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A systematic review of physical illness, functional disability, and suicidal behaviour among older adults

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Objectives: To conduct a systematic review of studies that examined associations between physical illness/functional disability and suicidal behaviour (including ideation, nonfatal and fatal suicidal behaviour) among individuals aged 65 and older.
Method: Articles published through November 2014 were identified through electronic searches using the ERIC, Google Scholar, PsycINFO, PubMed, and Scopus databases. Search terms used were suicid* or death wishes or deliberate self-harm. Studies about suicidal behaviour in individuals aged 65 and older with physical illness/functional disabilities were included in the review.
Results: Sixty-five articles (across 61 independent samples) met inclusion criteria. Results from 59 quantitative studies conducted in four continents suggest that suicidal behaviour is associated with functional disability and numerous specific conditions including malignant diseases, neurological disorders, pain, COPD, liver disease, male genital disorders, and arthritis/arthrosis. Six qualitative studies from three continents contextualized these findings, providing insights into the subjective experiences of suicidal individuals. Implications for interventions and future research are discussed.
Conclusion: Functional disability, as well as a number of specific physical illnesses, was shown to be associated with suicidal behaviour in older adults. We need to learn more about what at-risk, physically ill patients want, and need, to inform prevention efforts for older adults.

Keywords: death wishes; suicidal ideation; nonfatal suicidal behaviour; suicide; physical illness; functional disability

Introduction

Older adults have higher rates of suicide than younger age groups in most countries that report mortality data to the World Health Organization (Värnik, 2012), with those 85–90 years old constituting the age group with the highest rates (Shah, Bhat, Zarate-Escudero, De Leo, & Erlangsen, 2015). According to the US data, for each suicide in the general population, there are 25 episodes of nonfatal suicidal behaviour. This ratio approaches 1:4 in older adults (Drapeau & McIntosh, for the American Association of Suicidology, 2015).

Physical illness and functional disability are common in late life and may lead to loss of autonomy, isolation, pain, increased burden on social networks, and the development of depression. Older adults who die by suicide often consult their physicians within weeks of their death (Ahmedani et al., 2014; Innamorati et al., 2014). Physical ailments are often the focus of these visits, and mental distress and suicidal feelings are often unaddressed (Waern, Beskow, Runeson, & Skoog, 1999).

Although prior reviews have considered the role of physical illness and functional disability (Conwell, van Orden, & Caine, 2011; O'Connell, Chin, Cunningham, & Lawlor, 2004), no systematic review has explicitly studied this in older adults. We aimed to systematically review the evidence of a relationship between physical illness and functional disability and (1) death wishes, (2) suicidal ideation, (3) nonfatal suicidal behaviour, and (4) suicide in older adults (age 65 and older). The following questions were addressed:

(1) Which physical conditions are associated with death wishes, suicidal ideation, nonfatal suicidal behaviour, and/or suicide in older adults?
(2) What are the implications for the prevention of suicidal behaviour in older adults?
(3) What areas are in need of research?

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Methods

Guidelines from the Cochrane Collaboration were used (Higgins, Green, & Cochrane Collaboration., 2008). Eligibility criteria included (1) peer-reviewed publication in English, (2) focused on persons >64 years of age, (3) examined (a) death wishes, suicidal ideation, nonfatal suicidal behaviour/self-harm, or suicide, and (b) an indicator of physical health. Studies focusing on cognitive disorders, including dementia, were excluded as these were considered mental disorders in accordance with the DSM IV/ICD 10 diagnostic systems. Quantitative studies that lacked relevant comparison groups were also excluded.

Studies were identified through electronic searches using the ERIC, Google Scholar, PsycINFO, PubMed, and Scopus databases. Search terms used were suicid* or death wishes or deliberate self-harm. No search terms relating to physical health were applied. All publication years were considered. Carried out during October−November 2014, the combined searches yielded 31,985 references. If a title or an abstract appeared to describe a study that included older persons, physical illness/functional disability, and suicidal behaviour, the full article was retrieved and examined for relevance. The authors also found several studies not obtained through the search. A total of 65 articles (based on 61 samples) met the inclusion criteria. These studies were subsequently classified as population-based, register-based, clinical cohort, or post-mortem.

Results

Tables 1−4 provide details regarding the quantitative studies.

Physical illness

Population and register studies

Thirteen population-based studies were retrieved. Associations between physical illness and death wishes were observed in a Canadian study (Lapierre et al., 2015) and in one that utilized pooled data from 11 European countries (Fässberg et al., 2014). In population studies from Sweden (Fässberg, Östling, Börjesson-Hanson, Skoog, & Waern, 2013; Skoog et al., 1996) and Italy (Scocco, Meneghel, Caon, Dello Buono, & De Leo, 2001), questions regarding suicidal feelings also encompassed life-weariness and death wishes (Paykel, Myers, Lindenthal, & Tanner, 1974). Two (Scocco et al., 2001; Skoog et al., 1996) of the three studies reported associations of suicidal feelings with physical illness. Associations between physical illness and suicidal ideation did not persist in multivariate models in Taiwanese (Yen et al., 2005) and South Korean (Kang et al., 2014) studies.

Studies focusing on associations between physical illness and suicide mortality also showed mixed results. No association was found between the number of chronic illnesses and suicide in a US population-based study (Turvey et al., 2002). Having any of nine specific physical illnesses was not associated with suicide in a register study conducted in the United States (Miller, Mogun, Azrael, Hempstead, & Solomon, 2008), but having been hospitalized on a medical ward during the past two years was associated with increased risk of suicide in a Danish register study (Erlangsen, Vach, & Jeune, 2005).

Clinical studies

Medical comorbidity was associated with suicidal ideation in a US-based study of homecare recipients (Raue, Meyers, Rowe, Heo, & Bruce, 2007), but no association was found between medical conditions and suicidal thinking in Singaporean patients with depressive symptoms (Tan & Wong, 2008). Total illness burden was greater in US primary care patients with suicidal ideation, as compared to those without suicidal ideation (Hirsch, Duberstein, Chapman, & Lyness, 2007). A similar result was found among psychiatric inpatients in Israel who had engaged in nonfatal suicidal behaviour prior to hospitalization (Levy, Barak, Sigler, & Aizenberg, 2011).

Post-mortem studies

Three psychological autopsy studies examined the relationship between physical illness and suicide. Having any serious physical condition, as rated by the Cumulative Illness Rating Scale-Geriatrics (CIRS-G), associated strongly with suicide in a study conducted in Sweden, and the relationship remained after adjusting for depression (Waern et al., 2002). Associations between the number of physical illnesses and both nonfatal suicidal behaviour and suicide were shown in a Hong Kong-based study (Tsoh et al., 2005). Increased odds of suicide were found among older adults with one and two physical illnesses in a Chinese study (Jia, Wang, Xu, Dai, & Qin, 2014).

Subjective health

Population studies

In studies from four continents, poorer self-rated health was associated with wish to die (Jorm et al., 1995; Lapierre et al., 2015), death wishes/suicidal ideation/nonfatal suicidal behaviour (Barnow, Linden, & Freyberger, 2004), suicidal ideation (Chan, Liu, Chau, & Chang, 2011), remote suicidal feelings (Scocco et al., 2001), and suicide (Turvey et al., 2002). Poor subjective health was associated with current suicidal ideation in a Japanese study (Awata et al., 2005), but results did not remain in the multivariate model. No relationship was observed between poor perceived health and suicidal feelings among Swedish 97-year-olds without dementia (Fässberg et al., 2013), nor was an association found between poor/very poor self-rated health and past year suicidal ideation among community dwelling older adults in South Korea (Park, 2014).

Functional disability

Population studies

Eleven studies were retrieved. Associations between functional disabilities and death wishes were found in an

Table 1. Population-based studies.

Authors, year, country	Physical factor (measure of physical factor)	Sample[a] *N* and % women Outcome and *n*	Strength of association
Awata et al., 2005 Japan	Number of physical illnesses (clinical history) Subjective health (self-report) Physical functioning (SF-36) (McHorney, War Jr, Lu, & Sherbourne, 1994) Instrumental activities of living (Rouken−Shiki scale) (Koyano, 1987) Pain (self-report)	Community dwellers 70+. *N* = 1145 (58% women) Current suicidal ideation *n* = 52	Two−three physical illnesses: Univariate model: OR = 1.5 (CI[b] 0.7−3.5); Multivariate model: OR = 1.6 (CI 0.7−3.8) ≥4 physical illnesses: Univariate model: OR = 2.5 (CI 1.1−5.6); Multivariate model: OR = 1.5 (CI 0.6−3.4) Unhealthy subjective health: Univariate model: OR = 3.3 (CI 1.9−6.0); Multivariate model: OR = 1.3 (CI 0.7−2.5) Impaired physical functioning: Univariate model: OR = 2.2 (CI 1.2−3.8); Multivariate model: OR = 1.0 (CI 0.5−1.8) Impaired instrumental activities of living: Univariate model: OR = 4.3 (CI 2.3−7.9); Multivariate model: OR = 2.0 (CI 1.0−3.9) Pain (mild to severe): Univariate model: OR = 2.9 (CI 1.6−5.2); Multivariate model: OR = 1.9 (CI 1.0−3.5)
Barnow et al., 2004 Germany	Physical health (1 = poor to 5 = very good) Self-rated health (1 = poor to 5 = very good) ADL score (Katz, Downs, Cash, & Grotz, 1970) Requiring help with ADL (Katz et al., 1970)	Representative population-based sample including institutionalized persons 70+. *N* = 516 (44% women) Wish to die and/or suicidal ideation/suicide attempts *n* = 54	Physical health: Death wishes/suicidal thoughts/attempts: B = −0.046, S.E. = 0.450, Wald = 0.01, *p* = NS, Exp (B) = 0.96; Suicidal thoughts/attempts: B = −1.43, S.E. = 1.20, Wald = 1.42, *p* = NS, Exp (B) = 0.24 Poor self-rated health: Death wishes/suicidal thoughts/attempts: $\chi 2 = 28.9$, *p* = <0.01; Suicidal thoughts/attempts: $\chi 2 = 13.3$, *p* = <0.05 ADL score: Death wishes/suicidal thoughts/attempts: B = −0.910, S.E. = 0.772, Wald = 1.39, *p* = NS, Exp (B) = 2.49; Suicidal thoughts/attempts:B = 0.320, S.E. = 1.24, Wald = 0.66, *p* = NS, Exp (B) = 1.38 Requiring help with ADL: Death wishes/suicidal thoughts/attempts: $\chi 2 = 24.1$, *p* = <0.01; Suicidal thoughts/attempts: $\chi 2 = 6.9$, *p* = NS
Chan et al., 2011 Taiwan	Perceived health Disability Heart disease Hypertension Eleven self-reported physical conditions	Community dwellers. *N* = 3596 (47% women) Past week suicidal ideation *n* = 218	Fair perceived health: OR = 1.33 (CI 0.58−3.05) Good perceived health: OR = 0.71 (CI 0.27−1.85) Bad perceived health: OR = 3.34 (CI 1.48−7.51) Very bad perceived health: OR = 12.42 (CI 5.19−29.76) Disability: OR = 2.87 (CI 2.00−4.13) Heart disease: Univariate: OR = 2.03 (CI 1.46−2.80); Multivariate: Beta = 0.49, OR = 1.63 (CI 1.06−2.49) Hypertension: OR = 1.36 (CI 0.99−1.85) Asthma: OR = 2.84 (CI 1.76−4.58) Renal disease: OR = 1.45 (CI 0.90−2.33) Diabetes: OR = 1.58 (CI 1.09−2.29) Hyperlipidemia: OR = 0.99 (CI 0.66−1.47) Stroke: OR = 1.28 (CI 0.73−2.24) Headache: OR = 2.47 (CI 1.81−3.39) Joint pain: OR = 2.07 (CI 1.51−2.82) Neck pain: OR = 2.37 (CI 1.71−3.29) Lower back pain: OR = 2.51 (CI 1.94−3.43) Sciatica: OR = 1.94 (CI 1.36−2.77) Osteoporosis: OR = 1.90 (CI 1.38−2.62)

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Table 1. (*Continued*)

