2004) proposed a modified fear-avoidance model which incorporates fear of pain and fear of falling as predictors of future falls and disability. This model is also the first to include a role for those responsible for the care of an individual with dementia. Specifically, Hadjistavropoulos and colleagues (2004) suggest that the caregivers’ fear of falling should be considered in the prediction of future falls and disability among those who rely on others for their care. This model formed the theoretical basis for this study.

Previous research has already examined the relationship between caregivers’ attitudes about pain and falls and the incidence of falls, pain, and functional decline among older adults residing in LTC. Specifically, Dever Fitzgerald, Hadjistavropoulos, and MacNab (2009) found that nurse fears that a patient might fall were predictive of restraint use, and this restraint use was further predictive of fall-related injuries. In addition, it was found that restraint use was associated with a decreased ability to perform activities of daily living (ADLs). The goal of the current study was to determine whether the provision of resident-specific feedback regarding actual fall risk can reduce excessive caregiver fear about the possibility that a resident might fall, as well as decrease unnecessary restraints/activity restrictions. Participants in the study included individuals with dementia residing in 26 different LTC facilities in Saskatchewan. A subset of five professional caregivers who work frequently with each participating resident (e.g., Registered Nurses [RNS] and Special Care Aides [SCAs]) were interviewed to determine the extent to which they feared that a particular resident would fall. Following a four-month baseline observational period, participants who were randomly assigned to the experimental group underwent a physiotherapy assessment. In addition, a RN who works
regularly with the participant was designated the primary professional caregiver and provided information about the participant’s cognitive functioning by completing a frontal impairment symptom battery. Based on these assessments, participants in the experimental group were designated as a high, medium, or low risk for future falls, and these results were presented to all professional caregivers working with the participating resident. The subset of five professional caregivers were then re-administered the measure of fear regarding the possibility of resident falls. An additional four month observational follow-up period ensued to determine whether the presentation of specific assessment information reduced unnecessary fear and restrictions, as well as the incidence of falls.
1. LITERATURE REVIEW

1.1 Pain

Pain is extremely prevalent, particularly among older adults. It is estimated that chronic pain affects at least 50% of seniors living in the community, and approximately 80% of residents of LTC facilities (Charlton, 2005). The International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merskey & Bogduk, 1994, p. 211). This definition reconceptualised the way pain was previously defined. Within this definition, tissue damage is no longer a necessary condition for the experience of pain. In addition, IASP states that the inability to verbally communicate the presence of pain does not negate the possibility that an individual is experiencing pain, and is in need of appropriate pain management interventions (IASP, 2005). IASP also emphasizes the subjective nature of the pain experience (Aydede, 2005). Given this subjective nature, it is evident that pain is not solely a physical experience but rather includes physical, psychological, social, and emotional components (Hadjistavropoulos & Craig, 2004).

1.2 Theories of pain

Pain is a common experience across the life-span, but one that is complex and was once little understood. Various theories of pain have been proposed over the past three centuries. The first theory of pain by Descartes in 1644 suggested a direct relationship between the physical sensation on the body and the perception of pain in the brain. According to this Specificity Theory of pain, higher level cognitive processes were not involved in the pain experience. As such, early researchers in the field conceptualized
the pain experience as occurring through a straight sensory-projection system with injury activating a specific pain center in the brain. Proponents of this theory of pain believed pain could be treated by creating specific brain lesions that would stop the transmission of the painful stimuli (see Melzack & Katz, 2004 for a review).

According to Melzack and Katz (2004), other theories of pain followed Descartes’ specificity theory, including pattern theories developed by Goldscheider (1894). However, these theories continued to view the brain as a passive receiver of pain signals. It was not until the development of the Gate Control theory of pain that the brain was conceptualized to be influencing the pain experience, and the subjectivity of pain was fully appreciated.

1.2.1 The gate control theory and the neuromatrix model of pain. The Gate Control Theory of pain was originally developed by Melzack and Wall (1965), and was the first theory to consider the notion that pain is not exclusively a physical experience. The theory posits the presence of several ascending sensory pathways transmitting information to the brain, and several descending pathways affecting the transmission of nociceptive messages. Changes to both ascending and descending pathways have the ability to influence the pain experience. This is in contrast to Descartes’ notion of the direct relationship between sensory stimulation and the perception of pain.

The Gate Control Theory of pain moves away from pre-existing viewpoints suggesting that there is a direct one-to-one relationship between the sensation and the perception of pain. The theory also purports the presence of a gating mechanism in the spinal cord which can be opened or closed to either facilitate or inhibit the pain experience. That is, the opening and closing of the gate is influenced by activity in small-
and large-diameter fibres involved in the physical experience of pain, as well as by nerve impulses descending from the brain (Melzack & Wall, 1965). Regarding brain activity, for example, Melzack and Wall suggest that actively attending to the pain experience will open the gate and allow pain messages to be transmitted to the brain. Conversely, diverting attention away from the pain experience (e.g., via distraction) closes the gating mechanism and decreases the intensity of the pain experienced.

Melzack and Wall’s Gate Control Theory (1965) was in sharp contrast to Descartes’ specificity theory of pain and revolutionized the field of pain research (DeLeo, 2006). The Gate Control Theory of pain was the first theory to suggest that the brain is not merely a recipient of pain signals from the body, but rather, plays a dynamic role in the pain experience (Melzack, 1999). According to these theorists, the pain mechanism is affected by signals descending from the brain (e.g., thought processes, attention, mood). This incorporation of higher mental processing, through the consideration of variables such as thought processes and attention, acknowledged the importance of psychological factors (once deemed merely reactions) in the experience of pain. As such, the Gate Control Theory of pain underscored the need for psychological/behavioural assessment and treatment among individuals experiencing pain.

The Gate Control Theory of pain has been widely studied and supported in the research literature. Wall and Sweet (1967) were among the first to empirically test it. The authors applied stimulation to the sensory nerves or roots supplying the painful areas of adult participants who were in pain. Results indicated that, following stimulation, pressure to the previously sore areas did not produce pain. Moreover, 50% of the participants experienced relief from their pain for 30 minutes following a two minute
stimulation period. Higgins, Tursky, and Schwartz (1971) also found support for the Gate Control Theory of Pain in a sample of healthy adult males. Participants received nociceptive stimulation via a 60 hertz constant shock to the left forearm. The intensity of the stimulus gradually increased and participants were asked to identify a) when they first detected the painful stimulation; b) when the stimulation first became painful or annoying; c) when the stimulation reached a level they would refer to as ‘painful’; and d) when they felt they could not tolerate the next increase in intensity. Large fibers were activated through the application of pressure via a blood pressure cuff placed just distally of the electrode delivering the shock. Shocks were then applied during the inflation period of the blood pressure cuff. As a control, some trials were completed with the blood pressure cuff placed on the opposite arm as the electrode. Results indicate that the presence of the blood pressure cuff on the arm receiving the painful stimulus resulted in decreased pain ratings by participants. When the blood pressure cuff was placed on the opposite arm no changes in pain intensity ratings were observed. These results suggest that the stimulation provided by the blood pressure cuff, when placed on the arm receiving the painful stimulation, produced activity in the large fibers, thereby closing the pain gate. Numerous other studies have since provided consistent and strong support for the theory (McMahon & Koltzenburg, 2005; Melzack & Wall, 1996).

As a complement to the Gate Control Theory of pain, Melzack (1990) developed the Neuromatrix Model of pain. Melzack noted that the Gate Control Theory of Pain could not account for a phenomenon known as phantom limb pain – the sensation of pain among individuals whose limbs have been amputated, or perceptions of pain in paraplegics. Melzack proposed that an anatomical representation of the body, known as
the neuromatrix, exists in the brain. It is composed of a widespread network of neurons consisting of loops between the thalamus and cortex, and between the cortex and the limbic system (Melzack & Katz, 2004). The neuromatrix is believed to influence sensory, affective, motivational, and cognitive aspects of the pain experience. The Neuromatrix Model of pain suggests that continuous streams of information from various systems within the body form neurosignatures (patterns of neural connections) in the neuromatrix. This stream of information is involved in the individual’s perception of the intensity of the pain they are experiencing (Melzack, 1990). The Neuromatrix model of pain is a relatively new development in the field of pain research. As such, no large scale investigations testing this model have been completed to date. This is an important area for future research.

The Gate Control Theory of pain and the Neuromatrix Model were important and revolutionizing developments for both theoretical and clinical aspects of pain research and treatment. Moreover, the theories have withstood the test of time and remain highly influential (Dickenson, 2002; Melzack & Katz, 2004). They also underscore the subjectivity that is inherent in the pain experience, and the associated difficulties in assessing pain among patients who have serious limitations in ability to communicate as a result of dementia.

1.2.2 Biopsychosocial models of pain. Consistent with the Gate Control Theory of Pain proposed by Melzack and Wall (1965), which integrates the role of psychological factors in the pain experience, biopsychosocial models of pain suggest that biological, psychological, and social factors are all involved in the perception of pain.

Biopsychosocial models of pain incorporate the more narrow biomedical and
psychodynamic positions of pain and form a broader, more multidimensional, and inclusive perspective on pain (see Asmundson & Wright, 2004 for a review). According to biopsychosocial models of pain, the focus is on illness behaviours of the individual, namely, the ways in which pain symptoms are perceived and evaluated. These illness behaviours are dynamic, with the relative contribution of biological, psychological, and social factors in the maintenance of symptoms changing over time. It is suggested that symptoms typically begin through the development of biological factors, and that these illness behaviours are then reinforced by psychological and social factors such as attention from loved ones (see Asmundson & Wright, 2004). Biopsychosocial models of pain may be particularly relevant in the context of the current investigation given the significant role that caregivers play in the everyday care of individuals with dementia who reside in LTC facilities. The psychological (e.g., fear displayed by the caregivers) and social (e.g., performing activities for the residents to avoid the possibility of a fall) factors may serve to maintain disability in residents over time.

Biopsychosocial models of pain that are of direct relevance to this study are fear-avoidance models (e.g., Vlaeyen & Linton, 2000). These models are based on the premise that injured individuals who are excessively avoidant of activity, in order to decrease the likelihood of perceiving pain, become deconditioned, risking re-injury and, paradoxically, increasing the probability for future pain problems. These models and related evidence are reviewed in greater depth later in the manuscript.

1.3 Pain in Seniors

Older adults represent an increasingly large segment of the population as the “baby boomer” generation continues to age. In 2005, older adults aged sixty-five and
over accounted for approximately 13% of the population. This proportion is expected to climb to 25% by the year 2036 (Statistics Canada, 2005). Seniors are at an increased risk for pain as many chronic conditions, of which pain is a symptom, are more prevalent among older adults. One study suggested that 80% of individuals sixty-five years of age and older experience pain as a result of one or more chronic illnesses (Schofield, 2006). In addition, seniors are more likely than younger adults to develop chronic pain associated with chronic conditions, and have a more difficult time recovering from the pain (Edwards, 2006).

Although some conflicting results have emerged (Gagliese & Melzack, 1997; Gibson, Katz, Corran, Farrell, & Helme, 1994), the majority of the literature suggests that chronic pain increases with age. According to Gibson (2007), acute pain affects approximately 5% of the population across all age groups, while chronic pain increases until the seventh decade when a plateau or slight decline in prevalence rates is noted. Gibson (2007) suggests several possible reasons for the increased prevalence of pain in older populations, including a possible decline in endogenous pain inhibitory mechanisms and prolonged post-injury tenderness in older age. Moreover, pain is prevalent in this population regardless of the living arrangement of the older adult. Miro et al. (2007) found that there was no relationship between the incidence of pain and the living arrangement of the older adult (i.e., living independently in the community vs. living in a LTC facility). Prevalence rates of pain in seniors residing in the community are estimated to be between 25-50% (Jones, 2006), and this rate has been suggested to increase to 80% among older adults residing in LTC (Parmelee, Smith, & Katz, 1993). This increased rate among older adults residing in LTC may be the result of more
accurate reporting/documentation in this population. Although research supports the notion that chronic conditions and associated pain are common in this age group, an exact prevalence rate of pain among older adults is difficult to determine. Reasons for this difficulty include failure to ask all necessary questions about pain, the high mortality and attrition rates of seniors participating in research studies, and the fact that pain is often not the primary focus of research studies (Helme & Gibson, 1999).

Despite the high prevalence rates of chronic conditions and associated pain among older adults, pain in this population remains underassessed and undertreated (Martin, Williams, Hadjistavropoulos, Hadjistavropoulos, & MacLean, 2005). The underassessment and undermanagement of pain is seen both in seniors residing in the community and those in LTC facilities, and has been recognized as one of the most pressing ethical issues for pain clinicians (Ferrell et al., 2001). For example, using data from the Minimum Data Set (MDS; Mor, Morris, Hawes, Fries, & Phillips, 1995) from all nursing homes in the United States, it was determined that approximately 15% of residents presented with clinically significant pain (at moderate to severe levels) and 3.7 percent of residents reported experiencing excruciating pain at least one day of the previous week. MDS data showed that 41.2% of those older adults experiencing moderate pain were found to have a similar or higher levels of pain 60-180 days later (Teno, Kabumoto, Wetle, Roy, & Mor, 2004; Teno, Weitzen, Wetle, & Mor, 2001). Potential explanations for the undermanagement of pain among older adults residing in LTC facilities include a fear of opioid dependency, the incidence of side effects caused by many pain medications, and the pain beliefs of nursing home staff and family members of the older adult (Jones et al., 2005).
Although evidence is available suggesting that seniors are at an increased risk for experiencing pain, until recently, older adults were frequently overlooked in research studies as it was thought that pain was a normal part of aging and therefore unavoidable (Ferrell, 1996; Martin et al., 2005). In recent years, however, research has increasingly focused on the assessment and management of pain in older adults. For example, the year 2007 marked IASP’s global year against pain in older persons (Gibson, 2007).

One confounding factor in the assessment and management of pain in older adults is the high prevalence of dementia in this population. Specifically, seniors with dementia may be unable to verbally communicate the presence of pain to their caregivers and, as such, are at greater risk for inadequate pain management. The current study focused exclusively on older adults afflicted with dementia who are unable to make decisions regarding their own care as a result of their cognitive impairment.

1.3.1 Dementia. Many older adults residing in LTC facilities who experience chronic pain, often as a result of falls, also present with cognitive impairments as a result of dementia. The term dementia refers to a group of disorders characterized by the development and progressive loss of cognitive and intellectual functioning. A variety of dementias have been identified including Alzheimer’s disease, vascular dementia, and dementia due to Pick’s disease or Parkinson’s disease (American Psychiatric Association, 2005). The cause of many dementias remains unknown today. According to Goedert and Spillantini (2006), the past 25 years have seen a proliferation in research which has allowed for a basic understanding of the pathological processes associated with Alzheimer’s disease. The behavioural symptoms of Alzheimer’s disease have been attributed to a series of abnormalities that affect various brain regions. These
abnormalities result in neuronal damage and death, causing areas of the brain where these neurons terminate to experience reduced levels of synaptic proteins. Two hallmark features of the brain in Alzheimer’s disease are amyloid plaques and neurofibrillary tangles. In the Alzheimer’s disease brain, protein fragments known as amyloids, which are broken down and eliminated in healthy brains, accumulate between neurons causing hard amyloid plaques to develop. Neurofibrillary tangles are made up of tau proteins, and these tau proteins contribute to the development of microtubules in the brain. Microtubules are responsible for transporting nutrients and other proteins within the neuron. However, in the Alzheimer disease brain the formation of neurofibrillary tangles causes microtubule break down, stopping the transportation of nutrients, ultimately resulting in neuronal death. The neurofibrillary tangles and amyloid plaques may cause significant atrophy to the entire brain, resulting in deficits in all areas of cognitive functioning (Zilmer, Spiers, & Culbertson, 2007).

Alzheimer’s disease is the most common form of degenerative dementia (e.g., Goedert & Spillantini, 2006; Rogan & Lippa, 2002). Given the increase in the proportion of older adults in the population as a result of the greying of the “baby boomer” generation, it is not surprising that the prevalence of dementias such as Alzheimer disease has also increased with time. However, an exact prevalence rate of Alzheimer’s disease and other dementias is difficult to determine, partly because a definitive diagnosis of Alzheimer’s disease requires an autopsy. Nonetheless, according to the Alzheimer’s Society of Canada (2009), approximately half a million Canadians (or one in eleven) are currently suffering from Alzheimer’s disease or a related dementia.
Three sets of criteria exist today to assist in the accurate diagnosis of dementia. The American Psychiatric Association (APA)’s Diagnostic and Statistical Manual of Mental Disorder (DSM-IV; American Psychiatric Association, 2005) includes diagnostic criteria for a variety of dementias including dementia of the Alzheimer’s type and vascular dementia. According to the DSM-IV, dementia involves multiple cognitive deficits including memory impairment, and at least one of the following: aphasia, apraxia, agnosia, or a disturbance in executive functioning. Individuals with dementia may demonstrate deficits in areas such as language, attention, memory, abstract reasoning, and personality. Moreover, the DSM-IV indicates that the decline in cognitive functioning must result in significant impairment in occupational or social functioning.

In particular, disturbances in executive function are often considered a hallmark feature of Alzheimer’s disease and other dementias. In fact, APA (2005) includes impairment in executive function as a diagnostic criterion for a diagnosis of dementia. Executive functioning involves the ability to think abstractly, plan, initiate, sequence, monitor, and stop complex behaviour (e.g., American Psychiatric Association, 2005; Diesfeldt, 2004). Impairment in executive functioning may manifest itself in difficulty with inhibition and suppression of behavioural responses (Diesfeldt, 2004). These disturbances in executive functioning involving impairment in the ability to plan and initiate motor sequences were particularly relevant for the current investigation as it was expected that an increase in frontal deficits, as a result of dementia, would increase the likelihood that the resident would experience a fall.

1.3.2 The relationship between pain and dementia. Although pain is typically underassessed and undermanaged among all seniors (Martin et al., 2005), the detection
and management of pain among seniors with dementia is particularly challenging given the communication deficits, sensory impairments, and difficulties with memory (Ferrell, 1996; Goldstein & Morrison, 2005) associated with dementia. This represents a serious problem because seniors with dementia experience pain as frequently as their counterparts with no cognitive impairments (Proctor & Hirdes, 2001). As a result of the limited ability to communicate that often accompanies severe cognitive impairment, these older adults may be unable to self-report their pain to caregivers, and therefore are at an increased risk for undermanaged pain. Moreover, even in less severe stages of dementia when some ability to communicate remains intact, the self-report may be unreliable (Hadjistavropoulos, Craig, Martin, Hadjistavropoulos, & McMurty, 1997). To further complicate matters, behavioural manifestations of pain in this population are often attributed to behavioural difficulties, as pain in older adults with cognitive impairments is often manifested as agitation, decreased activity, and increased confusion (Pautex et al., 2006). Furthermore, there is also significant overlap between symptoms of pain and symptoms of delirium, making accurate pain assessment in this population increasingly challenging (Hadjistavropoulos, Voyer, Sharpe, Verreault, & Aubin, 2008).

In a study examining pain treatment in older adults with and without cognitive impairment (Morrison & Sui, 2000), it was found that individuals with dementia were prescribed and administered fewer analgesic medications than older adults who were cognitively intact. In this study, daily pain measurements for the seniors without cognitive impairments were obtained, and these ratings were used to approximate pain levels among the older adults with dementia. More than 40% of the adults with no cognitive impairments reported severe to very severe pain, and it can be expected that the
seniors with cognitive impairments were experiencing similar pain levels given that all participants had experienced hip fracture. However, the older adults without cognitive impairments recovering from hip fracture received three times the amount of opioid analgesia as the older adults with dementia (Morrison & Sui, 2000). This finding has been corroborated in several other investigations (Horgas, Nichols, Schapson, & Vietes, 2007; Kaasalainen et al., 1998; Proctor & Hirdes, 2001). In addition, Scherder and Bouma (1997) found that, although pain conditions were equally present in both seniors with and without dementia residing in a LTC facility, the use of nonsteroidal anti-inflammatory drugs (NSAIDs) and analgesic non-NSAIDs was lower among older adults with cognitive impairments.

Several reasons for the undermedication of seniors with dementia have been suggested. Some have hypothesized that one reason for the reduced use of pain medications among seniors with dementia is that seniors in the early and middle stages of Alzheimer’s disease suffer less pain, potentially as a result of a change in its affective component (Scherder & Bouma, 1997). However, research using fMRI has refuted such hypotheses. For example, an fMRI study found seniors with dementia actually show a greater amplitude and duration of pain related activity in sensory, affective, and cognitive processing regions of the brain when compared to age-matched seniors with no cognitive impairments (Cole et al., 2006). Based on the evidence of undertreatment and underdetection of pain, the present study focused on prevention of pain through the prevention of injurious falls.

Given that evidence suggests that seniors with dementia experience greater pain intensity for a longer duration (Cole et al., 2006), and receive fewer pain medications
(e.g., Morrison & Sui, 2000) than seniors without cognitive impairments, it is not surprising that the undertreatment of pain among older adults, particularly those afflicted with dementia, has significant consequences. Specifically, pain among older adults has been associated with significant levels of disability. In the Canadian Study of Health and Ageing (CSHA; Scudds & Ostbye, 2001), a sample of 5703 seniors residing in the community completed questionnaires measuring pain, pain intensity, and pain interference. According to Scudds and Ostbye (2001), 59.3% of female participants and 48.4% of male participants reported experiencing pain in the four weeks prior to the interview. Thirty five per cent of females and 29% of males reported that their pain interfered moderately with their ability to move. The relationship between pain severity/intensity and perceived levels of physical disability has also been found by Edwards (2006).

