

RUNNING HEAD: Correlates of anxiety in residential care

The Correlates of Anxiety among Older Adults in Nursing Homes and Other Residential Aged Care Facilities: A Systematic Review

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ABSTRACT

Objective

To synthesize and summarize the studies examining the correlates and predictors of anxiety in older adults living in residential aged care.

Methods

Using the PRISMA guidelines, five electronic databases were searched using key terms and subject headings, as well as reference lists of relevant papers. The search was limited to peer-reviewed literature published in English. Eligible studies examined the association between at least one correlate/factor and anxiety disorders or symptoms in aged care residents aged 50+ years.

Results

A total of 3741 articles were identified, of which 34 studies (with a total of 1,543,554 participants) were included in this review. Correlates associated with anxiety included pain, use of anti-depressants/lithium, depression, and lower perceived quality of life. Less consistent and/or less studied variables included younger age, female gender, higher educational level, functional dependence, subjective health status, more prescribed medications, impaired vision, insomnia, external locus of control, fear of falling, attachment, hope, meaning in life, and the influence of social, environmental, and staff/policy correlates.

Conclusions

While several variables were found to have strong associations with anxiety in aged care residents, a number of factors have been examined by only one or two studies. Further research (preferably prospective studies) is therefore needed to reliably confirm findings and to help plan and develop preventative and intervention strategies.

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INTRODUCTION

Anxiety has been found to be one of the most common psychiatric conditions in later life (Gonçalves, Pachana, & Byrne, 2011). However, research into anxiety among residents of residential aged care facilities (RACFs; also known as nursing homes, hostels, assisted-living facilities, and long-term care/residential homes) has only recently gained momentum.

To date, the rate of anxiety disorders and symptoms within this population is reported to range from 3.2% to 20% and 6.5% to 58.4%, respectively (Creighton, Davison, & Kissane, 2015). This suggests that, compared to community-dwelling elderly (where prevalence rates for anxiety disorders range from 0.7% to 17% (Copeland et al., 1987; Kirmiziloglu, Doğan, Kuğu, & Akyıldırım, 2009), anxiety is more prevalent in aged care residents. With people now living longer than previous generations, often with chronic health conditions, it is likely that this problem will worsen over coming years.

In an attempt to improve the detection of elderly people who experience anxiety or are at risk of developing anxiety, researchers have begun to investigate potential risk factors and correlates of late-life anxiety. Reviews on the factors associated with anxiety within a community-based population suggest variables such as cognitive impairment, high blood pressure, poor self-perceived health, functional limitations, female gender, and external locus of control are associated with an increased risk of anxiety (Vink, Aartsen, & Schoevers, 2008; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010). As well as adding to our understanding of the condition, this research provides some indications of how we might prevent anxiety disorders from developing or intervene to reduce the burden of anxiety in older adults.

However, to date no systematic review has been conducted specifically examining research on the correlates and predictors of anxiety within the rapidly growing aged care population. As older adults within RACFs are substantially older and more cognitively and functionally impaired than the community-dwelling elderly (Australian Institute of Health and Welfare, 2012), generalizing findings from community-based studies is problematic, and thus an overview of research conducted within RACFs is required. Given that reviews provide the field with an overview of the current state of knowledge in an integrative and critical manner, this systematic review aims to address this gap by describing and evaluating current research into the correlates of anxiety disorders and symptoms among older aged care residents. Not only will this enable an examination of key conceptual and methodological issues and provide potential directions for future research, it is hoped this review will also provide an

understanding of which factors have been consistently found to be associated with anxiety. This knowledge is important and has significant implications for the development of appropriate and targeted prevention and intervention strategies for the growing RACF population.

METHODS

Identification of relevant literature

The review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009). Five databases (Scopus, Ovid MEDLINE, PsycINFO, CINAHL, and Cochrane) were searched on 17 November 2015 using the search terms and limiters outlined in Figure 1. Reference lists of included articles were also manually screened to identify papers that had not yet been included.

