



RESEARCH

Depression and Aggressive Behaviour in Continuing Care: How Cognitive Impairment Might Not Explain the Whole Story

Éric R. Thériault* and Amy Grant†

Context: There is currently little research examining the relationship between depression and aggressive behaviour among individuals receiving long-term care. Previous research has focused on older adults with neurocognitive disorders (e.g., Alzheimer's). These studies have found a positive association between aggressive behaviour and depression and are additionally associated with cognitive impairment in older adults.

Objectives: The current study aims to better understand the relationship between aggressive behaviour and depression amongst older adults with and without cognitive impairment, as previous studies have not yet examined how these relationships may differ across levels of cognitive functioning.

Methods: Data from the Continuing Care Reporting System administered by the Canadian Institute for Health Information was used. At the time of analysis, data for individuals receiving continuing care was available across seven Canadian provinces and one territory.

Findings: Data from 2,682,612 individuals were extracted ($M_{age} = 80.42$, $SD = 11.5$). A positive relationship between aggressive behaviour and depressive symptoms was found for those with and without cognitive impairment. There was no evidence of a mediating effect of cognitive impairment on aggressive behaviour. Individuals with symptoms of depression demonstrated more aggressive behaviours.

Limitations: A limitation of the current work is the cross-sectional nature of the data examined. This restricts the ability to determine causation, and the questions of "Do depressive symptoms predict aggressive behaviour?" or "Are aggressive behaviours early symptoms of depression?" remain.

Implications: These findings indicate that, independent of cognition, those with depressive symptoms are more likely to exhibit aggressive behaviour. Recommendations on identification and treatment of depression in this population are discussed and related policy changes are considered.

Keywords: Older Adults; Aggressive Behaviours; Depression; Cognitive Impairment

Introduction

Although aggressive behaviours demonstrated by recipients of continuing care are seldom discussed in the public discourse, it is a relevant issue for those giving and receiving care within community and institutionalized settings. Continuing care is an umbrella term that includes care for those who need care beyond acute care settings, which encompasses complex continuing care and long-term care facilities. Aggressive behaviour includes any verbal or physical behaviours intended to harm or threaten another individual (Kunik et al., 2010). The prevalence of aggressive behaviour can vary widely

depending on the setting and profile of those receiving care. Sourial, McCusker, Cole and Abrahamowicz (2001) noted that among those with dementia in acute hospital settings, 95% had at least one agitated behaviour reported over the course of two weeks. However, other estimates in different settings are much lower. For example, Voyer and colleagues (2005) found that about 20% of older adults in long-term care displayed aggressive behaviour, with an equal proportion displaying either physical or verbal aggressive behaviour, about half of whom displayed both. It has also been argued that due to tolerance and acclimation of aggressive behaviour, and the fear of reprisals, aggressive behaviour tends to be underreported in most care facilities (Lachs et al., 2013).

Unsurprisingly, aggressive behaviour is highlighted as a major concern for individuals working within the general nursing profession. Aggressive behaviour has been reported to have negative impacts on caregivers, including physical injury, psychological distress, guilt, helplessness,

* Department of Psychology, Cape Breton University, Sydney, Nova Scotia, CA

† Maritime SPOR SUPPORT Unit – Research Services, Halifax, NS, CA

Corresponding author: Éric R. Thériault, PhD
(eric_theriault@cbu.ca)

lower job satisfaction and staff burnout (Lachs, Bachman, Williams & O'Leary, 2007; Sourial et al., 2001; Zwijsen et al., 2014). Approximately 15% of American nurses working in long-term care facilities reported being the victim of aggressive behaviour in the past two weeks, while over one third reported on-the-job assault as their top safety concern (Lachs et al., 2013). It is important to note that experience and reporting of on-the-job assault are likely to differ across regions and care settings, but the evidence highlights a significant prevalence of this issue. Because of the increased psychological distress experienced by staff, there may in turn be reactive abuse from staff, which is related to a decrease in the quality of care provided (Lachs et al., 2007).

Much of the literature on aggressive behaviour within long-term care has focused on its prevalence and the predictors of rates of aggressive behaviour. A better understanding of the factors related to an increase in aggressive behaviour rates will help to develop long-term strategies for decreasing aggressive behaviour within care facilities. **Figure 1** presents a conceptual model of the factors that affect aggressive behaviour in care settings. These encompass facility-level structural and social factors and resident-level psychological and physical factors. These elements of the model will be discussed in turn next.