Chronic pain has also been associated with psychological factors, such as depression. Schuler, Njoo, Hestermann, Oster, and Hauer (2004) found that older adults with chronic pain were more depression-prone when compared with older adults who were not experiencing chronic pain. In fact, it has been suggested that as many as 21% of individuals with chronic pain experience comorbid depression (Tyrer, Capon, Peterson, Charlton, & Thompson, 1989). Individuals with chronic pain may also develop fear and anxiety surrounding the experience of pain, and begin to avoid activities during which the experience of pain is likely. The current investigation was based on the relationship of fear and avoidance which is reviewed later in this document.
1.4 Falls

Pain and injury among older adults frequently occur as a result of falls. Although falls occur across all age groups, they can be particularly devastating among older adults. This is due to the strong likelihood of injury as a result of an increased prevalence of chronic diseases and age-related physiological changes seen in this population (Rubenstein, 2006). Hawk and colleagues (2006) have shown that approximately one in three older adults will experience a fall annually, and approximately one half of these individuals will experience more than one fall per year. Rubenstein (2006) states that the prevalence rate of falls in individuals over the age of 65 still residing in the community is forty per cent. The prevalence of falls increases to approximately 1.5 falls per resident among older adults residing in LTC facilities (Rubenstein, 2006; Rubenstein et al., 1996; Vu et al., 2006). One possible explanation for this increased prevalence is the increased frailty and older age of those individuals who reside in LTC facilities. However, this large difference in the prevalence rates of falls between seniors residing in the community and those residing in LTC facilities may be artificially inflated as a result of potential under reporting of falls in the community (Rubenstein et al., 1996). Given the high prevalence of falls, fall prevention in LTC facilities is a critical initiative. The current study aimed to decrease the incidence of falls in seniors with dementia residing in these facilities through the presentation of resident-specific assessment information to professional caregivers. It was expected that this individualized information would assist nurses in making accurate determinations about an individual’s risk for future falls, thereby reducing excessive fear and unnecessary restrictions, resulting in fewer falls in the follow-up portion of the study.
1.4.1 Consequences of falls. The consequences of falls among older adults can be numerous and severe. Experiencing a fall may increase the risk of mortality and morbidity, and decrease functional ability. Physical injury is the most obvious consequence of a fall (e.g., Brummel-Smith, 1989). According to Rubenstein (2006), unintentional injuries are the fifth leading cause of death among seniors (following cardiovascular disease, cancer, stroke, and pulmonary disorders), and approximately two thirds of these deaths occur following a fall. Moreover, Rubenstein (2006) suggests that approximately five per cent of falls among healthy older adults residing in the community result in fractures or require hospitalization. The risk of injury and hospitalization is doubled among individuals over the age of seventy-five.

Previous research on falls among seniors who are residing in LTC indicates a high prevalence of falls and fall-related injuries among institutionalized older persons. For example, in a three-year longitudinal study of 121 LTC residents, Jensen, Lundin-Olsson, Nyberg, and Gustafson (2002) found that 62.8 % of residents experienced at least one fall over the course of the study, resulting in a total of 428 falls. Of these falls, 28% resulted in at least one injury. Researchers have estimated that seniors with dementia may be as much as two times as likely to experience a fall, are more likely to be injured as a result of falls, and may recover less quickly than cognitively intact seniors (Shaw, 2002; van Doorn et al., 2003). In a previous investigation including 84 seniors with dementia residing in long-term care facilities, 47.6% of participants experienced a fall over a three-month period, and 21.4% were injured as a result (Dever Fitzgerald et al., 2009).

In addition to their physical consequences, falls among older adults have also been shown to have social, emotional, and psychological consequences. Following a fall,
Seniors may reduce their activity, resulting in a loss of function and independence as well as decreased social interaction (Murphy, Dubin, & Gill, 2003; van Doorn et al., 2003). In addition, falls can lead to a decrease in one’s general health (Gray-Miceli, Waxman, Cavalieri, & Lage, 1994). Rubenstein (2006) indicates that approximately one in forty older adults who experience a fall are hospitalized as a result of the fall. In addition, he indicates that only half of the individuals admitted to the hospital following a fall are typically still living one year later.

1.4.2 Risk factors for falls. Given the numerous severe consequences associated with falls in older adults with dementia, it is important to have a clear understanding of the risk factors associated with falls. The identification of individual risk factors for experiencing a fall was a crucial component of the current investigation, and this information was presented to all professional caregivers working with the participating resident to determine whether resident-specific risk assessment information can reduce excessive fear that a resident might experience a fall, as well as excessive restraint use/activity restriction.

Previous research has identified a number of risk factors that contribute to the high incidence of falls among older adults (Gray-Miceli et al., 1994; Rubenstein, 2006; Rubenstein et al., 1996). Risk factors for falls can be categorized as host factors (i.e., factors internal to the individual, such as dizziness) and environmental factors (i.e., external risk factors, such as loose carpets). Among older adults residing in LTC facilities, host factors typically play a more prominent role (Rubenstein et al., 1996) as such facilities are often designed to reduce environmental factors that could increase fall risk. In addition, assessing the role of environmental factors in falls occurring in LTC
facilities can be challenging given that nursing home records are often incomplete, the self-report of many residents may be compromised due to the effects of dementia, and because these facilities may be hesitant to implicate environmental contributors due to liability concerns (Rubenstein et al., 1996; Tinetti, 1987). As such, this study focused primarily on identifying and targeting risk factors for falls that are internal to the individual. Potential risk factors that were included in this study included the presence of cognitive impairments, such as dementia, physical risk factors (e.g., vision problems, chronic conditions), and the use of physical restraints or activity restrictions that serve to restrict the mobility of the individual.

1.4.2.1. Dementia. All participants included in the present study were experiencing cognitive impairments related to dementia. Previous research suggests that individuals with cognitive impairments due to dementia may be at a greater risk for experiencing falls as a result of the impaired judgement, gait, visual-spatial perception, and ability to recognize and avoid environmental hazards that accompany a diagnosis of dementia (Buchner & Larson, 1987; Rubenstein, 1994). In terms of prevalence, seniors with dementia are approximately twice as likely to experience a fall as older adults without cognitive impairments (Shaw, 2002; van Doorn et al., 2003). Specifically, van Doorn and colleagues reported a fall rate of 4.05 falls per year among seniors with dementia residing in LTC facilities compared to 2.33 falls per year among LTC residents without cognitive impairments. Individuals with dementia may also be at an increased risk for fall-related injuries and are typically less able to recover from fall-related injuries than seniors without dementia (Shaw, 2002). van Doorn and colleagues (2003) suggested that older adults with dementia were more likely to be injured as a result of a fall than
their counterparts without cognitive impairments. This increased injury rate among seniors with dementia is likely due to the higher prevalence rate of falls in this population, putting these individuals at greater risk for experiencing an injury.

Despite the increased risk and prevalence of falls among older adults with cognitive impairments, research in this area is limited as a diagnosis of dementia was often used as exclusionary criteria for research projects investigating falls. In one study examining falls among 2,008 residents with cognitive impairments, 189 residents experienced a fall over a one week period. Of these fallers, 36.5% sustained no injuries, 14.3% sustained serious injuries, and 49.2% experienced minor injuries (Kallin, Gustafson, Sandman, & Karlsson, 2005). Kallin and colleagues (2005) found that individuals with the lowest cognitive functioning were at the lowest fall risk compared to individuals with intermediate cognitive functioning. This may be due to the fact that patients with intermediate cognitive function have maintained some mobility, but have experienced a decrease in judgement as a result of the dementia, while individuals with advanced dementia may have decreased mobility (Kallin et al., 2005). Based on these findings, participants in the current study were required to have some basic mobility (e.g., not confined to a bed or broda-chair).

Dementia may also be considered a risk factor for falls given the deficits in executive functions that accompany various forms of dementia. Impairment in executive function would increase an individual’s risk for falling as these functions are responsible for allowing the individual to interact with his or her environment in efficient and effective ways. Executive functioning also involves the ability to plan and problem-solve – factors which may increase fall risk when impaired. Rapport and colleagues (1993)
have suggested that a decline in executive functions may result in increased impulsivity, which could potentially lead to an increase in falls. Moreover, Rapport, Hanks, Millis, and Deshpande (1998) suggest that impairment in executive functions may increase the fall risk over and above impulsivity alone. Specifically, they hypothesized that an inability to be flexible in thinking, and to adapt to your environment based on external feedback would increase an individual’s risk for falling. Likewise, they suggested that executive functions, such as attention and concentration, are necessary in order to complete tasks such as transferring from bed to chair. Results of the study suggested that behavioural perseveration and response inhibition were significant predictors of falls. Moreover, Rapport and colleagues (1998) suggest that visuospatial and motor impairment are moderated by impairments in executive function. That is, they suggest that an individual with motor and/or visuospatial impairments and intact executive functions may be aware of his or her limitations, and therefore pose no greater risk for experiencing a fall. Although all individuals included in the present study had a chart diagnosis of dementia, and therefore were, theoretically, at greater risk for experiencing a fall, frontal lobe impairments were also specifically assessed as previous research suggests that symptoms of frontal impairment will further increase the risk for falling.

1.4.2.2 Physical factors. A variety of physical factors have been implicated in the increased risk for falling among older adults, including physical disability, vision difficulties, stroke, and cardiovascular diseases (Hendrich, 1988; Rubenstein et al., 1996; Soja, Kippenbrock, Hendrich, & Nyhuis, 1992). Disorders of balance and gait have also been found to be significant predictors of falls among older adults (e.g., Rubenstein, 2006). While gait difficulties have been implicated in fall risk for both older males and
females, it has been suggested that females may be more prone to abnormal gait than males, and that this is one reason why falls are more common among older women than men (Campbell, Borrie, & Spears, 1989). The current study involved assessment of physical risk factors for falling in two ways: through the use of a checklist including a number of risk factors associated with falls, and through the use of individualized physiotherapy assessments focused on balance and gait.

1.4.2.3 Use of physical restraint. Previous investigations examining the use of restraints and their impact on fall rates among older adults with dementia residing in LTC facilities have shown that restraint use was predictive of fall-related injuries (Dever Fitzgerald et al., 2009). Despite this finding, however, research has demonstrated that professional caregivers view restraints as helpful in the prevention of falls, but feel conflicted regarding their use as it reduces the autonomy of the older adults (Williams et al., 2011).

The use of restraints in patient care continues to be a controversial topic (Shorr et al., 2002). For the purposes of the current investigation, restraint use was defined as any mechanical device placed on a resident which interferes with his or her mobility (Laurin, Voyer, Verreault, & Durand, 2004). Examples of such restraints include devices such as seatbelts on wheel chairs, lap belts, table tops, and geriatric (broda) chairs.

The most widely cited reason for using restraints on a care-recipient is to prevent falls (e.g., Frengley & Mion, 1998; Mion, Minnick, & Palmer, 1996; O'Keeffe, Jack, & Lye, 1996). However, previous research has demonstrated that physical restraints are often paradoxically associated with increased fall rates (Evans et al., 1997; Tinetti, Liu, & Fginter, 1992), and increased risk of injury (Dever Fitzgerald et al., 2009; Neufeld et al.,
Other commonly cited reasons for restraining a patient include easier management of behaviours common among seniors with dementia, and to prevent the patient from interfering with treatment, for example, by removing IVs (Cotter, 2005). Although one typically thinks of physical restraints when discussing the use of restraints in LTC facilities, increasingly chemical restraints are also used. A chemical restraint is classified as a pharmaceutical agent given with the “specific and sole purpose of inhibiting specific behaviour or movement” (Covert, Rodrigues, & Solomon, 1977, p. 86). Psychotropic medications are often used in LTC as a form of restraint (whether for undesirable behaviours or specifically to prevent falls). Although a systematic examination of chemical restraints was beyond the scope of the present investigation, given that chemical restraints are increasingly used in LTC (Feng et al., 2009), information about pro re nata (PRN) psychotropic medications were collected at pre- and post-intervention to determine whether any changes occurred in PRN medication usage as a result of the intervention. Medication usage was quantified using the Medication Quantification Scale (MQS-III; Harden et al., 2005).

Many LTC facilities now operate under a ‘least-restraint’ policy in an attempt to minimize the use of unnecessary restraints and/or restrictions. For example, the policy of our local health region (the Regina Qu'Appelle Health Region [RQHR]) states that the use of mechanical restraints is exceptional and temporary, and is limited to situations where alternative measures have been determined to be ineffective. This document also indicates that, when using a restraint, the situation must be assessed on an on-going basis (e.g., every 15 minutes for the first hour of application followed by observation at minimum every 60 minutes). Mechanical restraints are defined as “any appliance which
restricts free movement” (RQHR, 2008) and include devices such as jackets, waist restraints, lap belts, wrist or ankle cuffs, and mitts. The Adult Least Mechanical Restraint Policy outlines the decision-making process for determining that the use of restraints is warranted. This process involves an assessment of the patient, collaborative discussions with family members or substitute decision makers, and documentation that other alternatives have been attempted. Discussions with family members/decision makers should include information regarding the reason for the use of the restraint, alternatives attempted, the time frame during which the restraint will be applied, and the risks associated with the use of the restraint versus not using the restraint. This process may be waived during times of emergencies, in which case the family member would be informed as soon as possible that the restraint was applied. The document also includes an appendix which lists alternatives to restraint use (RQHR, 2008).

Although many organizations are now moving towards a policy of least restraint, there are potential barriers to the removal of restraints in LTC facilities. Moore and Haralambous (2007) asked LTC staff, residents, and family members for their perceptions regarding potential barriers to the removal of restraints in LTC. According to Moore and Haralambous (2007), the most commonly identified barrier identified by family members, staff, and residents was the perception that residents were at greater risk for harm without restraints than with a restraint, and that residents who are at risk for falls should be physically restrained. Barriers reported by staff members alone included a lack of time and staff, a lack of activity programs for residents, a lack of suitable equipment (e.g., beds that move up and down), the inability to monitor residents who are not restrained in large facilities, environmental clutter, a lack of knowledge regarding
possible alternatives to physical restraints, and skill to deal with difficult behaviour. In addition, some staff members reported that it was difficult to remove restraints because they were previously supported in their practice, and therefore have become standard in the manner in which they provide care.

The use of physical restraints in the care of older adults has received increased attention in recent years. While research has emerged questioning the efficacy of restraining devices, the prevalence of restraint use in LTC facilities remains high. Evans and Strumpf (1989) suggested that the prevalence of restraint use in LTC facilities is between 25 and 84 per cent. More recently, Feng et al. (2009) found that LTC facilities in Canada had the highest percentage of restraint use (31%) compared to four other countries (Finland, Hong Kong, Switzerland, and the United States). Physical restraints are often used in an attempt to prevent falls (e.g., Tinetti et al., 1992) and, indeed, a jury once ruled that a hospital was liable for a patient’s injury due to “failure to restrain” (HFCA, 1999). However, there is a lack of consistent evidence that the use of restraints minimizes the incidence of falls. For example, Kallin and colleagues (2005) found that use of physical restraints among cognitively-impaired older adults was not associated with a lower fall risk compared to individuals who were not restrained. Moreover, previous research has demonstrated that unnecessary restraint use may actually increase the likelihood of experiencing a fall. Specifically, Karlsson, Nyberg, and Sandman (1997) found that participants who were physically restrained in order to prevent falls received a higher fall risk index score (with higher fall index scores indicating a greater risk for experiencing a fall) than older adults who were not physically restrained. A previous investigation by Dever Fitzgerald et al. (2009) relied on professional caregiver self-report...
to measure the extent to which restraints/activity restrictions were used to prevent falls. The current study improved on this methodology by incorporating the use of an observational measure of restraints in order to more accurately determine the prevalence of restraints/activity restrictions designed to prevent falls and pain.

1.4.3. Measurement of risk factors for falls among seniors with dementia residing in LTC. Previous research examining physical risk factors for falls among older adults (Hadjistavropoulos, Martin, et al., 2007) has utilized a checklist based on the work of Soja and colleagues (1992). This checklist measures the number of physical risk factors for falls present at the time of the assessment, as well as previous risk factors for falling (e.g., past surgical procedures). This measure has been used with success in previous research (Hadjistavropoulos, Martin, et al., 2007) assessing physical risk factors for falls among seniors without cognitive impairments residing in the community. However, older adults with dementia are typically unable to complete this measure as a result of impairments in memory and ability to verbally communicate. As such, it is necessary for a proxy to complete this measure on behalf of the older adult with dementia. While family members may be familiar enough to complete this measure accurately on behalf of the older adult, it is sometimes difficult for professional caregivers to recall such a detailed history for each patient. As such, the current study focused on objective measures of the physical risk factors for falls via a physiotherapy assessment. The importance of physiotherapists for the assessment of older adults LTC has been previously documented (Hadjistavropoulos, Fitzgerald, & Marchildon, 2010). When assessing fall risk, physiotherapists also take into account many of the risk factors
listed in the checklist including difficulties with vision and use of an assistive walking device.

1.4.3.1 Physiotherapy assessments with older adults. Many physical tests suitable for use with older people who are cognitively intact can also be used with individuals experiencing symptoms of moderate to severe dementia (Hadjistavropoulos, Herr, et al., 2007). When conducting physiotherapy assessments with older adults with cognitive impairments, however, it is important to remember that more cueing is needed and additional demonstration of the task may be required for those who have difficulty with attention or trouble following directions. Furthermore, although standardized assessment tools may be used in the determination of fall risk among seniors with dementia, it has yet to be determined, through empirical research, which measure is the best at predicting falls. As such, many physiotherapists report relying on their own experience to assist in making the decision as to whether a person is at risk for experiencing a fall. The current investigation utilized a well-validated physiotherapy assessment targeting balance and mobility.

1.4.3.2 Neuropsychological testing with older adults. To date, few studies have examined cognitive and neuropsychological factors in relation to risk factors for falling. One of the first studies to examine the relationship between specific cognitive functions and falls among older adults was recently conducted (Holtzer et al., 2007). This cross-sectional study included 172 older adults who were residing in the community and involved a neuropsychological battery. The study led the authors to conclude that impaired frontal function, as assessed by tests of executive functioning and attention, played a critical role in increasing fall risk. Specifically, when scores on measures of
executive attention (representing frontal lobe functioning) were higher by one standard deviation, falls were reduced by approximately fifty per cent (Holtzer et al., 2007). This finding has been replicated in other studies (Anstey, Wood, Kerr, Caldwell, & Lord, 2009; Martin et al., 2009).

While few studies have examined neuropsychological functioning as a potential risk factor for falls, even fewer studies have focused specifically on neuropsychological testing for older adults with moderate to severe dementia. Older adults with moderate to severe dementia are typically unable to complete standard neuropsychological test batteries as a result of the severity of their impairments (e.g., they may be unable to verbally respond to test questions as a result of an inability to communicate). Given the severity of cognitive impairments within this sample, the current investigation utilized a caregiver-administered checklist to assess the presence of symptoms indicating frontal lobe impairments.

1.5 Fear Avoidance of Pain and Falls

Previous research (e.g., Kori, Miller, & Todd, 1990) has demonstrated that individuals with chronic pain are at risk for developing a fear of experiencing pain, and as such, avoid activities that might result in discomfort. Similar findings have been found with respect to avoidance of activities that may result in an increased likelihood of experiencing a fall and subsequent injury and pain (Dever Fitzgerald et al., 2009). These fear avoidance models formed the theoretical basis for this study.

1.5.1 Fear of pain and avoidance. Given the pervasive effects pain can have on daily life, it is not surprising that psychological correlates of pain, such as depression, anxiety, and fear have been associated with chronic pain (Fishbain, 1999). Fear of pain
has been defined as “an irrational and debilitating fear of physical movement resulting from a feeling of vulnerability to pain injury or reinjury” (Kori et al., 1990, p. 37). Fear of pain has been shown to have a negative relationship with one’s ability to cope with chronic or persistent pain. Moreover, individuals who are experiencing a fear of pain have been shown to have higher rates of disability (Vlaeyen & Linton, 2000). In the current investigation, it was hypothesized that caregivers’ fears of pain (i.e., about the possibility that the care-recipient will experience pain) is the most relevant in cases of patients with severe dementia because they make the decisions concerning activity restrictions. As a result, we posited that the fear of those individuals responsible for residents’ care would result in decreased patient activity and subsequent disability.

Previous research has demonstrated that the relationship between fear and avoidance does exist among healthcare providers. Specifically, Linton, Vlaeyen, and Ostelo (2002) surveyed health care providers and found that 66% of those surveyed recommended avoidance of activities and absence from work as a treatment for pain. While this treatment would be acceptable for acute pain episodes, the introduction of avoidance as a potential coping strategy may lead the individual to enter into a fear-avoidance cycle.

1.5.2 Fear avoidance models of pain. In recent years there has been a proliferation of research regarding the role of fear, anxiety, and avoidance in the development and maintenance of chronic pain. Fear avoidance models of pain (e.g., Lethem, Slade, Troup, & Bentley, 1983; Vlaeyen & Linton, 2000) have been proposed in an attempt to explain the relationship between fear, anxiety, avoidance, and chronic pain. Like the Gate Control Theory and biopsychosocial theories of pain reviewed above, these fear
avoidance models of pain emphasize the biological, psychological, and social components of the pain experience (Asmundson, Norton, & Vlaeyen, 2004).

Fear-avoidance models of pain purport that the perception of pain is accompanied by the assignment of meaning or judgement regarding that pain (i.e., the pain experience). These models suggest that the large majority of individuals perceive the pain as undesirable and unpleasant but do not make catastrophic interpretations regarding their pain. Their interpretation is followed by appropriate restrictions in activity to allow healing, with graduated increases in activity until the acute injury has healed. Some individuals, however, interpret the pain as being catastrophic causing the individual to become pain-fearful. The individual may develop a fear of pain itself or a fear of re-injury. As such, a fear-avoidance cycle develops that promotes and maintains the limitation of activity, disability, and pain (Asmundson et al., 2004; Vlaeyen & Linton, 2000).