Authors, year, country	Physical factor (measure of physical factor)	Sample[a] *N* and % women Outcome and *n*	Strength of association
Forsell et al., 1997 Sweden	Physician coded daily living activities and visual problems	Representative population-based sample including institutionalized persons aged 75+. $N = 969$ (77% women) Past two week suicidal thoughts $n = 129$	Impaired daily living activities: $F = 18.6$, df = 3964, $p < 0.001$ Visual problems: $F = 6.9$, df = 3963, $p < 0.001$
Forsell, 2000 Sweden	Disability (Katz et al., 1970)	Representative population-based sample including institutionalized persons aged 75+. $N = 964$[c] Death wishes $n = 128$ (baseline)	Disability: Baseline: OR = 3.2 (CI 0.9−5.6); Follow-up: OR = 1.8 (CI 0.8−2.8); Persistent and remittent: NS
Fässberg et al., 2013 Sweden	Perceived health (self-report) Motor function score (Gottfries-Bråne-Steen scale (Gottfries, Bråne, Gullberg, & Steen, 1982) Vision impairment (impeding examination) Hearing impairment (impeding examination) Stroke/TIA (self-report/close-informant interview/The Swedish Hospital Discharge register) Aches and pains (Comprehensive Psychopathological Rating Scale) (Åsberg, Montgomery, Perris, Schalling, & Sedvall, 1978)	Representative population-based sample including institutionalized persons aged 97 years. $N = 269$ (73 % women) Past month suicidal feelings $n = 31$	Poor perceived health: Suicidal feelings: 23.1 % vs. no suicidal feelings: 12.9%, $p = 0.270$ Functional disability: Suicidal feelings: 5.0% vs. no suicidal feelings: 3.8% (CI −3.23−0.80), $p = 0.236$ Vision impairment: Suicidal feelings: 25.8% vs. no suicidal feelings: 29.0%, $p = 0.447$ Hearing impairment: Suicidal feelings: 33.3% vs. no suicidal feelings: 37.0%, $p = 0.431$ Stroke/TIA: Suicidal feelings: 22.6% vs. no suicidal feelings: 15.5%, $p = 0.224$ Aches and pains: OR = 2.17 (CI 0.89−5.16)
Fässberg et al., 2014 Multisite, Europe	Number of chronic conditions Functional disability (trichotomized at site)	Representative population-based sample including institutionalized persons. $N = 15{,}890$ (59% women) Death wishes $n = 976$	One chronic condition: Multivariate model: OR = 1.324 (CI 1.051−1.669); Multivariate model (including depression symptom score): OR = 1.210 (CI 0.957−1.530) Two or more chronic conditions: Multivariate model: OR = 1.795 (CI 1.374−2.343); Multivariate model (including depression symptom score): OR = 1.459 (CI 1.110−1.917) Intermediate functional disability: Multivariate model: OR 1.89 (CI 1.42−2.52); Multivariate model (including depression symptom score): OR = 1.60 (CI 1.19−2.14) High functional disability: Multivariate model: OR = 3.22 (CI 2.34−4.42); Multivariate model (including depression symptom score): OR = 2.43 (CI 1.76−3.36)
Jeon et al., 2007 Korea	Number of physical illnesses (clinical history) Perceived health (self-rated)	Community dwellers. $N = 930$ (60% women) Past year suicidal ideation $n = 258$	1−2 physical illnesses: Men: OR = 3.27 (CI 1.09−9.78); Women: OR = 1.21 (CI 0.51-2.88) 3+ physical illnesses: Men: OR = 5.01 (CI 1.55−16.11); Women: OR = 2.06 (0.86−4.91) Unhealthy perceived health: Men: OR = 2.19 (CI 0.98−4.87); Women: OR = 2.12 (CI 1.09−4.14)

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Table 1. (*Continued*)

Authors, year, country	Physical factor (measure of physical factor)	Sample[a] *N* and % women Outcome and *n*	Strength of association
Jorm et al., 1995 Australia	Self-rated health Disability (in any of eight specified functions) Vision impairment (rated by interviewer) Hearing impairment (rated by interviewer) Pain (self-report fairly frequently constantly)	Representative population-based sample including institutionalized persons aged 70+. *N* = 923 (48% women) Past two weeks wish to die *n* = 21	Poor self-rated health: Model 1: OR = 12.7 (CI 4.7−34.3); Model 2: OR = 4.1 (CI 1.3−13.2) Disability: Model 1: OR = 5.9 (CI 2.1−16.4); Model 2: OR = 3.8 (CI 1.3−11.2) Vision impairment: Model 1: OR = 14.6 (CI 5.7−37.3); Model 2: OR = 9.4 (CI 3.4−26.0) Hearing impairment: Model 1: OR = 5.6 (CI 2.3−13.9); Model 2: OR = 5.5 (CI 2.1−14.5) Pain: Model 1: OR = 5.2 (CI 2.2−12.5); Model 2: OR = 2.7 (CI 1.1−7.0)
Kang et al., 2014 South Korea	Number of chronic medical illness (list of 11 common) (Lindesay, 1990) Chronic medical illness (severer) Disabled (WHODAS) (Üstün, 2010) Pain (Self-report)	Community dwellers. *N* = 1204 (62% women) Past month suicidal ideation *n* = 138	1 chronic medical illness: Prevalence: OR = 2.61 (CI 1.05−6.51); Incidence: OR = 0.70 (CI 0.30−1.60); Persistence: NA 2-3 chronic medical illnesses: Prevalence: OR = 4.15 (CI 1.75−9.83); Incidence: OR = 0.89 (CI 0.42−1.91); Persistence: NA 4+ chronic medical illnesses: Prevalence: OR = 6.75 (CI 2.82−16.19); Incidence: OR = 2.41(CI 1.14−5.11); Persistence: NA Chronic medical illness (severer): Prevalence: OR = 1.01 (CI 0.78−1.30); Incidence: OR = 1.16 (CI 0.87−1.56); Persistence: NA Disabled: Model 1: Prevalence: OR = 4.70 (CI 2.70−8.20); Incidence: OR = 1.29 (CI 0.77−2.16) Persistence: OR = 0.50 (CI 0.13−1.88); Model 2: Prevalence: OR = 2.42 (CI 1.31−4.47); Incidence: NA; Persistence: NA Mild pain: Prevalence: OR = 2.01 (CI 1.24−25); Incidence: OR = 1.82 (CI 1.02−3.25); Persistence: OR = 0.66 (CI 0.22−1.99) Moderate pain: Prevalence: OR = 4.41 (CI 2.79−6.96). Incidence: OR = 2.93 (CI 1.60−5.35); Persistence: OR = 0.72 (CI 0.25−2.02) Severe pain: Prevalence: OR = 1.47 (CI 1.12−1.93); Incidence: OR = 1.41 (CI 1.00−1.99); Persistence: NA
Kim et al., 2014 South Korea	Cholesterol measures Hypertension (self-reported diagnosis of and treatment history) Triglycerides Diabetes (self-reported diagnosis of and treatment history)	Community dwellers. *N* = 732 (59 % women) Past month suicidal ideation *n* = 93	Total cholesterol, mean (SD) mg/dl: No SI: 173.6 (33.3); SI: 187.1 (37.6), $p < .001$ High density lipoprotein cholesterol, mean (SD) mg/dl: No SI: 48.2 (13.6); SI: 46.9 (12.8), $p = 0.384$ Low density lipoprotein cholesterol, mean (SD) mg/dl: No SI: 95.5 (30.0); SI: 110.0 (32.6), $p < .001$ Hypertension, *N* (%): No SI: 200 (31.3); SI: 34 (36.6), $p = 0.309$ Triglycerides, mean (SD) mg/dl: No SI: 151.8 (82.0); SI: 155.3 (80.3), $p = 0.696$ Diabetes, *N* (%): No SI: 68 (10.6); SI: 14 (15.1), $p = 0.207$
Lapierre et al., 2012 Canada	Kidney/urinary problem	Community dwellers. *N* = 2777 (59% women) Past year wish to die *n* = 163	Kidney/urinary problem: Wish to die: 22.7% vs. no wish to die: 15.5%, $\chi^2 = 5.84$, $p = 0.05$

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Table 1. (*Continued*)

Authors, year, country	Physical factor (measure of physical factor)	Sample[a] *N* and % women Outcome and *n*	Strength of association
Lapierre et al., 2015 Canada	Number of chronic diseases Negative perception of own health [participants rated their own health by comparing it to people their own age (1 − excellent to 5 − bad)] Visual problem (glaucoma cataract) List of 15 self-reported chronic conditions	Community dwellers $N = 2811$ (70% women) Past year wish to die $n = 145$	Higher number of chronic diseases: Wish to die: Mean 4.36 (SD 2.12) vs. no wish to die: mean 3.22 (SD 2.11), p .001 Negative perception of own health: Wish to die: Mean 2.99 (SD 1.05) vs. no wish to die: mean 2.44 (SD 1.01), p .001 Visual problem (glaucoma cataract): Wish to die: 41.4% vs. no wish to die: 31.9%, $p = .017$; OR = 1.15 (CI 0.81−1.64) Heart problem: Wish to die: 31.0% vs. no wish to die: 27.6%, $p = 0.362$ Cholesterol: Wish to die: 42.8% vs. no wish to die: 38.6%, $p = 0.315$ High blood pressure: Wish to die: 53.1% vs. no wish to die: 52.8%, $p = 0.936$ Respiratory problem: Wish to die: 27.6% vs. no wish to die: 14.0%, $p = 0.001$; Model 1: OR = 1.85 (CI 1.24−2.75); Model 2: OR = 1.53 (CI 0.99−2.37) Digestive problems: Wish to die: 27.6% vs. no wish to die: 16.4%, $p = 0.001$; OR = 1.46 (CI 0.98−2.17) Liver problem: Wish to die: 4.8% vs. no wish to die: 2.5%, $p = 0.090$ Urinary/prostate problem: Wish to die: 21.4 % vs. no wish to die: 12.9 %, $p = 0.003$; Model 1: OR = 1.76 (CI 1.13−2.74); Model 2: OR = 1.85 (CI 1.14−3.01) Anaemia: Wish to die: 6.2% vs. no wish to die: 5.2%, $p = 0.603$ Diabetes: Wish to die: 15.2 % vs. no wish to die: 15.5%, $p = 0.928$ Endocrine problem: Wish to die: 26.9% vs. no wish to die: 19.9%, $p = 0.042$; OR = 1.27 (CI 0.85−1.89) Skin problem: Wish to die: 20.3% vs. no wish to die: 12.3 %, $p = 0.005$; OR = 1.46 (CI 0.94−2.25) Migraine/headaches: Wish to die: 13.8% vs. no wish to die: 6.6%, $p = .001$; OR = 1.57 (CI 0.93−2.64) Arthritis/rheumatism: Wish to die: 57.9% vs. no wish to die: 37.2%, $p = 0.001$; Model 1: OR = 1.72 (CI 1.19−2.48); Model 2: OR = 1.64 (CI 1.11−2.40) Back problem: Wish to die: 39.3% vs. no wish to die: 22.7%, $p = 0.001$; OR = 1.34 (CI 0.91−1.96)
Lee et al., 2013 South Korea	Functional limitations (single question)	Community dwellers. $N = 1343$[c] Past year suicidal ideation $n = 309$	Functional limitations: OR = 2.515 (CI 1.875-3.375)
Park, 2014 Korea	Fair self-rated health Poor/very poor self-rated health Limitations in daily living Three self-reported specific physical conditions	Community dwellers. $N = 1743$ (58% women) Past year suicidal ideation $n = 481$	Fair self-rated health: Older adults total: OR = 0.95 (CI 0.65−1.37); Older adults living alone: OR = 1.24 (CI 0.65−2.81); Older adults living with others: OR = 0.85 (CI 0.55−1.32) Poor/very poor self-rated health: Older adults total: OR = 1.23 (CI 0.89−1.72); Older adults living alone: OR = 0.92 (CI 0.41−2.04); Older adults living with others: OR = 1.32 (CI 0.91−1.92) Limitations in daily living: Older adults total: OR = 2.10 (CI 1.58−2.78); Older adults living alone: OR = 3.17 (CI 1.70−5.92); Older adults living with others: OR = 1.89 (CI 1.36−2.63)

(*continued*)

Table 1. (*Continued*)