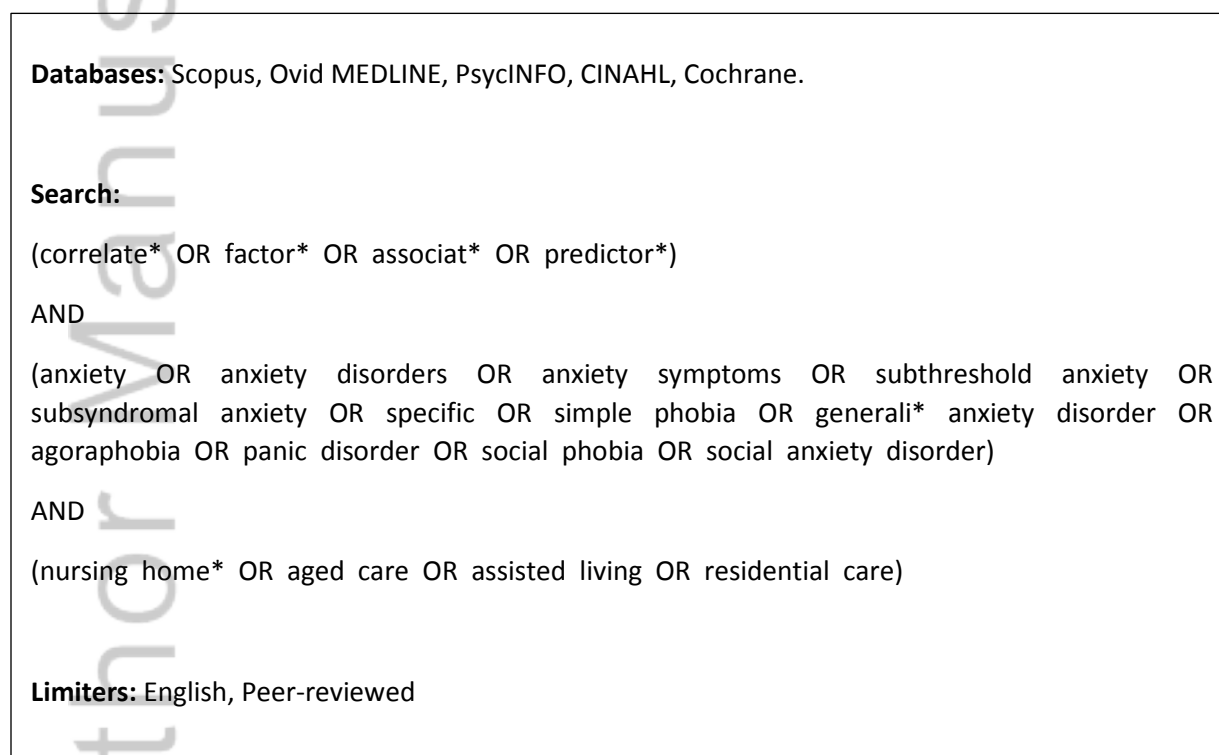


Figure 1. Search terms and strategy.

Eligibility criteria

To the authors' knowledge, no previous review has been conducted on the literature examining the correlates of anxiety in RACFs. Thus, all studies published from inception to October 2015 were considered, if they met the following inclusion criteria:

- (1) Reported cross-sectional or longitudinal quantitative data examining the association between anxiety and at least one factor. Studies that used anxiety as either a dependent or independent variable were included;
- (2) Included data on RACF residents aged 50 years or older; and
- (3) Published in English, in a peer-reviewed journal.

The primary outcome measure was the reported association between anxiety and the factor(s)/correlate(s) studied in the RACF population. Case reports, qualitative studies, reviews, theses, dissertations, and conference abstracts were excluded as they were considered to be outside the scope of this review.

Study selection and data extraction

Using the systematic review software Covidence, all references returned by the electronic searches were examined for duplicates and screened by title and abstract. The full text for potential studies were then sourced and examined to determine eligibility for inclusion.

For each included study, information was collected on: the country where the study was conducted, year of publication, study design, sample size, age range/mean age of participants, method/measure used to assess anxiety, the correlate(s) studied, statistical analyses used, whether statistical significance was found, and the direction of association.

Categorization of variables and coding associations with anxiety

Due to the limited amount of published literature in this area, all variables identified were included in the review. These were organized using the following categories: (1) demographic; (2) medical/biological; (3) psychological/cognitive/emotional; (4) social/cultural factors; and (5) physical environment/staff/policy factors.

Tables 2 – 6 provides an overview of the findings from the included studies, with the direction of association being indicated by a "+" for a positive association with anxiety, and "-" for a negative association. Strength of evidence has been denoted by the number of +/- (see footnotes for Tables 2 – 6).

A variety of univariate and multivariate statistical analyses were used to evaluate correlates, with the most common being regression, correlations, *t*-test and chi-square. If both uni-/bivariate and multivariate tests were conducted, uni-/bivariate tests were reported for consistency across studies.

Appraisal of methodological quality

Methodological quality was appraised using the Standard Quality Assessment Criteria for Evaluating Primary Research Papers (Kmet, Lee, & Cook, 2004). This checklist comprises 11 criteria assessing: appropriateness of study design, clarity with which participant selection and characteristics are described, adequacy of sample size, appropriateness of analytic methods, and whether the conclusions were supported by the data. Each criterion is given a score from 0 to 2, with 2 given for fully meeting the criterion, 1 for partially meeting the criterion, and 0 for not meeting criterion. A summary score ranging from 0 to 1 was calculated, with higher scores indicating a higher level of methodological quality. Studies with samples sizes ≤ 50 were excluded from this review, due to concerns about the lack of power needed to run the correlational analyses they conducted.

RESULTS

The search returned 4478 articles (see Figure 2). After the removal of duplicates and addition of six other papers identified through other sources, 3741 studies remained. These were then screened by title and abstract, after which 97 articles remained. The full texts of these studies were then assessed for eligibility, with 34 studies included in this review. Figure 2 outlines the process of study selection and reasons for exclusion. Collectively, these studies examined 54 variables and their association with anxiety in RACF residents.

Participant and study characteristics

Sample sizes ranged from 51 (Van Almenkerk, Depla, Smalbrugge, Eefsting, & Hertogh, 2015) to 1,492,200 (Walid & Zaytseva, 2009), with a total of 1,543,554 participants across all studies (median = 238 participants). An overlap in participants was present across two studies by Drageset and colleagues (Drageset, Eide, & Ranhoff, 2013a, 2013b); two by Haugan (Haugan, 2014; Haugan, Innstrand, & Moksnes, 2013); and four studies by Smalbrugge and colleagues (Smalbrugge, Jongenelis, Pot, Beekman, and Eefsting (2005); Smalbrugge, Jongenelis, Pot, Beekman, & Eefsting, 2007; Smalbrugge, Pot, Jongenelis, Beekman, & Eefsting, 2005; Smalbrugge et al., 2006). Only one of each of these studies contributed to the number of

subjects; however, given that each study examined different correlates, all were included in the review.

An additional Fisher's exact test examining differences in proportions of significant associations between studies with small ($n < 220$) or large sample sizes ($n \geq 220$) found no statistically significant association ($p = 0.427$).