Facility-level factors related to rates of aggressive behaviour

Here two sets of facility-level factors that relate to rates of aggressive behaviour in continuing care settings are distinguished, namely the structural and the social. The structural factors of the care facility include organizational culture (Cassie, 2012), workload, and job satisfaction of employees (Isaksson, Aström & Graneheim, 2008). Organizational culture can influence job burnout, satisfaction, patient safety and management techniques (Hunt et al., 2012) and has been associated with the quality of care pro-

vided to older adults. Staffing levels can result in rushed, depersonalized care, which is related to increased levels of aggressive behaviour (Morgan et al., 2008), while greater nurse involvement in the decision-making process is related to lower levels of aggressive behaviour (Anderson, Issel & McDaniel, 2003).

In addition to the organizational culture, the type of care received and the care setting have been associated with aggressive behaviour. Those in a secure unit are more likely to exhibit aggressive behaviour compared to those in an open unit (Voyer et al., 2005), although this may be confounded by residents' predisposing conditions (i.e., neurocognitive disorders). Additionally, aggressive behaviours are more common during direct or personal hygiene care provision (Zeller, Dassen, Kok, Needham & Halfens, 2012), such as getting dressed (Isaksson, Graneheim, Åström & Karlsson, 2011), and mealtime (Caspi, 2015). For individuals with neurocognitive impairment, acting out aggressively could be their way of communicating this pain and discomfort (Ahn & Horgas, 2013; Enmarker, Olsen & Hellzen, 2011).

Social Factors related to the care facility, such as poor quality and quantity of social relationships, are also related to an increase in aggressive behaviour (Cohen-Mansfield & Werner, 1998; Kunik et al., 2010). Facilities with interventions focussing on increased social interaction and recreational programming have seen decreases in this behaviour (e.g., Farina et al., 2006; Buettner, Fitzsimmons & Atav, 2006). To best understand aggressive behaviour, it is also vital to understand factors related to individual residents, including physical influences and psychological functioning.

Resident-level factors related to rates of aggressive behaviour

Here, two sets of resident-level factors that relate to rates of aggressive behaviour in continuing care settings are distin-

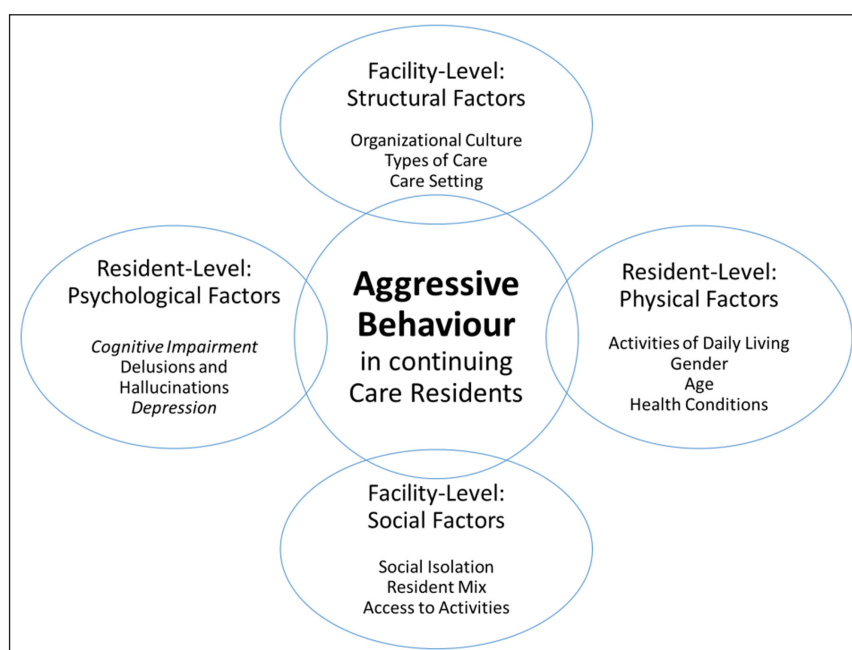


Figure 1: Conceptual model of factors that affect aggressive behaviour.

guished, namely physical and psychological. Numerous personal physical factors are associated with aggressive behaviour, which includes physical dependence, the need for help with Activities of Daily Living (Cassie 2012; Lachs et al., 2013), gender and age (where younger men tend to exhibit more aggressive behaviour; Cassie, 2012). The presence of pain or discomfort (Enmarker et al., 2011; Isaksson et al., 2011; Kunik et al., 2010); constipation (Leonard, Tinetti, Allore & Drickamer, 2006); insomnia (Voyer et al., 2005) and additional health problems (Cohen-Mansfield & Werner, 1998) are also associated with an increase in the display of aggressive behaviour.