Authors, year, country	Physical factor (measure of physical factor)	Sample[a] *N* and % women Outcome and *n*	Strength of association
			Ischaemic heart disease: Older adults total: OR = 1.45 (CI 0.82−2.55); Older adults living alone: OR = 0.73 (CI 0.19−2.78); Older adults living with others: OR = 1.67 (CI 0.89−3.14) Stroke: Older adults total: OR = 2.01 (CI 1.21−3.33); Older adults living alone: OR = 4.11 (CI 1.20−14.01); Older adults living with others: OR = 1.73 (CI 0.98−3.09) Cancer: Older adults total: OR = 1.12 (CI 0.68−1.84); Older adults living alone: OR = 0.55 (CI 0.16−1.89); Older adults living with others: OR = 1.17 (CI 0.68−2.02)
Rasic, Belik, Bolton, Chochinov, & Sareen, 2008 Canada	Cancer	Community dwellers aged 75+. *N* = 3621[c] Past year suicidal ideation *n* = 52	Cancer: Model 1: OR = 1.41 (CI 0.36−5.50); Model 2: OR = 1.79 (CI 0.45−7.16); Model 3: OR = 1.79 (CI 0.49−6.53)
Saias, Beck, Bodard, Guignard, & du Roscoat, 2012 Multisite, Europe	Long-term illness (single question) Material support (requiring assistance with personal hygiene, household or paperwork)	Community dwellers. *N* = 11,440 (59% women) Past month death ideation *n* = 1169	Long-term illness: OR = 1.28 (CI 1.07−1.53) Received material support in the last 12 months: OR = 1.12 (CI 0.94−1.33)
Scocco et al., 2001 Italy	Somatic pathology Subjective health (self report) Painful symptoms (D De Leo et al., 1991)	Community dwellers. *N* = 611 (63% women) Remote suicidal feelings *n* = 56 Recent suicidal feelings *n* = 40	At least one somatic pathology: Recent suicidal feelings: 90% vs. no suicidal feelings: 73%, $\chi^2 = 5.30$, 0.023; Remote suicidal feelings: NS Poor subjective health: Remote suicidal feelings: 12% vs. no suicidal feelings: 3%, $\chi^2 = 16.09$, $p = <0.001$; Logistic regression analysis: OR = 2.4, $p = <0.001$ Mean number of painful symptoms: Remote suicidal feelings: mean 2.1 vs. no suicidal feelings: mean 1.5, $t = 3.01$, $p = <0.005$ Mean number of painful symptoms: Recent suicidal feelings: mean 2.2 vs. no suicidal feelings: mean 1.5, $t = 2.37$, $p = <0.03$
Skoog et al., 1996 Sweden	3 or more physical disorders 2 self-reported specific physical conditions	Representative population-based sample including institutionalized persons aged 85 years. *N* = 345 (70% women) Past month suicidal feelings *n* = 55	Three or more physical disorders: OR = 2.5 (CI 1.3−4.6) Myocardial infarction: OR = 2.7 (CI 1.2−6.4) Peptic ulcer: OR = 3.0 (CI 1.4−6.2)
Turvey et al., 2002 USA	Total number of chronic illnesses Perceived health Functional impairment Physical impairment (Katz et al., 1970; Nagi, 1976; Rosow & Breslau, 1966) Heart attack Diabetes	Community dwellers aged 67+. *N* = 420[c] Suicide *n* = 20	Total number of chronic illnesses: OR = 1.51 (CI 0.97−2.27) Poor perceived health: OR = 3.36 (CI 1.21−10.16) Marked impairment: OR = 0.35 (CI 0.00−2.38) Mild functional impairment: OR = 0.92 (CI 0.32−2.83) Physical impairment (Rosow and Breslow): OR = 1.33 (CI 0.83−2.09) Physical impairment (Katz): OR = 0.38 (CI 0.00−1.18) Physical impairment (Nagi Scale): OR = 1.03 (CI 0.87−1.21)

(*continued*)

Table 1. (*Continued*)

Authors, year, country	Physical factor (measure of physical factor)	Sample[a] *N* and % women Outcome and *n*	Strength of association
	Four self-reported specific physical conditions		Heart attack: OR = 1.78 (CI 0.55−5.12) Diabetes: OR = 1.24 (CI 0.29−4.02) Stroke: OR = 0.30 (CI 0.00−1.80) Hip fracture: OR = 1.45 (CI 0.03−10.40) Fracture since age 50: OR = 3.39 (CI 1.16−9.40) Cancer: OR = 2.51 (CI 0.74−7.49)
Yamauchi et al., 2014a Japan	Stroke	Dwellers in 12 public health centre areas, data linkage with Regional Stroke Registry and mortality data. *N* = 7681[c] Suicide *n* = 35	Stroke: Univariable: RR[d] = 2.8[e]; Multivariable-adjusted: RR = 2.7 (CI 0.8−9.1)
Yamauchi et al., 2014b Japan	Cancer	Dwellers in 12 public health centre areas, data linkage with cancer registry and mortality data. *N* = 102,843[f,c] Suicide *n* = 42	Cancer: Unadjusted: RR[d] = 1.2[e]; Adjusted: RR = 1.2 (CI 0.4−3.8)
Yen et al., 2005 Taiwan	Physical illness	Community dwellers. *N* = 897 (45% women) Past week suicidal ideation *n* = 147	Physical illness: SI: 77.6 % vs. no SI: 62.3 %, X^2: 12.66, <0.001; OR = 0.83 (CI 0.51−1.36)

Note: [a]Study participants are aged 65 and above unless otherwise specified.
[b]95 % for all studies.
[c]% women not shown.
[d]Risk ratio.
[e]95 % CI not shown.
[f]Number for all study participants, not only 65+.

Table 2. Register-based studies.

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
Ahn et al., 2010 Korea	Cancer (Korea Central Cancer Registry)	1993–2005	Patients aged 80+. Comparison respondents from general population. *N* = 32,044[b] Suicide *n* = 67	Cancer: SMR = 1.46 (CI[c] 1.15–1.85)
Allebeck et al., 1989 Sweden	Cancer (Swedish Cancer-Environment Register)	1961–1979	Cancer patients aged 70+. Comparison respondents from general population. *N* = 424,127[d, b] Suicide *n* = 398	Cancer: Men: 70–79: SMR = 1.9 (CI 1.7–2.2); 80+: SMR = 1.7 (CI 1.4–2.0); Women: 70–79: SMR = 2.0 (CI 1.6–2.5); 80+: SMR = 1.5 (CI 0.9–2.3)
Allebeck & Bolund, 1991 Sweden	Cancer (Stockholm County In-patient Care Register)	1975–1985	Cancer patients 70+. Comparison respondents from general population. *N* = 59,845[d, b] Suicide attempt *n* = 58	Cancer: Men: 70–79: SMR = 1.0 (CI 0.6–1.6); 80–89: SMR = 2.7 (CI 1.6–4.5); Women: 70–79: SMR = 1.5 (CI 0.9–2.4); 80–89: SMR = 1.3 (CI 0.6–2.6)
Allebeck & Bolund, 1991 Sweden	Cancer (Stockholm County In-patient Care Register)	1975–1985	Cancer patients 70+. Comparison respondents from general population. *N* = 59,845[d, b] Suicide *n* = 70	Cancer: Men: 70–79: SMR = 2.5 (CI 1.7–3.6); 80–89: SMR = 2.6 (CI 1.5–4.3); Women: 70–79: SMR = 4.5 (CI 2.8–6.7); 80–89: SMR = 1.3 (CI 0.3–3.8)
Björkenstam, Edberg, Ayoubi, & Rosen, 2005 Sweden	Cancer (Malignant) (Swedish Cancer Registry)	1965–1999	Cancer patients 75+. Comparison respondents from general population. *N* = 1,031,919[d, b] Suicide *n* = 2112[d]	Cancer (Malignant): Findings for 1965–1979: Men: 75–89: *Re* = 2.4 (CI 2.0–2.9); 90+: *R* = 2.0 (CI 0.4–5.9); Women: 75–89: *R* = 2.4 (CI 1.5–3.5); 90+: –; Findings for 1975–1989: Men: 75-89: R = 2.1 (CI 1.8–2.5); 90+: *R* = 1.7 (CI 0.5–3.9); Women: 75-89: *R* = 2.4 (CI 1.8–3.1); 90+: R = 4.3 (CI 1.2–10.9); Findings for 1985–1999: Men: 75–89: R = 2.3 (CI 2.0–2.6); 90+: *R* = 2.9 (CI 1.7–4.6); Women: 75–89: *R* = 2.1 (CI 1.6–2.7); 90+: *R* = 1.4 (CI 0.2–5.2)
Carlsson et al., 2013 Sweden	Prostate cancer (Prostate Cancer Data Base Sweden)	1997–2009	Prostate cancer patients. Comparison respondents from general population. *N* = 77,539 Suicide *n* = 160	Prostate cancer: 0–6 months after diagnosis: 65–74: RR[f] = 6.9 (CI 2.8–17); 75+: RR = 7.8 (CI 3.7–16); 6-18 months after diagnosis: 65-74: RR = 2.0 (CI 1.1–3.6); 75+: RR = 2.0 (CI 1.2–3.4); >18 months after diagnosis: 65–74: RR = 1.1 (CI 0.82–1.6); 75+: RR = 1.4 (CI 1.0–1.8); Diagnosed at some point: 65–74: RR = 1.5 (CI 1.1–1.9); 75: RR = 1.7 (CI 1.4–2.2)
Crocetti et al., 1998 Italy	Cancer (Tuscany Cancer Registry)	1985–1989	Cancer patients. Comparison respondents from general population. *N* = 27,123[d, b] Suicide *n* = 31	Cancer: 65–74: SMR = 2.98 ($p = <0.001$); 75+: SMR = 1.85 ($p = <0.05$)
Dormer et al., 2008 Australia	Cancer (Western Australian Cancer Registry)	1981–2002	Cancer patients (excl. nonmelanoma skin cancer) aged 70+. Comparison respondents from general population. *N* = 121,533 [d, b] Suicide *n* = 59	Cancer: 70–79: SMR = 1.58 (CI 1.13–2.21); 80+: SMR = 1.89 (CI 1.28–2.80)
Erlangsen et al., 2005 Denmark	Hospitalization within past 2 years (National Registry of Patients)	1996–1998	Persons 65+ hospitalized for somatic disorders. Comparison respondents from general population. *N* = 1,684,205[d, b] Suicide *n* = 661	Hospitalized vs. not hospitalized: Men: 65–79: RR[f] = 3.3 (CI 2.7–4.0) vs. RR = 1.0 (CI 0.8–1.3); 80+: RR = 5.1 (CI 3.9–6.5) vs. RR = 2.6 (CI 2.0–3.4); Women: 65–79: RR = 3.4 (CI 2.5–4.5) vs. RR = 1.0 (CI 0.7–1.3); 80+: RR = 3.8 (CI 2.7–5.4) vs. RR = 1.0 (CI 0.6–1.6)

(*continued*)

Table 2. (*Continued*)

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
Erlangsen et al., 2015 Denmark	Thirty-four specific physical conditions (National Registry of Patients)	1990–2009	Persons diagnosed with physical disorder at hospital during past 3 years[g]. Comparison respondents from general population. *N* = 1,849,110 (55% women) Suicide *n* = 4792	Glaucoma: Men: Unadjusted: RR[e] = 1.16 (CI 0.67-2.00); Women: Diagnosed within 3 years: Unadjusted: RR = 1.87 (CI 1.13–3.11); Adjusted: RR = 1.86 (CI 1.12–3.10); Multivariate: RR = 1.75 (CI 1.05–2.91) Cataract: Men: Diagnosed within 3 years: Unadjusted: RR = 1.12 (CI 0.94–1.33); Adjusted: RR = 1.55 (CI 1.37–1.75); Multivariate: RR = 1.37 (CI 1.21–1.54); Women: Diagnosed within 3 years: Unadjusted: RR = 1.02 (CI 0.84–1.24); Adjusted: RR = 2.06 (CI 1.77–2.40); Multivariate: RR = 1.64 (CI 1.41–1.91) Hearing loss: Men: Diagnosed within 3 years: Unadjusted: RR = 0.90 (CI 0.77–1.05); Women: Diagnosed within 3 years: Unadjusted: RR = 0.75 (CI 0.60–0.95) Heart diseases: Men: Diagnosed within 3 years: Unadjusted: RR = 1.24 (CI 1.12–1.37); Adjusted: RR = 1.24 (CI 1.12–1.37); Multivariate: RR = 1.19 (CI 1.08–1.32); Women: Diagnosed within 3 years: Unadjusted: RR = 1.24 (CI 1.06–1.44); Adjusted: RR = 1.31 (CI 1.12–1.53) Chronic obstructive pulmonary disease (COPD): Men: Diagnosed within 3 years: Unadjusted: RR = 2.07 (CI 1.77–2.40); Adjusted: RR = 2.09 (CI 1.79–2.43); Multivariate: RR = 1.81 (1.55–2.10); Women: Diagnosed within 3 years: Unadjusted: RR = 2.42 (CI 1.99–2.96); Adjusted: RR = 2.61 (CI 2.14–3.18); Multivariate: RR = 2.00 (CI 1.64–2.45) Enteritis and colitis: Men: Diagnosed within 3 years: Unadjusted: RR = 1.20 (CI 0.72–1.99); Women: Diagnosed within 3 years: Unadjusted: RR = 1.22 (CI 0.67–2.21); Gastrointestinal disorders: Men: Diagnosed within 3 years: Unadjusted: RR = 1.75 (CI 1.49–2.05); Adjusted: RR = 1.71 (CI 1.46–2.01); Multivariate: RR = 1.41 (CI 1.20–1.66); Women: Diagnosed within 3 years: Unadjusted: RR = 2.20 (CI 1.81–2.68); Adjusted: RR = 2.26 (CI 1.86–2.76); Multivariate: RR = 1.67 (CI 1.37–2.04)

