Dementia and Geriatric Cognitive Disorders

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Review Article

Depression and Quality of Life in Older Persons: A Review

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Key Words
Cognition · Cross-sectional studies · Depression · Depressive disorder · Epidemiologic studies · Longitudinal studies · Psychogeriatric hospital · Older persons · Quality of life

Abstract
Background: Depression is a prevalent and disabling condition in older persons (≥60 years) that increases the risk of mortality and negatively influences quality of life (QOL). The relationship between depression, or depressive symptoms, and QOL has been increasingly addressed by research in recent years, but a review that can contribute to a better understanding of this relationship in older persons is lacking. Against this background, we undertook a literature review to assess the relationship between depression and QOL in older persons. ***Summary:*** Extensive electronic database searches revealed 953 studies. Of these, 74 studies fulfilled our criteria for inclusion, of which 52 were cross-sectional studies and 22 were longitudinal studies. Thirty-five studies were conducted in a clinical setting, while 39 were community-based epidemiological studies. A clear definition of the QOL concept was described in 25 studies, and 24 different assessment instruments were employed to assess QOL. Depressed older persons had poorer global and generic health-related QOL than nondepressed individuals. An increase in depression severity was associated with a poorer global and generic health-related QOL. The associations appeared to be stable over time and independent of how QOL was assessed. ***Key Messages:*** This review found a significant association between severity of depression and poorer QOL in older persons, and the association was found to be stable over time, regardless which assessment instruments for QOL were applied. The lack of a definition of the multidimensional and multilevel concept QOL was common, and the large variety of QOL instruments in various studies make a direct comparison between the studies difficult.

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Introduction

The World Health Organization (WHO) has predicted that by 2020 depression will become the third leading cause of disability worldwide [1]. Depression in older persons (≥60 years) is prevalent in community living settings [2–8] and even more prevalent among older individuals who have been hospitalized due to serious physical diseases or institutionalized due to reduced physical and/or cognitive functioning [9–12]. Known risk factors for depression are female gender [1, 13], older age [14, 15], poorer coping abilities [16], physical morbidity [2, 4, 9, 17–22], impaired level of functioning [2, 5, 6, 9, 13, 18, 23–29], reduced cognition [2, 3, 8, 20, 30–35], and bereavement [13, 36]. Depression has been associated with an increased risk of mortality [2, 37], and poorer outcome of treatment of physical disorders [4, 10]. In addition, depression may influence quality of life (QOL) negatively [38–40].

The WHO defines the concept of QOL as 'individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns' [41]. QOL is a multidimensional and multilevel concept. The QOL concept is often divided into three levels, where global QOL is at the highest level in a hierarchy, followed by generic health-related QOL (HQOL) at the next level, and disease-specific HQOL (not included in this review) at the third and lowest level [42]. Global QOL may include general life satisfaction (LS) and covers general feelings of well-being (WB) [38, 42] and other aspects such as economic situation, health, social and/or spiritual aspects of life [43]. Generic HQOL usually includes domains such as physical, psychological, social, and environmental evaluations of life [38], with both positive and negative aspects [38, 41]. Therefore, generic HQOL is a more comprehensive concept than the current health status of an individual.

Several studies worldwide have explored the relationship between depressive symptoms or a depressive disorder and QOL in older persons, but as far as we know, there is no review. A review can offer a summary of existing quantitative research with a quality assessment of each study to contribute to a better understanding of the relationship between depression and QOL. The wide range of definitions of QOL complicates the research field and may make comparisons between studies difficult. Furthermore, the wide variety of assessment instruments for both depression/depressive symptoms and QOL [2–8, 10, 18, 20, 21, 25, 26, 34, 44–51] increases the need for a review of the existing research. Given these challenges, the aim of the present study was to review the literature on the association between depression and QOL in older persons.

Method

Selection of Studies

We conducted a systematic, computerized search in the MEDLINE, PubMed, PsychINFO, EMBASE and CINAHL databases (end date March 9, 2014). We used the terms 'depress' (with truncation, which included all words that contained depress, such as depression, depressed, depressive etc.), AND 'older persons' OR 'aging' OR 'elder care' OR 'geriatric patient' OR 'geriatric psychiatry' OR 'geriatric psychotherapy' AND 'quality of life' OR 'life satisfaction' OR 'well-being'. According to database-specific rules, CINAHL headings, key words, and MeSH terms were combined, as in 'depression in old age' OR 'depression in the elderly'. In addition, reference lists were screened to find studies that were otherwise not detected by the systematic searches. Studies were included in the review if they met the following criteria:

- mean age of studied subjects ≥60 years,
- a quantitative design,
- depression was classified according to established diagnostic criteria [Diagnostic and Statistical Manual for Mental Disorders (DSM); International Classification of Diseases (ICD)] or assessed and defined by a specific depression instrument,