In addition to this exhaustive list of physical factors, individual-level psychological factors, such as depression, have also been linked to aggressive behaviour (e.g., Cassie, 2012; Cohen-Mansfield & Werner, 1998; Leonard et al., 2006). Both depression and aggressive behaviour can be common among older adults receiving long-term care, especially those with cognitive impairment (Bennett & Thomas, 2014; Majić et al., 2012; Voyer et al., 2005). A direct association has been identified between aggressive behaviour and depression among those with cognitive impairment (Majić et al., 2012; Margari et al., 2012). The relationship between depression and the type of physical aggression has been consistent across studies (Cohen-Mansfield & Werner, 1998; Majić et al., 2012; Marx, Cohen-Mansfield & Werner, 1990; Menon et al., 2001; Talerico, Evans & Strumpf, 2002); however, the direction of the relationship between verbal aggression and depression has been more inconclusive. Some studies have found an association between depression and verbal aggression (Cohen-Mansfield & Werner, 1998; Majić et al., 2012; Marx, Cohen-Mansfield & Werner, 1990), while other studies have not (Menon et al., 2001; Talerico, Evans & Strumpf, 2002). Margari and colleagues (2013) have found a relationship between aggressive behaviour and both depressive symptoms and cognitive impairment, arguing that “aggressive behavior and depressive symptoms may be part of the clinical picture of senile dementia” (Margari et al., 2012). These authors also found that the use of antipsychotic medication was associated with an increase in aggressive behaviour, cognitive impairment and depression.

In addition to depression and cognitive impairment, other psychological factors, such as psychosis, have been linked with aggressive behaviour (Isaksson et al., 2008), although the nature of this relationship is not clear. Some research argues that the presence of both delusions and hallucinations predict aggressive behaviour (Leonard et al., 2006); others argue that only delusions predict aggressive behaviour and not hallucinations (Kunik et al., 2010).

Difficulties with cognition have long been tied to aggressive behaviour, especially in those receiving long-term care (e.g., Cassie, 2012; Cohen-Mansfield & Werner, 1998; Enmarker et al., 2011; Rosen et al., 2008; Voyer et al., 2005). Nearly half (44% and 45%) of older adult residents in Canadian care facilities have a symptom/diagnosis of depression and dementia, respectively (Canadian Institute of Health Information, 2010; Statistics Canada, 2016); however, the relationship between these factors is unclear

(Bennett & Thomas, 2014). Cognitive impairment has been argued to play a role in aggressive behaviour when this behaviour is a result of communication issues (Rosen et al., 2008), pain or discomfort (Enmarker et al., 2011; Leonard et al., 2006), psychosis (Isaksson et al., 2011; Leonard et al., 2006) or physical dependence (Cassie, 2012; Enmarker et al., 2011; Lachs et al., 2013). The overwhelming majority of the research done on aggressive behaviour only examines individuals with cognitive impairment or makes the assumption that aggressive behaviour is only present in those with cognitive impairment (e.g., Cohen-Mansfield & Werner, 1998; Enmarker et al., 2011; Voyer et al., 2005). However, the explanatory relationship between depression and aggressive behaviour is also not clear, especially for those without cognitive impairment.

Some have argued that depression is a potential cause or risk factor for neurocognitive impairment (e.g., Ownby, Crocco, Acevedo, John & Loewenstein, 2006; Silva, Gonçalves-Pereira, Xavier & Mukaetova-Ladinska, 2013), yet this has not been demonstrated universally (e.g., Becker et al., 2009; Luppá et al., 2013). Having a history of depression is associated with an increased likelihood of being diagnosed with Alzheimer’s disease (Ownby et al., 2006; Saczynski et al., 2010); however, others have only found this to be true in the development of vascular neurocognitive impairment (Brunnström, Passant, Englund & Gustafson, 2013). To muddy the waters even more, it has been postulated that depression is a consequence or a feature of cognitive impairment (Huang, Wang, Li, Xie & Liu, 2011; Sheline et al., 2006). Depression has also been seen to share some common neurochemical features (e.g., 5-HT_{1A} receptor deficits) with cognitive impairment, and this relationship might explain some of the disruptive behaviours associated with aggressive behaviour (Mitchell et al., 2010). Some argue that the realization of having an impairment can lead to depression (Jajodia & Borders, 2011) or that a diagnosis of cognitive impairment can contribute to the development of depressive symptoms (Carpenter et al., 2008). The relationship between depression and neurocognitive impairment is complex, but it is clear that they are intertwined (Bennett & Thomas, 2014).

Clearly with the complex arrangements of factors discussed in this model, understanding the factors contributing to aggressive behaviour and how to intervene to prevent and reduce such behaviour requires careful methodological development. The majority of prior work has not examined aggressive behaviour independent of cognition. The current study attempts to bridge this gap by investigating aggressive behaviour and depression in both individuals with and without cognitive impairment using large-scale robust national data from Canadian continuing care facilities who reported to the Canadian Institute for Health Information (CIHI) between 2011 and 2015.