(*continued*)

Table 2. (*Continued*)

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
				Liver diseases: Men: Diagnosed within 3 years: Unadjusted: RR = 3.27 (CI 2.11−5.08); Adjusted: RR = 3.64 (CI 2.35−5.66); Multivariate: RR = 2.69 (CI 1.73−4.17); Women: Diagnosed within 3 years: Unadjusted: RR = 5.27 (CI 3.43−8.67); Adjusted: RR = 5.45 (CI 3.43−8.67); Multivariate: RR = 4.00 (CI 2.51−6.37); Renal diseases: Men: Diagnosed within 3 years: Unadjusted: RR = 1.44 (CI 1.03−2.02); Adjusted: RR = 1.54 (CI 1.10−2.17); Women: Diagnosed within 3 years: Unadjusted: RR = 1.10 (CI 0.57−2.11) Prostate: Men: Diagnosed within 3 years: Unadjusted: RR = 1.40 (CI 1.23−1.60); Adjusted: RR = 1.35 (CI 1.19−1.54); Multivariate: RR = 1.38 (CI 1.20−1.57) Male genital disorders: Men: Diagnosed within 3 years: Unadjusted: RR = 2.81 (CI 1.46−5.40); Adjusted: RR = 2.88 (CI 1.49−5.53); Multivariate: RR = 2.43 (CI 1.26−4.68) Diabetes: Men: Diagnosed within 3 years: Unadjusted: RR = 1.00 (CI 0.77−1.29); Women: Diagnosed within 3 years: Unadjusted: RR = 0.75 (CI 0.48−1.17) Thyroid diseases: Men: Diagnosed within 3 years: Unadjusted: RR = 0.75 (CI 0.36−1.57); Women: Diagnosed within 3 years: Unadjusted: RR = 1.27 (CI 0.86−1.89) Cerebrovascular diseases and hemiplegia: Men: Diagnosed within 3 years: Unadjusted: RR = 1.61 (CI 1.41−1.84); Adjusted: RR = 1.53 (CI 1.33−1.75); Multivariate: RR = 1.31 (CI 1.15−1.51); Women: Diagnosed within 3 years: Unadjusted: RR = 1.73 (CI 1.43−2.10); Adjusted: RR = 1.77 (CI 1.46−2.15); Multivariate: RR = 1.41 (CI 1.16−1.72) Epilepsy: Men: Diagnosed within 3 years: Unadjusted: RR = 2.34 (CI 1.62−3.37); Adjusted: RR = 2.41 (CI 1.67−3.47); Multivariate: RR = 1.68 (CI 1.17−2.43); Women: Diagnosed within 3 years: Unadjusted: RR = 2.89 (CI 1.69−4.67); Adjusted: RR = 2.94 (CI 1.77−4.89) Parkinson's disease: Men: Diagnosed within 3 years: Unadjusted: RR = 1.92 (CI 1.26−2.92); Adjusted: RR = 1.80 (CI 1.19−2.74); Women: Diagnosed within 3 years: Unadjusted: RR = 2.26 (CI 1.25−4.08); Adjusted: RR = 2.22 (CI 1.23−4.02)

(*continued*)

Table 2. (*Continued*)

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
				Polyneuropathy: Men: Diagnosed within 3 years: Unadjusted: RR = 1.16 (CI 0.55−2.43); Women: Diagnosed within 3 years: Unadjusted: RR = 2.22 (CI 0.92−5.34); Adjusted: RR = 2.46 (CI 1.02−5.93) Arthritis: Men: Diagnosed within 3 years: Unadjusted: RR = 1.40 (CI 1.09−1.79); Adjusted: RR = 1.51 (CI 1.18−1.94); Multivariate: RR = 1.38 (CI 1.08−1.77); Women: Diagnosed within 3 years: Unadjusted: RR = 1.34 (CI 0.99−1.80); Adjusted: RR = 1.42 (1.05−1.92) Arthrosis: Men: Diagnosed within 3 years: Unadjusted: RR = 0.88 (CI 0.71−1.08); Women: Diagnosed within 3 years: Unadjusted: RR = 0.85 (CI 0.67−1.08) Osteoporosis: Men: Diagnosed within 3 years: Unadjusted: RR = 2.07 (CI 1.30−3.29); Adjusted: RR = 2.18 (CI 1.37−3.47); Multivariate: RR = 1.75 (CI 1.10−2.78); Women: Diagnosed within 3 years: Unadjusted: RR = 1.96 (CI 1.48−2.58), Adjusted: RR = 2.29 (CI 1.74−3.02; Multivariate: RR = 1.92 (CI 1.46−2.54) Foot fracture: Men: Diagnosed within 3 years: Unadjusted: RR = 1.11 (CI 0.53−2.32); Women: Diagnosed within 3 years: Unadjusted: RR = 1.38 (CI 0.72−2.66) Hand fracture: Men: Diagnosed within 3 years: Unadjusted: RR = 1.32 (CI 0.84−2.07); Women: Diagnosed within 3 years: Unadjusted: RR = 1.01 (CI 0.61−1.68) Hip fracture: Men: Diagnosed within 3 years: Unadjusted: RR = 1.59 (CI 1.24−2.04); Adjusted: RR = 1.31 (CI 1.02−1.68); Women: Diagnosed within 3 years: Unadjusted: RR = 1.45 (CI 1.17−1.80); Adjusted: RR = 1.45 (CI 1.17−1.81) Leg fracture: Men: Diagnosed within 3 years: Unadjusted: RR = 1.67 (CI 1.12−2.47); Adjusted: RR = 1.68 (CI 1.13−2.49); Women: Diagnosed within 3 years: Unadjusted: RR = 1.06 (CI 0.68−1.67) Spinal fracture: Men: Diagnosed within 3 years: Unadjusted: RR = 2.67 (CI 1.96−3.63); Adjusted: RR = 2.49 (CI 1.83−3.38); Multivariate: RR = 1.82 (CI 1.34−2.48); Women: Diagnosed within 3 years: Unadjusted: RR = 2.96 (CI 2.23−3.93); Adjusted: RR = 3.04 (CI 2.29−4.04); Multivariate: RR = 2.12 (CI 1.59−2.83)

(*continued*)

Table 2. (*Continued*)

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
				Shoulder/arm fracture: Men: Diagnosed within 3 years: Unadjusted: RR = 1.42 (CI 1.06−1.92); Adjusted; RR = 1.42 (CI 1.06−1.92); Women: Diagnosed within 3 years: Unadjusted: RR = 0.98 (CI 0.77−1.24) Bladder cancer: Men: Diagnosed within 3 years: Unadjusted: RR = 2.26 (CI 1.73−2.96); Adjusted: RR = 2.09 (CI 1.60−2.74); Multivariate: RR = 2.08 (CI 1.59−2.73); Women: Diagnosed within 3 years: Unadjusted: RR = 1.79 (CI 0.85−3.76) Bone cancer: Men: Diagnosed within 3 years: Unadjusted: RR = 1.40 (CI 1.03−1.89); Adjusted: RR = 1.35 (CI 1.00−1.82); Multivariate: RR = 1.36 (CI 1.00−1.84); Women: Diagnosed within 3 years: Unadjusted: RR = 0.97 (CI 0.55−1.72); Brain cancer: Women: Diagnosed within 3 years: Unadjusted: RR = 3.75 (CI 1.21−11.63); Adjusted: RR = 3.72 (CI 1.20−11.55); Multivariate: RR = 3.46 (CI 1.11−10.75) Breast cancer: Women: Diagnosed within 3 years: Unadjusted: Not shown; Adjusted: RR = 1.72 (CI 1.29−2.30); Multivariate: RR = 1.67 (CI 1.25−2.24) Gastrointestinal cancer: Men: Diagnosed within 3 years: Unadjusted: RR = 2.62 (CI 1.92−3.57); Adjusted: RR = 2.54 (CI 1.86−3.47); Multivariate: RR = 2.54 (CI 1.86−3.48); Women: Diagnosed within 3 years: Unadjusted: RR = 1.37 (CI 0.68−2.75) Genital cancer: Men: Diagnosed within 3 years: Unadjusted: RR = 1.57 (CI 1.26−1.95); Adjusted: RR = 1.55 (CI 1.24−1.93); Multivariate: RR = 1.58 (CI 1.26−1.97); Women: Diagnosed within 3 years: Unadjusted: RR = 1.59 (CI 0.99−2.57) Lung cancer: Men: Diagnosed within 3 years: Unadjusted: RR = 2.45 (CI 1.90−3.17); Adjusted; RR = 2.49 (CI 1.92−3.22); Multivariate: RR = 2.30 (CI 1.78−2.98); Women: Diagnosed within 3 years: Unadjusted: RR = 3.67 (CI 2.46−5.50); Adjusted: RR = 3.77 (CI 2.52−5.64); Multivariate: RR = 3.16 (CI 2.11−4.73)

(*continued*)

Table 2. (*Continued*)

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
				Lymph node cancer: Men: Diagnosed within 3 years: Unadjusted: RR = 1.81 (CI 1.26−2.62); Adjusted: RR = 1.82 (CI 1.26−2.62); Multivariate: RR = 1.84 (CI 1.28−2.65); Women: Diagnosed within 3 years: Unadjusted: RR = 1.64 (CI 0.90−2.96)
Fall et al., 2009 Sweden	Prostate cancer (Swedish Cancer Registry)	1987−2004	Men diagnosed with prostate cancer within past 1 year. Comparison respondents from general population. *N* = 168,584[d] Suicide *n* = 99	Prostate cancer: 65−74: RR[f] = 2.6 (CI 2.0−3.4); 75+: RR = 2.5 (CI 1.8−3.4)
Fang et al., 2008 Sweden	Amyotrophic lateral sclerosis (ALS) (Inpatient Register)	1965−2004	Patients diagnosed with ALS aged 70+. Comparison respondents from general population. *N* = 6642[d] (44% women) Suicide *n* = 4	Amyotrophic lateral sclerosis (ALS): SMR = 3.2 (CI 0.9−8.1)
Fang et al., 2010 USA	Prostate cancer (Surveillance, Epidemiology, and End Results Program)	1979−2004	Men diagnosed with prostate cancer within 1-3 months aged 70+. Comparison respondents from general population. *N* = 185,216 Suicide *n* = 91	Prostate cancer: 1-3 months after diagnosis: 70−79: SMR = 1.6 (CI 0.9−2.6); 80+: SMR = 2.4 (CI 1.3−4.1); 4-12 months after diagnosis: 70−79: SMR = 1.2 (CI 0.8−1.6); 80+: SMR = 1.2 (CI 0.8−1.8)
Fang et al., 2012 Sweden	Cancer (Swedish Cancer Registry)	1991-2006	Persons diagnosed with cancer. Comparison respondents from general population. *N* = 3911[b] Suicide *n* = 184	Cancer: 65−74: RR[f] = 3.7 (CI 2.9−4.5); 75−84: RR = 2.7 (CI 2.2−3.2)
Juurlink et al., 2004 Canada	Prescription data (proxy for 12 specified conditions)	1992−2000	Persons receiving prescribed drug medications (proxy for disorders) aged 66+. Comparison respondents from general population. *N* = 6644 (24% women) Suicide *n* = 1329	Congestive heart failure: Univariate: OR = 1.73 (CI 1.33−2.24) Multivariate: OR = 1.36 (CI 1.00−1.85) Ischemic heart disease: Univariate: OR = 0.92 (CI 0.76−1.12); Multivariate: Not included Chronic lung disease: Univariate: OR = 1.62 (CI 1.37−1.92); Multivariate: OR = 1.30 (CI 1.06−1.58) Hyperacidity syndromes: Univariate: OR = 1.26 (CI 1.09−1.47); Multivariate: OR = 0.81 (CI 0.68−0.97) Urinary incontinence: Univariate: OR = 2.02 (CI 1.29−3.17); Multivariate: OR = 1.11 (CI 0.65−1.89) Diabetes mellitus: Univariate: OR = 1.01 (CI 0.73−1.41); Multivariate: Not included Seizure disorder: Univariate: OR = 2.95 (CI 1.89−4.61); Multivariate: OR = 2.41 (CI 1.42−4.07) Parkinson: Univariate: OR = 1.60 (CI 1.00−2.55); Multivariate: OR = 1.11 (CI 0.65−1.90) Moderate pain: Univariate: OR = 1.91 (CI 1.66−2.20); Multivariate: OR = 1.24 (CI 1.04−1.47) Severe pain: Univariate: OR = 7.52 (CI 4.93−11.46); Multivariate: OR: 4.07 (CI 2.51−6.59)