1.5.2.1 Empirical evidence for the fear avoidance model of pain. A large body of research is developing regarding fear-avoidance models of pain. However, this research has relied heavily on cross-sectional approaches, and as such, the current investigation and the previous work of Dever Fitzgerald and colleagues (2009) contributes to the literature by examining these models using longitudinal methodology. The model has been previously tested with a variety of age-groups. Cook, Brawer, and Vowles (2006) found that older adults may report lower levels of fear of pain than younger adults, which may result from older adults’ unwillingness to report pain due to stoicism. In addition, Swinkels-Meewisse, Roelofs, Oostendorp, Verbeek, and Vlaeyen (2006) tested a fear-avoidance model of pain in the context of actual performance and perceived disability.
among individuals experiencing an acute episode of low-back pain. The results of their study suggested that individuals who were more fearful of pain perceived themselves as being more disabled when asked to lift a heavy object. An additional study compared levels of fear-avoidance, distress, and disability in individuals with chronic versus acute low-back pain. Grotle, Vollestad, Veierod, and Brox (2004) found that those patients with chronic pain reported more fear-avoidance beliefs, distress, and avoidance compared to those suffering from acute pain.

A relationship has also been found previously between fear-avoidance and the ability to perform activities of daily living (ADLs) in a general population sample. Buer and Linton (2002) found that increased fear-avoidance beliefs were associated with a perception of increased pain intensity. Buer and Linton also detected a relationship between avoidance of activity and difficulty performing basic ADLs.

1.5.3 Fear of falling. Similar to the development of fear of pain, some individuals develop excessive concern regarding the possibility that they will experience a fall and subsequent pain and disability (Cumming, Salkeld, Thomas, & Szonyi, 2000). Fear of falling has been described by Tinetti and Powell (1993) as an ongoing concern about falling which limits the performance of daily activities. Although some level of fear of falling may be beneficial and adaptive (i.e., avoiding icy sidewalks in the winter), fear of falling can be maladaptive if it causes the individual to begin avoiding a significant portion of activities (Evitt & Quigley, 2004). In fact, fear of falling has been found to predict falls even after controlling for physical risk factors for falling (e.g., Delbaere, Crombez, Vanderstraeten, Willems, & Cambier, 2004; Dever Fitzgerald et al., 2009), possibly because it can lead to excessive activity restriction and deconditioning.
Fessel and Nevitt (1997) asked older adults with rheumatoid arthritis whether they experienced a fear of falling or fear of losing their balance. They found that 47% of individuals who had not previously experienced a fall reported a fear of falling. According to Lach (2005), while fear of falling can develop after the experience of a fall, it may also develop from learning that someone else has experienced a fall, or from a decrease in one’s confidence about their abilities. Moreover, although we know that an association exists between falls and the development of fear of falling, it is unclear whether previous falls cause an individual to become fearful of future falls, whether fear of falling causes future falls, or whether a third factor acts as a moderator between these two variables. For example, it is possible that fear of falling leads to increased activity restrictions in an attempt to prevent falls. This decreased activity, in turn, may lead to an overall deconditioning placing the individual at a higher risk for experiencing subsequent falls. Friedman, Munoz, West, Reuben, and Fried (2002) suggest that fear of falling and prior history of falls are interrelated, and that individuals who develop one are at risk to develop the other. Along with fear of falling often comes a subsequent avoidance of activities in an attempt to reduce the risk of falling (Fessel & Nevitt, 1997; Rubenstein, 2006). As such, fear of falling has been found to be associated with declines in gait and balance, and an increased difficulty with the performance of basic ADLs.

Fear of falling has been found to be common among older adults residing in the community, with the oldest old adults reporting higher levels of fear of falling than their younger counterparts (Arfken, Lach, Birge, & Miller, 1994). Among their sample of 1,358 older adults residing in the community, Arfken and colleagues (1994) found that 29% reported a fear of falling, with 9% expressing that they were very fearful of falling.
Moreover, higher prevalence rates of fear of falling have been found among women than men (e.g., Arfken et al., 1994; Legters, 2002). However, this difference in prevalence rates may be mediated by the fact that there are more elderly women than men (given that females typically have a longer life-span), and that males may be more likely to underreport a fear of falling as a result of the perceived stigma attached to reporting fear (e.g., Legters, 2002). While the majority of studies focusing on fear of falling have concentrated on older adults residing in the community, fear of falling has also been detected among older adults who live in LTC facilities. Specifically, Franzoni, Rozzini, Boffelli, Frisoni, and Trabucchi (1994) found that fear of falling was common among nursing home residents, with approximately 46% of participants reporting a fear of falling. Fear of falling was more common among individuals who were more impaired in everyday functioning, had difficulties with posture and gait, and were on psychotropic medications. Moreover, those residents who reported a fear of falling were found to have more significant functional decline over a two-year period than those not reporting a fear of falling (Franzoni et al., 1994). The present investigation examined the link between fear of falling and functional ability through the extension of fear of falling to a third party who is responsible for the care of the LTC facility resident.

1.5.3.1 Correlates of fear of falling. Excessive fear of falling has been shown to have serious consequences for older adults. One of the most significant consequences of fear of falling may be the subsequent self-imposed avoidance of activities that often accompanies this fear. For example, Fessel and Nevitt (1997) reported that 38% of their participants who reported a fear of falling also reported modifying activities as a result. Modification of activities included being more cautious when walking, relying on
assistive devices, and avoiding stairs, steps, or ladders. Such activity restriction could lead to weakened muscles and overall deconditioning, resulting in decreased functional ability in the older adult (Arfken et al., 1994; Bruce, Devine, & Prince, 2002). Williams, Hadjistavropoulos, and Asmundson (2005) suggest that fear of falling may influence ability to perform ADLs because experiencing the fear while engaging in activities can reduce self-efficacy and confidence. This finding has been supported among individuals residing in LTC (Myers & Gonda, 1986). Previous investigations have found a relationship between fear of falling and the ability to complete ADLs. Specifically, Cumming and colleagues (2000) found that individuals scoring higher on a measure of fear of falling had more difficulty completing ADLs than those who reported less fear of falling. Moreover, Li, Fisher, Harmer, McAuley, and Wilson (2003) found that older adults who scored higher on a measure of fear of falling engaged in significantly fewer activities than those achieving lower scores. However, given the correlational nature of the study, it is unclear whether fear of falling led to reduced activities, or whether the reduction in activities allowed for the development of fear of falling. Brouwer, Musselman, and Culham (2004) examined fear of falling among community-dwelling older adults and found that those who reported a fear of falling walked more slowly, were weaker, and perceived their physical status as poorer than individuals who did not self-report a fear of falling. As a result of the decreased functional ability, it is not surprising that fear of falling can be accompanied by a significant decrease in quality of life in seniors (Cumming et al., 2000; Gagnon, Flint, Naglie, & Devins, 2005).
1.6. A Modified Fear Avoidance Model of Pain and Falls for Seniors with Dementia

The majority of the research literature regarding fear of pain and fear of falling among seniors has focused on seniors without cognitive impairments who are able to self-report their own levels of fear and take precautions based on their level of concern that they might fall and/or experience pain. Older adults with dementia residing in LTC facilities are often not responsible for the decisions concerning activity restrictions or restraint use to prevent falls, as these decisions tend to be made by members of the LTC staff (e.g., nurses). Moreover, seniors with dementia may be unable to accurately and reliably self-report their fears as a result of their cognitive impairments. As such, it is important to consider the cognitive status of the older adult when examining rates of fear of pain and fear of falling. As a result of these difficulties, older adults with dementia have typically been excluded from studies examining fear of pain and fear of falling. Hadjistavropoulos and colleagues (2004) proposed a modified model of fear of falling in an attempt to explain the roles of fear of pain and fear of falling in disability and functional impairment among older adults with dementia. Given the significant impairments that result from dementia, many of these older adults rely heavily or completely on other individuals for their care. Hadjistavropoulos and colleagues’ (2004) modified fear avoidance model accounts for caregiver fear that their care-recipient might fall or experience pain. In particular, they suggest that caregivers who are particularly fearful that their care recipient will experience a fall and/or have pain are more likely to enforce activity restrictions and restrain their care recipients in an attempt to prevent the possibility of falls and/or pain. While some restrictions may be required and beneficial, it is likely that excessive activity restriction results in physical deconditioning among the
seniors with dementia, and this physical deconditioning puts the older adult at an increased risk for experiencing a fall. Similarly, a fearful caregiver may communicate his or her fears to their care-recipients thereby increasing the anxiety levels of the care recipient. Anxiety has been shown to negatively affect balance performance and postural control (Carpenter, 2006; Carpenter, Adkin, Brawley, & Frank, 2006). Dever Fitzgerald et al. (2009) were the first to apply a modified fear avoidance model of falls and pain to seniors with dementia who reside in LTC facilities. Results of this study supported Hadjistavropoulos and colleagues’ (2004) assertion that fear of falling may be extended beyond the individual in cases where someone is providing care to the person at risk for falling.

Previous research has demonstrated the importance of considering the role of caregiver attitudes in the outcomes of their care-recipients. Harris (1989) examined staff attitudes, nurse leadership behaviours, and falls among residents over a four-month period in twelve VA homes in the United States. Harris (1989) suggested that the number of falls experienced by the seniors was influenced by the staff attitudes. In particular, as nurse leadership behaviours and job expectations (e.g., the belief that work goal completion would lead to desired rewards) increased, falls among the residents decreased. However, as staff ego-involve ment (the degree to which work performance affirms self-esteem) and positive attitudes regarding seniors increased, falls also increased. One possible explanation for this increase may be that as attitudes toward seniors became more positive, staff may have provided more autonomy and less supervision to the residents thereby potentially increasing the risk for falls. The current investigation, as well as the previous research conducted by Dever Fitzgerald et al.
(2009) differed from the Harris study in that the focus is on attitudes specific to falls among seniors as opposed to general staff attitudes.

Dever Fitzgerald et al. (2009) demonstrated that the fall- and pain-related fears of LTC staff played an important role in the decision to use restraints/restrictions. Moreover, the relationship between the care staff fears and use of restraints/restrictions persisted even after controlling for physical risk factors for falls, suggesting that the restraint/restriction use was, at times, excessive. Although Dever Fitzgerald and colleagues (2009) also found a relationship between restraint/restriction use and fall-related injuries, a relationship was not found between restraint/restriction use and falls in general. It is possible that a relationship between caregiver-enforced restraint/restriction use and falls was not found because the follow-up period of three months was insufficient to detect this relationship. The current investigation increased the study duration to eight months to determine whether a relationship exists between caregiver-imposed restraint/restriction use and falls, or whether the relationship between nurse fears about patient falls and resident falls need not be mediated by activity restriction.

1.7 Purpose

The purpose of this study was to further examine fear of falling among professional caregivers of seniors with dementia residing LTC facilities. This study allowed the physiotherapist and frontal behavioural assessed level of risk to be partialed out from the correlation between nurses’ fears about patient falls and falls sustained. This contributes to the literature by allowing for the estimation of the extent to which unjustified fear of falling contributes to falls, presumably by leading to unnecessary restrictions.
While research has been conducted to determine if nurses can decrease resident fear of falling (Gentleman & Malozemoff, 2001), more focus was needed on reducing caregiver fear of falling (since caregiver fear of resident falling could lead to unnecessary restrictions). The current study has important theoretical implications as it sought to determine whether receiving resident-specific information can reduce caregiver fear and associated restraints/restrictions. The research also has important clinical implications. If effective, programs to reduce fear in caregivers can be developed, thereby reducing unnecessary restrictions and decreasing fall incidence in LTC.

1.8 Hypotheses

The following hypotheses were examined:

- **Hypothesis 1**: Professional caregiver fears about patient falls will be predictive of restraint/restriction use, and this restraint/restriction use will be predictive of falls.

- **Hypothesis 2**: Professional caregiver fears about patient falls will be predictive of restraint/restriction use, and this restraint/restriction use will be predictive of resident ability to perform ADLs as measured by the OARS ADL scale at follow-up.

- **Hypothesis 3**: Professional caregivers who receive fall-risk assessment information following physiotherapy and frontal functioning assessments will, on average, experience a change in their level of fear about patient falls.

- **Hypothesis 4**: Residents who are cared for by nurses who receive fall-risk assessment information will experience a change in restraint use (e.g., fewer or more restraints will be used) compared to those whose caregivers do not receive resident assessment feedback, because the feedback will affect restraint use.
• *Hypothesis 5:* Residents who are cared for by nurses who receive fall-risk assessment feedback will experience fewer falls over the second four month observation period than those whose caregivers did not receive assessment feedback.

• *Hypothesis 6:* A significant positive relationship will exist (in the experimental group) between nurse fears about patient falls and falls sustained, even after controlling for the actual fall risk determined through the physiotherapy and frontal impairment assessment.

• *Hypothesis 7:* A significant positive relationship will exist (in the experimental group) between nurse fears about patient falls and the use of restraint/restrictions even after controlling for the actual fall risk determined through the fall-risk assessment.
2. METHODOLOGY

2.1 Participants

Prior to beginning recruitment of participants for the study, ethical approval was obtained from both the University of Regina Research Ethics Board (REB) and the Regina Qu’Appelle Health Region (see Appendices A and B).

Participants in the present study were seniors residing in LTC facilities in Saskatchewan. To be eligible for inclusion in the study, participants were required to have a chart diagnosis of dementia and to retain some basic mobility within the facility (e.g., participants who were bed- or broda-chair ridden were ineligible to participate). Eligible participants were identified by LTC facility staff familiar with the patients. Given that all participants had dementia, consent was obtained by proxy. Interested proxies were asked to return a signed and dated consent form to the researcher. These consent forms were kept separate from participant data in a secure and locked filing cabinet. Each participant was immediately assigned a participant number to ensure his or her confidentiality. The electronic document linking resident names to participant numbers was kept in a secure password-protected electronic file. Upon the assignment of their unique participant number, participants were also randomly assigned to the control or experimental groups using a coin toss.

A power analysis using G*Power statistical software (Erdfelder, Faul, & Buchner, 1996) indicated that 179 participants would provide sufficient power (.80 with an alpha level of .05 assuming a medium size of effect) for the planned analyses. It was determined that an additional 30 participants would be recruited to account for attrition over the study period, resulting in a proposed sample of 209 participants.
After approximately 14 months of active recruitment, the final sample size consisted of 156 individuals and the pool of potential participants had been exhausted. Six people were eliminated from all analyses for one of two reasons: 1) the participant did not meet all inclusion criteria (e.g., the participant was younger than 65 years of age), or 2) the participant died before any data could be collected.

2.2 Measures

2.2.1 Demographic information sheet. Demographic information was collected for each resident participating in the study through chart and facility database reviews completed by trained members of the research team. Collected information for each resident included: age, sex, level of completed education, medication use, and medical diagnoses (see Appendix C). Demographic information was also collected for each staff member interviewed over the course of the study. Information collected from staff included age, sex, length of time in their profession, and length of time employed in their current position.

2.2.2 Cognitive performance scale. Scores on the Cognitive Performance Scale (CPS; Morris, Fries, Mehr, Hawes, Phillips, Mor, et al., 1994) obtained within the last 12 months were used to determine the level of cognitive impairment of participating residents. Each participating resident was administered a CPS as part of the MDS protocol (the regular assessment process completed by nurses) and this information was obtained from the chart audit. The CPS is a 5-item instrument which measures short and long-term memory, decision-making skills, communication, and independence in eating. The CPS results in a total score ranging from 0 to 6, with each score representing a level of cognitive impairment (0 = intact, 1 = borderline intact, 2 = mild impairment, 3 =
moderate impairment, 4-5 = severe impairment, and 6 = very severe impairment). Based on previous research (e.g., Paquay et al., 2007) a cut off score of 3 or more points on the CPS was used to determine moderate to severe dementia. This cut off has been shown to result in a sensitivity of .75 and a specificity of 0.86. Scores on the CPS have been shown to have acceptable inter-rater reliability (κ = 0.85), and to be significantly correlated with scores on the Mini-Mental Status Examination (MMSE; eta squared = 0.75) (Morris, Fries, Mehr, Hawes, Phillips, Mohr, et al., 1994). The CPS has been found to have .94 sensitivity and specificity using the MMSE as a criterion (Hartmaier et al., 1995).

2.2.3 Measure of caregivers’ attitudes of falling and pain. This measure of professional caregivers’ fears about the possibility that residents might experience pain and falls (see Appendix D) was developed by Dever Fitzgerald et al. (2009). Caregivers employed in the LTC facilities in which the participants resided were asked the following six questions regarding their attitudes about falling and pain in their care recipients.

- Compared to other residents who are not wheelchair- or bed-ridden and using a 0-10 scale, how afraid are you that this care-recipient may experience a fall?
- Compared to other residents who are not wheelchair- or bed-ridden and using a 0-10 scale, how confident are you that this care-recipient will not experience a fall?
- Compared to other residents who are not wheelchair- or bed-ridden and using a 0-10 scale, how often do you use restraints/activity restriction on this care-recipient to prevent falling?
- Compared to other residents who are not wheelchair- or bed-ridden and using a 0-10 scale, how afraid are you that this care-recipient may experience pain with activity?
• Compared to other residents who are not wheelchair- or bed-ridden and using a 0-10 scale, how often do you place restraints/activity restrictions on this care-recipient to prevent pain?

• Using a 0-10 scale, how much pain do you believe this care-recipient is experiencing?

Caregivers were asked to rate the level of pain they believed their care recipient was experiencing from 0-10 as it has been shown that global ratings of pain by nurses are valid (Aubin, Giguere, Hadjistavropoulos, & Verreault, 2007; Fuchs-Lacelle & Hadjistavropoulos, 2004). The responses of all caregivers reporting for any one patient were averaged. Previous research using the Measure of Caregivers’ Attitudes of Falling and Pain has demonstrated an average intraclass correlation of nursing staff ratings of .93 which suggests a very high degree of interrater agreement across participants (Dever Fitzgerald et al., 2009).

2.2.4 Activities of daily living. Ability to perform ADLs was assessed at the beginning and end of the eight month study period in order to determine any change in participants’ ability to perform these basic activities over the course of the study. Ability to perform ADLs was measured using the Activities of daily living portion of the ADL/IADL scale (See Appendix E) developed by Older American Resource Services (OARS; Fillenbaum, 1988). Seven questions are used to assess the participants’ ability to complete ADLs (e.g., ability to dress and feed oneself). Caregivers were asked to indicate whether the participant is unable to perform a certain activity, whether he or she is able to perform the activity with some assistance, or whether he or she can perform the activity independently. The caregiver was then asked to indicate the care recipient’s overall level
of functioning ranging from 1 (excellent functioning) to 6 (totally impaired functioning). The ADL scale has been found to have good criterion validity with physical therapists’ assessment of the abilities of seniors to perform such activities (\(\tau = .83\)) and good test-retest reliability (\(\tau = .87\)) (Fillenbaum, 1988; Fillenbaum & Smyer, 1981).

2.2.5 Physical risk factors for falls. In order to estimate actual fall risk based on physical ability, participants in the experimental group were assessed by a licensed physiotherapist. The physiotherapy assessment followed the Tinetti-Performance-Oriented Mobility Assessment (POMA) protocol (Tinetti, 1986) which is designed to identify elderly people who are at risk for falling through the evaluation of balance and gait. The POMA, divided into balance assessment and gait assessment, is used to evoke changes in position and gait as used in normal, everyday activities. During the balance portion of the test, eight positions and position changes were evaluated: sitting, balance, arising from a chair, immediate and prolonged standing balance, withstanding a nudge on the sternum, balance with eyes closed, turning balance, and sitting down. The gait assessment portion includes initiation, step height, step length, step continuity, symmetry, path deviation, trunk sway, and walking stance (Abbruzzese, 1998). The POMA can be conducted at bedside, or in a hallway or room providing there is a hard, straight-back chair and a 10-foot straight path for walking. Moreover, the POMA takes only ten-minutes to complete and the physiotherapist is present at all times to prevent falls. Separate scores are computed for balance (scored out of 16) and gait (scored out of 12). A score below 19 is indicative of a high risk for falls. Scores between 19 and 24 suggest a greater chance for falls but not a high risk (Abbruzzese, 1998). Scores on the POMA
have been found to be predictive of future falls. The POMA scale has been demonstrated to have good interrater reliability, \( r = .85 \) (Whitney, Poole, & Cass, 1998).

2.2.6 Frontal behavioural inventory. The Frontal Behavioural Inventory (FBI; Milan et al., 2008) is a 24-item behavioural questionnaire that is completed by caregivers regarding their care-recipients’ symptoms of frontal impairment. Items on the FBI include apathy, inflexibility, loss of insight, perseveration, and impulsivity and are designed to measure change in the patient’s behaviour over time. Each item is rated on a scale from 0 (indicating that the behaviour never occurs/there is no change in the frequency of the behaviour) to 3 (the behaviour occurs most of the time/there is a severe change in the frequency of the behaviour). Previous research has demonstrated the ability of the FBI to distinguish between patients suffering from Alzheimer’s disease and those suffering from symptoms of frontal variant frontal-temporal dementia (Milan et al., 2008). Moreover, the FBI has been shown to be highly correlated with other measures of behavioural problems, suggesting that it is an accurate measure of symptoms of frontal impairment (Milan et al., 2008). A cut-off score of 23 has been recommended to determine the presence of symptoms of frontal impairment. Using this cut-off score Milan and colleagues (2008) yielded a 97% sensitivity and 95% specificity in distinguishing patients with symptoms of frontal impairment from non-frontally impaired individuals. This cut-off was used in the current study, with those scoring below 23 considered to be at a lower risk for falls (based on the FBI results only), and those scoring 23 or higher considered to be at a higher risk for falls.