Methodology

Purpose

To better understand aggressive behaviour and depression in those receiving continuing care, the current study sought to answer four questions:

- 1) What are the rates of aggressive behaviour and depression among those receiving continuing care?
- 2) Do these rates of aggressive behaviour vary between those with and without cognitive impairment?
- 3) Is there a relationship between aggressive behaviour and depression for both those who are cognitively impaired and cognitively intact?
- 4) Does cognitive impairment mediate the relationship between depression and aggressive behaviour?

Data and Sample

Data from the Continuing Care Reporting System (CCRS) of CIHI was used to answer the aforementioned questions. CIHI is an independent, not-for-profit corporation that seeks to improve the health of Canadians by collecting and sharing clinical, administrative and financial data from publicly funded facilities who provide continuing or extended care (e.g., hospitals and long-term care facilities) in most of Canada (CIHI, 2018a). The CCRS was launched in 2003 and contains demographic, clinical, functional and resource utilization information on those receiving continuing care. The collection of this data is mandated by 9 of 13 provinces and territories in Canada (excluding Québec, Prince Edward Island, Nunavut and the Northwest Territories), for anyone staying within a long-term care facility (i.e., nursing home) and complex continuing care hospitals/units, thus providing a large-scale understanding of the state of health within these facilities. Data from the facilities must adhere to the standards set out by CIHI (CIHI, 2018a). The CCRS in continuing and long-term care settings has been found to provide robust and high-quality data (see Hirdes et al., 2013).

CCRS data is assessed and collected exclusively by trained nurses, social workers and physicians. This data is made up of the Resident Assessment Instrument-Minimum Data Set (RAI-MDS 2.0) by InterRAI. This instrument was designed for care planning, and thus data within these facilities is collected as part of usual practice (Stones, Clyburn, Gibson & Woodbury, 2006). Real-time reports help flag resident risks and inform care planning. The information is then passed on to the CIHI (2018a). The RAI-MDS consists of roughly 300 items across a variety of domains like mood, behaviour, communication, disease and mobility, to highlight a few (Brink & Stones, 2007). Because the assessment is conducted with trained assessors, both the reliability and validity of the RAI are excellent (Landi et al., 2000; Morris et al., 1994; Morris, Fries & Morris, 1999; Morris et al., 1997).

The CCRS data used for the current study were collected between 2011 and 2015. It represents the latest assessment of 2,682,612 unique individuals. Most of the data was from Ontario (65%), British Columbia (17%) and Alberta (11%), and the remaining data was from 6 other provinces and territories (7%) in Canada. The average age of residents in the sample was 80.42 years (SD = 11.5), with a greater percentage of females (68%), as is typical in samples of older adults. Additionally, considering the exclusion of Québec (where the majority of Francophones in Canada are located), most of the sample spoke English as their first language (83.8%), compared to those who spoke French (2.8%) and those who did not speak either

as their first language (13.2%). Individuals who were comatose at the time of evaluation were excluded from this study.

Measures

As discussed, the RAI-MDS is made up of hundreds of items that can be combined to create various measures and indexes. For the current study, three of these measures were used, namely the Depression Rating Scale (DRS), the Cognitive Performance Scale (CPS) and the Aggressive Behaviour Scale (ABS).

The **Depression Rating Scale (DRS)** is comprised of seven items related to both mood and behaviour, creating a 14-point measure of depressive symptoms (Burrows, Morris, Simon, Hirdes & Phillips, 2000). Higher scores indicate a greater degree of depressive symptoms. The DRS correlates highly with both the Hamilton and Cornell depression scales (Burrows et al., 2000) and has demonstrated good convergent/divergent validity and reliability (Fisher, Seow, Brazil, Smith & Guthrie, 2015). A score of three or more on the DRS is a valid measure of clinically meaningful symptoms of depression (Burrows et al., 2000; Martin et al., 2008).

The 7-point **Cognitive Performances Scale (CPS)** was used to measure cognitive impairment, which is comprised of items related to memory impairment, level of consciousness and executive functioning. Higher scores indicate greater cognitive impairment. The CPS has been found to correlate highly with the Mini-Mental Status Exam (Morris et al., 1994; Paquay et al., 2007) and the test for severe impairment (Morris et al., 1994). A score of two or more on the CPS has been used as an indicator for significant cognitive impairment, corresponding to a score of 19 or lower on the Mini-Mental Status Exam (Achterberg et al., 2003; Morris et al., 1994; Paquay et al., 2007).

The **Aggressive Behaviour Scale (ABS)** was used to measure aggressive and abusive behaviour. It is comprised of items measuring the number and frequency of aggressive, abusive and inappropriate behaviours over the past seven days, prior to assessment. The ABS can range from 0 to 12, with higher scores indicating more frequent aggressive behaviours. The ABS has been reported to have good internal consistency (between 0.79 and 0.95) and was validated against the Cohen-Mansfield Agitation Inventory aggression subscale with a coefficient of 0.72 (Perlman & Hirdes, 2008). A score of five or more indicates greater frequency and intensity of aggressive behaviour over the past seven days and thus was used as the cut-off for defining those who exhibit aggressive behaviour within the current sample (Perlman & Hirdes, 2008).