Table 1 presents the characteristics of all studies included in this review, including participant characteristics, study design and quality rating, anxiety assessment measures, and performed statistical analyses. Thirty studies (83%) utilised a cross-sectional design while four (12%) were prospective/longitudinal. Eleven studies (31%) were a secondary analysis of data collected for a previous study. Sixty-two percent ($n = 21$) of included studies attempted to control for potential confounders of anxiety, with the majority using regression analyses (e.g., multiple linear regression, logistic regression) to do so. Studies controlled for factors such as depression, Schizophrenia, Parkinson's disease, behavioural symptoms, and demographic factors, which were considered appropriate given the predictor/correlate of anxiety being studied. The review yielded studies from 13 countries, with the largest number of studies from the United States of America ($n = 14$), followed by the Netherlands ($n = 7$), United Kingdom ($n = 2$), Norway ($n = 4$), Australia ($n = 2$), and Malta, Italy, Spain, Japan, France, Egypt, and Canada (all had an $n = 1$).

Correlates of anxiety in RACF residents

Tables 2 to 6 summarizes the associations between potential correlates and anxiety in RACF residents.

Demographic correlates. Five demographic variables were examined (age, educational status, gender, marital status, and whether or not the resident had children), with younger age, a higher educational level, and female gender found to be significantly related to higher anxiety (Table 2).

Biological/health-related correlates. Out of 18 variables examined, 14 were found to be significantly associated with anxiety. Specifically, use of anticholinergic medications, antipsychotic medications, and antidepressants, higher cognitive functioning, a higher number of medications, an increased risk of falls, pain, functional impairment, more medical diagnoses, impaired vision, insomnia, experience of a stroke, more medical specialist consultations, and having worse self-perceived health were found to be associated with higher anxiety. No association was found with use of anxiolytics or tranquilizers, the presence of chronic obstructive pulmonary disease, or impaired hearing (Table 3).

Psychological/emotional correlates. Out of 11 variables examined, 10 were found to be associated with anxiety. Depression, a lower perceived quality of life, external locus of control, more frequent behavioural problems, the experience of a negative life event, and fear of falling were all found to be significantly and positively related to higher anxiety. Higher intrapersonal self-transcendence, hope, more meaning in life, and higher wellbeing were all found to have a significant negative association with anxiety. No association was found with stress or interpersonal self-transcendence (Table 4).

Social/cultural correlates. Out of eight variables examined, only lower perceived social support and social competence, and attachment were found to be significantly associated with higher anxiety. Loneliness, receiving reassurance of worth from others, opportunity for nurturance, religiousness, and social integration had no association with anxiety (Table 5).

Physical environment/staff/policy correlates. Five out of eleven variables studied were found to be significantly associated with anxiety. Relocating to dependent living compared to an independent living facility, residing at an RACF for longer, receiving a more negative reaction to behavioral issues from staff, and the presence of more unmet needs were all found to be significantly and positively associated with anxiety. Residents' perceived nurse-patient interactions were indirectly associated with anxiety, mediated by the influence of depression. No effects were reported for perceived inadequacy of care, the resident's level of decisional control in the move to the RACF, and staff's sense of competence, qualifications, age, and job satisfaction (Table 6).

Predictors of anxiety in RACF residents

One study examined the predictors of anxiety among RACF residents. Keister (2006) found residents with an internal locus of control and who appraised the relocation to an RACF as challenging were less likely to experience anxiety post-one week relocation, while receiving more information (obtaining informational support) was a significant predictor of higher anxiety.

DISCUSSION

To the authors' knowledge, this review is the first to document the literature examining the correlates and predictors of anxiety in RACF residents. Significant correlates were found in all five categories, with the strongest and most consistent associations (i.e., $\geq 70\%$ of 3 or more studies) with anxiety being found for: depression, lower perceived quality of life, pain, use of anti-depressants or lithium, and lower perceived social support. As two thirds of studies

included in the review attempted to control for potential confounders, these offer some reassurance, but we note that another third failed to control for any confounders and consequential variables may have been missed. There is a need for more studies to continue examining this.

With regards to demographic factors, the present review suggests that younger age, female gender, and higher educational level may be correlated with higher levels of anxiety. However, fewer than 50% of studies examining these factors found a significant relationship, suggesting that the strength of association is questionable. Nonetheless, these findings are similar to those found in community-dwelling older adults; where female gender (Vink et al., 2008) and younger age (i.e., those aged 65 – 74 years) (Byers et al., 2010; Gonçalves et al., 2011; Grenier et al., 2011; Gum et al., 2009) have been found to be associated with a higher prevalence of anxiety disorders and symptoms. Given that knowledge on demographic correlates of anxiety in RACF residents has the potential to help staff identify individuals who may be at risk, further research assessing these factors would be beneficial.

The most consistent biological/health-related correlates were pain, use of anti-depressants/lithium, and functional dependence, with 86%, 75%, and 50% of studies finding a significant positive association, respectively. Cognitive functioning was the least consistent variable, with three of six studies finding that higher cognitive functioning was associated with increased anxiety. While use of anticholinergic medications, risk of falls, higher mortality in residents with cancer, medical specialist consultations, poorer subjective health status, more prescribed medications, impaired vision, and insomnia were also all found to be positively associated with anxiety, information on these factors was limited to one or two studies. These findings are in contrast to those within community-dwelling elderly samples, where poorer self-perceived health (Almeida et al., 2012; Gonçalves et al., 2011; Ribeiro et al., 2015), number of chronic illnesses (Forlani et al., 2014; Gonçalves et al., 2011; Grenier et al., 2011), and cognitive impairment appear to be the three most common biological variables positively associated with anxiety. Given that the number of frail RACF residents experiencing comorbid medical issues is increasing (Dwyer, Stoelwinder, Gabbe, & Lowthian, 2015), and research has found a strong association between depression and both perceived and number of health problems, (Braam et al., 2005; Davison, McCabe, Knight, & Mellor, 2012), further research to confirm and clarify the association between specific biological/health-related variables (e.g., self-perceived health, impaired vision) and anxiety in RACF residents is warranted.