2.2.7 Restraint use. Previous research by Dever Fitzgerald et al. (2009) assessed restraint use by asking every professional caregiver working with the participating
resident about the extent to which he or she restrained/restricted the resident to prevent falls and pain (with 0 indicating no restraints/restrictions and 10 indicating frequent restraint/restriction use). Relying solely on self-report can be problematic if definitions of restraints/restrictions are not consistent. Moreover, care staff may be reluctant to self-report the use of restraints/restrictions for fear of potential litigation. As such, the current investigation supplemented the nurse self-report with an observational measure of restraint use based on the work of Rossy and Mackey (2003) and Edwards and colleagues (2006). The tool requires that an observer note the number of patients on the nursing unit (in this case the number of residents on the unit participating in the study), the number of patients with physical restraints (including mitts, wheelchair belts, soft waist belts, pelvic supports, limb holders, and four-point restraints), and whether the restraint is properly applied. The observer then reviews the charts of the individuals who are restrained for the twenty-four hour period prior to the observation period to determine whether the particular use of the restraint was documented, evidence of patient assessment, and exploration of alternatives, monitoring requirements, and patient and family education. As in the Edwards and colleagues study, observations were randomly timed in order to observe the patient at varying times. In particular, a total of 16 observation sessions were completed for each participant (eight observations in the first four-month period and eight observations in the second four-month period).

2.2.8 Medical risk factors questionnaire. A 24-item questionnaire (see Hadjistavropoulos, Martin, et al., 2007) designed to assess medical risk factors associated with a higher risk for experiencing a fall (see Appendix F) was administered for each participating resident at the beginning of the study period. The designated primary
professional caregiver was asked which risk-factors apply to each participant of the study (e.g., dizzy spells, vision problems), and those applicable to each participant were recorded (for a possible total of 24). Where applicable, some information was verified during the chart audit (e.g., prior surgeries). Hadjistavropoulos and colleagues (2007) demonstrated that a higher score on this measure, indicating a greater number of physical risk factors for falls, predicts subsequent falls. Based on a sample of 84 residents of LTC facilities, the average score on this measure (based on nurses’ reports about residents) was 6.81 (SD = 3.21) (Dever Fitzgerald et al., 2009).

2.2.9 Medication quantification scale-III. Patient’s medication use (taken from medication sheets in the patients’ charts) for the 30 day pre-intervention and 30-day post intervention period were quantified using the Medication Quantification Scale-III (MQS-III; Harden et al., 2005). The MQS-III objectively quantifies medications into a single, clinically-meaningful numerical value, called the MQS-III score. The MQS-III score is calculated using a detriment weight (a value assigned to each class of medication based on the drug’s potential for abuse and other negative side effects) multiplied by the dosage level of the medication (1 = sub-therapeutic or PRN, 2 = lower 50% of the therapeutic dose range, 3 = upper 50% of the therapeutic dose range, 4 = supratherapeutic). The MQS scores for each medication were then summed to give a total MQS-III score for each of the 30 days pre- and post Intervention. Two variables were created in the present investigation - one representing a summary score for psychoactive drugs measured by the MQS (e.g., anti-anxiety, SSRI, tricyclic antidepressants, other antidepressants, antipsychotics, barbiturates, benzodiazepines, and sedatives/hypnotics), and the other representing all medication categories measured by the MQS. Two scores were calculated
for each participant, one score representing their medication usage for the 30 day period prior to the intervention, and one score representing their medication usage for the 30 days post-intervention. Initial studies of the MQS-III suggest satisfactory validity and reliability ($\alpha = 0.84$) (Harden et al., 2005).

2.3 Procedure

Once enrolled in the study, chart and facility database reviews were conducted for each participating resident to obtain basic demographic information (age, sex, level of education, medications, and medical diagnoses). Each individual’s score on the CPS was also obtained from the chart. A subset of professional caregivers (i.e., those who are most likely to work with the participating resident during the day and evening shifts, including the RN responsible) were designated for each participant. This subset of RNs was chosen through a discussion with the Director of Care to ensure that the caregivers worked with the resident regularly and were familiar with his/her care needs. This subset of caregivers consisted of five care staff (i.e., 3 licensed nurses (i.e., RNs, Licensed Practical Nurses [LPNs] or Registered Psychiatric Nurses [RPN]) and 2 SCAs where possible). From this subset, one professional caregiver (an RN) was asked to complete the medical risk factor questionnaire. The primary professional caregiver also completed the OARS ADL scale. Each of the five professional caregivers completed the Measure of Caregivers’ Attitudes of Falling and Pain.

The first observational portion of the study began at the time of the first interview. Each resident participating in the study was monitored over a four-month period in order to determine the extent to which restraints/restrictions were used, as well as to determine

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For participants in the control group (i.e., participants who did not receive the intervention) medication data was collected at the same time as those in the experimental group.
the number of falls experienced over that time period. Members of the nursing staff were
asked to complete a brief (2 page) report each time a participating resident experienced a
fall (see Appendix G). Information collected included the time and date of the fall, any
antecedents to the fall (e.g., the person was walking to the bathroom), and any
consequences resulting from the fall (e.g., treatment by the nursing home staff,
hospitalization). Moreover, incident reports were reviewed on a weekly basis to ensure
that all falls experienced over the course of the study were documented by the nursing
staff in the study materials. Chart reviews were also conducted to collect information
about medication use changes for the fourth and fifth study months to determine whether
changes in medications occurred following the assessment portion of the study. In order
to obtain an objective measure of restraint/restriction use, members of the research staff
(blinded to the study condition) completed an observational checklist and chart audit
based on the work of Edwards and colleagues (2006). These observations and chart audits
were completed at sixteen randomly determined points throughout the 8-month study
period (8 times during the first four month period and 8 times during the second four
month period). Observations were conducted between the hours of 0700 and 2200.

Following the four-month baseline observation period, participants who were
randomly assigned to the experimental condition underwent a physiotherapy and proxy-
administered assessment of frontal lobe functioning. The physiotherapy assessments were
completed by a licensed physiotherapist, and the frontal behaviour inventory was
administered by a graduate student in clinical psychology. Assessments were conducted
in a quiet, private room located at the facility where the participating resident resided.
Following the physiotherapy assessment and frontal behaviour inventory administration,
an estimated level of risk for experiencing a fall was calculated for each resident based on
the assessment results. Specifically, a participant’s score on the physiotherapy measure
(i.e., the POMA) was placed into one of three categories: minimal fall risk, medium fall
risk, and high fall risk. Similarly, based on Milan et al.’s (2008) suggested cut-off score
of 23 on the FBI, individuals scoring above cut off were considered to have frontal
impairment while those falling below the cut-off score were not. Finally, individuals
scoring one standard deviation above the mean reported by Dever Fitzgerald et al. (2009)
on the Medical Risk Factors questionnaire were also considered to be at a higher risk for
experiencing a fall. Each of these risk-factor measures were incorporated into a single
fall-risk score. The method for determining this score is presented in Table 1. These
results were then presented to the LTC home staff (i.e., each staff member working with
the resident). Attempts were made to present this information to the caregivers as a
group via a case conference for each participating resident. However, certain staff
members were often unable to attend the feedback sessions, and therefore feedback was
often given individually. Caregiver fear that the resident might fall/experience pain was
then measured among the subset of caregivers who completed the Professional
Caregivers’ Attitudes About Falling and Pain measure at baseline, within two days of
receiving the feedback (i.e., post-intervention), and at the end of the study period (i.e.,
follow-up). In the control group, caregiver fear that the resident might fall/experience
pain was also measured at this four-month period as well as at the end of the study. The
use of restraints/restrictions, as well as any falls, were then monitored for an additional
four months to determine whether the provision of resident-specific information impacted
Table 1.

_Fall Risk Score Calculation_

<table>
<thead>
<tr>
<th>Fall Risk Score</th>
<th>Description</th>
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<tbody>
<tr>
<td>3</td>
<td>If either POMA is &lt; 19 and/or FBI is ≥ 23, and/or Medical Risk Factor Questionnaire score is ≥ 10.02</td>
</tr>
<tr>
<td>2</td>
<td>If POMA is 19-24</td>
</tr>
<tr>
<td>1</td>
<td>If POMA is ≥ 25</td>
</tr>
</tbody>
</table>

Note: POMA = Tinetti-Performance-Oriented Mobility Assessment protocol (Tinetti, 1986); FBI = Frontal Behavioural Inventory (Milan et al., 2008).

Note: A score of 3 indicates the highest fall risk.
professional caregiver concerns that a resident might fall/have pain and the use of restraints/restrictions. Individuals in the control condition were also monitored over this four month period. The procedure for the current investigation is presented graphically in Figure 1.
Figure 1.

Flow chart of study procedure.

Eligible participants identified by Nursing Home Staff
- Dementia Diagnosis
- Some basic mobility retention

Consent by proxy obtained

Participants randomized into Control or Experimental condition

Chart reviewed for each participant

Subset of caregivers and primary caregiver designated for each participant. Each caregiver completed the Attitudes questionnaire. The primary caregiver completed the Medical Risk Questionnaire and the OARS ADL Scale

Falls and restraints measured over a four-month period

Subset of caregivers completed the Attitudes Questionnaire

Falls and restraints measured over a four-month period

Subset of caregivers completed the Attitudes Questionnaire and the OARS ADL Scale

Chart reviewed for each participant

Subset of caregivers and primary caregiver designated for each participant. Each caregiver completed the Attitudes questionnaire. The primary caregiver completed the Medical Risk Questionnaire and the OARS ADL Scale

Falls and restraints measured over a four-month period

Participants underwent an individual physiotherapy assessment. Primary caregivers completed the Frontal Behavioural Inventory

Fall-risk scores calculated based on individual assessments presented to all nursing staff that worked with the participant

Subset of caregivers completed the Attitudes Questionnaire

Falls and restraints measured over a four-month period

Subset of caregivers completed the Attitudes Questionnaire and the OARS ADL Scale
3.0 RESULTS

3.1 Sample Characteristics

A sample of 150 individuals (105 women, 45 men) was used for the analyses of this study. Participants were from 26 different LTC facilities. The breakdown of participants by facility is presented in Table 2.

Participants had a mean age of 86.22 (SD = 6.41) years. The majority (70%) of participants were female, and the majority were widowed (53.33%). With respect to level of education, 22.67% of participants had eight or fewer years of formal education (although it should be noted that educational information was unavailable for 34% of the sample). Participants had a mean CPS score of 3.44 (SD = 1.16), which is indicative of moderate cognitive impairment. On average, participants had 6.89 medical risk factors for falling (see Table 3 for a complete list of frequencies of endorsed medical risk factors for falls). On average, participants had 5.8 medical diagnoses and were on 13.09 prescribed medications (see Table 4 for a full break down of participant demographic variables by overall sample and experimental versus control groups).

Demographic information was also collected for staff members who were selected to interview about each of the study participants. A total of 238 professional care staff (i.e., RNs, RPNs, LPNs, SCAs) were interviewed about the study participants. Interviewed caregivers included 71 RNs (30.74%), 28 RPNs (12.12%), 25 LPNs (10.82%), and 107 SCAs (46.32%). The caregivers reported an average of 18.95 (SD = 11.19) years of experience and had worked an average of 11.57 (SD = 9.12) years at the facility where they were currently employed. Ninety five per cent of the caregivers were female and caregivers had a mean age of 46.56 years (SD = 10.58).
Table 2

*Participant Break Down by Facility.*

<table>
<thead>
<tr>
<th>Facility</th>
<th>Type of Facility</th>
<th>Number of Participants</th>
<th>Number of beds in the facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Urban</td>
<td>6</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>Urban</td>
<td>25</td>
<td>358</td>
</tr>
<tr>
<td>3</td>
<td>Urban</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Rural</td>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>Rural</td>
<td>5</td>
<td>48</td>
</tr>
<tr>
<td>6</td>
<td>Rural</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>7</td>
<td>Urban</td>
<td>5</td>
<td>194</td>
</tr>
<tr>
<td>8</td>
<td>Urban</td>
<td>7</td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>Rural</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>Urban</td>
<td>4</td>
<td>57</td>
</tr>
<tr>
<td>11</td>
<td>Rural</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>12</td>
<td>Urban</td>
<td>6</td>
<td>216</td>
</tr>
<tr>
<td>13</td>
<td>Urban</td>
<td>9</td>
<td>143</td>
</tr>
<tr>
<td>14</td>
<td>Urban</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>15</td>
<td>Urban</td>
<td>17</td>
<td>160</td>
</tr>
<tr>
<td>16</td>
<td>Urban</td>
<td>13</td>
<td>110</td>
</tr>
<tr>
<td>17</td>
<td>Rural</td>
<td>3</td>
<td>58</td>
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<tr>
<td>18</td>
<td>Rural</td>
<td>5</td>
<td>44</td>
</tr>
<tr>
<td>19</td>
<td>Rural</td>
<td>2</td>
<td>30</td>
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Table 2 (Continued)

<table>
<thead>
<tr>
<th>Facility</th>
<th>Type of Facility</th>
<th>Number of Participants</th>
<th>Number of beds in the facility</th>
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</thead>
<tbody>
<tr>
<td>20</td>
<td>Rural</td>
<td>6</td>
<td>143</td>
</tr>
<tr>
<td>21</td>
<td>Rural</td>
<td>4</td>
<td>49</td>
</tr>
<tr>
<td>22</td>
<td>Rural</td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td>23</td>
<td>Rural</td>
<td>1</td>
<td>38</td>
</tr>
<tr>
<td>24</td>
<td>Rural</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>25</td>
<td>Urban</td>
<td>4</td>
<td>243</td>
</tr>
<tr>
<td>26</td>
<td>Rural</td>
<td>3</td>
<td>30</td>
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</tbody>
</table>
Table 3

*Frequency of Current Medical Risk Factors for Falling*

<table>
<thead>
<tr>
<th>Risk Factor for Falling</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>138</td>
<td>92.0</td>
</tr>
<tr>
<td>Incontinence</td>
<td>94</td>
<td>62.7</td>
</tr>
<tr>
<td>Impaired ability to walk</td>
<td>80</td>
<td>53.3</td>
</tr>
<tr>
<td>Use of walking aides</td>
<td>80</td>
<td>53.3</td>
</tr>
<tr>
<td>Difficulty regaining balance</td>
<td>78</td>
<td>52.0</td>
</tr>
<tr>
<td>Decreased mobility in lower extremities</td>
<td>78</td>
<td>52.0</td>
</tr>
<tr>
<td>History of falls</td>
<td>75</td>
<td>50.0</td>
</tr>
<tr>
<td>General weakness</td>
<td>75</td>
<td>50.0</td>
</tr>
<tr>
<td>Nocturia</td>
<td>65</td>
<td>43.3</td>
</tr>
<tr>
<td>Impaired vision</td>
<td>64</td>
<td>42.7</td>
</tr>
<tr>
<td>Significant cardiovascular diagnoses</td>
<td>42</td>
<td>28.0</td>
</tr>
<tr>
<td>Significant orthopaedic diagnoses</td>
<td>39</td>
<td>26.0</td>
</tr>
<tr>
<td>Depression</td>
<td>38</td>
<td>25.3</td>
</tr>
<tr>
<td>Sleeplessness</td>
<td>36</td>
<td>24.0</td>
</tr>
<tr>
<td>Urinating frequently</td>
<td>34</td>
<td>22.7</td>
</tr>
<tr>
<td>Vertigo</td>
<td>24</td>
<td>16.0</td>
</tr>
<tr>
<td>Impaired speech</td>
<td>22</td>
<td>14.7</td>
</tr>
<tr>
<td>Admission to cancer or orthopaedics ward</td>
<td>9</td>
<td>6.0</td>
</tr>
<tr>
<td>Surgical procedure planned/performe d</td>
<td>9</td>
<td>6.0</td>
</tr>
<tr>
<td>Admission for syncope</td>
<td>8</td>
<td>5.3</td>
</tr>
<tr>
<td>Temperature elevation</td>
<td>5</td>
<td>3.3</td>
</tr>
</tbody>
</table>
Table 3 (continued)

<table>
<thead>
<tr>
<th>Risk Factor for Falling</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foley catheter</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>Intravenous therapy</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>1</td>
<td>0.7</td>
</tr>
</tbody>
</table>
Table 4

Participant Demographic Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall sample</th>
<th>Experimental group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>((n = 150))</td>
<td>((n = 77))</td>
<td>((n = 73))</td>
</tr>
<tr>
<td>Age [M (SD)]</td>
<td>86.22 (6.41)</td>
<td>86.90 (5.75)</td>
<td>85.51 (7.00)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45 (30.00%)</td>
<td>20 (25.97%)</td>
<td>25 (34.25%)</td>
</tr>
<tr>
<td>Female</td>
<td>105 (70.00%)</td>
<td>57 (74.03%)</td>
<td>48 (65.75%)</td>
</tr>
<tr>
<td>Level of Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 years or less</td>
<td>34 (22.67%)</td>
<td>19 (24.68%)</td>
<td>15 (20.55%)</td>
</tr>
<tr>
<td>Some high school</td>
<td>30 (20.00%)</td>
<td>16 (20.78%)</td>
<td>14 (19.18%)</td>
</tr>
<tr>
<td>High school</td>
<td>18 (12.00%)</td>
<td>8 (10.39%)</td>
<td>10 (13.70%)</td>
</tr>
<tr>
<td>Some university/college</td>
<td>8 (5.33%)</td>
<td>5 (6.49%)</td>
<td>3 (4.11%)</td>
</tr>
<tr>
<td>University/college</td>
<td>11 (7.33%)</td>
<td>4 (5.19%)</td>
<td>7 (9.59%)</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>1 (0.67%)</td>
<td>1 (1.30%)</td>
<td>0 (0.00%)</td>
</tr>
<tr>
<td>No education information</td>
<td>48 (32.00%)</td>
<td>24 (31.17%)</td>
<td>24 (32.88%)</td>
</tr>
<tr>
<td>Marital Status Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>42 (28.00%)</td>
<td>19 (24.68%)</td>
<td>23 (31.51%)</td>
</tr>
<tr>
<td>Separated/ Divorced</td>
<td>8 (5.33%)</td>
<td>3 (3.90%)</td>
<td>5 (6.85%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>80 (53.33%)</td>
<td>48 (62.34%)</td>
<td>32 (43.84%)</td>
</tr>
<tr>
<td>Single</td>
<td>9 (6.00%)</td>
<td>2 (2.60%)</td>
<td>7 (9.59%)</td>
</tr>
<tr>
<td>No information</td>
<td>11 (7.33%)</td>
<td>5 (6.49%)</td>
<td>6 (8.22%)</td>
</tr>
</tbody>
</table>
Table 4 (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall sample (n = 150)</th>
<th>Experimental group (n = 77)</th>
<th>Control group (n = 73)</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Medical Diagnoses [M (SD)]</td>
<td>5.80 (2.61)</td>
<td>5.62 (2.48)</td>
<td>5.99 (2.76)</td>
</tr>
<tr>
<td># of Medications [M (SD)]</td>
<td>13.09 (5.14)</td>
<td>12.45 (5.25)</td>
<td>13.75 (4.98)</td>
</tr>
<tr>
<td># of Medical Risk Factors for Falls [M (SD)]</td>
<td>6.89 (3.39)</td>
<td>7.25 (3.68)</td>
<td>6.46 (3.00)</td>
</tr>
<tr>
<td>CPS Score [M (SD)]</td>
<td>3.44 (1.16*)</td>
<td>3.36 (1.12)**</td>
<td>3.51 (1.20)*****</td>
</tr>
<tr>
<td>Attrition status [M (SD)]</td>
<td>1.20 (0.46)</td>
<td>1.23 (0.51)</td>
<td>1.17 (0.41)</td>
</tr>
</tbody>
</table>

*n=137
**n = 69
***n=68
3.2 Group Comparisons

Participants in the control and experimental groups were compared on all demographic variables. Independent samples $t$-tests were conducted to compare participants on the demographic variables (i.e., age and CPS scores, medical risk factors for falls, medications, and medical diagnoses). There was no significant difference in age for participants in the control and experimental groups; $t (148) = 1.33, p = 0.19$ (two-tailed). Groups also did not differ with respect to scores on the CPS; $t (135) = -0.77, p = 0.44$ (two-tailed). No significant differences were detected between groups on the number of medical risk factors for falls; $t (107) = 1.22, p = 0.23$ (two-tailed), number of prescribed medications; $t (148) = -1.55, p = 0.12$ (two-tailed), and number of medical diagnoses; $t (148) = -0.85, p = 0.40$ (two tailed). Fisher’s Exact Test was used to compare participants in the control and experimental groups on the categorical demographic variables including participant marital status, education level, and attrition status (e.g., whether or not the participant completed the full 8-month study). No significant differences in marital status ($p = 0.08$), education level ($p = 0.79$), and attrition status ($p = 0.71$) were found between participants in the control and experimental groups. A Chi-square test for independence (with Yates Continuity Correction) indicated no significant association between participant sex and group membership, $\chi^2 (1, n = 150) = 0.86, p = 0.35$, $\phi = 0.09$. In summary, no significant differences were found between control and experimental groups on any demographic variables and in attrition status throughout the study.
3.3 Inter-rater reliability

Inter-rater reliability was assessed for the four items of the observational measure of restraint using Cohen’s Kappa correlations ($\kappa$). Inter-rater agreement was calculated for 15% of the observations completed throughout the study period. To evaluate the quality of inter-rater agreement, cutoff scores as described by Peat (2001) were implemented. Very good agreement was obtained for activity during the observation period ($\kappa = 0.83$), type of restraint used ($\kappa = 0.94$), whether the patient was able to loosen the restraint ($\kappa = 0.89$), and whether the restraint was properly applied ($\kappa = 0.88$).