(*continued*)

Table 2. (*Continued*)

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
				Rheumatoid arthritis: Univariate: OR = 1.00 (CI 0.33−2.99); Multivariate: Not included Breast cancer: Univariate: OR = 1.46 (CI 0.46−4.57); Multivariate: Not included Prostate cancer: Univariate: OR = 1.18 (CI 0.71−1.95); Multivariate: Not included
Kurella et al., 2005 USA	End stage renal disease (Center for Medicare and Medicaid Services, Medical Evidence form)	1995−2000	Patients aged 75+. Comparison respondents from general population. *N* = 102,424[d] (47% women) Suicide *n* = 264[d]	End stage renal disease: Unadjusted: RR[f] = 2.25 (CI 1.58−3.22); Multivariate: RR = 1.49 (CI 1.03−2.16)
Larsen et al., 2010 Denmark	Myocardial infarction (Danish Society of Cardiology)	1981−2006	Patients aged 70+. Comparison respondents from general population. *N* = 49,518[b] Suicide *n* = 5249	Myocardial infarction: Age 70−79: Unadjusted: RRe = 1.24 (CI 1.08−1.42); Adjusted: RR = 1.19 (CI 1.02−1.38); Age 80−89: Unadjusted: RR = 1.24 (CI 1.03−1.49); Adjusted: RR = 1.23 (CI 1.02−1.49)
Miccinesi et al., 2004 Italy	Cancer (Tuscany Cancer Registry)	1985−1999	Cancer patients. Comparison respondents from general population. *N* = 90,197[d] (47% women) Suicide *n* = 76	Cancer: 65−74: SMR = 180[h]; 75+: SMR = 231[h]
Miller et al., 2008 USA	Nine specific medical illnesses (Pharmaceutical Assistance Program for the Aged and Disabled)	1994−2002	Persons using Medicare. Comparison respondents part of same program. *N* = 1408 (18% women) Suicide *n* = 128	Medical illness (any of 9 specific): Crude: OR = 1.2 (CI 0.8−1.8) Angina pectoris: Crude: OR = 1.3 (CI 0.8−2.0) Congestive heart failure: Crude: OR = 2.0 (CI 1.3−3.3); Multivariate: OR = 1.1 (CI 0.6−1.9) Acute myocardial infarction: Crude: OR = 1.4 (CI 0.8−2.7) Chronic obstructive pulmonary disease (COPD): Crude analysis: OR = 1.7 (CI 1.1−2.5); Multivariate: OR = 1.1 (CI 0.7−1.8) Diabetes: Crude: OR = 0.8 (CI 0.5−1.2) Stroke: Crude analysis: OR = 1.8 (CI 1.2−2.7); Multivariate: OR = 1.2 (CI 0.7−1.9) Osteoarthritis: Crude analysis: OR = 1.2 (CI 0.7−2.1) Spine disorder: Crude analysis: OR = 1.8 (CI 1.1−3.0); Multivariate: OR = 0.9 (CI 0.5−1.6) Malignancy: Crude: OR = 3.3 (CI 1.9−5.7); Multivariate: OR = 2.3 (CI 1.1−4.8)
Misono et al., 2008 USA	Cancer (Surveillance, Epidemiology, and End Results Program)	1973−2002	Cancer patients. Comparison respondents from general population. *N* = 3,594,750[d] (52% women) Suicide *n* = 3271	Cancer: 65−69: SMR = 2.42 (CI 2.27−2.58); 70−74: SMR = 2.48 (CI 2.33−2.64); 75−79: SMR = 2.28 (CI 2.12−2.46); 80−84: SMR = 2.38 (CI 2.16−2.61); 85+: SMR = 2.51 (CI 2.19−2.86)
Nakash, Barchana, Liphshitz, Keinan-Boker, & Levav, 2013 Israel	Cancer (Israel National Cancer Registry)	1999−2007	Cancer patients ethnic origins. Comparison respondents from general population. *N* not shown Suicide: *n* = 10 (Asia-North Africa) (10% women); *n* = 131 Europe-America (21% women)	Cancer: Asia−North Africa: Men: SIR = 0.59 (CI 0.21−0.98); Women: SIR = 1.36 (CI 0.00−1.04); Europe−America: Men: SIR = 1.88 (CI 1.52−2.24); Women: SIR = 1.36 (CI 0.85−1.86)

(*continued*)

Table 2. (*Continued*)

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
Oberaigner et al., 2014 Austria	Cancer (Malignant) (Cancer patients diagnosed in Tyrol, Austria)	1991−2010	Cancer patients aged 70+. Comparison respondents from general population. *N* = 53,803[d] (48% women) Suicide *n* = 52	Cancer (malignant): Men and women: 70−79: SMR = 1.86 (CI 1.31−2.55); 80+: SMR = 1.62 (CI 0.89−2.72); Men: 70−79: SMR = 1.72 (CI 1.15−2.47); 80+: SMR = 1.99 (CI 1.09−3.34); Women: 70−79: SMR = 2.52 (CI 1.15−4.79); 80+: SMR = 0.00 (CI 0.00−2.31)
Smailyte et al., 2013 Lithuania	Cancer (Lithuanian Cancer Registry)	2001−2009	Cancer patients aged 70+. Comparison respondents from general population. *N* = 132,459[d] (48% women) Suicide: *n* = 98	Cancer: Men: SMR = 1.44 (CI 1.14−1.79); Women: SMR = 1.27 (CI 0.75−2.00)
Tanaka et al., 1999 Japan	Cancer (Osaka Cancer Registry)	1978−1994	Cancer patients diagnosed in hospital aged 70+. Comparison respondents from general population. *N* = 23,979[d] (45% women) Suicide *n* = 8	Cancer: O/E = 1.36 (CI 0.59−2.68)
Teasdale & Engberg, 2001 Denmark	Stroke (National Bureau of Health Register of Hospitalizations)	1979−1993	Persons diagnosed with stroke in hospital aged 70+. Comparison respondents from general population. *N* = 67,070[b] Suicide: *n* = 154	Stroke: Age 70−79: SMR = 1.81 (CI 1.51−2.17); Aged 80+: SMR = 1.30 (CI 0.95−1.79)
Urban et al., 2013 USA	Lung cancer (ICD for Oncology)	1973−2009	Patients diagnosed with lung cancer aged 70+. Comparison respondents from general population. *N* = 418,202[b] Suicide *n* = 561	Lung cancer: Diagnosed: 70−79: SMR = 5.66 (CI 5.12−6.24); 80+: SMR = 6.18 (CI 5.25−7.23); Diagnosed within last 3 months: 70−79: SMR = 14.8 (CI 12.5−17.4); 80+: SMR = 15.5 (CI 12.4−19.3); Diagnosed more than 3 months ago: 70−79: SMR = 4.2 (CI 3.7−4.8); 80+: SMR = 3.7 (CI 2.9−4.6)
Voaklander et al., 2008 Canada	13 specified physical conditions	1993−2002	Persons aged using health care services from GP or hospital aged 66+. Comparison respondents from general population. *N* = 3601 (28% women) Suicide *n* = 602	Cardiac diagnosis: Physician coded: Unadjusted: OR = 0.95 (0.73−1.24); Hospital coded: Unadjusted: OR = 2.67 (CI 2.05−3.46) Hypertension: Physician coded: Unadjusted: OR = 0.85 (CI 0.68−1.06); Hospital coded: Unadjusted: OR = 2.62 (CI 1.88−3.66) Asthma: Physician coded: Unadjusted: OR = 1.53 (CI 0.93−2.49); Hospital coded: Unadjusted: OR = 1.59 (CI 0.51−4.96) Chronic obstructive pulmonary disease (COPD): Physician coded: Unadjusted: OR = 1.30 (CI 0.89−1.89); Hospital coded: Unadjusted: OR = 3.37 (CI 2.26−5.02) Liver disease: Physician coded: Unadjusted: OR = 1.68 (CI 1.11−2.42); Group adjusted: OR = 1.19 (CI 0.73−1.95); Fully adjusted: OR = 0.89 (CI 0.53−1.49); Hospital coded: Unadjusted: OR = 4.32 (CI 2.55−7.01); Group adjusted: OR = 2.56 (CI 1.40−4.67); Fully adjusted: OR = 3.12 (CI 1.70−5.75) Renal disease: Physician coded: Unadjusted: OR = 0.86 (CI 0.33−2.27); Hospital coded: Unadjusted: OR = 1.66 (CI 0.17−15.98)

(*continued*)

Table 2. (*Continued*)

Authors, year, country	Physical factor (data source)	Follow-up	Sample[a] *N* and % women Outcome and *n*	Strength of association
				Incontinence: Physician coded: Unadjusted: OR = 1.98 (CI 1.50−2.62); Group adjusted: OR = 1.66 (CI 1.18−2.34); Fully adjusted: OR = 1.76 (CI 1.24−2.49); Hospital coded: Unadjusted: OR = 4.54 (CI 2.28−9.03); Group adjusted: OR = 2.21 (CI 0.92−5.29); Fully adjusted: OR = 1.84 (CI 0.74−4.54) Diabetes: Physician coded: Univariate: OR = 0.69 (CI 0.46−1.03); Hospital coded: Univariate: OR = 2.27 (CI 1.53−3.39) Stroke: Physician coded: Unadjusted: OR = 2.25 (CI 1.42−3.57); Group adjusted: OR = 2.18 (CI 1.25−3.83); Fully adjusted: OR = 2.39 (CI 1.37−4.20); Hospital coded: Unadjusted: OR = 2.15 (CI 1.40−3.39); Group adjusted: OR = 1.01 (CI 0.54−1.88); Fully adjusted: OR = 1.32 (CI 0.71−2.44) Pain: Narcotic pain killers: Prescriptions: Unadjusted: OR = 4.38 (CI 3.22−5.93); Group adjusted: OR = 3.03 (CI 2.12−4.34); Fully adjusted: OR = 2.57 (CI 1.71−3.86) Narcotic pain killers: Mild: OR = 2.10 (CI 1.29−3.42); Strong: OR = 6.30 (CI 2.61−15.20) Osteoarthritis: Physician coded: Unadjusted: OR = 1.34 (CI 0.99−1.74); Hospital coded: Unadjusted: OR = 1.22 (CI 0.61−2.45) Osteoporosis: Physician coded: Unadjusted: OR = 1.69 (CI 0.62−4.66); Hospital coded: Unadjusted: OR = 3.12 (CI 1.56−6.21) Cancer: Physician coded: Unadjusted: OR = 0.99 (CI 0.72−1.35); Group adjusted: OR = 1.19 (CI 0.84−1.69); Fully adjusted: OR = 1.09 (CI 0.76−1.57); Hospital coded: Unadjusted: OR = 3.93 (CI 2.72−5.67); Group adjusted: OR = 3.28 (CI 2.11−5.09); Fully adjusted: OR = 2.15 (CI 1.33−3.49)

Note: [a]Study participants are aged 65 and above unless otherwise specified.
[b]% women not shown.
[c]95 % for all studies.
[d]All ages.
[e]Rate ratio.
[f]Relative risk.
[g]See article for results for lifetime diagnoses.
[h]95 % CI not specified, but does not include 100.

Table 3. Clinical studies.