In terms of the psychological/emotional/cognitive correlates, the most consistent correlates were depression and lower perceived quality of life, with 100% and 87% of studies finding a

positive association with anxiety in RACF residents, respectively. External locus of control was also found to be both a significant correlate and predictor of anxiety, although the research was limited to two studies. These findings are somewhat similar to community-based samples; where depression has been found to be the most common factor associated with anxiety (Gonçalves et al., 2011; Vink et al., 2009; Zhang et al., 2014), followed by the experience of a negative life event (Cohen et al., 2006; Diefenbach et al., 2004; Vink et al., 2009) and external locus of control (Mehta et al., 2003; Smit et al., 2007). While more behavioural problems and experiencing negative life events were also found to have a positive association with anxiety in RACF residents, this was only found in one or two studies, suggesting further research into these variables should be conducted to clarify their relationship. Other psychological variables that were found to be significantly correlated with anxiety were fear of falling, decreased hope, meaning in life, and intrapersonal self-transcendence. The individual's cognitive appraisal of the situation as challenging was also found to be significant predictor of less anxiety. While 100% of studies found a significant association, the research into these variables was limited to one or two studies. This is concerning, as they are potentially malleable, individual-level factors that have the potential to be useful (once better understood) in devising interventions and preventative strategies. Thus, further research into these variables would be highly beneficial.

With regards to social/cultural factors, lower subjective social support was the only variable found to be consistently studied and associated with anxiety – with 75% of studies finding a significant negative association. This is consistent with findings from community-dwelling samples, where both objective (i.e., number of contacts, frequency of visits from friends) and higher subjective social support is frequently found to have a negative association with anxiety (Almeida et al., 2012; Beekman et al., 2000). Better objectively-rated social competence, and higher levels of attachment in RACF residents, were all found to be significantly associated with anxiety in 50% or more studies; however again the research was limited to one or two studies. Further research examining the influence or association between social/cultural factors would be highly beneficial, particularly as many (e.g., social support, interpersonal relationships) are variables that can be targeted in interventions.

Lastly, in terms of the physical environment/staff/policy correlates, none were found to have a consistent relationship with anxiety. With the exception of length of time residing in a RACF (which was only found to have a significant positive association in one of the seven studies), all other correlates had been examined in only one or two studies. This prevents reliable conclusions being drawn about their associations with anxiety. Thus, further research

examining how the physical environment and staff behaviour is related to the experience of anxiety is warranted.

From a clinical perspective, the above findings suggest that interventions should aim to optimize symptom control by ensuring that depression and pain are managed and treated appropriately, that staff respond sensitively to unmet needs, promote meaningful activities, aim to increase the amount of control residents have over their care/environment, and enhance social support, particularly as residents are settling into their new home. More severe anxiety disorders would warrant specific psychotherapeutic and psychotropic treatment.

Limitations

It is important to acknowledge several limitations of this review. First, the heterogeneity in anxiety measures and subject samples prevented the authors from performing a meta-analysis. Second, the majority of anxiety correlates were only documented in a small number of studies, which limits both the generalizability and reliability of the findings. Further research examining both the same and different variables across different samples, ideally with larger sample sizes, is therefore needed to enable a reliable conclusion on the influence of individual factors. Moreover, there is a lack of research examining the predictors of anxiety among RACF residents, with only one study being found in this review. Given that examining predictors can provide some evidence for causality, future research should aim to conduct studies that enable the computation of predictive modelling techniques (e.g., logistic regression). Lastly, the majority of research utilised a cross-sectional design. While this also limits our ability to draw conclusions on the causal relationships between the correlates and anxiety, cross-sectional research does provide a foundation of preliminary evidence for potential correlates, from which further prospective studies can be developed.

Conclusions

This review demonstrates that while several variables have been found to have strong and consistent associations with anxiety among RACF residents (e.g., pain, use of anti-depressants/lithium, depression, and lower perceived quality of life), the majority have been examined by only one or two studies. Further research is therefore needed to clarify the hypothesized relationship between these factors and anxiety. An improvement in our understanding of anxiety within RACFs is required to enable us to plan, design, and implement preventative and intervention strategies for this vulnerable population.

Conflict of interest

None declared.