3.4 Hypothesis Testing

3.4.1 Hypotheses 1 and 2. The first two study hypotheses purported that professional caregiver fears that residents will experience a fall will be predictive of restraint/restriction use, and that this restraint/restriction use will be predictive of falls experienced by residents (Hypothesis 1) and residents' ability to perform ADLs (Hypothesis 2). As per precedent in the literature (Tinetti & Powell, 1993), items in the fear measure used in this investigation included questions both about fear of falling and about balance confidence, as they are both deemed important (Tinetti & Powell, 1993; Tinetti, Richman, & Powell, 1990). However, the fear of falling items and the corresponding balance confidence items were highly correlated ($>.90$). As such the confidence and fear items were combined to form a single index of falling. Four models (i.e., testing the relationship between nurse fears about patient falls, nurse reported restraint use, and falls; nurse fears about patient falls, observed restraint use and falls; nurse fears about patient falls, nurse reported restraint use, and ADL ability; and nurse fears about patient falls, observed restraint use and ADL ability) were developed based
on the hypothesized relationships. The observed restraint use variable was dichotomized (i.e., the patient was never observed to be restrained versus the patient was observed to be restrained at least once).² These four models were tested separately in control and experimental groups using path analysis techniques. Path analysis is a form of multivariable analysis that tests causal hypotheses for a set of variables that are assumed to be linearly related. The path analysis model can be represented in a diagram, wherein a one-way arrow represents a “causal” relationship between variables. Double arrows represent a correlation between variables, but no hypothesis regarding causality is made. In path models variables that are housed in rectangles are "observed variables" (i.e., variables that were directly measured as part of the study) while circles represent latent (unmeasured) variables. The numbers in the path models represent the strength of the relationship, with significant relationships indicated by an asterisk. Table 5 presents the means and standard deviations of all variables included in the path analyses. Correlations between all variables used in the path analyses are shown in Table 6 for the experimental group and Table 7 for the control group.

The first path analysis examined the relationship between nurse fear about patient falls, nurse-reported restraint use, and the number of falls experienced by patients. This model is presented graphically in Figure 2, with coefficient values for the control group shown in parentheses. Full results are shown in Table 8. For the experimental group, significant relationships include caregiver fears at baseline and caregiver self-reported restraint use at baseline (β = 0.42); caregiver fears at baseline and post-intervention (β =

² Note: It was determined that the restraint variable should be dichotomized given that the variable was significantly positively skewed. Attempts were made to complete the analysis with a non-dichotomized variable (i.e., after transforming the data) but this resulted in significant missing data. As such, a dichotomized variable was used for all analyses.
Table 5
Means and SDs for variables used in the path analyses (Hypotheses I and II)

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
</tr>
<tr>
<td>Falls (Baseline)</td>
<td>77</td>
<td>1.35</td>
</tr>
<tr>
<td>Falls (Follow-up)</td>
<td>77</td>
<td>1.18</td>
</tr>
<tr>
<td>Nurse FAPF (Baseline)</td>
<td>75</td>
<td>10.72</td>
</tr>
<tr>
<td>Nurse FAPF (P.I.)</td>
<td>67</td>
<td>12.90</td>
</tr>
<tr>
<td>Caregiver reported restraint use (baseline)</td>
<td>76</td>
<td>3.64</td>
</tr>
<tr>
<td>Caregiver reported restraint use (P.I.)</td>
<td>67</td>
<td>4.15</td>
</tr>
<tr>
<td># of times restrained (Baseline - dichotomized)</td>
<td>76</td>
<td>0.68</td>
</tr>
<tr>
<td># of times restrained (Follow-up - dichotomized)</td>
<td>64</td>
<td>0.68</td>
</tr>
<tr>
<td>OARS ADL (Baseline)</td>
<td>77</td>
<td>9.08</td>
</tr>
<tr>
<td>OARS ADL (Follow-up)</td>
<td>63</td>
<td>8.48</td>
</tr>
</tbody>
</table>

Note: P.I. = Post-Intervention; FAPF = Fears about patient falls; OARS ADL = Older American Resource and Services Activity of Daily Living Questionnaire
Note: Baseline = 1st four months of the study, PI = immediately post-intervention, Follow-up=end of the 8 month study period
**Table 6**

Spearman Correlation matrix for variables included in path analyses (Experimental Group)

<table>
<thead>
<tr>
<th></th>
<th>Falls (Baseline)</th>
<th>Falls (Follow-up)</th>
<th>Caregiver fears (baseline)</th>
<th>Caregiver fears (PI)</th>
<th>Caregiver reported restraint use (baseline)</th>
<th>Caregiver reported restraint use (PI)</th>
<th># of times restrained (baseline)</th>
<th># of times restrained (PI)</th>
<th>OARS ADL (Baseline)</th>
<th>OARS ADL (Follow-up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls (Baseline)</td>
<td>1.00</td>
<td>0.10</td>
<td>0.26*</td>
<td>0.11</td>
<td>0.22</td>
<td>0.18</td>
<td>-0.004</td>
<td>0.08</td>
<td>-0.14</td>
<td>-0.16</td>
</tr>
<tr>
<td>Falls (Follow-up)</td>
<td>1.00</td>
<td>0.10</td>
<td>0.14</td>
<td>-0.009</td>
<td>0.08</td>
<td>-0.21</td>
<td>0.10</td>
<td>0.14</td>
<td>-0.14</td>
<td></td>
</tr>
<tr>
<td>Nurse FAPF (baseline)</td>
<td>1.00</td>
<td>0.10</td>
<td>0.62**</td>
<td>0.58**</td>
<td>0.23</td>
<td>0.23</td>
<td>0.20</td>
<td>-0.38**</td>
<td>-0.30*</td>
<td></td>
</tr>
<tr>
<td>Nurse FAPF (PI)</td>
<td>1.00</td>
<td>0.10</td>
<td>0.48**</td>
<td>0.43**</td>
<td>0.16</td>
<td>0.05</td>
<td>-0.19</td>
<td>-0.33**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregiver reported</td>
<td>1.00</td>
<td>0.10</td>
<td>0.67**</td>
<td>0.30**</td>
<td>0.23</td>
<td>0.23</td>
<td>-0.62**</td>
<td>-0.52**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>restraint use (baseline)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregiver reported</td>
<td>1.00</td>
<td>0.10</td>
<td>0.25*</td>
<td>0.22</td>
<td>-0.52**</td>
<td>-0.55**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>restraint use (PI)</td>
<td>1.00</td>
<td>0.10</td>
<td>0.52**</td>
<td>-0.45**</td>
<td>-0.37**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of times restrained</td>
<td>1.00</td>
<td>0.10</td>
<td></td>
<td>-0.26*</td>
<td>-0.32*</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(baseline - dichotomized)</td>
<td></td>
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<td></td>
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<tr>
<td># of times restrained</td>
<td>1.00</td>
<td>0.10</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>(PI - dichotomized)</td>
<td>1.00</td>
<td>0.10</td>
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<tr>
<td>OARS ADL</td>
<td>1.00</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(Baseline)</td>
<td>1.00</td>
<td>0.10</td>
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<tr>
<td>OARS ADL</td>
<td>1.00</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Follow-up)</td>
<td>1.00</td>
<td>0.10</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

Note: P.I. = Post-Intervention; FAPF = Fears about patient falls; OARS ADL = Older American Resource and Services Activity of Daily Living Questionnaire
Table 7

Spearman Correlation matrix for variables included in path analyses (Control Group)

Falls (Baseline)       Falls (Follow-up)  Caregiver fears (baseline)  Caregiver fears (PI)  Caregiver reported restraint use (baseline)  Caregiver reported restraint use (PI)  # of times restrained (baseline)  # of times restrained (PI)  OARS ADL (Baseline)  OARS ADL (Follow-up)  
Falls (Baseline)       1.00            0.62**          0.35**          0.40**          0.21            0.23            0.08            0.02            -0.24*          -0.14          
Falls (Follow-up)      1.00            0.27*          0.34**          0.07            0.04            -0.03           -0.02           -0.03           -0.05          
Nurse FAPF (baseline)  1.00            0.59**          0.59**          0.48**          0.17            0.15            -0.34**         -0.42**         
Nurse FAPF (PI)        1.00            0.31*          0.35**          -0.06           0.11            -0.24*          -0.24*          
Caregiver reported restraint use (baseline)  1.00            0.74**          0.35**          0.23            -0.46**         -0.46**         
Caregiver reported restraint use (PI)        1.00            0.35**          0.38**          -0.48**         -0.60**         
# of times restrained (baseline - dichotomized)  1.00            0.61**          0.61**          -0.22           -0.26*          
# of times restrained (PI - dichotomized)      1.00            0.29*           0.37**          -0.29*          -0.37**          
OARS ADL (Baseline)    1.00            0.69**          1.00            
OARS ADL (Follow-up)   1.00            

Note: PI = Post-Intervention; FAPF = Fears about patient falls; OARS ADL = Older American Resource and Services Activity of Daily Living Questionnaire
Figure 2
Path model exploring the relationship among nurse fears about patient falls, self-reported restraint use, and falls

Note: Values in parentheses represent values for the control group
Table 8

Parameter estimates for path model examining the relationship between nurse fears about patient falls (FAPF), self-reported restraint use, and falls

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Experimental Group</th>
<th>Error</th>
<th>z-value</th>
<th>Control group</th>
<th>Error</th>
<th>z-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse FAPF (B) -&gt; # of Falls (B)</td>
<td>0.15</td>
<td>0.08</td>
<td>1.84</td>
<td>0.28</td>
<td>0.08</td>
<td>3.52</td>
</tr>
<tr>
<td>Caregiver self-reported restraint use (B) -&gt; # of Falls (B)</td>
<td>0.04</td>
<td>0.10</td>
<td>0.51</td>
<td>-0.11</td>
<td>0.08</td>
<td>1.39</td>
</tr>
<tr>
<td># of Falls (B) -&gt; # of Falls (F)</td>
<td>0.16</td>
<td>0.10</td>
<td>1.58</td>
<td>0.69</td>
<td>0.12</td>
<td>6.01</td>
</tr>
<tr>
<td>Nurse FAPF (PI) -&gt; # of Falls (F)</td>
<td>0.07</td>
<td>0.07</td>
<td>0.97</td>
<td>0.11</td>
<td>0.08</td>
<td>1.40</td>
</tr>
<tr>
<td>Caregiver self-reported restraint use (PI) -&gt; Falls (F)</td>
<td>-0.03</td>
<td>0.06</td>
<td>0.51</td>
<td>-0.05</td>
<td>0.06</td>
<td>0.71</td>
</tr>
<tr>
<td>Nurse FAPF (B) -&gt; Nurse FAPF (PI)</td>
<td>0.51</td>
<td>0.08</td>
<td>6.56</td>
<td>0.57</td>
<td>0.09</td>
<td>6.17</td>
</tr>
<tr>
<td>Nurse FAPF (B) -&gt; Caregiver self-reported restraint use (B)</td>
<td>0.42</td>
<td>0.09</td>
<td>4.72</td>
<td>0.56</td>
<td>0.10</td>
<td>5.47</td>
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</tbody>
</table>

Note: B = Baseline; PI = Post-intervention; Values in **bold** represent significant results
### Table 8 (continued)

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Experimental</th>
<th>Error</th>
<th>z-value</th>
<th>Control group</th>
<th>Error</th>
<th>z-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse FAPF (PI) -&gt; Caregiver self-reported restraint use (PI)</td>
<td>0.008</td>
<td>0.11</td>
<td>0.08</td>
<td>0.20</td>
<td>0.10</td>
<td>2.00</td>
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<tr>
<td>Caregiver self-reported restraint use (B) -&gt;</td>
<td>0.95</td>
<td>0.11</td>
<td>8.78</td>
<td>0.79</td>
<td>0.09</td>
<td>8.46</td>
</tr>
<tr>
<td>Caregiver self-reported restraint use (PI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

RMSEA (90% CI)  

<table>
<thead>
<tr>
<th>RMSEA (90% CI)</th>
<th>0.16 (0.06-0.26)</th>
<th>0.09 (0.00-0.20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRMR</td>
<td>0.06</td>
<td>0.07</td>
</tr>
<tr>
<td>CFI</td>
<td>0.92</td>
<td>0.98</td>
</tr>
</tbody>
</table>

Note: B = Baseline; PI = Post-intervention; Values in **bold** represent significant results; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual; CFI = Comparative fit index
and caregiver self-reported restraint use at baseline and post-intervention ($\beta = 0.95$). In line with our hypothesis, a significant relationship was found between caregiver fears at baseline and caregiver self-reported restraint use at baseline. In contrast to our hypothesis, no significant relationship was found between caregiver self-reported restraint use at baseline and the number of falls experienced by participants at baseline. For the post-intervention period, no significant relationship was found between nurse fears about patient falls and self-reported restraint use, or between restraint use and post-intervention falls.

In order to test the adequacy of the model fit to the data for the experimental group, the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) were calculated. For the experimental group, the model resulted in a CFI value of 0.92. According to Hu and Bentler (1999) a CFI of greater than 0.90 is indicative of a good-fitting model. The RMSEA value for the tested model is 0.16. RMSEA values range from 0-1.00 with smaller numbers indicating better model fit. Acceptable model fit is indicated by an RMSEA value of 0.06 or less (Hu & Bentler, 1999). Finally, the SRMR value of 0.06 does not suggest an acceptable model (models with a SRMR value of less than 0.05 suggesting a good fitting model).

In the control group, significant relationships were found between nurse fears about patient falls at baseline and caregiver self-reported restraint use ($\beta = 0.56$); nurse fears about patient falls at baseline and falls during the baseline period ($\beta = 0.28$); nurse fears about patient falls at baseline and post-intervention ($\beta = 0.57$); caregiver self-reported restraint use at baseline and post-intervention ($\beta = 0.79$); nurse fears about
patient falls post-intervention and caregiver self-reported restraint use post-intervention ($\beta = 0.20$); and falls at baseline and post-intervention ($\beta = 0.69$). With respect to the hypothesis, a significant relationship was found at baseline between nurse fears about patient falls and reported restraint use, however a significant relationship between caregiver reported restraint-use and falls at baseline was not detected. Similarly, in the post-intervention period, a significant relationship was found between nurse fears about patient falls and restraint use, but not between restraint use and falls. The model for the control group was not a good fit overall, with a CFI value of 0.98, a RMSEA value of 0.09, and a SRMR value of 0.07.

The second path analysis examined the relationship between nurse fears about patient falls, observed restraint use (e.g., was the patient ever observed to be restrained or not), and the number of patient falls. This model is presented graphically in Figure 3, with coefficient values for the control group shown in parentheses. Full results are seen in Table 9. For the experimental group, significant relationships include nurse fears about patient falls at baseline and observed restraint use at baseline ($\beta = 0.03$), nurse fears about patient falls post-intervention ($\beta = 0.52$), and falls at baseline ($\beta = 0.17$); and observed restraint use (dichotomized) at baseline and post-intervention ($\beta = 0.50$). With respect to the hypothesis, a significant relationship was found between nurse fears about patient falls and restraint use at baseline, but no significant relationship was detected between restraint use at baseline and falls at baseline. None of the hypothesized significant relationships were detected at post-intervention. For the experimental group, this model was not found to be an acceptable fit overall, with a CFI value of 0.91; a RMSEA value
Figure 3
Path model exploring relationship among nurse fears about patient falls, observed restraint use, and falls

Note: Values in parentheses represent values for the control group
Table 9

Parameter estimates for path model examining the relationship between nurse fear about patient falls (FAPF), observed restraint use, and falls

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Experimental Group</th>
<th>Error</th>
<th>z-value</th>
<th>Control group</th>
<th>Error</th>
<th>z-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse FAPF (B) -&gt; # of Falls (B)</td>
<td>0.17</td>
<td>0.07</td>
<td>2.39</td>
<td>0.22</td>
<td>0.07</td>
<td>3.17</td>
</tr>
<tr>
<td>Observed restraint use (dichotomized) (B) -&gt; # of Falls (B)</td>
<td>-0.27</td>
<td>0.63</td>
<td>0.43</td>
<td>-0.09</td>
<td>0.67</td>
<td>0.13</td>
</tr>
<tr>
<td># of Falls (B) -&gt; # of Falls (F)</td>
<td>0.14</td>
<td>0.10</td>
<td>1.40</td>
<td>0.68</td>
<td>0.12</td>
<td>5.82</td>
</tr>
<tr>
<td>Nurse FAPF (PI) -&gt; # of Falls (F)</td>
<td>0.06</td>
<td>0.07</td>
<td>0.90</td>
<td>0.10</td>
<td>0.07</td>
<td>1.35</td>
</tr>
<tr>
<td>Observed restraint use (dichotomized) (PI) -&gt; Falls (F)</td>
<td>0.30</td>
<td>0.52</td>
<td>0.58</td>
<td>-0.50</td>
<td>0.70</td>
<td>0.71</td>
</tr>
<tr>
<td>Nurse FAPF (B) -&gt; Nurse FAPF (PI)</td>
<td>0.52</td>
<td>0.08</td>
<td>6.66</td>
<td>0.58</td>
<td>0.09</td>
<td>6.17</td>
</tr>
<tr>
<td>Nurse FAPF (B) -&gt; Observed restraint use (dichotomized) (B)</td>
<td>0.03</td>
<td>0.01</td>
<td>2.14</td>
<td>0.01</td>
<td>0.01</td>
<td>0.79</td>
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</tbody>
</table>

Note: B = Baseline; PI = Post-intervention; Values in **bold** represent significant results
Table 9 (continued)

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Experimental Group</th>
<th>Error</th>
<th>z-value</th>
<th>Control group</th>
<th>Error</th>
<th>z-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse FAPF (PI) -&gt; Observed restraint use (dichotomized) (PI)</td>
<td>-0.01</td>
<td>0.02</td>
<td>0.74</td>
<td>0.01</td>
<td>0.01</td>
<td>1.25</td>
</tr>
<tr>
<td>Observed restraint use (dichotomized) (B) -&gt; Observed restraint use (dichotomized) (PI)</td>
<td>0.50</td>
<td>0.11</td>
<td><strong>4.71</strong></td>
<td>0.53</td>
<td>0.09</td>
<td><strong>5.60</strong></td>
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</table>

RMSEA (90% CI)  
0.12 (0.00-0.23)  
0.09 (0.00-0.20)

SRMR  
0.07  
0.07

CFI  
0.91  
0.97

Note: B = Baseline; PI = Post-intervention; Values in **bold** represent significant results; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual; CFI = Comparative fit index
of 0.12; and a SRMR value of 0.07.

In the control group, significant relationships include nurse fears about patient falls at baseline and nurse fears about patient falls post-intervention ($\beta = 0.58$); nurse fears about patient falls at baseline and falls during the baseline period ($\beta = 0.22$); observed restraint use at baseline and post-intervention ($\beta = 0.53$); and falls at baseline and post-intervention ($\beta = 0.68$). The hypothesized relationships were not found to be statistically significant. The model was determined to be an unacceptable fit for the control group, with a CFI value of 0.97, a RMSEA value of 0.09, and a SRMR value of 0.07.