Authors, year, country	Physical factor (measure of physical factor	Sample[a] *N* and % women Outcome and *n*	Strength of association
Hirsch et al., 2007 USA	Burden of illness (CIRS) (Linn, Linn, & Gurel, 1968) Functional status (activity) (Karnofsky & Burchenal, 1949)	Primary care patients. *N* = 462 (63% women) Suicide ideation *n* = 37	CIRS: Mean: 7.37 (SD 2.87), bivariate correlation: .14, p = <0.05); Step 1: OR = 0.95 (CI[b] 0.79−1.14), Unstandardized B (SE): −0.05 (0.09), Wald score: 0.25; Step 2: OR = 0.95 (CI 0.79−1.15), Unstandardized B (SE): −0.05 (0.10), Wald score: 0.29 Activity: Mean: 8.55 (SD 2.81), bivariate correlation: .14, *p* = <0.05); Step 1: OR = 1.10 (CI 0.93−1.31), Unstandardized B (SE): 0.09 (0.09), Wald score: 1.28; Step 2: OR = 1.16 (CI 0.97−1.40), Unstandardized B (SE): 0.16 (0.09), Wald score: 2.71
Kim et al., 2006 USA	Three self-reported physical conditions	Primary care patients screened for depression. *N* = 355 (75% women) Past year wishes to die *n* = 44	Myocardial infarction: Model 1: OR = 2.61 (CI 1.31−5.19); Model 2: OR = 3.17 (CI 1.52−6.60); Model 3: OR = 2.45 (CI 1.03−5.85); Model 4: OR = 3.32 (CI 1.26−8.75). Urinary incontinence: Model 1: OR = 2.59 (CI 1.31−5.10); Model 2: OR = 2.36 (CI 1.17−4.77); Model 3: OR = 1.88 (CI 0.88−4.17); Model 4: OR = 1.90 (CI 0.81−4.46) Stroke: Model 1: OR = 2.31 (CI 1.12−4.79); Model 2: OR = 2.82 (CI 1.31−6.06); Model 3: 3.08 (CI 1.23−7.71); Model 4: OR = 2.38 (CI 0.90−6.29)
Levy et al., 2011 Israel	Mean total CIRS score (Cumulative Illness Rating Scale) (Linn et al., 1968)	Geriatric hospital admissions. *N* = 165 (64% women) Suicide attempt *n* = 78	Mean total CIRS score: Unadjusted: 10.2 ± 3.6 vs. 8 ± 4.3, p = 0.0008; Adjusted: 10.8 vs. 7.5, *p* = <0.0001
Raue et al., 2007 USA	Medical comorbidity (Charlson Comorbidity Index) (Charlson, Pompei, Ales, & MacKenzie, 1987) Activities of daily living limitations (Lawton ADL scales) (Lawton, Moss, Fulcomer, & Kleban, 1982) Instrumental activities of daily living limitations Vision impairment Pain (SF-36) (Ware & Sherbourne, 1992)	Random sample, new admissions visiting nursing services. *N* = 539 (65% women) Passive suicidal ideation *n* = 57 Active suicidal ideation *n* = 6	Medical comorbidity: Passive SI: mean 3.6 (SD 2.4); Active SI: mean 3.7 (SD 2.7); No SI: mean 2.5 (SD 2.0), *p* = 0.001 (significant difference between passive SI and no SI). Multiple logistic regression OR = 1.17 (CI 1.02−1.35) Activities of daily living limitations: Passive SI mean = 1.5 (SD 1.6); Active SI mean = 0.7 (SD 0.5); No SI mean = 1.0 (SD 1.3). *p* = 0.017 (significant difference between passive SI and no SI). Multiple logistic regression OR = 1.07 (CI 0.83−1.38). *p* = 0.587 Instrumental activities of daily living limitations: Passive SI mean = 3.9 (SD 1.3); Active SI mean = 2.8 (SD 2.0); No SI mean = 3.2 (SD 1.5). *p* = 0.005. Multiple logistic regression OR = 1.17 (CI 0.89−1.54) Vision impairment: Passive SI 9.4%; Active SI 20.0%; No SI 5.5%. P = 0.130 'A great deal' of pain: Passive SI 48.2%; Active SI 33.3%; No SI 26.0 %. *p* = 0.002 (significant difference between passive SI and no SI). Multiple logistic regression: OR = 1.32 (CI 0.69−2.53)
Takahashi et al., 1995 Japan	Physical illness (case note review) Malignant illnesses (case note review)	Geriatric hospital admissions *N* = 100[c] Suicide attempt *n* = 50	Physical illness: Suicide attempt: 82%; No suicide attempt: 86%, *p* = NS Malignant illnesses: Suicide attempt: 10% in cases; No suicide attempt: 16%, *p* = NS
Tan & Wong, 2008 Singapore	Number of medical conditions	Geriatric psychiatry inpatients and outpatients with depression *N* = 80 (69% women) Past week suicidal thinking *n* = 43	≥2 medical conditions: Suicidal thinking: 53%, No suicidal thinking: 47%, *p* = 1.000 ≥3 medical conditions: Suicidal thinking: 57.1%, No suicidal thinking: 42.9%, *p* = 1.000
Tsoh et al., 2005 Hong Kong	Number of physical illnesses Instrumental activities of daily living (Instrumental Activities of Daily Living Scale) (Lawton & Brody, 1969) five specific physical conditions	Consecutive admissions from one hospital of persons who attempted suicide. Community-comparison respondents. *N* = 158 (60% women) Suicide attempt *n* = 66	Number of physical illnesses: Unadjusted: OR = 2.6 (CI 1.8−3.7) Instrumental activities of daily living: Unadjusted: OR = 0.1 (CI 0.04−0.2); Adjusted: OR = 0.3 (95% CI 0.1−0.7) Diabetes mellitus: Unadjusted: OR = 3.3 (CI 1.4−7.6) Stroke: Unadjusted: OR = 11.8 (CI 3.3−42.1) Arthritis: Unadjusted: OR = 4.6 (CI 2.1−9.9); Adjusted: OR = 22.6 (CI 3.2−157.3) Bone fracture: Unadjusted: OR = 20.0 (CI 2.5−158.1) Malignancy: Unadjusted: OR = 5.2 (CI 1.4−19.9)

Abbreviations: NS: Not significant.
Note: [a]Study participants are aged 65 and above unless otherwise specified.
[b]95 % for all studies. [c] % women not shown.

Table 4. Post-mortem studies.

Authors, year, country	Physical factor (measure of physical factor	Sample[a] *N* and % women Outcome and *n*	Strength of association
Jia et al., 2014 China	Physical illnesses (informant or comparison subjects report)	Suicide cases (informant psychological autopsy interviews). Comparison cases with similar demographics. *N* = 179[b] Suicide *n* = 92	Physical illness (yes vs. no): Unadjusted: OR = 3.11 (CI[c] 1.47−6.59); Adjusted: OR = 3.44 (CI 1.44−8.24) One physical illnesses: Unadjusted: OR = 2.64 (CI 1.14−6.11); Adjusted: OR = 2.94 (CI 1.12−7.72) Two physical illnesses: Unadjusted: OR = 3.44 (CI 1.38−8.57); Adjusted: OR = 4.02 (CI 1.40−11.53) Three or more physical illnesses: Unadjusted: OR = 10.67 (CI 1.94−58.63); Adjusted: OR = 4.08 (CI 0.64−25.88)
Rubenowitz, Waern, Wilhelmson, & Allebeck, 2001[d] Sweden	Somatic illness (Paykel Recent Life Change Questionnaire) (Paykel et al., 1969)	Consecutive suicide cases undergoing forensic examination. Comparison cases with similar demographics. *N* = 238 (46% women) Suicide *n* = 85	Somatic illness (Paykel): Men and women: 0−6 months preceding suicide: OR = 2.8 (CI 1.5−5.2); 7−12 months: OR = 2.2 (CI 1.2−3.9); 13−24 months: OR = 2.1 (CI 1.2−3.7); 0−24 months: OR = 2.3 (CI 1.2−4.4); Men: 0−6 months preceding suicide: OR = 3.4 (CI 1.4−8.1); 7−12 months: OR = 2.6 (CI 1.1−5.9); 13−24 months: OR = 2.2 (CI 1.0−4.8); 0−24 months: OR = 3.2 (CI 1.3−7.9); Women: 0−6 months preceding suicide: OR = 2.2 (CI 0.9−5.5); 7-12 months: OR = 1.9 (CI 0.8−4.4); 13−24 months: OR = 2.1 (CI 0.9−4.9); 0−24 months: OR = 1.7 (CI 0.7−4.1)
Tsoh et al., 2005 Hong Kong	Number of physical illnesses Hospitalization in past 3 months for physical disorder(s) Instrumental activities of daily living (Lawton & Brody, 1969) Four specific physical conditions	Suicide cases (informant psychological autopsy interviews). Community-comparison respondents. *N* = 158 (56% women) Suicide *n* = 67	Number of physical illnesses: Unadjusted: OR = 1.9 (CI 1.4−2.6) Hospitalization in past 3 months for physical disorder(s): Unadjusted: OR = 6.8 (CI 3.1−14.7) Instrumental activities of daily living: Unadjusted OR = 0.2 (CI 0.1−0.4); Adjusted OR = 0.2 (CI 0.06−0.7) Chronic obstructive airway disease (COAD): Unadjusted OR = 2.6 (CI 1.1−6.4) Arthritis: Unadjusted: OR = 2.4 (CI 1.1−5.5); Adjusted: OR = 11.5 (CI 2.4−56.1) Bone fracture: Unadjusted: OR = 15.7 (CI2.0−125.0) Malignancy: Unadjusted: OR = 7.7 (CI 2.1−28.2); Adjusted: OR = 24.3 (CI 2.8−214.1)
Waern et al., 2002[d] Sweden	Serious physical condition (Cumulative Illness Rating Scale-Geriatrics) (Miller et al., 1992) (a rating of ≥3) Overall physical burden score >10	Consecutive suicide cases undergoing forensic examination. Comparison cases with similar demographics. *N* = 238 (46% women) Suicide *n* = 85	Any serious physical condition: Men and women: OR = 3.0 (CI 1.6−5.5); Multivariate logistic regression: OR = 6.4 (CI 2.0−20.0); Men: OR = 4.2 (CI 1.8−9.5); Women: OR = 2.1 (CI 0.8−5.3) Overall physical burden score >10: Men and women: OR = 1.4 (CI 0.7−2.7); Men: OR = 2.8 (CI 1.2−6.5); Women: OR = 0.4 (CI 0.1−1.4) Eyes, ears, nose, throat: OR = 6.6 (CI 2.4−17.9) Visual impairment: OR = 7.0 (CI 2.3−21.4). Multivariate logistic regression: OR = 11.4 (CI 2.4−54.5) Heart: OR = 1.0 (CI 0.4−2.5) Vascular: OR = 1.1 (CI 0.3−4.0) Haematopoietic: OR = 3.2 (CI 0.2−53.9) Respiratory: OR = 0.7 (CI 0.1−3.5) Lower gastrointestinal track: OR = 3.3 (CI 0.7−14.8) Renal: OR = 2.2 (CI 0.1−39.7) Upper gastrointestinal tract: OR = 6.4 (CI 0.5−79.2) Genitourinary: OR = 3.0 (CI 1.0−9.0) Endocrine/metabolic: OR = 2.7 (CI 0.6−11.4) Stroke: OR = 2.8 (CI 1.0−8.3) Neurological: OR = 3.8 (CI 1.5−9.4); Multivariate logistic regression: OR = 9.0 (CI 2.0−40.1) Musculoskeletal: OR = 1.6 (CI 0.7−3.9) Malignancy: OR = 3.4 (CI 1.2−9.8); Multivariate logistic regression: OR = 4.7 (CI 1.2−18.2)

(*continued*)

Table 4. (*Continued*)

Authors, year, country	Physical factor (measure of physical factor)	Sample[a] *N* and % women Outcome and *n*	Strength of association
Waern, Rubenowitz, & Wilhelmson, 2003d Sweden	Somatic disorder (Cumulative Illness Rating Scale-Geriatrics (Miller et al., 1992) (a rating of ≥3)	Consecutive suicide cases undergoing forensic examination. Comparison cases with similar demographics. $N = 238$ (46% women) Suicide 65−74 $n = 47$; 75+ $n = 38$[e]	Somatic illness: 65-74 years: OR = 2.2 (CI 0.9−5.5); 75+: OR = 3.5 (CI 1.3−9.7) Serious somatic disorder: 65−74 years: OR = 2.0 (CI 0.8−5.0); 75+: OR = 4.5 (CI 1.7−11.8); Final logistic regression model: OR = 5.2 (CI 1.1−24.2)

Note: [a]Study participants are aged 65 and above unless otherwise specified.
[b]% women not shown.
[c]95 % for all studies.
[d]Substudies from same psychological autopsy study.
[e]For results for specific conditions (all NS), see article.