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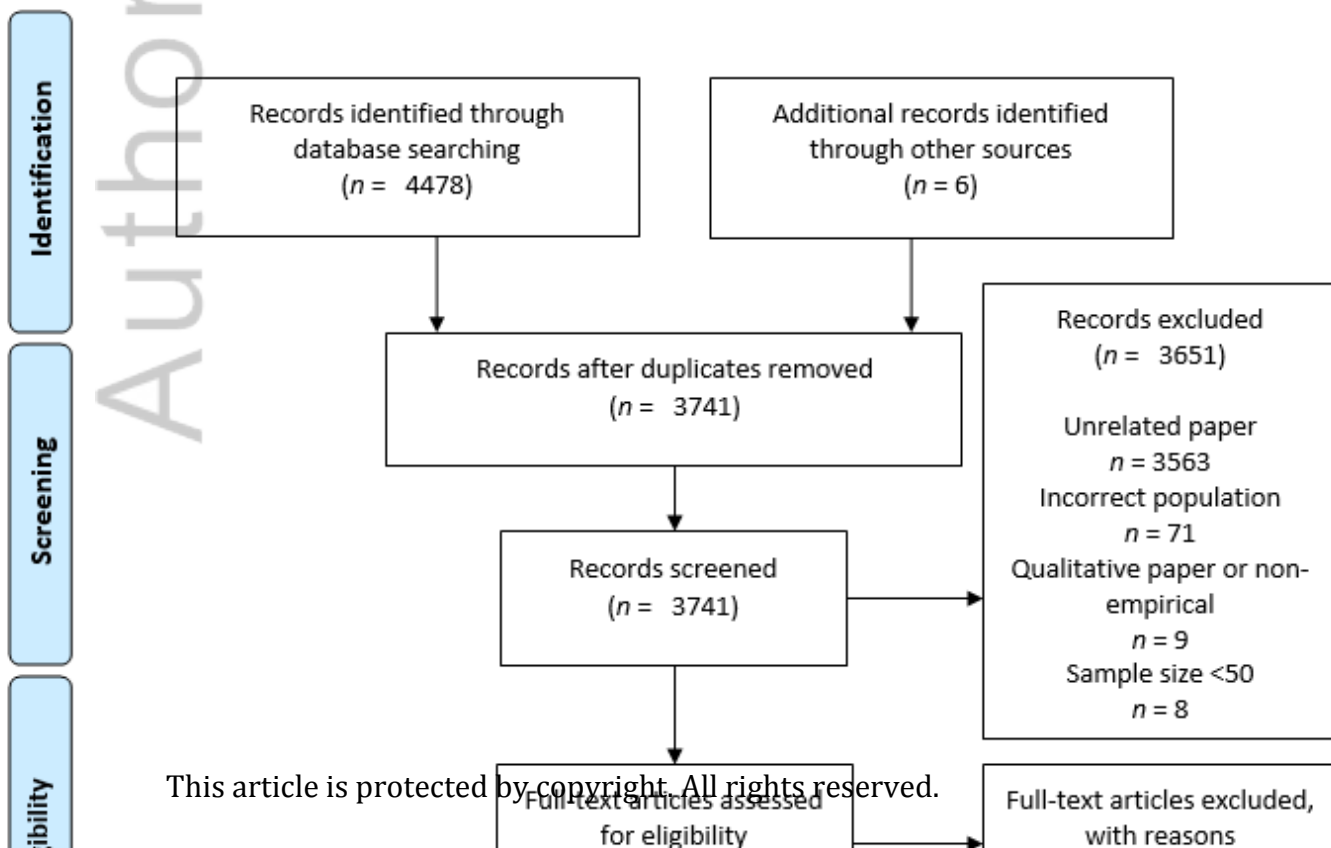
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Figure 2. Flowchart depicting study selection

Table 1. Study Characteristics

Author(s) (year)	Participants	Design (location of sample)	Measure of anxiety (administration method)	Statistical test(s)	Quality rating
Baldacchino and Bonello (2013)	137 Maltese older adults from six RACFs; aged ≥ 65 years	Cross-sectional, comparative study; purposive convenience sampling used to recruit RACFs (Malta and Australia)	HADS-A (SR)	Student <i>t</i> -test; one-way ANOVA	0.85
Carstensen and Fremouw (1988)	51 older adults from one rural RACF; aged ≥ 55 years	Cross-sectional, observational study (USA)	SADS (SR)	Correlation coefficients	0.75
Casten, Parmelee, Kleban, Powell Lawton, and Katz (1995)	579 older adults from one RACF; aged ≥ 61 years	Cross-sectional study; secondary analysis of data obtained from a larger, ongoing study (USA)	DSM-III-R Symptom Checklist (SI); POMS (SR)	Hierarchical multiple regression; SEM	0.91
Chatterjee, Mehta, Sherer, and Aparasu (2010)	13507 older adults with dementia from 1174 RACFs; aged ≥ 65 years	Cross-sectional, nationally representative sample of RACF residents with dementia; utilised data from the 2004 National Nursing Home Survey (USA)	MDS (CR)	Multivariate logistic regression	0.95
Cheok, Snowdon, Miller, and Vaughan (1996)	107 older adults from five RACFs; aged ≥ 65 years	Cross-sectional study; convenience sampling used to recruit residents (Australia)	GA scale (SR)	<i>t</i> -test; chi-square test	0.75

Drageset et al. (2013a)	227 older adults without cognitive impairment from 30 RACFs; ≥65 years	Cross-sectional, observational study; convenience sample of RACFs (Norway)	HADS-A (SR)	Chi-square test; ordinal logistic regression	0.90
Drageset et al. (2013b)	227 older adults without cognitive impairment from 30 RACFs; ≥65 years	Prospective, observational study (Norway)	HADS-A (SR)	Cox proportional hazards regression model	0.95

Table 1. Continued

Author(s) (year)	Participants	Design (location of sample)	Measure of anxiety (administration method)	Statistical test(s)	Quality rating
Hancock, Woods, Challis, and Orell (2006)	238 older adults with dementia from 24 RACFs; aged ≥60 years	Cross-sectional, observational study (United Kingdom)	RAID (SSI)	<i>t</i> -test	0.85
Haugan et al. (2013)	202 cognitively intact older adults from 44 RACFs; aged ≥65 years	Cross-sectional, observational study (Norway)	HADS-A (SR)	SEM	0.95
Haugan (2014)	202 cognitively intact older adults from 44 RACFs; aged ≥65 years	Cross-sectional, observational study; random sampling of RACFs (Norway)	HADS-A (SR)	Correlational analyses	0.95
Hoe et al. (2006)	238 older adults with dementia from 24 RACFs; aged ≥60 years	Cross-sectional, observational study; secondary analysis of data obtained from larger study (United Kingdom)	RAID (SSI)	Correlational analyses; multivariate regression	0.75

Junginger, Phelan, Cherry, and Levy (1993)	100 older adults from one RACF; aged ≥ 65 years	Cross-sectional, random sample of residents (USA)	SCID for DSM-III-R (SI)	Chi-square	0.75
Kamble, Chen, Sherer, and Aparasu (2009)	6103 older adults with dementia; aged ≥ 65 years	Cross-sectional, nationally representative study of RACFs and residents with dementia; stratified, two-stage probability study design; utilised data from the 2004 National Nursing Home Survey (USA)	MDS (CR)	Multiple logistic regression	0.95