The third path analysis examined the relationship between nurse fears about patient falls, caregiver self-reported restraint use, and patients’ ability to complete ADLs at follow-up. This model is presented graphically in Figure 4, with coefficient values for the control group shown in parentheses. Full results are shown in Table 10. For the experimental group, significant relationships include nurse fears about patient falls at baseline and nurse self-reported restraint use at baseline ($\beta = 0.42$); nurse fears about patient falls at baseline and nurse fears about patient falls post-intervention ($\beta = 0.51$); nurse self-reported restraint use at baseline and patient ADL ability at baseline ($\beta = -0.42$); nurse self-reported restraint use at baseline and post-intervention ($\beta = 0.95$); and nurse self-reported restraint use at post-intervention and patient ADL ability post-intervention ($\beta = -0.39$). The hypothesized relationship between nurse fears about patient falls, restraint use, and ADL ability was supported at baseline, however, this was not true in the post-intervention portion of the study. The model was an acceptable fit for the experimental group, with a CFI of 0.97, a RMSEA of 0.12, and a SRMR of 0.04.
Figure 4.
Path model exploring the relationship among nurse fear about patient falls, self-reported restraint use and patient ADL ability

Note: Values in parentheses represent values for the control group
Table 10

Parameter estimates for path model exploring the relationship between nurse fear about patient falls (FAPF), self-reported restraint use and patient ADLs

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Experimental Group</th>
<th>Error</th>
<th>z-value</th>
<th>Control group</th>
<th>Error</th>
<th>z-value</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse FAPF (B) -&gt; Nurse FAPF (PI)</td>
<td>0.51</td>
<td>0.08</td>
<td><strong>6.27</strong></td>
<td>0.58</td>
<td>0.10</td>
<td><strong>5.95</strong></td>
<td></td>
</tr>
<tr>
<td>Nurse FAPF (B) -&gt; Caregiver self-reported restraint use (B)</td>
<td>0.42</td>
<td>0.09</td>
<td><strong>4.55</strong></td>
<td>0.56</td>
<td>0.11</td>
<td><strong>5.05</strong></td>
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</tr>
<tr>
<td>Nurse FAPF (PI) -&gt; Caregiver self-reported restraint use (PI)</td>
<td>0.02</td>
<td>0.12</td>
<td>0.13</td>
<td>0.17</td>
<td>0.11</td>
<td>1.63</td>
<td></td>
</tr>
<tr>
<td>Caregiver self-reported restraint use (B) -&gt; Caregiver self-reported restraint use (PI)</td>
<td>0.95</td>
<td>0.11</td>
<td><strong>8.38</strong></td>
<td>0.80</td>
<td>0.10</td>
<td><strong>8.07</strong></td>
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</tr>
<tr>
<td>Nurse FAPF (B) -&gt; ADL ability (B)</td>
<td>-0.05</td>
<td>0.06</td>
<td>0.77</td>
<td>-0.08</td>
<td>0.10</td>
<td>0.78</td>
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</tr>
<tr>
<td>Caregiver self-reported restraint use (B) -&gt; ADL ability (B)</td>
<td>-0.42</td>
<td>0.07</td>
<td><strong>5.85</strong></td>
<td>-0.26</td>
<td>0.10</td>
<td><strong>2.57</strong></td>
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Note: B = Baseline; PI = Post-intervention; Values in **bold** represent significant results
<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Experimental Group</th>
<th></th>
<th></th>
<th></th>
<th>Control group</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse FAPF (PI) -&gt; ADL ability (F)</td>
<td>-0.07</td>
<td>0.08</td>
<td>0.86</td>
<td>0.01</td>
<td>0.09</td>
<td>0.14</td>
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<tr>
<td>Caregiver self-reported restraint use (PI) -&gt; ADL ability (F)</td>
<td>-0.39</td>
<td>0.07</td>
<td><strong>5.47</strong></td>
<td>-0.22</td>
<td>0.07</td>
<td><strong>3.01</strong></td>
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</tr>
<tr>
<td>ADL ability (B) -&gt; ADL ability (F)</td>
<td>-0.01</td>
<td>0.14</td>
<td>0.09</td>
<td>0.50</td>
<td>0.11</td>
<td><strong>4.55</strong></td>
<td></td>
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</tr>
<tr>
<td>RMSEA (90% CI)</td>
<td>0.12 (0.00-0.23)</td>
<td>0.09 (0.00-0.21)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SRMR</td>
<td>0.04</td>
<td>0.05</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>0.97</td>
<td>0.98</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Note: B = Baseline; PI = Post-intervention; Values in **bold** represent significant results; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual; CFI = Comparative fit index
Significant relationships detected within the path analysis model for participants in the control group included nurse fears about patient falls at baseline and caregiver self-reported restraint use at baseline ($\beta = 0.56$); nurse fears about patient falls at baseline and post-intervention ($\beta = 0.58$); caregiver reported restraint use at baseline and patient ADL ability at baseline ($\beta = -0.26$); caregiver reported restraint use at baseline and post-intervention ($\beta = 0.80$); caregiver self-reported restraint use post-intervention and patient ADL ability post-intervention ($\beta = -0.22$); and patient ADL ability at baseline and post-intervention ($\beta = 0.50$). With respect to the hypothesis for participants in the control group, significant relationships were found between nurse fears about patient falls, caregiver reported restraint use and patient ADL ability at baseline. This relationship was not found in the post-intervention period, although a significant relationship was detected between caregiver reported restraint use and patient ADL ability post-intervention. This model was an acceptable fit for control participants, with a CFI of 0.98, a RMSEA value of 0.09, and a SRMR value of 0.05.

The final path analysis model was designed to explore the relationship between nurse fears about patient falls, observed restraint use (dichotomized), and patient ADL ability. This model is presented graphically in Figure 5, with coefficient values for the control group shown in parentheses. Full results are shown in Table 11. For the experimental group, significant relationships included nurse fears about patient falls at baseline and observed restraint use at baseline ($\beta = 0.03$); nurse fears about patient falls at baseline and patient ADL ability at baseline ($\beta = -0.18$); nurse fears about patient falls at baseline and post-intervention ($\beta = 0.51$); observed restraint use at baseline and patient ADL ability at baseline ($\beta = -1.74$) and patient restraint use post-intervention ($\beta = 0.52$);
Figure 5
Path model exploring relationship among nurse fears about patient falls, observed restraint use (dichotomized), and patient ADL ability

Note: Values in parentheses represent values for the control group
Table 11

Parameter estimates for path model exploring the relationship between nurse fears about patient falls (FAPF), observed restraint use (dichotomized) and patient ADLs

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Experimental Group</th>
<th>Error</th>
<th>z-value</th>
<th>Control group</th>
<th>Error</th>
<th>z-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse FAPF (B) -&gt; Nurse FAPF (PI)</td>
<td>0.51</td>
<td>0.08</td>
<td><strong>6.39</strong></td>
<td>0.58</td>
<td>0.10</td>
<td><strong>5.95</strong></td>
</tr>
<tr>
<td>Nurse FAPF (B) -&gt; Observed restraint use (B)</td>
<td>0.03</td>
<td>0.01</td>
<td><strong>2.10</strong></td>
<td>0.01</td>
<td>0.01</td>
<td>1.09</td>
</tr>
<tr>
<td>Nurse FAPF (PI) -&gt; Observed restraint use (PI)</td>
<td>-0.008</td>
<td>0.02</td>
<td>0.53</td>
<td>0.009</td>
<td>0.01</td>
<td>0.83</td>
</tr>
<tr>
<td>Observed restraint use dichotomized (B) -&gt; Observed restraint use dichotomized (PI)</td>
<td>0.52</td>
<td>0.11</td>
<td><strong>4.83</strong></td>
<td>0.56</td>
<td>0.10</td>
<td><strong>5.57</strong></td>
</tr>
<tr>
<td>Nurse FAPF (B) -&gt; ADL ability (B)</td>
<td>-0.18</td>
<td>0.06</td>
<td><strong>2.76</strong></td>
<td>-0.21</td>
<td>0.09</td>
<td><strong>2.38</strong></td>
</tr>
</tbody>
</table>

Note: B = Baseline; PI = Post-intervention; Values in **bold** represent significant results;
Table 11 (continued).

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Experimental Group</th>
<th>Error</th>
<th>z-value</th>
<th>Control group</th>
<th>Error</th>
<th>z-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed restraint use dichotomized (B) -&gt; ADL ability (B)</td>
<td>-1.74</td>
<td>0.55</td>
<td><strong>3.15</strong></td>
<td>-0.88</td>
<td>0.89</td>
<td>0.99</td>
</tr>
<tr>
<td>Nurse FAPF (PI) -&gt; ADL ability (F)</td>
<td>-0.16</td>
<td>0.10</td>
<td>1.70</td>
<td>-0.05</td>
<td>0.08</td>
<td>0.62</td>
</tr>
<tr>
<td>Observed restraint use dichotomized (PI) -&gt; ADL ability (F)</td>
<td>-1.40</td>
<td>0.68</td>
<td><strong>2.06</strong></td>
<td>-1.56</td>
<td>0.81</td>
<td>1.93</td>
</tr>
<tr>
<td>ADL ability (B) -&gt; ADL ability (F)</td>
<td>0.38</td>
<td>0.14</td>
<td><strong>2.73</strong></td>
<td>0.59</td>
<td>0.11</td>
<td><strong>5.36</strong></td>
</tr>
<tr>
<td>RMSEA (90% CI)</td>
<td>0.00 (0.00-0.11)</td>
<td></td>
<td></td>
<td>0.13 (0.00-0.24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRMR</td>
<td>0.03</td>
<td></td>
<td></td>
<td>0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>1.00</td>
<td></td>
<td></td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: B = Baseline; PI = Post-intervention; Values in **bold** represent significant results; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual; CFI = Comparative fit index
patient restraint use post-intervention and ADL ability post-intervention ($\beta = -1.40$); and ADL ability at baseline and follow-up ($\beta = 0.38$). The hypothesized relationship between nurse fears about patient falls, observed restraint use, and patient ADL ability was supported at baseline but not in the post-intervention portion of the study. The model was a good fit for the experimental group, with a CFI of 1.00, a RMSEA of 0.00, and a SRMR of 0.03.

Significant relationships in the control group include nurse fears about patient falls at baseline and patient ADL ability at baseline ($\beta = -0.21$); nurse fears about patient falls at baseline and nurse fears about patient falls post-intervention ($\beta = 0.58$); observed restraint use at baseline and post-intervention ($\beta = 0.56$); and ADL ability at baseline and follow-up ($\beta = 0.59$). The hypothesis was not supported for the control group in either the baseline or post-intervention study periods. The model was an unacceptable fit for the control group, with a CFI of 0.94, a RMSEA of 0.13, and a SRMR of 0.07.

3.4.2 Hypotheses 3 and 4 and 5. The third, fourth, and fifth hypotheses were designed to test group differences to determine whether the study "intervention" (i.e., the feedback based on the physiotherapy and neuropsychological assessment) resulted in a change in the a) level of fear caregivers experienced about the possibility of resident falls (Hypothesis 3); b) use of restraints, as measured by the observational restraint tool (Hypothesis 4); and c) the number of falls experienced in the post-intervention period (Hypothesis 5). In order to test these hypotheses, a mixed model multivariate analysis of variance (MANOVA) was calculated with group membership acting as the between subjects factor and time as the within-subjects factor. The dependent variables included caregiver-reported fear of falling (at baseline, post-intervention, and at follow-up),
resident falls (at baseline and post-intervention) and observed restraint use (pre- and post-intervention). Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of covariance matrices, and multicollinearity. Some violations of these assumptions were noted. In particular, the assumption of normality for two variables (number of falls post-intervention and observed restraint use post-intervention) was not met, however this is common for large samples (Pallant, 2007). In addition, the assumption of multivariate normality was violated and the dataset was examined for outliers causing this violation. Three outliers were found in the dependent variable measuring the number of falls post-intervention. Given that only three outliers were detected, and variation was expected in this variable, these participants were retained (no significant differences were found when these outliers were deleted). Finally, the assumption of equality of error variances for three variables (number of times restrained at baseline, fear of falling post-intervention, and fear of falling at follow up) was violated. As such, for these variables a more conservative alpha was applied ($p = 0.01$). According to Pallant, given that each of the two groups has an N greater than 30, any violations of normality or equality of variance will not have a significant impact on the results. With that said, there were no significant differences detected between participants in the control and experimental groups on the dependent variables, $F (3, 119) = 1.96, p = 0.10$; Wilks’ Lambda = 0.90, partial eta squared = 0.10.

These data were further examined using three separate mixed-model ANOVAS; one for each dependent variable (resident falls, caregiver-reported fears, and observed restraint use). This was done to evaluate effects of individual variables (as opposed to the
MANOVA which examines the variables for an omnibus effect). The first ANOVA was conducted to assess the impact of the assessment and provision of feedback on caregiver-reported fears across the three time periods (at baseline, post-intervention, and at follow-up). There was no significant interaction between group membership (experimental versus control) and time, $F(2, 125) = 1.39, p = 0.25$, partial eta squared = 0.02. There was a significant main effect for time, $F(2, 125) = 19.95, p = 0.001$, partial eta squared = 0.24, with both groups showing an increase in caregiver-reported fear post-intervention, and a reduction in caregiver-reported fear (compared to post-intervention) at follow-up (see Table 12). The main effect comparing the two groups was not significant, $F(1, 126) = 64.24, p = 0.17$, partial eta squared = 0.02. Overall, no difference across groups based on the intervention were found.

The second ANOVA was conducted to assess the impact of the assessment and provision of feedback on observed restraint use at two different study periods (pre-intervention and post-intervention). There was no significant interaction between group membership (experimental versus control) and time, $F(1, 96) = 0.26, p = 0.61$, partial eta squared = 0.003. There was a significant main effect for time, $F(1, 96) = 9.34, p = 0.003$, partial eta squared = 0.09, with both groups showing an increase in observed restraint-use following the intervention (see Table 13). The main effect comparing the two groups was not significant, $F(1, 96) = 0.54, p = 0.46$, partial eta squared = 0.01. The analysis suggests no difference in observed restraint use across groups based on the intervention.

The final ANOVA was conducted to assess the impact of the assessment and provision of feedback on resident falls at two different study periods (pre-intervention and post-intervention). There was no significant interaction between group membership
Table 12

Nurse fears about patient falls across three time periods (Interactions)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Experimental</th>
<th></th>
<th></th>
<th>Control</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>n</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Baseline</td>
<td>63</td>
<td>10.64</td>
<td>4.27</td>
<td>65</td>
<td>10.54</td>
<td>4.69</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>63</td>
<td>13.08</td>
<td>3.44</td>
<td>65</td>
<td>12.05</td>
<td>4.23</td>
</tr>
<tr>
<td>Follow-up</td>
<td>63</td>
<td>12.30</td>
<td>2.92</td>
<td>65</td>
<td>10.97</td>
<td>4.12</td>
</tr>
</tbody>
</table>
Table 13

Observed restraint-use across two time periods (Interactions)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Baseline</td>
<td>49</td>
<td>2.41</td>
</tr>
<tr>
<td>Follow-up</td>
<td>49</td>
<td>3.02</td>
</tr>
</tbody>
</table>
(experimental versus control) and time, $F(1, 148) = 0.50, p = 0.48$, partial eta squared = 0.003. There was no significant main effect for time, $F(1, 148) = 0.12, p = 0.91$, partial eta squared = 0.001 (see Table 14). The main effect comparing the two groups was on the cusp of significance, $F(1, 148) = 3.83, p = 0.052$, partial eta squared = 0.03. The lack of a significant interaction suggests that the intervention did not result in a difference in falls between groups.

3.4.3 Hypothesis 5. Additional analyses were conducted to examine the fifth hypothesis (i.e., that participants in the experimental group would experience significantly fewer falls post-intervention than those in the control group) given that it was the central hypothesis in the study. Falls were recorded weekly and compared across groups. A total of 237 falls occurred in the 4-month period between the "intervention" and the completion of the study. Ninety-one of these falls occurred in the experimental group, while participants in the control group experienced a total of 146 falls. As an additional test of this hypothesis, independent sample $t$-tests were calculated to determine whether the number of falls at pre- and post-intervention differed significantly across the two groups. The independent-samples $t$-test showed that there was no significant difference in the mean number of falls between control ($M = 1.88, SD = 2.58$) and experimental groups ($M = 1.35, SD = 2.23$) experienced in the four-month baseline period; $t(148) = -1.34, p = 1.82$ (two-tailed). A significant difference was detected in the mean number of falls between control ($M = 2.00, SD = 3.06$) and experimental groups ($M$
Table 14

Resident falls across two time periods (Interactions)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Baseline</td>
<td>77</td>
<td>1.35</td>
</tr>
<tr>
<td>Follow-up</td>
<td>77</td>
<td>1.18</td>
</tr>
</tbody>
</table>
\(t(116.104) = -1.98, p = 0.03\) (one-tailed).

Although the independent t-test showed a significant group difference in falls in the post-intervention study period, the assumptions for this statistical test, namely, the assumption of normality, were violated. Therefore, it was determined that further statistical analysis to test this hypothesis was necessary\(^3\). A negative binomial regression analysis was chosen as the appropriate analysis. Negative binomial distributions are an alternative to the Poisson statistical model. Both models (i.e., the negative binomial distribution and the Poisson model) are an appropriate choice for modelling when counting the number of events that occur across time (i.e., the number of falls over the study period). In particular, a negative binomial distribution is used when there is variability in the data. As such, the negative binomial distribution was used to examine the relationship between group membership (control versus experimental), and the number of falls in the baseline and post-intervention portions of the study (see table 15 for full results). This model was a good fit for the data, with a deviance/degree of freedom of 1.01. Group overall is a significant term in the model \((p = 0.01)\), such that a change in group membership resulted in a difference in the number of falls experienced. In comparison to the reference category (control group), members of the experimental group experienced fewer falls (log change of -0.33). This means that for each fall

\(^3\) A chi-square analysis was conducted to determine whether a significant difference existed across groups in the number of falls occurring in baseline and post-intervention periods (i.e., did participants in the experimental group experience a significantly greater reduction in falls from pre- to post-intervention than the control group). No significant association between group membership and the amount of change in the number of falls was found \((\chi^2(2, n = 135) = 0.54, p = 0.77, \text{Cramer’s } V = 0.6\)\). Two chi-square analyses (i.e., for the baseline and post-intervention periods) were also conducted to examine whether significant differences existed between groups on three additional categorical fall variables (i.e., did the participant never fall, did the participant fall once, did the participant fall more than once). No significant differences were found between groups on these variables \((\chi^2(2, n = 150) = 1.75, p = 0.42, \text{Cramer’s } V = 0.11\) and \(\chi^2(2, n = 150) = 3.51, p = 0.17, \text{Cramer’s } V = 0.15\), respectively).
Table 15

Number of falls as a function of group, time, and group x time interaction

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DF</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald 95% Confidence Limits</th>
<th>Wald Chi-Square</th>
<th>Pr &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>0.6295</td>
<td>0.1643</td>
<td>0.3076 0.9515</td>
<td>14.69</td>
<td>0.0001</td>
</tr>
<tr>
<td>GROUP</td>
<td>1</td>
<td>-0.3289</td>
<td>0.2351</td>
<td>-0.7897 0.1318</td>
<td>1.96</td>
<td>0.1617</td>
</tr>
<tr>
<td>time</td>
<td>1</td>
<td>0.0636</td>
<td>0.2313</td>
<td>-0.3898 0.5170</td>
<td>0.08</td>
<td>0.7833</td>
</tr>
<tr>
<td>GROUP*time</td>
<td>1</td>
<td>-0.1972</td>
<td>0.3338</td>
<td>-0.8515 0.4572</td>
<td>0.35</td>
<td>0.5548</td>
</tr>
<tr>
<td>Dispersion</td>
<td>1</td>
<td>1.4370</td>
<td>0.2040</td>
<td>1.0371 1.8368</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Reference category = control group
experienced in the control group post-intervention, the experimental group experienced 0.7 falls. However, this decrease in falls is not significant ($p = 0.16$).

3.4.4 Hypothesis 6. According to Hypothesis 6, it was expected that after controlling for actual fall risk in experimental participants, a significant positive correlation would exist between the level of fear reported by nurses that their care recipient would experience a fall and the number of falls experienced by that care recipient. The fall risk score (i.e., the categorization score derived from the physiotherapy and neuropsychological assessments and the checklist measuring medical risk factors for falls; see Table 1) was used as a control variable in each partial correlation. A total of three partial correlations (Spearman) were calculated to correspond to the different study periods. The first partial correlation examined the relationship between caregiver fear of resident falls measured at the baseline portion of the study and the number of falls experienced by participants in the first four month portion of the study. The relationship between caregiver fear of residents falls and falls in the baseline period was significantly positively correlated, $r_s (67) = .24, p = 0.02$ (one-tailed), indicating that higher nurse fears about patient falls at baseline were related to a higher number of falls experienced by the residents in the first four months of the study.

A second partial correlation was used to examine the relationship between nurse fears about patient falls post-intervention (i.e., their level of fear immediately following receipt of the resident specific assessment feedback) and the number of falls in the second four-month (follow-up) portion of the study. The relationship between nurse fears about patient falls post-intervention and the number of falls experienced by participants in the second four-month study period was not significant, $r_s (67) = .13, p = 0.14$ (one-tailed),
indicating that higher nurse fears about patient falls at post intervention were not associated with a higher incidence of participant falls in the follow-up portion of the study. Finally, a partial correlation was calculated examining the relationship between nurse fears about patient falls throughout the study (e.g., a combination of their fear scores at baseline and post-intervention) and the total number of falls experienced by participants (e.g., falls occurring over the entire 8-month study period). The relationship between nurse fears about patient falls throughout the study and the total number of falls experienced by participants was significantly positively correlated, $r_s (66) = 0.24, p = 0.03$ (one-tailed), indicating that, overall, higher levels of fears (as reported by nurses) were related to a higher incidence of falls in resident. Therefore, this analysis shows that higher nurse fears about patient falls were associated with higher numbers of falls in the baseline period, but that such nurse fears were not significantly associated with falls post-intervention Therefore, Hypothesis 6 was not supported.

Although information about actual fall risk was only calculated for participants in the experimental group, partial correlations were conducted in the control group controlling for fall risk as measured by the medical risk factor questionnaire. The relationship between nurse fears about patient falls and falls was significant at baseline $r_s (70) = 0.25, p = 0.02$, at post-intervention $r_s (65) = 0.36, p =0.002$, and throughout the entire study period, $r_s (65) = 0.40, p =0.001$.

3.4.5 Hypothesis 7. Hypothesis seven predicted that a significant relationship would exist between nurse fears about patient falls and the use of restraint/restrictions even after controlling for the actual fall risk determined through the fall-risk assessment. The fall risk score (i.e., the total score derived from the physiotherapy and
neuropsychological assessments and the checklist measuring risk factors for falls) was used as a control variable in each partial correlation. A total of three partial correlations were calculated to correspond to the different study periods. The first partial correlation examined the relationship between caregiver fear of resident falls measured at the baseline portion of the study and the number of times participants were observed to be restrained (out of 16 observation periods) in the first four month portion of the study. The relationship between caregiver fear of residents falls and the number of observed restraint use in the baseline period was significantly positively correlated, $r_s (59) = .27, p = 0.02$ (one-tailed), indicating that higher nurse fears about patient falls at baseline were related to a greater number of incidents of observed restraint use in the baseline period of the study (i.e., the first four months). A second partial correlation was conducted to examine the relationship between nurse fears about patient falls post-intervention (i.e., their level of fear immediately following receipt of the resident specific assessment feedback) and the incidence of observed restraint use in the second four-month (follow-up) portion of the study. The relationship between nurse fears about patient falls post-intervention and the frequency of observed restraint use experienced by participants in the second four month study period was not significant, $r_s (51) = .14, p = 0.15$ (one-tailed), indicating that higher nurse fears about patient falls at post intervention were not associated with a higher incidence of restraint use in the follow-up portion of the study. Finally, a partial correlation was calculated examining the relationship between nurse fears about patient falls throughout the study (i.e., a total of their fear scores at baseline and post-intervention) and the total number of incidents where participants were observed to be restrained (of the 16 observation periods occurring throughout the entire 8-month
The relationship between nurse fears about patient falls throughout the study and the total number of incidents of observed restraint use was significantly positively correlated, $r_s (46) = .28, p = 0.03$ (one-tailed), indicating that, overall, there was a relationship between such nurse fears and observed restraint use throughout the study period.