Results

The first objective of this study was to determine the frequency of both aggressive behaviour and depression in those receiving continuing care. Within the general sample, 9.0% (241,146) received a score of five or more on the ABS, identifying the individuals who exhibit regular aggressive behaviour. Comparatively, about one third of the sample (30.1%, 805,753) exhibited depressive symptoms, with a score of three or more on the DRS. To answer the second objective, a χ^2 was used to determine if the

rates of aggressive behaviour and depression were different among those with and without cognitive impairment. A significantly higher proportion of individuals with moderate to severe cognitive impairment exhibited moderate to severe aggressive behaviour compared to those with no to mild cognitive impairment (11.2% vs. 1.7%; $\chi^2 = 51257.72$ (1), $p < 0.001$). Similarly, there was a higher proportion of those with moderate to severe cognitive impairment who were found to have clinically depressive symptoms (32.5% vs. 22.0%; $\chi^2 = 24532.41$ (1), $p < 0.001$).

To gain more insight into this, an independent-samples t-test was run to examine the differences in the overall score of the ABS and DRS scales between those with no/mild versus moderate/severe cognitive impairment. Similar to the χ^2 , those with moderate to severe cognitive impairment had significantly higher mean scores on both the ABS and the CRS compared to those with no to mild cognitive impairment. Those with mild or no cognitive impairment had a mean ABS score of 0.43 (SD = 1.14), and those with moderate and severe cognitive impairment had a mean score of 1.60 ((SD = 2.40), $t(2678064) = 376.48$, $p < 0.001$). While those with mild or no cognitive impairment had a mean DRS score of 1.42 (SD = 2.10), and those with moderate and severe cognitive impairment had a mean score of 2.11 ((SD = 2.43), $t(2678064) = 200.46$, $p < 0.001$).

Correlations were run to better understand the relationship between aggressive behaviour and depression for both those with and without cognitive impairment. While

examining those with no or mild cognitive impairment, a significant correlation was found between the ABS and DRS ($r(608020) = 0.40$, $p < 0.001$). A similar relationship was found when looking at those with moderate to severe cognitive impairment: the DRS and ABS were significantly correlated ($r(2070046) = 0.42$, $p < 0.001$), indicating that a relationship between depression and aggressive behaviour exists for both those with and without cognitive impairment. Additionally, these patterns were present for both the verbal abuse frequency ($r(608020) = 0.36$, $p < 0.001$) and physical abuse frequency ($r(608020) = 0.13$, $p < 0.001$) measures within the RAI-MDS.

A two-way ANOVA was carried out to better understand the differences in ABS between those who exhibit depressive symptoms (DRS 3+) and those who do not (DRS 0–2) and between those with (CPS 2+) and without (CPS 0–1) cognitive impairment. This analysis revealed there was a significant main effect of both depression ($F(1, 2678062) = 14973.20$, $p < 0.001$) and cognitive impairment ($F(1, 2678062) = 14973.20$, $p < 0.001$) on aggressive behaviour (**Figure 2**); both those with depression and those with cognitive impairment exhibited more aggressive behaviour. The results of the aforementioned analyses did not differ after controlling for demographic variables (age, sex and language).

A statistically significant interaction between the effect of cognitive impairment and depression on aggressive behaviour was also found ($F(1, 2678062) = 14973.20$, $p < 0.001$) (**Table 1**).