Australian study (Jorm et al., 1995), and in a study based on pooled data from 11 sites across Europe (Fässberg et al., 2014). Relationships with suicidal ideation were observed in studies conducted in Taiwan (Chan et al., 2011) and South Korea (Kang et al., 2014; Lee, Hahm, & Park, 2013; Park, 2014). In Japan, impaired physical functioning was associated with current suicidal ideation in univariate, but not multivariate analyses (Awata et al., 2005).

Clinical studies

Higher mean number of limitations in activities of daily living (ADL) was observed among US recipients of home care with passive suicidal ideation (thoughts that life was not worth living or that one would be better off dead), as compared to those without suicidal ideation (Raue et al., 2007). Results did not persist, however, in the multivariate model. Limitations in instrumental ADL increased the odds of both nonfatal and fatal suicidal behaviour in Hong Kong (Tsoh et al., 2005).

Vision and hearing loss

Population and register studies

Significant associations between visual impairment and death wishes/suicidal feelings/thoughts were observed in some population studies (Forsell, Jorm, & Winblad, 1997; Jorm et al., 1995) but not in others (Fässberg et al., 2013; Lapierre et al., 2015). One hospital register study showed elevated suicide risk in those with cataract (Erlangsen, Stenager, & Conwell, 2015). Hearing loss was examined in two population-based studies; elevated risk of death wishes was observed in one (Jorm et al., 1995), but not in the other, which focused on 97-year-olds (Fässberg et al., 2013). Hearing loss did not predict suicide in a register-based study (Erlangsen et al., 2015).

Clinical studies

No association was found between vision impairment and suicidal ideation in a study that focused on homecare patients (Raue et al., 2007).

Post-mortem studies

A strong association between vision impairment and suicide was noted in one study (Waern et al., 2002).

Cardiovascular conditions

Population and register studies

A significant association between heart disease and past week suicidal ideation was noted in one population-based study (Chan et al., 2011). No association was found with past-year wish to die in another study (Lapierre et al., 2015). One register study reported no association between cardiovascular disease and suicide after adjusting for other predictive illnesses from the univariate analysis

(Juurlink, Herrmann, Szalai, Kopp, & Redelmeier, 2004). Another study found no relationship between cardiac disease and suicide after adjustment for medical and psychiatric comorbidity (Voaklander et al., 2008). Null findings were observed in another register study that focused specifically on medicare recipients (Miller et al., 2008). A history of myocardial infarction (MI) was linked to suicidal feelings in a representative, population-based sample of 85-year-olds (Skoog et al., 1996), and to suicide in a hospital register study (Larsen, Agerbo, Christensen, Sondergaard, & Vestergaard, 2010).

Clinical studies

MI was linked to wishes to die in US primary care patients, also in multivariate models including a large number of factors (Kim, Bogner, Brown, & Gallo, 2006).

Post-mortem studies

Serious cardiac illness was observed in similar proportions (10 %) in suicide cases and matched population comparison individuals (Waern et al., 2002).

Results for several other specific cardiac conditions, as well as findings regarding hypertension and cholesterol are shown in Tables 1–3.

Pulmonary conditions

Population and register studies

Respiratory problem was associated with wish to die in one population-based study (Lapierre et al., 2015), but the association did not hold in the adjusted model that included sex and depression. Asthma was associated with suicidal ideation in another population-based study (Chan et al., 2011). A slight increase in odds for suicide was observed in persons with chronic lung disease in one register study (Juurlink et al., 2004). Chronic obstructive pulmonary disease (COPD) was linked to suicide in three other studies (Erlangsen et al., 2015; Miller et al., 2008; Voaklander et al., 2008). However, adjusted results remained significant only for the study with the largest sample size (Erlangsen et al., 2015).

Post-mortem studies

COPD was associated with suicide risk in one study, but only univariate results were reported (Tsoh et al., 2005).

Gastrointestinal and renal disorders

Population and register studies

Self-reported digestive problems were linked to death wishes, but not in multivariate analyses (Lapierre et al., 2015). Peptic ulcer was associated with a threefold increase in odds for past month suicidal feelings in a population sample of 85-year-olds (Skoog et al., 1996). Having been prescribed medication for hyperacidity was not associated with suicide after adjustment for other predictive illnesses (Juurlink et al., 2004). Liver disease was linked to a higher risk of suicide in two register studies (Erlangsen et al., 2015; Voaklander et al., 2008). No association was found between renal disease and suicide in one register study (Voaklander et al., 2008), but another reported an association between endstage renal disease and suicide in adults aged 75 and older (Kurella, Kimmel, Young, & Chertow, 2005).

Genitourinary conditions

Population and register studies

In adjusted models, prostate and male genital disorders were associated with suicide in two register studies (Erlangsen et al., 2015; Voaklander et al., 2008), but not in a third which employed prescription data to detect these conditions (Juurlink et al., 2004).

Clinical studies

Urinary incontinence was associated with death wishes in primary care patients after adjustment for demographics, but not after functional status was included in the model (Kim et al., 2006).

Endocrine disorders

Population and register studies

Most population (Lapierre et al., 2015; Turvey et al., 2002) and register-based studies (Erlangsen et al., 2015; Juurlink et al., 2004; Kim et al., 2014; Miller et al., 2008) reported no association between diabetes and suicidal behaviour. A couple found univariate but not multivariate associations (Chan et al., 2011; Voaklander et al., 2008). Likewise, little evidence of a link between suicidal behaviour and thyroid or other endocrine disorders was found (Erlangsen et al., 2015; Lapierre et al., 2015).

Clinical and post-mortem studies

Similar null findings were noted in a clinical cohort of older adults with nonfatal suicidal behaviour (Tsoh et al., 2005), and in a post-mortem study (Waern et al., 2002).

Neurological conditions

Population and register studies

Two register studies demonstrated a two-threefold increase in suicide risk in older adults with seizure disorders (Erlangsen et al., 2015; Juurlink et al., 2004). Cerebrovascular disease/hemiplegia was also linked to suicide (Erlangsen et al., 2015). Associations with stroke were observed in adjusted analyses in two register studies (Teasdale & Engberg, 2001; Voaklander et al., 2008), but not in a third (Miller et al., 2008). One population-based study showed an association between migraine headache and suicidal ideation (Chan et al., 2011). A second examined a potential association between migraine headache

and wish to die, but no relationship was found (Lapierre et al., 2015).

Post-mortem studies

Serious neurological disorders (dementia excluded) were associated with a nearly ninefold increase in odds for suicide in one study based on informant reports and medical record review (Waern et al., 2002).

Pain

Population and register studies

Pain was associated with wish to die (Jorm et al., 1995) and suicidal ideation (Awata et al., 2005) in older adult populations. Three pain levels (mild, moderate, and more severe) were all associated with baseline and incident past-month suicidal ideation, but not with persistent suicidal ideation (Kang et al., 2014). No association was found between aches and pains and suicidal feelings among 97-year-olds (Fässberg et al., 2013).

Clinical studies

An association between pain and suicidal ideation among home care recipients did not remain in adjusted analyses (Raue et al., 2007).

Musculoskeletal conditions

Population and register studies

A relationship between arthritis/rheumatism and past-year wish to die was observed in a population-based study (Lapierre et al., 2015). A link to suicide was also found in one register study (Erlangsen et al., 2015) but not three other studies (Juurlink et al., 2004; Miller et al., 2008; Voaklander et al., 2008). Osteoporosis was linked to excess risk of suicide among recently diagnosed hospitalized older adults (Erlangsen et al., 2015). Out of a range of fractures, only spinal fractures were found to be linked to suicide in adjusted analyses (Erlangsen et al., 2015; Turvey et al., 2002).

Clinical and post-mortem studies

An association between arthritis and nonfatal suicidal behaviour was reported in one study that compared a cohort of individuals hospitalized following a suicidal act and a population-based group (Tsoh et al., 2005). Parallel findings were demonstrated for the post-mortem cohort also included in that study (Table 4).

Cancer

Population and register studies

Nine register studies reported associations between cancer and various suicidal behaviours (Ahn et al., 2010; Crocetti, Arniani, Acciai, Barchielli, & Buiatti, 1998; Dormer, McCaul, & Kristjanson, 2008; Fang et al., 2012; Miccinesi, Crocetti, Benvenuti, & Paci, 2004; Miller et al., 2008; Misono, Weiss, Fann, Redman, & Yueh, 2008; Smailyte et al., 2013; Voaklander et al., 2008) while one showed no association (Tanaka et al., 1999). Lung cancer was linked to elevated risk of suicide in two studies (Erlangsen et al., 2015; Urban et al., 2013). Prostate and genital cancers were related to elevated suicide risk in males in three studies (Carlsson et al., 2013; Erlangsen et al., 2015; Fall et al., 2009).

Post-mortem studies

Studies from Hong Kong and Sweden showed strong associations between malignancy and suicide (Tsoh et al., 2005; Waern et al., 2002).

Age and sex effects

Population and register studies reporting age effects

Recent history of hospitalization on a medical ward was associated with high suicide risk in men aged 80 and older (Erlangsen et al., 2005). Another register study showed elevated suicide risk in prostate and genital cancers in men aged 80 and older, but not among men aged 70 to 79 (Fang et al., 2010).

Population and register studies reporting sex effects

While sex differences were not directly examined, suicide risk was analysed separately in men and women for 21 physical health conditions in a large Danish study (Erlangsen et al., 2015). Both gastrointestinal cancer and cardiovascular disease diagnosed within the past three years were associated with suicide risk in men but not in women. In contrast, elevated risk was seen in women with brain cancer and glaucoma, but not in men with these conditions. In a South Korean study, having one or more physical illnesses increased the odds of past year suicidal ideation in community dwelling men, but not in women (Jeon, Jang, Rhee, Kawachi, & Cho, 2007). In that same study, the reverse was found for self-reported poor health. A Swedish cancer register study showed a twofold risk of suicide in the 80 and older men only (Allebeck, Bolund, & Ringback, 1989). Several register studies showed mixed results (Allebeck & Bolund, 1991; Oberaigner, Sperner-Unterweger, Fiegl, Geiger-Gritsch, & Haring, 2014).

Post-mortem studies

When Swedish data for women and men were analysed separately, both (1) any serious physical condition and (2) high overall physical-illness burden showed significant associations for men, but not for women (Waern et al., 2002). Age-stratified analyses (Waern et al., 2003) demonstrated that serious physical health problems were associated with a fourfold increase in suicide risk in those aged 75 and older.

Qualitative studies

In studies from Taiwan (Ku, Tsai, Lin, & Lin, 2009; Lee, Tsai, Chen, & Huang, 2014), the Netherlands (Rurup et al., 2011) and Sweden (Van Orden et al., 2014), older adults with a history of suicidal ideation or behaviour were interviewed about the reasons for their suicidality, while in a Canadian study (Clarke, Korotchenko, & Bundon, 2012), older adults were interviewed about preparing for death. Finally, a study from Norway (Kjølseth, Ekeberg, & Steihaug, 2010) used a psychological autopsy method to understand the suicide motives of a sample of older adults, from the point of view of their surviving significant others.

In one of the Taiwanese studies (Ku et al., 2009), male veterans ($N = 19$, ages 73−85) were asked to describe what triggered their suicidal act. Frustration with illness, disability, and pain were mentioned by 95 % of respondents. Their quotes reveal what made, from their perspective, the illnesses and disabilities unbearable and suicidogenic: 'I couldn't accept that I needed to take more and more pills . . . . So I tried to hang myself,' said one veteran (p. 749). 'I used to be a military officer. . . . very concerned . . . about my appearance and dignity. But after the stroke, I needed help to go to the toilet . . . . I felt that I was living without dignity,' said another veteran (p. 749). Explanations for nonfatal self-harm were given by 54 women and 47 men aged 70−91 in the Swedish study (Van Orden et al., 2014). Twenty-four per cent mentioned how disability impacted on their functioning and autonomy ('I can no longer do the things I used to do'), and 16 % explicitly associated their suicidal act with their physical illness or pain ('I wanted to get away from the pain. I decided, I've had enough') (p. 539).

In the second Taiwanese study (Lee et al., 2014), 17 women and 7 men, aged 65−84, and in psychiatric outpatient care, were asked what they believed precipitated their first episode of suicidal ideation in the prior year, as well as what prevented them from 'executing' the suicide. Illness and physical discomfort were at the top of the list of reported reasons for the suicidal ideation, with death seen as 'a good way to resolve . . . [the] health problems' (p. 4).