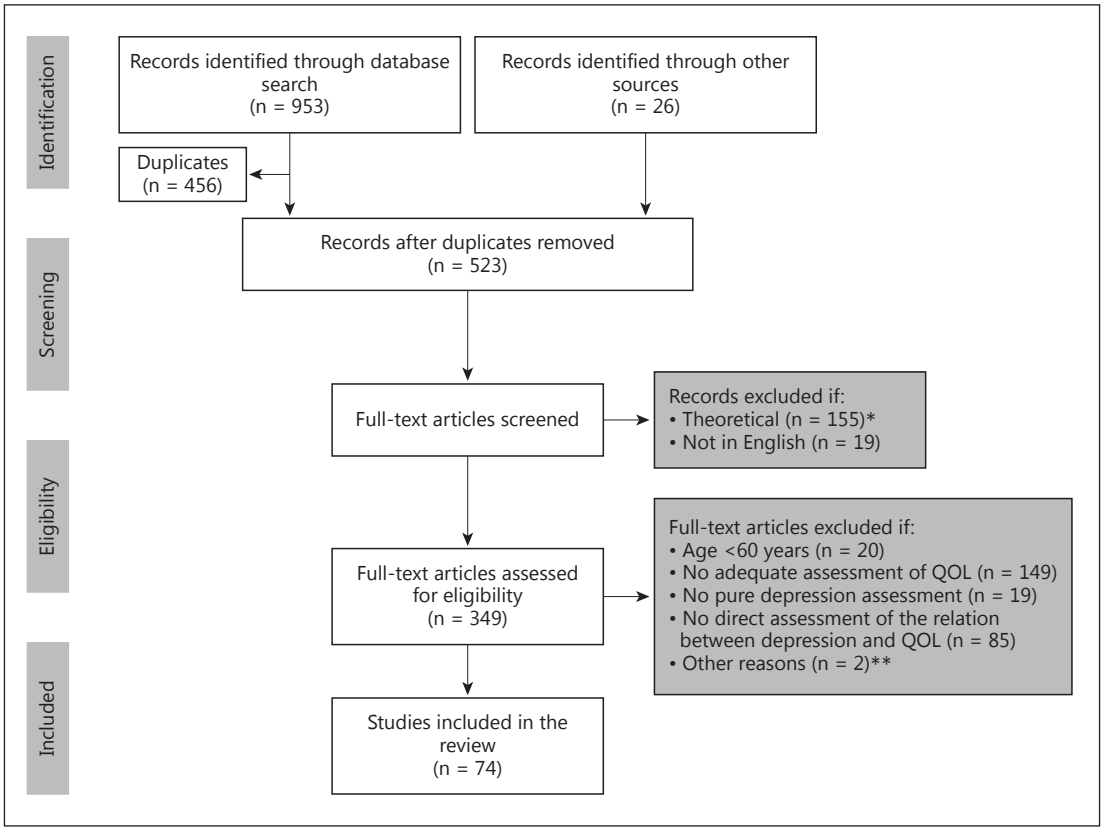

Fig. 1. Flow diagram of studies identified, screened, assessed for eligibility, and included in this review [52]. * Theoretical records excluded the use of theoretical articles, reviews, comments, protocols and dissertations. ** Other reasons for excluding studies were, e.g., same participants used in more than one study without new results (n = 2).

- at least 1 assessment instrument for global QOL or generic HQOL,
- an assessment of a relationship between depression and the concept of QOL was undertaken in the same individuals,
- the study was published in a scientific referee-based journal written in English.

Studies were excluded from the review if they were theoretical, reviews, editorials, comments or disseminations.

Identification of Relevant Studies

The titles and abstracts of 953 record hits were screened; 26 additional records were located by examining reference lists to identify relevant publications not detected by the computerized search. After screening titles and abstracts, 523 studies were kept for full-text screening and evaluation based on the inclusion and exclusion criteria. The search, screening, and full-text screening were performed by 2 researchers (H.S. and A.-S.H.). Detailed information about the studies that were identified, screened, assessed for eligibility, and included in this review is presented in the PRISMA flow diagram (fig. 1) [52].

Quality Assessment

Based on theoretical considerations and methodological aspects, the quality of each of the studies was assessed according to predefined criteria [53, 54]. Eight quality criteria (fig. 2) were used. The first five were scored as 0 or 1, whereas the three latter were scored as 0, 1, or 2 because valid and reliable information on depression and the QOL assessment was considered to be of leading importance in the evaluation covering the main focus of this review. Thus, the quality score varied between 0 and 11.

One point was given if the study was
(a) Longitudinal
(b) Contained information about the setting
(c) Included more than 100 participants
(d) Contained information about cognitive functioning
(e) Applied a theoretical-based QOL definition

Two points were given if
(a) Information about the diagnosis was according to the DSM or the ICD
(b) A well-established assessment of depression was used
(c) A well-established QOL assessment was used

Total score
A total score was calculated by totaling up the number of positive criteria (0 – 11 points)

Fig. 2. Criteria for assessing quality.

Choosing a summary cutoff score for 'high quality' remains arbitrary [55] but is usually within a threshold between 50 and 70% of the maximum obtainable points [16, 53, 56], and an a priori cutoff value for 'high quality' above 60% was established. A study was considered to be 'high quality' when it scored ≥7 points, and 'low quality' when it scored ≤6 points of the maximum obtainable 11 points. This simple method recommended in the Cochrane Handbook for Reviews was selected to ascertain the validity of the review [55, 57].