Partial correlations were also calculated to determine the relationship between nurse fears about patient falls and caregiver reported use of restraints (i.e., based on a rating of 0-10 when asked how often they restrain that care recipient to prevent them from falling). A similar pattern of relationships emerged, with the relationship between nurse fears about patient falls and self-reported restraint use being significant at baseline, $r (67) = .49, p = 0.001$ (one-tailed) and for the complete 8-month study period, $r (59) = .40, p = 0.001$ (one-tailed). The relationship between such nurse fears and self-reported restraint use at post-intervention was not significant, $r (66) = .20, p = 0.06$ (one-tailed).

Although information about actual fall risk was only calculated for participants in the experimental group, partial correlations were conducted in the control group controlling for fall risk as measured by the medical risk factor questionnaire. The relationship between nurse fears about patient falls and observed restraint use was not significant at baseline, $r_s (55) = 0.08, p = 0.57$, at post-intervention, $r_s (57) = -0.02, p = 0.88$, or throughout the entire study period, $r_s (46) = -0.08, p = 0.60$. When examining these relationships using the caregiver self-reported restraint use variable, the relationship was significant at baseline $r (70) = 0.29, p = 0.01$, post-intervention $r (65) = 0.22, p = 0.04$, and throughout the entire study period $r (62) = 0.34, p = 0.01$. 
3.5 Additional analysis

Although it was initially determined that this study would focus solely on the use of physical restraints (e.g., lap belts, wheelchair trays), medication information was collected for each participant to determine whether differences in PRN medication use existed between groups as a function of the study intervention. Medications were quantified using the MQS and variables were created – one representing a summary score for psychoactive drugs measured by the MQS (e.g., anti-anxiety, SSRI, tricyclic antidepressants, other antidepressants, antipsychotics, barbiturates, benzodiazepines and sedatives/hypnotics), and the other representing all medication categories measured by the MQS. Two scores were calculated for each participant, one score representing their medication usage for the 30 day period prior to the intervention, and one score representing their medication usage for the 30 days post-intervention.\(^4\)

A negative binomial distribution was conducted to determine whether a difference existed in overall PRN medication use across groups (pre and post intervention). See Table 16 for full results. This model was not a great fit for the data, with a deviance/degree of freedom of 0.81. Overall, this model revealed that group overall was not a significant term in the model \((p = 0.93)\). In addition, time and the group by time interaction were not significant factors in the model \((p = 0.75, \text{ and } p = 1.00, \text{ respectively})\), suggesting that no significant difference in overall PRN medication usage was found between control and experimental participants.

A Poisson regression analysis was used to determine whether a difference existed in overall psychoactive PRN medication use across groups (pre and post intervention).

\(^4\) For participants in the control group (e.g., participants who did not receive the intervention) medication data was collected at the same time as those in the experimental group
Table 16

Negative binomial distribution for all PRN Medications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DF</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald 95% Confidence Limits</th>
<th>Wald Chi-Square</th>
<th>Pr &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>-0.0851</td>
<td>0.2521</td>
<td>-0.5791 - 0.4090</td>
<td>0.11</td>
<td>0.7358</td>
</tr>
<tr>
<td>time Post-Physiotherapy</td>
<td>1</td>
<td>0.0802</td>
<td>0.3544</td>
<td>-0.6145 - 0.7748</td>
<td>0.05</td>
<td>0.8211</td>
</tr>
<tr>
<td>GROUP Experimental</td>
<td>1</td>
<td>0.0211</td>
<td>0.3662</td>
<td>-0.6967 - 0.7389</td>
<td>0.00</td>
<td>0.9541</td>
</tr>
<tr>
<td>time*GROUP Post-Physiotherapy Experimental</td>
<td>1</td>
<td>0.0014</td>
<td>0.5149</td>
<td>-1.0078 - 1.0106</td>
<td>0.00</td>
<td>0.9978</td>
</tr>
<tr>
<td>Dispersion</td>
<td>1</td>
<td>2.5333</td>
<td>0.4003</td>
<td>1.7488 - 3.3178</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
See Table 17 for full results. This model was not a great fit for the data, with a deviance/degree of freedom of 1.28. Group was not a significant term in the model ($p = 0.47$), nor was time or the time and group interaction ($p = 0.96$ and $p = 0.35$, respectively). Therefore, the results of this model suggest that no significant difference in psychoactive PRN medication usage was detected across control and experimental participants.
Table 17

Poisson distribution for Psychoactive PRN Medication Usage

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DF</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald 95% Confidence Limits</th>
<th>Wald Chi-Square</th>
<th>Pr &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>-1.0247</td>
<td>0.2211</td>
<td>-1.4581 -0.5914</td>
<td>21.48</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>time Post-Physiotherapy</td>
<td>1</td>
<td>-0.2524</td>
<td>0.3344</td>
<td>-0.9078 0.4029</td>
<td>0.57</td>
<td>0.4503</td>
</tr>
<tr>
<td>GROUP Experimental</td>
<td>1</td>
<td>-0.4236</td>
<td>0.3638</td>
<td>-1.3306 0.2894</td>
<td>1.36</td>
<td>0.2442</td>
</tr>
<tr>
<td>time*GROUP Post-Physiotherapy Experimental</td>
<td>1</td>
<td>0.4787</td>
<td>0.5117</td>
<td>-0.2542 1.1816</td>
<td>0.88</td>
<td>0.3495</td>
</tr>
<tr>
<td>Scale</td>
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<td>1.0000</td>
<td>0.0000</td>
<td>1.0000 1.0000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.0 DISCUSSION

4.1 General Overview of Findings

This study represents an important contribution to research on older adults residing in LTC facilities - a population that continues to be under-studied. There are several reasons for this. Conducting longitudinal research in LTC facilities is especially challenging given the increased age of residents, number of medical diagnoses, and high turn-over rates in these facilities. Nonetheless, LTC residents represent an important research group, particularly given the world’s aging population. Although research in LTC is becoming somewhat more common as the baby boomer generation ages and older adults become a larger portion of the population, it tends to be limited, for the most part, to cross sectional designs. A major strength of the current study is that it followed LTC residents longitudinally over 8-months, which is a significant time period for this population. This was necessary in order to follow residents and track falls over a sufficiently long period.

The study involved a physiotherapy/frontal impairment assessment and provision of feedback approach in an effort to reduce the number of falls experienced by LTC residents. The study also aimed to influence excessive restraint use that may serve to actually increase the fall risk in these residents (Kallin et al., 2005; Karlsson et al., 1997). The study design allowed the role of physical risk factors for falls (both those reported by nurses and those measured objectively in the experimental group) to be parsed out in order to examine the unique role of nurse fear and staff-imposed restraints/restrictions on resident falls and functional ability over time.
This research built on a previous investigation by Dever Fitzgerald et al. (2009). It was felt that one limitation in the 2009 study was the reliance on caregiver self-report with respect to restraint use. Previous research (Williams et al., 2011) has shown that nursing home care staff may underreport restraint use for a variety of reasons (e.g., lack of agreement about what constitutes a restraint, fear of liability). As such, the present investigation added an observational measure of restraint use to provide more objective data on the use of restraints in LTC. Specifically, an observer (who was blind with respect to experimental condition) visited the LTC facilities multiple times over the 8-month study period to observe whether the study participants were restrained. In addition, the present investigation built on previous work by Dever Fitzgerald et al. (2009) by not only observing fall rates in LTC facilities, but by designing an intervention (in the form of a fall-risk assessment and provision of resident-specific assessment information to nurses) aimed at reducing falls. It was also hoped that this assessment and feedback provision would result in a change in restraint use in LTC. This methodology was chosen as it was hypothesized that resident-specific information about fall risk would have a greater impact on fall prevention (and carry more weight with nursing staff members) than general feedback or education about fall reduction (e.g., nurses often dismiss research evidence showing that excessive restraint use can increase fall risk) (Williams et al., 2011).

A major strength of this study was that the assessment did not rely solely on physical factors that might increase fall risk (e.g., medical conditions, physical impairments) but also incorporated a neuropsychological/frontal lobe functioning component. An inclusion of neuropsychological/cognitive factors in an examination of
falls is critical as cognitive functioning plays a major role in a person's ability to navigate their environment and avoid impulsive acts that can increase fall risk (Rapport et al., 1998; van Doorn et al., 2003). A review of the literature suggests that this is the first study to incorporate neuropsychological factors in this manner when determining an individual's risk for experiencing falls. Another strength of this study is the effort to consider information about both physical and chemical restraints in LTC. Although chemical restraint use is complicated to assess in this population given the large number of medications consumed by older adults, and the difficulty in ascertaining the reasons each medication is prescribed (i.e., whether it is intended to be used as a chemical restraint or as a treatment for a medical condition), it was important to include this information as the cause of falls in LTC is so multifactorial. Moreover, as the use of physical restraints becomes less acceptable in LTC facilities chemical restraints may increase in prevalence.

The results of the current investigation partially replicated the findings of Dever Fitzgerald et al. (2009) which demonstrated that a significant relationship exists between nursing staff fears about the possibility that residents might experience a fall, and the use of restraints in LTC. Furthermore, this study provided support for the relationship between restraint use and ADL ability, such that a higher incidence of restraint use has a negative impact on residents' ability to perform basic ADLs. The results also demonstrate the extremely high prevalence rate of restraint use in LTC, highlighting the need for reform given the negative consequences of this restraint use (i.e., the impact on resident's ability to perform basic ADLs). Finally, this study provided some support for the assessment and provision of feedback approach. Specifically, nurses' fears and restraint
use were no longer significantly related post-intervention in the experimental group, whereas the relationship persisted in the control group. This lack of association post-assessment and feedback in the experimental group suggests that the assessment and provision of feedback may have impacted nurses’ decisions on whether or not to restrain residents (i.e., the decision to restrain residents was no longer significantly tied to nurse fear and therefore could be based on other factors). This is an important finding but one that must be interpreted cautiously as this finding was not consistent across all analyses (i.e., it was not found consistently throughout the models tested in the present investigation). The hypothesis that the assessment and provision of resident-specific feedback would result in a reduction in the incidence of falls was not supported. Despite this, however, the study provides pivotal information that will lead to further research in the area of falls prevention in LTC facilities with more frequent interventions and ongoing feedback.

4.2 Detailed Discussion of Findings

4.2.1 The relationship between nurse fears about patient falls, restraint use, and resident ADL ability. A key finding of this study pertained to the relationship between nurse fears about patient falls, restraint use, and residents' ADL ability. When the relationship between such nurse fears, nurse-reported restraint use (as measured by the Attitudes questionnaire) and participant ADL ability (as measured by the OARS ADL questionnaire) was examined, the relationship was found to be the same across experimental and control groups at baseline (i.e., at baseline nurse fears about patient falls were related to self-reported restraint use, and this self-reported restraint use was related to participant ADL ability). In contrast, at the post-intervention period of the
study, the relationship between nurse fear about patient falls and restraint use was no longer significant, reflecting a change in both control and experimental groups. This suggests that the feedback could have affected restraint use practices, which was one of the goals of the study (although given that this change occurred in both groups this cannot be definitively determined). Both the experimental and control groups continued to show a significant relationship between nurse reported restraint use and ADL ability at post-intervention. This is consistent with the findings from Dever Fitzgerald et al. (2009). This finding suggests that LTC residents who were restrained more often required more assistance with ADLs than residents who were restrained less frequently. This relationship is logical, given that residents who are restrained more frequently are less able to complete ADLs independently such as getting in and out of bed, going to the bathroom, and walking. It is therefore not surprising that this relationship was found at both pre-and post-intervention phases of the study and in both groups. Nonetheless, this finding demonstrates that restraint use may have an impact on an older adult's general functional abilities. However, this type of correlation does not imply causality and should be further investigated.

When nurse fear about patient falls, observed restraint use, and resident ADL ability were examined the findings were somewhat different. Specifically, the hypothesized relationships were supported in the experimental group at baseline (i.e., nurse fears about patient falls were related to observed restraint use, which was in turn related to patient ADL ability). This relationship was not found in the control group. At post-assessment in the experimental group, nurse fears about patient falls were no longer related to observed restraint use (suggesting that restraint use was no longer tied to nurse
fear level), but the relationship between restraint use and patient ADL ability persisted. This suggests that, regardless of the reason for the restraint, it relates to ADL ability negatively. The relationships were not significant in the control group at either baseline or post-assessment. The absence of a significant relationship at baseline is difficult to explain and the possibility of Type II error cannot be ruled out. As such further investigation of this issue is warranted.

4.2.2 Restraint use. The observational measure of restraint use was included in the present investigation as it was expected that nurses may not accurately report restraint use for a number of reasons (e.g., inaccurate recall). However, results suggest that the nurses' reports of restraint use and the observed restraint use were highly correlated at baseline. This suggests that nurses are willing and able to accurately describe their use of restraints.

It is possible that, although many LTC facilities encourage minimization of restraints, nurses may interpret this to mean only the more extreme forms of restraints (i.e., a trunk restraint where a person is tied to the bed or chair is unacceptable). Anecdotally, many nurses stated through the data collection portion of the assessment that they did not consider backwards seatbelts on wheelchairs to be a restraint, as the person is able to undo it themselves. Regardless, in the literature and for the purposes of this investigation such devices were considered restraints (and notably, many residents with cognitive impairments would be unable to remove this device independently). To ensure that accurate information about restraint use was collected when the nurses completed the Attitudes Questionnaire nurses were informed of the devices that should be
considered restraints. This could have resulted in the higher than expected correlation between nurse-reported restraint use and the observed restraint use.

It is important to note that the observed restraint use variable was positively skewed (with over 50% of participants being restrained two or fewer times in both the baseline and follow-up portion of the study). A significant portion of the sample (e.g., 35.5% in baseline, and 28.9% in follow-up) were never observed to be restrained. These participants could have simply been more mobile than some other participants who were restrained more frequently. Although a requirement for study eligibility was that participants retain some degree of mobility, the degree to which participants moved around the facility independently varied. Despite the skewness of this variable, it is clear that restraint use continues to be prevalent in the LTC facilities under study despite administrative encouragement to minimize restraints. The finding that 64.5% of residents at baseline and 71.1% at follow-up were observed to be restrained at least once is important. This restraint use prevalence rate is significantly higher than the rate found in other studies examining restraint use. Specifically, Kopke et al. (2012) examined restraint use in 4,449 residents in nursing homes in Germany and found that (prior to their intervention to reduce restraint use) 30.6% of control group residents and 31.5% of intervention group residents were observed to be physically restrained during at least one out of three observation periods. Similar findings were obtained in a multi-national study that included Canada. Specifically, Feng et al. (2009) found that the prevalence of restraint use varies significantly across countries. They reviewed data from 5 countries (Switzerland, the United States, Hong Kong, Finland, and Canada) and found that restraint use prevalence rates were highest in Canadian facilities with over 31% of
residents being restrained (as reported by nurses). The findings of the present study in relation to the investigations of Feng et al. and Kopke et al. suggest that the prevalence rates reported in these large scale studies may not generalize to all facilities. Moreover, methodological differences in data collection approaches could also account for the discrepancies.

4.2.3 The relationship between nurse fear about patient falls and restraint use.
Dever Fitzgerald et al. (2009) found that nursing home staff fears that residents would experience falls/pain was predictive of restraint/restriction use, and that this restraint/restriction use was in turn predictive of resident falls and their ability to perform basic ADLs. This relationship was also examined in the present study. Indeed, a significant relationship was found between nurse fears about patient falls at baseline and caregiver self-reported restraint use at baseline. This was true in both the control and experimental groups. This suggests that, in both control and experimental groups, nurse fears about patient falls were related to their reported use of restraints on LTC residents at the outset of the study, and this is consistent with previous findings. Most interestingly, however, in one of the models, in the experimental group this relationship did not persist post-assessment and provision of feedback (i.e., nurse fears about patient falls were predictive of restraint use in the control group at follow-up but not in the experimental group). This was also supported by additional analyses conducted examining this relationship and controlling for actual fall risk as determined by the study assessment. The finding that, following the assessment and provision of feedback, nurse fears about patient falls were no longer significantly related to restraint use in experimental participants suggests that the intervention may have been successful in breaking this
relationship in favour of using more objective criteria for deciding on restraint use. Dever Fitzgerald et al. (2009) found that nurse fears about patient falls were exaggerated at times, and if exaggerated fears are dictating nurses’ use of restraints on residents it stands to reason that residents may be restrained unnecessarily at times. As such, the finding that, post-assessment and feedback nurses’ fears were not related to their reported restraint use in experimental participants suggests that nurses may have been basing their decision to restrain participants on information other than their level of concern about resident falls.

Despite the significant changes detected in the post-intervention period in experimental participants, when examining the relationship between nurse fears about patient falls and restraint use (both caregiver-reported and observed) throughout the entire 8-month study period the significant relationship persisted, suggesting that overall nurse fears about patient falls continue to be related to restraint use. This suggests that, although the assessment and feedback provision had an immediate effect on this relationship (such that immediately following the feedback, nurse fears about patient falls were not related to restraint use), this change may not have been maintainable over the four month follow-up period given that such dramatic changes in a resident's functioning could occur over that time. Moreover, given that one fall can have such a significant impact on the functional ability of an older adult, it is possible that the information presented at the study mid-point was no longer accurate as the study period progressed. This supports the need for ongoing, frequent, and regular assessment of these residents.

4.2.4 The relationship between restraint use and participant falls. At no point in the study, for either the experimental or control groups, was nurse reported restraint use
found to be significantly related to the number of falls experienced by participants. The relationship between restraint use and falls was also examined in the present investigation using the observed restraint use variable. In this case the findings were similar to those involving nurse-reported restraints. That is, no significant relationship was found between observed restraint use and participant falls in either the control or experimental groups at either baseline or post-assessment time periods. This is surprising, given the support for the relationship between restraint use and falls in the research literature. For example, Tinetti, Lui, and Fginter (1992) found that in a one year follow-up study, 31% of LTC participants were restrained either intermittently or continuously, and that a serious fall occurred in 17% of those participants, compared to only 5% of non-restrained participants. However, it is important to note that in this study restraint use was not measured by nurse self-report, but rather relied on either information from patient charts or patient observation. Furthermore, it is possible that participants who were not restrained were more able-bodied generally, and therefore experienced fewer falls.

Others have also documented a relationship between restraint use and falls (Tinetti et al., 1992). A more recent study conducted by Luo, Lin, and Castle (2011) supported the relationship between restraint use and falls in seniors with dementia. Luo et al. examined data from a random sample of over 13,000 residents who were part of the 2004 National Nursing Home Survey in the United States (data were collected by having registered nurses complete survey questions using resident medical charts. They included five (compared to the seven included in this investigation) types of restraints (i.e., limb restraints, trunk restraints, chairs that prevent rising, full bed rails, and side rails) and collected information on whether they were "not used", "used less than daily", "used
daily", "don't know", and "not ascertained". These categories were then collapsed into "physical restraints" (limb, trunk, and chair that prevents rising) and "bed rails". Luo et al. found that trunk restraints in seniors with dementia were associated with an increased incidence of falls and fractures. Interestingly, Luo et al. found that the type of restraint determined whether it was a risk factor for falls (e.g., trunk restraints) or a protective factor for falls (e.g., bed rails). One problem with the Luo et al. (2011) study is that they relied on chart/medical information as their data collection source and restraint use is not always reliably documented in patient charts, and is not the most reliable measurement method (Laurin et al., 2004). Therefore, the data may not be a true representation of restraint use in those facilities. Furthermore, the Luo study was cross-sectional in nature, and longitudinal studies may provide richer information about the incidence of falls given the significant changes that occur in nursing home residents over time. Also of note, Luo et al. (2011) found that restraint use was identified in 9.99% of residents with dementia. This is significantly lower than the percentage of participants found to be restrained in other investigations. Specifically, in the current study, 64.5% of participants were noted to be restrained at least once in the baseline portion of the period and 71.1% of participants were noted to be restrained at least once in the follow-up portion of the study. This significantly higher restraint use prevalence in this study may account for the lack of relationship found between restraint use and falls (i.e., if the participants are constantly restrained they have little opportunity to fall as they have no chance to mobilize independently). Even if this were to reduce the number of falls experienced, it likely has a significant impact on the patient's quality of life.
4.2.5 The relationship between nurse fear about patient falls and falls. The relationship between nurse fears about patient falls and falls was examined to determine whether a direct relationship existed between these two variables. The relationship between such nurse fears and falls was significant at baseline for both control and experimental participants without the mediating observed restraint use variable. This relationship did not persist, in either group, at post-assessment and provision of feedback. It is not clear what factors might have led to the change. Additional analyses were conducted to determine whether a significant relationship existed between nurse fears about patient falls and resident falls after controlling for actual fall risk (as determined by the assessment results). Once again, this relationship was significant at baseline such that higher scores on the nurse fear measure were related to the number of falls experienced by LTC residents. However, following the assessment and provision of feedback, no significant association between nurse fears about patient falls and resident falls was detected. Given that the actual fall risk variable acted as a control, this finding suggests that excessive or exaggerated nurse fears about patient falls did not play a role in increasing the incidence of falls among these participants. This is an important finding. It is expected that nurses will be fearful about the possibility of resident falls given the serious consequences associated with falls in this population. However, it is when this fear becomes excessive or exaggerated relative to the resident's actual risk for falling that it becomes problematic (i.e., realistic fears based on the resident's functioning may actually serve as a protective factor against falls because appropriate prevention strategies could be implemented). It would be interesting for future research to specifically examine excessive nurse fear about patient falls in relation to restraint use and future falls.
4.2.6 Effectiveness of the assessment and feedback provision on resident falls. A key hypothesis of the study (Hypotheses 5) suggested that the assessment information provided to nursing home staff (i.e., the level of fall risk for each participant based on the physical and neuropsychological assessments) would lead to a reduction in the number of falls experienced by residents in the post-assessment and feedback portion of the study.