Table 1. Continued

Author(s) (year)	Participants	Design (location of sample)	Measure of anxiety (administration method)	Statistical test(s)	Quality rating
Karkare, Bhattacharjee, Kamble, and Aparasu (2011)	13507 older adults from 1,174 RACFs; aged ≥ 65 years	Cross-sectional, nationally representative study of RACFs and residents; stratified, two-stage probability study design; utilised data from the 2004 National Nursing Home Survey (USA)	MDS (CR)	Multiple logistic regression	0.90

Keister (2006)	114 older adults from 11 RACFs; aged ≥65 years	Prospective study; convenience sampling of residents used; data from Time 1 used only (USA)	STAI (SR)	Hierarchical regression	0.80
Landi et al. (2015)	1490 older adults from 31 RACFs; aged ≥65 years	Prospective, observational study; secondary analysis of data from a larger, prospective cohort study (Italy)	MDS (CR)	Chi-square test; ANOVA	0.95
Lapane, Quilliam, Chow, and Kim (2012)	9952 older adults from 185 RACFs	Cross-sectional study; random sampling of residents used (USA)	MDS (CR)	Multiple logistic regression	0.95
Milliren (1977)	131 residents from one RACF	Cross-sectional study; secondary analysis of data (USA)	Mental Status Quotient (SI)	Chi-square test	0.75
Moreno, Solana, Rico, and Fernandez (2008-2009)	105 older adults from one RACF; aged ≥65 years)	Cross-sectional study (Spain)	Spanish version of Templer Death Anxiety Scale (SR)	ANOVA	0.85

Table 1. Continued

Author(s) (year)	Participants	Design (location of sample)	Measure of anxiety (administration method)	Statistical test(s)	Quality rating
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Mullins and Lopez (1982)	228 older adults from three RACFs; mean age = 75.18 years	Cross-sectional, comparative study of older (≥ 75 years) and younger (≤ 74 years) residents (USA)	Templer Death Anxiety Scale (SR)	Discriminant analysis	0.75
Neville and Teri (2011)	148 older adults from 19 RACFs; aged ≥ 69 years	Cross-sectional study; retrospective, secondary analysis of data (USA)	RAID (SSI)	Regression analysis	0.90
Nijk, Zuidema, and Koopmans (2009)	1322 older adults with dementia from 25 RACFs; aged 37-102 years	Cross-sectional (Netherlands)	NPI-NH (OS)	Logistic regression	0.95
Parmelee, Katz, and Lawton (1993)	994 older adults from one RACF and one independent living apartment; aged 61 – 102 years	Prospective study (USA)	Checklist of symptoms based on the SADS for DSM-III-R	Chi-square test; ANOVA	0.65
Prado-Jean et al. (2010)	319 older adults with dementia from 17 RACFs; aged ≥ 65 years	Cross-sectional study; random sample of RACFs (France)	NPI-NH (OS)	Student <i>t</i> -test; chi-square test	0.80
Sharaf and Ibrahim (2008)	208 older adults from all government and two private RACFs; aged ≥ 60 years	Cross-sectional study (Egypt)	STAI (SR)	<i>t</i> -test; ANOVA; Pearson correlation; stepwise multiple regression	0.90
Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005); Smalbrugge et al.	333 older adults from 14 RACFs; aged ≥ 55 years	Cross-sectional, observational study; secondary analysis of data obtained for AGED study (Netherlands)	SCAN (SSI)	Logistic regression	0.95

(2007)

Table 1. Continued

Author(s) (year)	Participants	Design (location of sample)	Measure of anxiety (administration method)	Statistical test(s)	Quality rating
Smalbrugge et al. (2006)	333 older adults from 14 RACFs; aged ≥ 55 years	Cross-sectional, observational study; secondary analysis of data obtained for AGED study (Netherlands)	SCAN (SSI)	Multilevel regression; ANOVA; chi-square test	0.95
Thomasma, Yeaworth, and McCabe (1990)	62 older adults from one RACF; aged ≥ 70 years	Quasi-experimental, time-series design (USA)	STAI (SR)	Pearson correlations; ANOVA	0.85
Van Almenkerk et al. (2015)	274 older adults who had had a stroke from 17 RACFs	Cross-sectional, observational study (Netherlands)	NPI (OS)	Multilevel analyses	0.95
Voyer, Verreault, Mengue, and Morin (2006)	2332 older adults from 28 RACFs; aged ≥ 65 years	Cross-sectional, observational study; secondary analysis of data (Canada)	Seven MOSES items (OS)	Logistic regression	0.85
Walid and Zaytseva (2009)	1492200 older adults from 1174 RACFs; aged ≥ 65 years	Cross-sectional, nationally representative study of RACFs and residents; stratified, two-stage probability study design; data from 2004 National Nursing Home Survey	Diagnosis of anxiety on file	Correlational analyses	0.60

(USA)