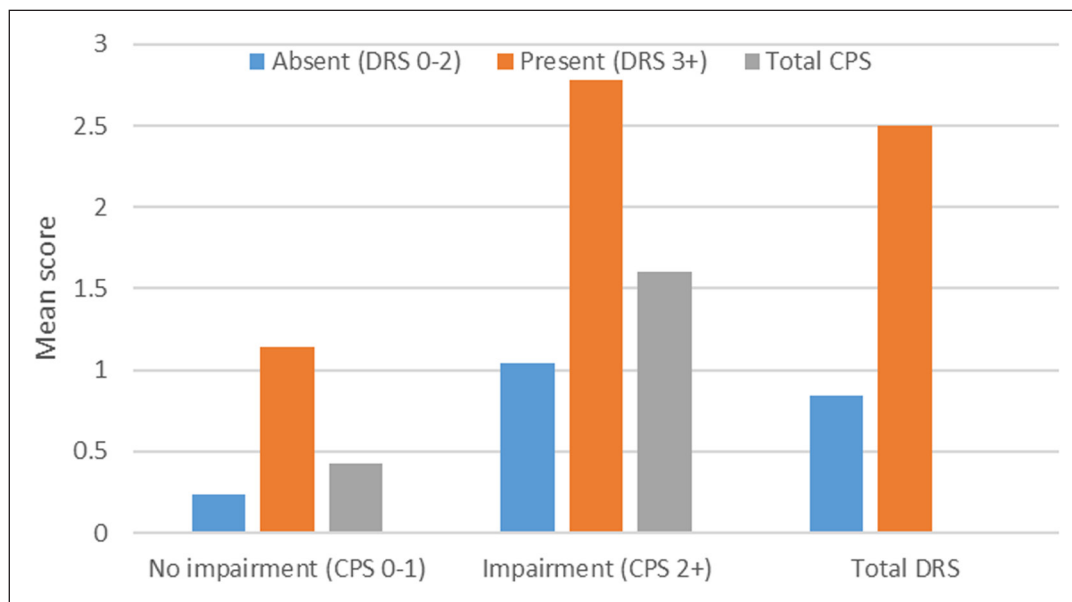


Figure 2: Mean differences in Aggressive Behaviour scores.

Table 1: Results of the Analysis of Variance.

Source	df	MS	F	p	Effect Size
Cognition (A)	1	505835.18	127006.90	<0.001	0.045
Depression (B)	1	590054.88	148153.07	<0.001	0.052
A × B	1	59634.32	14973.19	<0.001	0.006
Error	2678062	3.98		<0.001	

Lastly, a mediation model was created to understand the relationship between cognitive impairment, depression and aggressive behaviour. This model found a significant relationship between the ABS and both the DRS ($\beta = 0.39$, $p < 0.001$) and CPS ($\beta = 0.38$, $p < 0.001$). However, a structural equation model testing the mediation relationship found no evidence of a mediating effect of CPS, as the effect of DRS on ABS was not reduced by adding the mediator (**Figure 3**). The strength of these correlations was compared using the analysis by Lenhard and Lenhard (2014), and the relationship between depression and aggressive behaviour was stronger than that of cognitive impairment and aggressive behaviour ($z = 345.39$, $p < 0.001$).

Discussion

The purpose of this study was to understand the relationship between aggressive behaviour and depression in those receiving continuing care in Canada. Relatively few (9%) individuals receiving continuing care exhibited regular aggressive behaviour. However, almost one third (30.1%) of the sample exhibited depressive symptoms, as measured through a score of three or greater on the DRS, which is predictive of meeting the DSM-IV criteria for depression (Martin et al., 2008). Individuals who were cognitively impaired had higher rates of aggressive behaviour, higher scores on the ABS and higher depression scores compared to those who had no to mild symptoms of cognitive impairment. Despite this, the rate of aggressive behaviour amongst those who had mild to no cognitive impairment was not zero, indicating that cognition was not the only explanatory factor of aggressive behaviour. The relationship between depression and aggressive behaviour was further elucidated through testing of a mediation model, which did not find evidence there was a mediating effect of cognitive impairment.

Rates of Aggressive behaviour and Depression

Rates of aggressive behaviour were much lower than previously reported rates (e.g., Sourial et al., 2001; Voyer et al., 2005), though past studies have used different assess-

ment instruments. Aggressive behaviour rates in the current study are likely conservative estimates, given that assessment only included those who regularly displayed aggressive behaviour versus those who displayed this infrequently. Although the ABS has been validated against the Cohen-Mansfield Agitation Inventory (CMAI; Perlman & Hirdes, 2008), it has been argued that the MDS-ABS might underestimate aggressive behaviour when compared with the Ryden Aggression Scale and the CMAI (Berry, Young & Kim, 2017). The frequency of depressive symptoms found in this sample is in line with previous studies, with some reporting rates ranging from 9% to 15% with use of the Center for Epidemiologic Studies Depression Scale (Luppa et al., 2013; Guthrie, Thériault & Davidson, 2016) and as high as 45% using the DRS (CIHI, 2010). This sample represents a near census level of data for those receiving continuing care and is not simply a sample of a few care facilities, thus giving more representative estimates of aggressive behaviour and depressive symptoms in Canadian care facilities.