The lack of a significant difference between participants in the control and experimental groups on the number of falls experienced post-intervention was surprising. When looking at the raw data, the result looks impressive (i.e., 91 falls occurring in the experimental group post-intervention compared to 146 falls in the control group).

Furthermore, the initial basic analysis (i.e., the t-tests) suggested a significant relationship did exist. However, given the normality assumption violation associated with the t-test, it was deemed that further analyses were required. Several additional analysis techniques were employed and the significant finding did not persist in many of these analyses. One possibility for this is the lack of statistical power. Had it been possible to recruit the full sample size the results may have been significant. It is necessary, also, to interpret this approaching significant finding given the possibility of Type 1 error given the multiple analyses conducted.

In considering the lack of consistent support for the assessment and feedback provision's impact on fall rates, it is important to reiterate here that nurses were provided only with a level of fall risk based on the assessment information. Specifically, nurses were informed that patients were at a high, medium, or low risk for falls but were not given any recommendations about how to use this information to prevent future falls from occurring. Such recommendations were not made because the aim of the study was
to determine whether resident-specific assessment information about fall risk was sufficient to have an impact on fall rates and restraint use through changes in nurse fears about patient falls. However, it is possible that with recommendations about how to use the individualized assessment results, differences in the outcome variables would have been observed. It would be interesting for future research to include a measure of change on nurse practices (e.g., via an interview with care staff or direct observation). It is known from previous focus groups (Williams et al., 2011) that nurses believe restraint use is helpful in the prevention of falls, despite evidence to the contrary. In the present study, nurses may have been unmotivated or unwilling therefore to change this practice regardless of the feedback they were given about the participant (or, they may not have known to do so since they were only given feedback about level of risk). Others have found success in reducing physical restraints in nursing-home residents after a nurse education program (Kopke et al., 2012) consisting of group sessions. Kopke et al. also provided additional training for key nurses and supportive material for other individuals involved in the residents' care (e.g., relatives, legal guardians, and the residents themselves). However, although in Kopke's study a reduction in physical restraints was found, the intervention had no impact on fall rates, fall-related fractures, or psychotropic medication usage. Finally, in the present study it is possible that, given that experimental and control participants resided on the same LTC units and were cared for by the same nursing staff members, LTC staff altered their care practices with all residents for whom they care, and not just those in the experimental group (e.g., by restraining more or less). Although it would have been ideal to separate experimental and control groups by unit, this was not possible given the sample size required to collect the data in this manner.
(i.e., more LTC units than are available in the entire health region would have been needed according to a power calculation).

4.2.7. The impact of the assessment and feedback provision on PRN medication usage. Although it was not initially an aim of the present investigation, it was determined that it was important to include an examination of medication usage to determine whether any group differences in medications that could be considered “chemical restraints” were detected in the post-intervention portion of the study. PRN medications (prescribed to be taken as needed) were considered because, unlike regularly scheduled medications, PRN administration frequency is largely determined by nurses who received the fall assessment feedback. Previous research (Fuchs-Lacelle, Hadjistavropoulos, & Lix, 2008) supported the notion that assessment information can have an impact on PRN pain medication, such that regular use of a pain assessment checklist resulted in an increased usage of PRN medications to manage observed pain. The results of the present investigation showed no significant group differences in the use of PRN medications that could be considered chemical restraints. Despite this, however, medication use is an important component of the study as this investigation represents one of the first attempts to examine the impact of the use of this form of chemical restraint. Given the emphasis on physical restraints and their relationship to falls, nurses may not be extending their practices for fall prevention to chemical restraints. This could be because they do not yet know that many of these medications are used to chemically restrain residents. Furthermore, it remains difficult to ascertain the reason for the use of certain medications (i.e., nurses could have given a dose of a medication used as a chemical restraint for a purpose entirely unrelated to fall
prevention (e.g., to calm undesirable behaviours)). It would be interesting for future research, along the lines of the present project, to involve physicians who prescribe medications that can be considered physical restraints.

4.3 Limitations and Future Directions

It is important to consider the limitations of this investigation when interpreting the results. Although, in the context of the clinical LTC literature, an impressive sample size was used, it is possible that an even larger sample size (i.e., one suitable for a smaller effect size than was originally assumed) could have yielded more significant results. As previously stated, however, this sample size was not attainable despite extending the research area to several health regions in the province. Given the limited sample available it was also not possible to randomize units as experimental or control units, leading to overlap in nurses caring for these participants. Additionally, although efforts were made to ensure equal numbers of men and women in the sample, more women were recruited. This demographic inequality is expected, as women are more likely to live longer with dementia and the majority of LTC residents are female (Hill, Forbes, Berthelot, Lindsay, & McDowell, 1996).

As stated above, one strength of this study was the use of an observational measure of restraint use, rather than relying solely on the self-report of nurses which may be unreliable. Nonetheless, this method of collecting information about restraint use resulted in a highly skewed variable (i.e., over 50% of the sample was observed to be restrained two or fewer times). As such, it was determined that the variable had to be dichotomized (e.g., never observed to be restrained versus restrained at least once) in order for the statistical analyses to be completed. It is possible that more variability in the
observed restraints variable (e.g., if any and all instances of restraint could be observed as opposed to observations during very limited time periods), different results would have been obtained. However, it should be noted that even the dichotomized variable was highly correlated with nurse self-reported restraint use at baseline, suggesting that it may still have been an adequate measure of restraint use even in its dichotomized form.

Following the commencement of this investigation, research emerged suggesting that the POMA, which was used to assess patient mobility, may not be an ideal measure for the use of older adults with cognitive impairments. Specifically, Sterke, Huisman, van Beeck, Looman, and van der Cammen (2010) conducted physiotherapy assessments using the POMA with 75 LTC residents with cognitive impairments caused by dementia. They found that 41% of patients had difficulty following one or more of the instructions required to complete the assessment, and it was suggested that further research on the accuracy of this measure in the predictive validity of falls with older adults with dementia is needed. It should be noted that, in the present investigation, the physiotherapy assessments were conducted by highly trained physiotherapists who had experience working with older adults, and therefore, this may not represent a true limitation in the present study. Participants who were completely unable to follow the instructions of the physiotherapist were not assessed, and therefore it may be reasonable to assume that the results of the POMA in this study were accurate. It is possible that results would differ if another assessment instrument was used; however, assessment tools for seniors with dementia continue to be limited and it is likely that the POMA continues to be the best measure for these purposes at the present time.
Finally, it is important to note that some of the models tested in this investigation did not accomplish an excellent fit for the data. As such, the significant results noted must be interpreted with some caution. Although the data were not always a good fit for the model, this does not preclude the possibility that significant relationships exist between these variables. Rather, the inadequate fit suggests that the hypothesized causal relationships were not supported. The findings of this investigation should be replicated to determine whether these significant relationships persist with models that represent a better fit of the collected data. Despite this, however, the findings represent an important step in the ongoing battle against falls in LTC facilities and point to future research directions.

Many directions for future research should be noted. Although a major strength of this study was the incorporation of a cognitive/neuropsychological measure as a component of the fall risk score, future research would benefit from a more direct measure of frontal lobe functioning, as opposed to collateral informant-report format. It is possible that the executive functions that may predict fall risk in an individual were not adequately captured by this measure, or that nurses were not sufficiently aware of the resident’s cognitive functioning. Future research can examine patient-administered measures of neuropsychological functioning in this context and allow for more specific assessment information to be given to care staff about patient functioning and fall risk.

With respect to restraint use, it would be important for future research to include information about nurse reported restraint use at all three study periods (e.g., baseline, post-intervention and follow-up). Additionally, with respect to restraint use, as stated above, Kopke et al., (2012) found a reduction in restraint use with a multi-component
intervention program. However, upon review of the intervention it appears that Kopke relied primarily on nurse education methods (e.g., meeting with nurses and discussing restraint use guidelines and information about restraint use). Future research could combine this general information and education with resident specific assessment intervention to determine whether such a combined approach would result in reduced restraint use and a reduction in falls. Furthermore, future research could expand on the resident specific information presented to nurses and include specific recommendations about how to minimize falls in the individual (e.g., instructions on how care plans and preventative strategies should be altered). It would be important to also include a measure of compliance with these recommendations to determine whether the intervention is successful in reducing nurse fears about patient falls, patient falls, and restraint use.

One possibility relating to this research is that one instance of feedback may not be sufficient to lead to ongoing change in nurse practices and fall rates in this population. This is logical, given that a resident’s functioning can change so dramatically over time (i.e., one fall can lead to a major change in restraint use, future fall risk, ADL ability, and overall quality of life). Future research could also examine the efficacy of ongoing assessment and feedback as opposed to this one single instance. Ongoing feedback would allow nurses and caregivers to adapt and tailor recommendations and care plans as the individual patient continues to age and his or her level of fall risk changes accordingly. The health and functional ability of LTC residents can change quickly and, therefore, it may be important to address these issues on an ongoing basis, as opposed to a single point in time. This speaks strongly to the need for further funding for LTC facilities so that professionals trained in the assessment and prevention of falls can work regularly
with those residents and liaise with LTC nursing staff to ensure quality of life is maximized through minimal restraint practices and the minimization of falls and their negative consequences.

4.4 Conclusions

Falls continue to be a significant concern for older adults, particularly older adults with cognitive impairments resulting from Alzheimer's Disease or other dementias. Given the complex etiology of falls, it is logical to assume that any intervention program aimed at reducing falls in this population must be multi-faceted. The aim of this study was to reduce falls (and unnecessary restraint use) by providing nurses with resident-specific information about an individual's fall risk based on resident performance on a physiotherapy test and symptoms of frontal impairment. Although the assessment and provision of feedback was not successful in reducing falls among the participants who received the assessment and provision of feedback, there likely is significant utility in conducting systematic physical therapy assessments of LTC residents as a means of identifying potentially treatable functional limitations, and even pain, which is often not identified effectively because of dementia patients’ limited ability to communicate due to severe cognitive impairment. Falls continue to be a significant issue in LTC facilities, resulting in injuries and increased mortality rates among residents (Rubenstein, 1994; Rubenstein et al., 1988). Despite the lack of significant findings in fall reduction, this study makes several contributions to the literature. Specifically, this was the first study to use an assessment and provision of feedback "intervention" approach to fall prevention in LTC facilities. Some support was found in this study for this approach, in that following the assessment and provision of feedback, nurses' fears were no longer significantly
related to restraint use among experimental participants. This is an important step given that previous research has suggested that nurse fears about patient falls may be excessive and therefore result in unnecessary restraint use (Dever Fitzgerald et al., 2007).

Furthermore, the findings of this study lend support to the notion that a single instance of feedback may not be sufficient to lead to significant change in this population. The need for regular, ongoing assessment of risk factors for falls is clear given how quickly the status and functional ability of LTC residents can change over time. Moreover, although there was little support for the impact of the assessment and provision of feedback to nurses on fall rates and restraint use, there was evidence (i.e., the lack of a significant relationship between nurse fears about patient falls and restraint use post-assessment and feedback) to suggest that, following the intervention, nurses were using information other than their own fear to determine whether participants should be restrained. This is important work that should be continued. Additionally, this study demonstrates that restraint use is highly prevalent among LTC facilities, with restraint use prevalence rates significantly higher than those reported in previous research. This study also supported the relationship between increased restraint use and decreased ADL ability in older adults over time, highlighting the need for immediate intervention to reduce restraint use in this population.

Overall, this investigation highlights the need for ongoing research in the area of fall prevention in LTC. Ongoing research in this area will ensure that efforts are made to reduce the frequency of falls in this population and limit the negative consequences associated with falls, including resident injury and health care costs.
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APPENDIX A

Certificate of Approval
Research Ethics Board

PRINCIPAL INVESTIGATOR: Dr. T. Hadjistavropoulos

APPROVAL DATE: October 27, 2009

RQHR PROJECT #: REB-09-43

TITLE: Research and Community Alliance for Quality of Life in Long Term Care (The QOL Team): Patient Assessments, Nurse Fears, and Protective Behaviours Relating to Fall Prevention in Seniors with Dementia.

APPROVED

CERTIFICATION

The protocol and consent form for the above named project have been reviewed by the Chair of the Regina Qu’Appelle Health Region Research Ethics Board and the experimental procedures were found to be acceptable on ethical grounds for research involving human subjects.

The Regina Qu’Appelle Health Region Research Ethics Board meets the standards outlined by Canada’s Tri-Council Policy Statement for Ethical Conduct for Research Involving Humans.

The Regina Qu’Appelle Health Region Research Ethics Board has met the criteria for purposes of Section 29 of the Health Information Protection Act.

Please note that all future correspondence regarding this project must include the RQHR project number.

Best wishes in your continuing research endeavours.

Dr. Elan Paluck, Chair
Regina Qu’Appelle Health Region
Research Ethics Board

cc: Ms. C. Klassen, Corporate Services, WRC

This Certificate of Approval is valid provided there is no change in the experimental procedures. Any significant changes to the protocol must be reported to the Chair for the Board’s consideration, in advance of implementation of such changes. You are required to provide a status report on an annual basis.
APPENDIX B

UNIVERSITY OF
REGINA

OFFICE OF RESEARCH SERVICES

MEMORANDUM

DATE: October 6, 2009

TO: Theresa Dever Fitzgerald
    Psychology

FROM: Dr. Bruce Plouffe
      Chair, Research Ethics Board

Re: Patient Assessments, Nurse Fears, and Protective Behaviours Relating to Fall Prevention in Seniors with Dementia (File # 13S0910)

Please be advised that the University of Regina Research Ethics Board has reviewed your proposal and found it to be:

☐ 1. APPROVED AS SUBMITTED. Only applicants with this designation have ethical approval to proceed with their research as described in their applications. For research lasting more than one year (Section 1F). ETHICAL APPROVAL MUST BE RENEWED BY SUBMITTING A BRIEF STATUS REPORT EVERY TWELVE MONTHS. Approval will be revoked unless a satisfactory status report is received. Any substantive changes in methodology or instrumentation must also be approved prior to their implementation.

☐ 2. ACCEPTABLE SUBJECT TO MINOR CHANGES AND PRECAUTIONS (SEE ATTACHED). Changes must be submitted to the REB and approved prior to beginning research. Please submit a supplementary memo addressing the concerns to the Chair of the REB.** Do not submit a new application. Once changes are deemed acceptable, ethical approval will be granted.

☐ 3. ACCEPTABLE SUBJECT TO CHANGES AND PRECAUTIONS (SEE ATTACHED). Changes must be submitted to the REB and approved prior to beginning research. Please submit a supplementary memo addressing the concerns to the Chair of the REB.** Do not submit a new application. Once changes are deemed acceptable, ethical approval will be granted.

☐ 4. UNACCEPTABLE AS SUBMITTED. The proposal requires substantial additions or redesign. Please contact the Chair of the REB for advice on how the project proposal might be revised.

Dr. Bruce Plouffe

cc: Dr. Thomas Hadjistavropoulos – Psychology

** supplementary memo should be forwarded to the Chair of the Research Ethics Board at the Office of Research Services (Research and Innovation Centre, Room 109) or by e-mail to research.ethics@uregina.ca

Phone: (306) 585-4775
Fax: (306) 585-4593
www.uregina.ca/research

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APPENDIX C

Demographic Information

Participant Number: __________________________

Facility: ___________________________  Unit: ___________________________

Date of Birth: ______________________

Sex: ______________________

Marital Status: ______________________

Level of Education: ______________________

Date of Admission: ______________________

Cognitive Performance Scale Score: _________  Date of Assessment: _________

Diagnoses:
________________________________________________________

________________________________________________________

Medications & Doses:
________________________________________________________

________________________________________________________

________________________________________________________
APPENDIX D

Measure of Professional Caregivers’ Attitudes of Falling and Pain

Scale ranges from 0-10 with 0 indicating low levels and 10 indicating high levels.

1) Compared to other residents who are not wheelchair- or bed-ridden how afraid are you that this care-recipient may experience a fall?

   0   1   2   3   4   5   6   7   8   9   10

2) Compared to other residents who are not wheelchair- or bed-ridden how confident are you that this care-recipient will not experience a fall?

   0   1   2   3   4   5   6   7   8   9   10

3) Compared to other residents who are not wheelchair- or bed ridden how often do you use restraints/activity restrictions on this care-recipient to prevent falling?

   0   1   2   3   4   5   6   7   8   9   10

4) Compared to other residents who are not wheelchair- or bed-ridden how afraid are you that this care-recipient may experience pain with activity?

   0   1   2   3   4   5   6   7   8   9   10

5) Compared to other residents who are not wheelchair- or bed-ridden how often do you place activity restrictions on this care-recipient to prevent pain?

   0   1   2   3   4   5   6   7   8   9   10

6) How much pain do you believe this care-recipient is experiencing?

   0   1   2   3   4   5   6   7   8   9   10
APPENDIX E

OARS ADL SCALE

Fillenbaum, 1988

Today’s date: ____________________

<table>
<thead>
<tr>
<th>Activity</th>
<th>Without help</th>
<th>With help</th>
<th>Unable to perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can care-recipient eat?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can care-recipient dress and undress?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can care-recipient take care of appearance?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can care-recipient walk?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can care-recipient get in and out of bed?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can care-recipient take a bath or shower?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can care-recipient use the bathroom or toilet?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Please rate your care-recipient’s overall level of functioning:**

Excellent | Totally Impaired
---|---
1 | 2 | 3 | 4 | 5 | 6
APPENDIX F

Medical Risk Factor Questionnaire

INSTRUCTIONS: Indicate the conditions that apply to the person you are caring for now or in the past. Please specify time frames where appropriate.

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Does your loved one experience this problem currently?</th>
<th>How long has he or she experienced the problem? (Specify # years, months, or days)</th>
<th>Did he/she experience this problem in the past? (circle one)</th>
<th>How long ago did the problem begin? (Specify # years, months, or days)</th>
<th>How long did he/she have the problem in the past? (Specify # years, months, or days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General weakness</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased mobility in lower extremities</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleeplessness</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incontinence (loss of bladder/bowel control)</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nocturia (loss of bladder control during the night)</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foley catheter (a tube inserted into the bladder that allows for continuous urine drainage)</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confusion</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of falls</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission for syncope (fainting)</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant orthopaedic diagnosis (e.g., hip/knee problems)</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission related to cancer or orthopedics ward</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical procedure planned/ performed</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant cardiovascular diagnosis (e.g., stroke, heart disease)</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature elevation (fever)</td>
<td>YES / NO</td>
<td></td>
<td>YES / NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance abuse</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impaired speech</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impaired vision</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertigo (a false sense of motion or spinning that leads to dizziness and discomfort)</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty regaining balance</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinating frequently</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impaired ability to walk</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of walking aids</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intravenous therapy</td>
<td>YES / NO</td>
<td>YES / NO</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is your care-recipient currently taking any of the following medications?

1) Antidepressants (e.g., amitriptyline, Effexor, Paxil, Prozac, Zoloft)  
   Yes____  No____
2) Antipsychotic agents (e.g., Risperidal, Thorazine, Haldol, Zyprexa)  
   Yes____  No____
3) Anxiolytic/sedatives/hypnotics (e.g., Ativan, Klonopin, Valium, Xanax)  
   Yes____  No____
4) Cardiovascular medications (e.g., ACE inhibitors, Beta blockers, diuretics)  
   Yes____  No____
5) Nonsteroidal anti-inflammatory medications (e.g., Aspirin, Celebrex, Daypro, Motrin)  
   Yes____  No____
APPENDIX G

FOLLOW UP QUESTIONNAIRE REGARDING FALLS

Date of Report:

____________________________________________________________________________________

1. Participant Number: _____________

2. Date of fall: ________________
   Time of day of fall: _____am ____pm (check one)

3. What was your care recipient doing just before he/she fell (what was happening just before the fall that likely caused the fall?)

4. Was your care recipient injured as a result of the fall? If so, ask the caregiver to describe any pain that they think their care recipient is experiencing by reporting it on the below diagram.

5. Say to participant:
   “Please specify the amount of pain your care recipient experienced as a result of this fall on a scale from 0 to five.” (circle the number that most accurately reflects the strength of the care recipient’s pain)

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pain</td>
<td>Mild</td>
<td>Discomforting</td>
<td>Distressing</td>
<td>Horrible</td>
<td>Excruciating</td>
</tr>
</tbody>
</table>
6. Did your care recipient require medical assistance? If so, please specify.

____________________________________
____________________________________

7. What happened after the fall (if different from seeking medical assistance)

____________________________________
____________________________________

8. Does your care recipient still have pain or any physical difficulties as a result of the fall?

____________________________________
____________________________________

____________________________________