Zuidema, De Jonghe, Verhey, and Koopmans (2009)	1319 older adults from 26 RACFs; median age = 83 years	Cross-sectional, cohort study (Netherlands)	NPI-NH (OS)	Logistic regression	0.95
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RACFs, residential aged care facilities; HADS-A, Hospital Anxiety and Depression Scale – Anxiety Subscale; SR, self-report; ANOVA, Analysis of Variance; SADS, Social Avoidance and Distress Scale; DSM-III-R, Diagnostic and Statistical Manual – third edition – revised; SI, structured interview; POMS, Profile of Mood States; MDS, Minimum Data Set; SEM, structural equation modeling; CR, caregiver report; GA Scale, Generalized Anxiety Scale; HADS-A, Hospital Anxiety and Depression Scale – Anxiety Subscale; RAID, Rating Anxiety in Dementia Scale; SSI, semi-structured interview; SCID, Structured Clinical Interview for DSM-III-R; HARS, Hamilton Anxiety Rating Scale; STAI, State-Trait Anxiety Inventory; MMSE, Mini-Mental State Examination; NPI-NH, Neuropsychiatric Inventory – Nursing Home version; SADS, Schizophrenia and Affective Disorders Schedule; MMPI, Minnesota Multiphasic Personality Inventory; AGED study, Amsterdam Groningen Elderly Depression study; SCAN, Schedules for Clinical Assessment in Neuropsychiatry; MANOVA, multivariate analysis of variance; NPI, Neuropsychiatric Inventory; MOSES, Multidimensional Observation Scale for Elderly Subjects; OS, observational scale; GAS, Goldberg Anxiety Scale.

Table 2. Summary of Associations between Demographic Correlates and Anxiety in RACF Residents

Variable	Studies	Strength of evidence ^a	% of studies reporting association	Comment
Age (younger)	Baldacchino and Bonello (2013); Cheok et al. (1996); Drageset et al. (2013a); Moreno et al. (2008-2009); Mullins and Lopez (1982); Neville and Teri (2011); Parmelee et al. (1993); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005); Thomasma et al. (1990)	++	4/10 (40%)	Younger age was found to be significantly associated with anxiety.
Educational status	Baldacchino and Bonello (2013); Drageset et al. (2013b); Junginger et al. (1993); Moreno et al. (2008-2009); Mullins and Lopez (1982); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	++	3/7 (43%)	Higher educational level found to have a significant positive association with anxiety.
Gender (female)	Baldacchino and Bonello (2013); Cheok et al. (1996); Drageset et al. (2013b); Milliren (1977); Moreno et al. (2008-2009); Mullins and Lopez (1982); Neville and Teri (2011); Parmelee et al. (1993); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005); Zuidema et al. (2009)	+	2/11 (18%)	
Marital status	Baldacchino and Bonello (2013); Drageset et al. (2013b); Junginger et al. (1993); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	0	0/5 (0%)	
Children (yes/no)	Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	0	0/2 (0%)	

^a = strength of evidence determined using the following: + = positive association from at least one cross-sectional study; ++ = positive association from at least three cross-sectional studies; +++ = positive association from five or more cross-sectional studies; ++++ = positive association from at least one prospective study; - = negative association from at least one cross-sectional study; -- = negative association from at least three cross-sectional studies; --- = negative association from five or more cross-sectional studies; ---- = negative association from one prospective study; 0 = no association found.

Table 3. Summary of Associations between Biological/Health-Related Correlates and Anxiety in RACF Residents

Variable	Studies	Strength of evidence ^a	% of studies reporting association	Comment
Use of anticholinergic medication	Chatterjee et al. (2010); Landi et al. (2015)	++++	2/2 (100%)	
Pain	Casten et al. (1995); Lapane et al. (2012); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge et al. (2007); Smalbrugge, Pot, et al. (2005); Van Almenkerk et al. (2015); Walid and Zaytseva (2009)	+++	6/7 (86%)	
Cognitive functioning (higher)	Cheok et al. (1996); Neville and Teri (2011); Parmelee et al. (1993); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005); Zuidema et al. (2009)	++	3/6 (50%)	
Functional dependence/impairment	Keister (2006); Mullins and Lopez (1982); Parmelee et al. (1993); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005); Smalbrugge et al. (2006)	++	3/6 (50%)	
Use of antipsychotic medication	Kamble et al. (2009); Nijk et al. (2009)	+	1/2 (50%)	

Stroke	Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	+	1/2 (50%)	Experiencing a stroke was found to be significantly associated with higher anxiety symptoms but not subthreshold anxiety disorders.
Medical specialist consultations	Smalbrugge et al. (2006)	+	1/1 (100%)	
Number of medical diagnoses	Drageset et al. (2013b); Moreno et al. (2008-2009); Parmelee et al. (1993); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	+	2/5 (40%)	

Table 3. Continued

Variable	Studies	Strength of evidence^a	% of studies reporting association	Comment
Subjective health status	Moreno et al. (2008-2009); Mullins and Lopez (1982)	-	2/2 (100%)	Both studies found subjective health status to be significantly poorer in residents with higher levels of death anxiety.
Number of medications	Smalbrugge et al. (2006)	+	1/1 (100%)	One study (Karkare et al., 2011) reported that residents were significantly less likely to receive
Use of antidepressants or lithium	Cheek et al. (1996); Karkare et al. (2011); Nijk et al. (2009); Smalbrugge et al. (2006)	+/-	3/4 (75%)	

Impaired vision	Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	+	1/2 (50%)	antidepressants with a diagnosis of anxiety. The remaining two studies found anxiety to be positively associated with antidepressant use. Impaired vision was found to be significantly associated with higher anxiety symptoms but not subthreshold anxiety disorders.
Insomnia	Voyer et al. (2006)	+	1/1 (100%)	
Use of anxiolytics	Nijk et al. (2009); Smalbrugge et al. (2006)	0	0/2 (0%)	
Use of tranquilizers	Milliren (1977); Nijk et al. (2009)	0	0/2 (0%)	
COPD	Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	0	0/2 (0%)	
Impaired hearing	Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	0	0/2 (0%)	

COPD, chronic obstructive pulmonary disease.