Relationship between aggressive behaviour and depression across cognition

Similar relationships were found between aggressive behaviour and depression measures for both those with and without cognitive impairment, whereby those who had high depressive symptom scores tended to exhibit higher aggressive behaviour. This indicates that not only is there a relationship between aggressive behaviour and depression (e.g., Majić et al., 2012; Margari et al., 2012), but also this relationship is found between both those with and without cognitive impairment. The results of the current study indicate both verbal and physical aggression are related to depression, which was inconsistent in previous research (Marx et al., 1990; Menon et al., 2001; Talerico et al., 2002). Because most of the previous work on aggressive behaviour either exclusively examined those with cognitive impairment or assumes this relationship (e.g., Isaksson et al., 2011; Sourial et al., 2001; Voyer et al., 2005; Zeller et al., 2012), it was important to determine in the

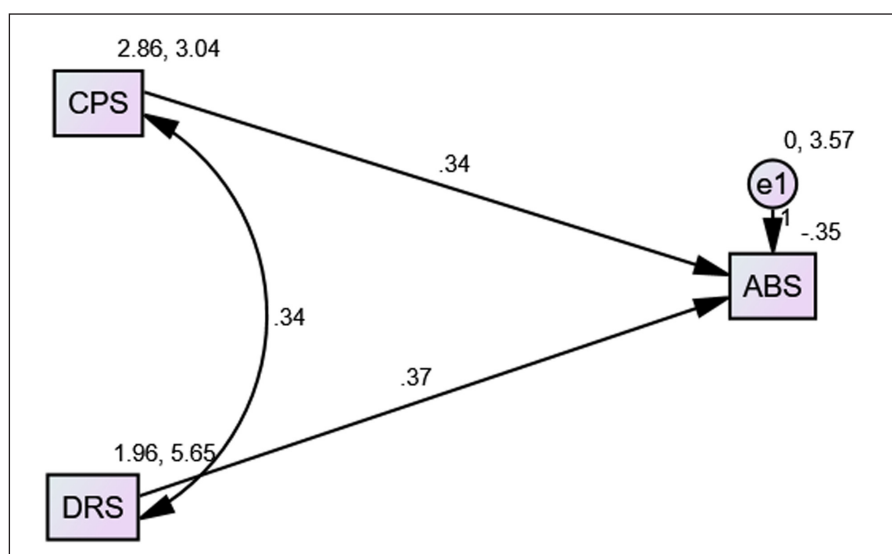


Figure 3: Model of CPS, DRS and ABS.

current study whether the ratio of aggressive behaviour varied between those with and without cognitive impairment and whether the relationship between aggressive behaviour and depression varied across levels of cognitive impairment (e.g., Cassie, 2012; Cohen-Mansfield & Werner, 1998; Leonard et al., 2006).

Is there a mediating effect of cognitive impairment?

Considering the complex relationship between neurocognitive impairment and depression (see Bennett & Thomas, 2014), it was important to understand whether cognitive impairment would mediate the relationship between aggressive behaviour and depression. The current study found that both those with depression and those with cognitive impairment exhibited more aggressive behaviour. Additionally, an interaction was found between the effects of cognitive impairment and depression on aggressive behaviour, illustrating a differing relationship between the variables. However, we did not find evidence that the relationship between depression and aggressive behaviour was mediated by cognitive impairment, indicating they are both uniquely related to aggressive behaviour, and in fact, depression shared a slightly stronger relationship with aggressive behaviour than cognitive impairment.

General Discussion

Aggressive behaviour is a major concern for those working within care facilities (e.g., Lachs et al., 2007; Lachs et al., 2013; Zwijsen et al., 2014), as well as for informal caregivers. Aggressive behaviour has been associated with increased stress and caregiver burden/burnout among family members (Kunik et al., 2010; Talerico et al., 2002), which can lead to a reduction in visitation by family members, creating further concern as this in turn influences the care experience of the resident (Draper et al., 2000).

A better understanding of the factors related to an increase in aggressive behaviour is essential to help improve quality of life of care recipients. The use of psychotropic medications, such as antipsychotics, are widely used as a way to manage aggressive behaviour in North America (Howland, 2008), despite these medications not being clinically approved for use in the treatment of aggressive behaviour. Some studies have found that up to 71% of older adults receiving long-term care were prescribed at least one psychotropic drug (Gustafsson, Sandman, Karlsson, Gustafson & Lövheim, 2013). Notably, in a sample from the United States, 36% were receiving some type of sedative and 25% were receiving antipsychotic medications (Gustafsson, Sandman, Karlsson, Gustafson & Lövheim, 2013). Similar figures have been cited by CIHI, where on average 22% of long-term care residents were prescribed antipsychotic medication without having a diagnosis of psychosis, the intended use of such medication. This percentage ranged from 17% in Alberta to as high as 38% in Newfoundland and Labrador (CIHI, 2018b). The use of antipsychotic medication to manage aggressive behaviour is worrisome considering the risks and consequences of using such medication, including but not limited to adverse cognitive effects (Cancelli,

Beltrame, Gigli & Valente, 2009), increased risk of falls (Gauthier et al., 2010), stroke (Douglas & Smeeth, 2008; Herrmann & Lanctôt, 2005; Howland, 2008) and even mortality (Gill et al., 2007; Jeste et al., 2008). In addition to antipsychotic medication being used to manage aggressive behaviour, physical restraints are still used in some long-term care facilities in Canada. According to national data from CIHI, 5.7% of residents in long-term care in Canada are in daily restraints. This number ranges from 4.5% in Ontario to 12.1% in Newfoundland and Labrador and 14.2% in Yukon (CIHI, 2018b). These numbers truly illustrate issues with the quality of care.