In a Dutch study (Rurup et al., 2011), interviews were carried out with a sample of adults who had indicated a wish to die in a previous survey. Seventeen of the 31 participants were aged 71−99. Exemplary quotes from three older women were 'You can't do anything . . . I dread every day. Life is so boring (p. 208)'; 'It's not nice to be old . . . . I always did everything myself, but I can't no longer (p. 208); and, 'You're no longer useful . . . . you're not needed anymore' (p. 209). These quotes suggest that the illnesses and disabilities were suicidogenic when they were experienced as depriving the individuals of their independence, sense of usefulness, and pleasure with living.

The Canadian study (Clarke et al., 2012) focused on the end of life plans of 19 women and 16 men who had at least three chronic health problems. These respondents, who were between the ages of 73 and 91 and mostly of European descent, were not interviewed about suicide, but the topic of suicide came up. Women more often spoke 'of not wanting to burden others' (p. 1414) as a reason for their interest in hastening their death. '[M]y daughter having to look after me, that's a big worry to me . . . . that's why I feel that we really should [be able to have] euthanasia,' said an 87-year-old woman (p. 1410). Men tended to emphasize illnesses as a threat to their wish to be independent, powerful, and in control. 'I don't want someone . . . to look after me, wash me, clean me,' said a 79-year-old widower. A 75-year-old man said, 'If I was to have a stroke and have to go to the hospital, how would I get my pills to end it?' For many men, suicide appeared to be a way to regain dignity and control: 'The hell with it! Go home and get the gun out and blow your brains out,' a 79-year-old man stated (p. 1411). According to the authors' study, 'a bad death was defined [by the men in their study] in terms of a loss of autonomy that challenged their view of themselves as active, independent and masculine' (p. 1409).

The Norwegian psychological autopsy study (Kjølseth et al., 2010) of reasons for older adult suicide was based on interviews with 63 informants (relatives, physicians, and home-based care nurses) regarding suicide of 19 men and 4 women aged 65−90 the informants knew well. These interviews were conducted two to six months after the suicide. According to the informants, the older person suffered from illnesses and other strains, such that life had become a burden and death had come to be viewed as a relief. The informants also reported that prior to their suicide, the individuals had said that they were 'tired of living'. The informants generally viewed the older adult suicide as understandable. For example, the physician of a nearly 87-year-old man said he could understand his patient's decision because 'He was old enough to die' (p. 211).

Discussion

This systematic review identified 59 quantitative and 6 qualitative studies exploring the link between a variety of physical illnesses and functional disabilities and suicidal behaviours. While somewhat divergent results were obtained for studies focusing on physical illness per se, results were more consistent regarding functional disability and certain specific physical conditions, including malignant diseases, neurological disorders, male genital disorders, arthritis/arthrosis, COPD, and liver disease. Little support was found for associations with cardiovascular diseases in general but several studies showed elevated risk for MI. Many studies examined a possible link between diabetes and suicide behaviour, but few found evidence for such a connection. While results for renal disease were inconclusive, it should be acknowledged that renal disease can involve clinical complexities (dialysis withdrawal) (Bostwick & Cohen, 2009) not addressed in this systematic review.

Five qualitative studies contributed the perspectives of older adults on the reasons for their suicidality. A further study reported on the beliefs and attitudes of family

members and formal care providers about the recent suicide of an older person they knew well. A common theme across studies was that the illnesses and disabilities were experienced suicidogenic when they threatened the person's independence, sense of usefulness, value, dignity, and/or pleasure with life.

Before results of this review are discussed further, methodological considerations need to be highlighted. Due to variability in definitions of suicidal behaviours and the large variation in physical illness exposures, we were unable to perform a meta-analysis. Also, few clinical studies were found with our search strategy. An alternative search approach (for example, a search that included disease names and employed full-text searches) might have yielded more studies. Another issue is that the degree to which findings were adjusted for potential confounders varied widely among studies.

A cut-off at age 65 was employed in this review. We are aware, however, that older adulthood is a social construct. In some cultures, people in their 40s or 50s might be considered older adults. Furthermore, only a handful of the studies in this review provided age-stratified suicide risk estimates. It is likely that physical health differentially impacts the risk of suicidal behaviour in persons in their early 70s, as compared to persons in their upper 90s. Conventional risk factors may be of less relevance in extreme old age, as suggested by the findings of the Swedish study on suicidal feelings in dementia-free 97-year-olds (Fässberg et al., 2013).

Relatively few studies presented sex-specific results. For many studies, the percentage of women in the sample was not reported. For those that did (see tables), proportions differed widely from study to study. There could be many reasons for this variability, including differing sex-ratios in the background population, in the rate of the particular physical condition being studied, geographical/cultural variations in the sex ratios for a particular type of suicidal behaviour, and differential reporting of suicide in women and men.

We acknowledge that any lack of association between suicidality and physical illness/functional disability might be due to inadequate power. This is less of a problem in register studies, which offer advantages in terms of large sample sizes, no loss to follow-up and objective information regarding dates of hospitalization. However, selection bias (many include hospitalized cases only) and lack of individual-level data are inherent disadvantages. Another limitation is that severity of conditions and time since diagnosis were rarely characterized. Adjustment to any medical condition takes time. Initial feelings of overwhelming hopelessness often abate.

A major limitation specific to the post-mortem studies is the use of proxy data. Informants, often next of kin, were interviewed shortly after the suicide. Their perspectives on the reasons for the suicide were therefore impacted by their recent loss as well as by their relation to the decedent. This is less of an issue in studies that also include data derived from medical records. Regarding the qualitative psychological autopsy study included in this review, it should be mentioned that the authors, who were also interviewers revealed that they considered older adult suicide to have been an acceptable choice for the older adults in their study. This position likely influenced what the authors asked of the informants and how they asked it, as well as the authors' interpretations and conclusions.

Implications for families

This review of the literature provides risk estimates related to a large number of physical conditions, many of which may place significant strain on families and friends of the persons afflicted. While findings from the qualitative studies provide some clues about the thoughts and feelings of suicidal older adults with physical illnesses and/or disabilities, we need to know more about the *consequences* of specific types of physical conditions on individuals and their families, in order to inform interventions. The family is oftentimes the primary source of care for older persons living at home, even in countries like Sweden where municipalities have explicit obligations to provide care for their older adults (Triantafillou et al., 2010). Involving family members in the development and implementation of treatment plans for suicidal older persons should therefore be considered in both acute and long-term care settings (De Leo, Draper, & Krysinska, 2009; Fässberg et al., 2012).

Implications for non-government organisations (NGOs)

This study's findings can inform NGO suicide prevention centres to better map out, address, and plan services for suicidal older adults. An example of a suicide prevention model for older persons is the program developed by the Samaritans of Singapore (SOS) (https://sos.org.sg/). In response to increasing suicide rates, the SOS started collaborating with similar NGOs, government bodies, and other service providers (e.g., day-care, hospitals, nursing homes). Their focus was on creating awareness of older adults with physical illness/disability who may be at heightened risk of suicide. This review identified a number of physical conditions that could be highlighted in educational interventions for staff working with older persons at NGOs, as well as other service providers.

Implications for clinicians

Quantifying the extent or severity of physical illness or functional disability in older patients will not identify potentially suicidal individuals. For example, a controlled psychological autopsy study that examined the last contact with a health professional of persons aged 60 and over who died of suicide or sudden death found that severity of physical illness and functional impairment did not distinguish the suicides from the sudden death cases (De Leo, Draper, Snowdon, & Kolves, 2013).

While this literature review found associations between suicidal behaviour and a number of physical illness and disability conditions, it should be pointed out that the risk estimates were rather modest, as compared to those reported for psychiatric illness (Waern et al., 2002).

Comorbid physical and mental health problems are frequent, especially in older adults. A number of psychological autopsy studies focusing on older adults found that major depression was present in about half of cases (Conwell et al., 2011; Pompili et al., 2008). Therefore, clinicians working with suicidal older adults need to consider both medical and psychiatric morbidity when making choices regarding pharmacological treatment options. During the clinical consultation, asking older persons about how they are getting on with managing their medicines and activities needed for their medical conditions may provide clues to these older persons' suicidal thoughts. Low self-efficacy and feelings of helplessness in dealing with the functional impairment and self-care activities interferes with the quality of life as well as adherence to medical regimens (Bane, Hughes, & McElnay, 2006; Chao, Nau, Aikens, & Taylor, 2005; Lindner, Foerster, & von Renteln-Kruse, 2014).

Integrating mental health care into primary care, medical specialty care, and geriatric health care can be an effective strategy for identifying and treating suicidal older people with physical conditions (Alexopoulos et al., 2009; Bensadon, 2015; Erlangsen et al., 2011; Gallo et al., 2013; Lindner, Foerster, & von Renteln-Kruse, 2013; Unützer et al., 2006; Williams et al., 2007). There is also a need for integrating mental health care and palliative care (Kasl-Godley, King, & Quill, 2014). Collaborative care models typically involve the following components: (1) improving routine screening and diagnosis of depressive disorders; (2) increasing provider use of evidence-based protocols for the proactive management of diagnosed depressive disorder; and (3) improving clinical and community support for patient engagement in treatment goal-setting and self-management (Thota et al., 2012). Promising findings notwithstanding (Alexopoulos et al., 2009; Gallo et al., 2013; Unützer et al., 2006), concerns have been raised about collaborative care's cost and sustainability (Almeida et al., 2012) and potential for disrupting workflow and undermining continuity of care (Wittink, Duberstein, & Lyness, 2013).

The findings of this review suggest that greater attention to, and expertise in suicide prevention is needed in specialty medical settings. Interventions involving specialty medical providers, particularly oncologists and neurologists, need to be developed. Although older adults seen in specialty medical care settings are also seen in primary care settings, those experiencing severe illnesses may be seen more frequently by specialists.

Future research

Most suicide prevention initiatives for older adults focus on depression screening and treatment (Lapierre et al., 2011). Such interventions may miss at-risk physically ill older adults who are distressed in ways not captured by conventional diagnostics (Epstein et al., 2010; Hjelmeland, Dieserud, Dyregrov, Knizek, & Leenaars, 2012; Kjølseth et al., 2010). We actually know little about what at-risk, physically ill patients want, and need, to help them relieve their distress. This paucity of data must be viewed in the context of the biomedical model's emphasis on diagnosis and treatment, which leaves little room for listening and empathically responding to the person's narrative (Duberstein & Wittink, 2015; Wittink et al., 2013). There is however cause for optimism. For example, advances in information technology could be used in connection with automated practice audits (Almeida et al., 2012) and for the facilitation of client-provider communication and decision-making (Duberstein & Wittink, 2015). A recent intervention study demonstrated increased clinician inquiry about suicide when older adults completed a brief computerized survey in the waiting room (Shah et al., 2014). More research is needed on whether eliciting and responding to older adults' psychological needs in the context of medical care reduces the risk of suicidal behaviour and improves other health outcomes (Duberstein & Wittink, 2015).

While the topic of voluntary euthanasia was beyond the scope of the current review, it is likely that there is an overlap with suicide, especially in those with serious physical illness. The literature on the topic is sparse. One Australian psychological autopsy study focusing on persons aged 60+ addressed this issue, reporting that 8.5% of suicides belonged to a euthanasia group (De Leo et al., 2013). Many of the themes identified in the qualitative studies we reviewed (e.g., loss of autonomy, inability to engage in activities) were also observed among terminally ill persons of mixed ages who died under the Oregon Death with Dignity Act (Oregon Public Health Division, 2014). Relevant to the current paper is the finding that loss of control of bodily functions was endorsed by half of those who died in accordance with the Death with Dignity Act, highlighting the need for more research on the topic. There is also a need for more research on the withdrawal of life support, not just in renal disease (Bostwick & Cohen, 2009) but in other conditions as well.

Another question for future research is how and why suicide motivations may differ in older women and men, as well as, more generally, why older men in some cultures are more likely than older women to die by suicide under conditions of ill health and disability (Canetto, 1992; 1997). In this regard, we need to remember that there is significant variability, across cultures, in rates of older adult suicide as well as variability in female/male suicide rate ratios. Research on scripts of gender and aging, illness and suicide across cultures (Canetto & Lester, 1998; Stice & Canetto, 2008) would help make sense of the global variability in suicidality among older adult women and men, and would support the design of culture- and gender-grounded suicide prevention programmes.

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