^a = strength of evidence determined using the following: + = positive association from at least one cross-sectional study; ++ = positive association from at least three cross-sectional studies; +++ = positive association from five or more cross-sectional studies; ++++ = positive association from at least one prospective study; - = negative association from at least one cross-sectional study; -- = negative association from at least three cross-sectional studies; --- = negative association from five or more cross-sectional studies; ---- = negative association from one prospective study; 0 = no association found.

Table 4. Summary of Associations between Psychological/Emotional Correlates and Anxiety in RACF Residents

Variable	Studies	Strength of evidence ^a	% of studies reporting association	Comment
Depression	Cheok et al. (1996); Haugan et al. (2013); Moreno et al.	++++	7/7 (100%)	

	(2008-2009); Neville and Teri (2011); Parmelee et al. (1993); Prado-Jean et al. (2010); Smalbrugge, Pot, et al. (2005)				
Perceived quality of life (higher)	Almeida et al. (2012); Hoe et al. (2006);	----	2/3 (670%)		
External locus of control	Keister (2006)	++++	1/1 (100%)		
Fear of falling	Sharaf and Ibrahim (2008)	+	1/1 (100%)		Fear of falling significantly and positively correlated with trait and state anxiety.
Frequency of behavioral problems	Neville and Teri (2011)	+	1/1 (100%)		
Life events	Moreno et al. (2008-2009); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	+	2/4 (50%)		Experience of a negative life event in the past year was significantly associated with higher anxiety.
Intrapersonal self-transcendence (higher)	Haugan (2014)	-	1/1 (100%)		
Hope	Haugan (2014)	-	1/1 (100%)		
Meaning in life (increased purposefulness)	Haugan (2014)	-	1/1 (100%)		
Cognitive appraisal of situation	Keister (2006)	-	1/1 (100%)		The more challenging the older adult appraised relocation to a RACF, the less anxiety they experienced.
Wellbeing (higher)	Smalbrugge et al. (2006)	-	1/1 (100%)		
Interpersonal self-transcendence (higher)	Haugan (2014)	0	0/1 (0%)		

RACF, Residential aged care facility.

^a = strength of evidence determined using the following: + = positive association from at least one cross-sectional study; ++ = positive association from at least three cross-sectional studies; +++ = positive association from five or more cross-sectional studies; ++++ = positive association from at least one prospective study; - = negative association from at least one cross-sectional study; -- = negative association from at least three cross-sectional studies; --- = negative association from five or more cross-sectional studies; ---- = negative association from one prospective study; 0 = no association found.

Table 5. Summary of Associations between Social/Cultural Correlates and Anxiety in RACF Residents

Variable	Studies	Strength of evidence ^a	% of studies reporting association	Comment
Social support (subjective)	Keister (2006); Mullins and Lopez (1982); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	--	3/4 (75%)	
Social competence	Carstensen and Fremouw (1988)	-	1/1 (100%)	Lower objectively-rated social competence was significantly associated with higher anxiety.
Attachment Loneliness	Drageset et al. (2013a) Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005)	- 0	1/1 (100%) 0/2 (0%)	
Reassurance of worth from others	Drageset et al. (2013a)	0	0/1 (0%)	
Opportunity for nurturance (i.e., being responsible for the care of others)	Drageset et al. (2013a)	0	0/1 (0%)	
Religiousness	Moreno et al. (2008-2009)	0	0/1 (0%)	
Social integration	Drageset et al. (2013b)	0	0/1 (0%)	

RACF, Residential aged care facility.

^a = strength of evidence determined using the following: + = positive association from at least one cross-sectional study; ++ = positive association from at least three cross-sectional studies; +++ = positive association from five or more cross-sectional studies; ++++ = positive association from at least one prospective study; - = negative association from at least one cross-sectional study; -- = negative association from at least three cross-sectional studies; --- = negative association from five or more cross-sectional studies; ---- = negative association from one prospective study; 0 = no association found.

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Table 6. Summary of Associations between Physical Environment/Staff/Policy Correlates and Anxiety in RACF Residents

Variable	Studies	Strength of evidence ^a	% of studies reporting association	Comment
Type of residence	Thomasma et al. (1990)	++++	1/1 (100%)	Residents who relocated to dependent living were significantly more anxious than those who moved to independent living.
Length of time residing at RACF	Baldacchino and Bonello (2013); Drageset et al. (2013a); Mullins and Lopez (1982); Parmelee et al. (1993); Smalbrugge, Jongenelis, et al. (2005); Smalbrugge, Pot, et al. (2005); Thomasma et al. (1990)	+	1/7 (14%)	
Staff's reaction to behavioral issues (negative reaction)	Neville and Teri (2011)	+	1/1 (100%)	The more the behaviour bothered the staff, the more anxiety residents experienced.
Unmet needs	Hancock et al. (2006)	+	1/1 (100%)	Residents with clinical anxiety had significantly higher unmet needs compared to those without anxiety.
Perceived inadequacy of care	Smalbrugge, Pot, et al. (2005)	0	0/1 (0%)	
Staff's sense of competence, job satisfaction, age, and level of qualifications	Neville and Teri (2011)	0	0/1 (0%)	
Resident's decisional control in move to RACF	Keister (2006)	0	0/1 (0%)	

Residents' perceived nurse-patient interaction	Haugan et al. (2013)	-	0/1 (0%)	Residents' perceived nurse-patient interactions were indirectly associated with anxiety, mediated by the influence of depression.
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RACFs, Residential aged care facilities.

^a = strength of evidence determined using the following: + = positive association from at least one cross-sectional study; ++ = positive association from at least three cross-sectional studies; +++ = positive association from five or more cross-sectional studies; ++++ = positive association from at least one prospective study; - = negative association from at least one cross-sectional study; -- = negative association from at least three cross-sectional studies; --- = negative association from five or more cross-sectional studies; ---- = negative association from one prospective study; 0 = no association found.



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