Possible Interventions

These findings demonstrate the need to better understand aggressive behaviour and how to help manage these behaviours. Person-centred care and staff training have been identified through a recent systematic review as being moderately supported and effective (Navarro & Bornstein, 2018). The variables known to cause and increase aggressive behaviour, which are themselves amenable to treatment, are important to target and measure in addition to measuring the outcome (aggressive behaviour) in order to support long-term effectiveness. In Navarro and Bornstein's review, none of the treatment methods examined had a focus on depression.

A better understanding of the role that depression has on aggressive behaviour might help in the development of better aggressive behavioural interventions, given our results demonstrating the independent relationship between depression and cognitive impairment with aggressive behaviour. Several reviews of depression interventions have found significant benefits to group therapy (Tavares & Barbosa, 2018) and various forms of cognitive behavioural therapy both for older adults in the community (Lee et al., 2012) and within long-term care facilities (Simning & Simons, 2017). Other positive effects of depression treatment have been demonstrated through case examples, such as Fiddick's Nursing Home in Ontario, which, after introducing an interdisciplinary approach to care that included a psychiatrist and a geriatrician, saw a noticeable decrease in depression rates within their facility (CIHI, 2013).

Similar changes in policy and care practices have led to a decrease in aggressive behaviour as well as the use of antipsychotic medications within other long-term care facilities, notably the introduction of the P.I.E.C.E.S. learning and development model of care, which is a person and care partner-directed approach. This type of intervention has been found to lower the cost of care while also lowering rates of aggressive behaviour and antipsychotic medication usage (Huang et al., 2011; McAiney et al., 2007; Stolee et al., 2009). In some facilities, the number of individuals receiving antipsychotic medications dropped by 12% (CIHI, 2013). Recently, use of the butterfly care model, where focus is placed on the individual and on facility-level factors through the creation of a homelike environment, has demonstrated promising results in reducing aggressive behaviour and the use of antipsychotic medications (Komanchuk, 2017; Sheard, 2016). In one care facility

where this model was used, aggressive behaviour dropped by 90%, antipsychotic medications dropped by 68% and staff sick time fell by 90% (Vogel, 2018). However, these recent results warrant some caution as they have yet to be reported in peer-reviewed research.

Limitations

A major limitation of the current work is the cross-sectional nature of the data, which restricts the ability to determine causation: Do depressive symptoms predict aggressive behaviour? Are aggressive behaviours an early symptom of depression? These questions merit further examination with the use of longitudinal data and designs. Although longitudinal analyses are possible with the use of the RAI-MDS, it was beyond the scope of this study and the data provided by the CIHI. Additionally, the data set examined did not include variables related to socioeconomic status (e.g., income or education), which is related to both depression (e.g., Bierman & Lee, 2018; Ylli et al., 2016), personality and cognition (e.g., Jones, 2017; Qian, Schweizer & Fischer, 2014) amongst older populations and would be important to control for in future studies.

Conclusion

This is one of the few studies to examine depression with aggressive behaviour in both those with and without cognitive impairment. These findings not only have significance for research in this area but might also have the potential for policy changes with regard to how aggressive behaviour is managed in continuing care in Canada. About half of those with symptoms of depression (as measured by the DRS) have a current diagnosis of depression (CIHI, 2010), illustrating a potential lack of care for these individuals. Additionally, very few older Canadians receiving continuing care receive an evaluation by a licenced mental health specialist (less than 10% for those with a diagnosis of depression and less than 5% for those with symptoms of depression), with even fewer (under 3%) receiving psychological therapy (CIHI, 2010). The predominant treatment for those with symptoms and/or a diagnosis of depression in Canadian continuing care facilities is antidepressant medications (near 80%) (CIHI, 2010), which is not recommended as first-line treatment for depression (e.g., Limosin, Manetti, René & Schuster, 2015). The extensive use of restraints and antipsychotic medications (CIHI, 2010; 2013; 2018b) within Canadian care facilities to manage aggressive behaviour is additionally problematic.

Quality assessment and adherence in reporting to CIHI is essential for policymakers to have data around depression rates and treatment of depression, such that changes in quality of care based on best evidence can be made. Considering the forecasted increase in the demand for long-term care in Canada, from the current 263,000 beds to 462,000 by 2035 (Gibbard, 2017), it is paramount that factors influencing aggressive behaviour are better understood.

Competing Interests

The authors have no competing interests to declare.

Author Contribution

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