Results

Methodological Quality of the Studies

In total, 52 studies had a cross-sectional design, and 22 studies had a longitudinal design (tables 1, 2). The concept of QOL was defined in 25 studies. The results of the quality assessment showed that one longitudinal study received 11 points (1.4%). Of the 74 studies, 32 cross-sectional (43.3%) and 21 longitudinal (95.5%) were high quality, according to our evaluation. Studies that received ≤6 points lacked four or more of the quality criteria.

No studies reported difficulties administrating the QOL instruments. In all, 45 studies reported that they excluded individuals with cognitive impairment or a diagnosis of dementia, of which 30 were cross-sectional studies (58.8%) [11, 12, 17, 19, 24, 30–33, 37, 58–60, 62–66, 69, 72, 73, 75–78, 88–92] and 15 were longitudinal studies (68.2%) [2–4, 8, 10, 18, 20, 21, 25, 26, 34, 45, 46, 48, 49]. Cognitive function was equally assessed in clinical studies (n = 11) and in community-based studies (n = 12). The Mini-Mental State Examination (MMSE) was used in 23 studies [2, 8, 10, 12, 17, 19, 20, 25, 26, 31–33, 37, 48, 58, 62, 66, 69, 73, 78, 88–90] for exclusion purposes. To exclude participants, the cutoff score for the MMSE varied considerably between the studies, i.e. a short form was used in one study with a cutoff ≤5. Otherwise, the range in the original MMSE was ≤9–28 (tables 3, 4).

Settings and Samples

Of the 74 studies, 34 studies were clinical studies and 39 studies were community-based epidemiological studies. One study was carried out simultaneously in hospitals, primary health-care settings and in the community (tables 3, 4). The most frequent setting in the clinical studies was psychogeriatric hospitals (inpatients, 4 studies; outpatients, 7 studies) and medical hospitals (inpatients, 6 studies; outpatients, 3 studies). The remaining clinical studies (14 studies) were carried out in primary care settings such as GP practices, nursing homes, long-term care or assisted living facilities. The mean age of the participants in the

Table 1. Quality assessment of the cross-sectional studies (n = 52)

First author [Ref.]	Prospective design	Setting defined	n > 100	Cognitive functioning	Definition of QOL with reference to literature	Diagnosis of depression (DSM/ICD)	Well-established assessment of depression	Well-established assessment of QOL	Score +/– (max 11)
Chan [58]	–	1	1	1	1	2	2	2	10
Ni Mhaolain [59]	–	1	1	1	1	2	2	2	10
Chan [17]	–	1	–	1	1	2	2	2	9
Friedman [60]	–	1	1	1	–	2	2	2	9
Naumann [61]	–	1	1	–	1	2	2	2	9
Scocco [62]	–	1	1	1	–	2	2	2	9
Chan [63]	–	1	–	1	–	2	2	2	8
Deslandes [64]	–	1	–	1	–	2	2	2	8
Dezutter [65]	–	1	1	1	1	–	2	2	8
Diefenbach [66]	–	1	–	1	–	2	2	2	8
Gallegos-Carrillo [19]	–	1	1	1	1	–	2	2	8
Helvik [30]	–	1	1	1	1	–	2	2	8
Helvik [11]	–	1	1	1	1	–	2	2	8
Korte [67]	–	1	1	–	–	2	2	2	8
Ordu Gokkaya [12]	–	1	1	1	1	–	2	2	8
Park [68]	–	1	1	–	–	2	2	2	8
Xavier [33]	–	1	–	1	–	2	2	2	8
Akyol [9]	–	1	1	–	1	–	2	2	7
Cheng [69]	–	1	1	1	–	–	2	2	7
Cummings [24]	–	1	1	1	–	–	2	2	7
Doraiswamy [70]	–	1	–	–	–	2	2	2	7
Dragomirecka [71]	–	1	1	–	1	–	2	2	7
Flood [72]	–	1	1	1	–	–	2	2	7
Garcia-Pena [73]	–	1	1	1	–	–	2	2	7
Ghubach [74]	–	1	1	–	1	–	2	2	7
Lee [75]	–	1	1	1	–	–	2	2	7
Margis [31]	–	1	–	1	1	–	2	2	7
Minardi [76]	–	1	–	1	1	–	2	2	7
O'Brien [77]	–	1	1	1	–	–	2	2	7
Rogers [78]	–	1	–	1	1	–	2	2	7
Ryu [79]	–	1	1	–	1	–	2	2	7
Van der Weele [37]	–	1	1	1	–	–	2	2	7
Boey [22]	–	1	1	–	–	–	2	2	6
Brown [23]	–	1	1	–	–	–	2	2	6
Chachamovich [80]	–	1	1	–	–	–	2	2	6
Coleman [81]	–	1	1	–	–	–	2	2	6
Demura [82]	–	1	1	–	–	–	2	2	6
Garner [83]	–	1	–	–	1	–	2	2	6
Gonzáles-Celis [84]	–	1	–	–	1	–	2	2	6
Halvorsrud [85]	–	1	–	–	1	–	2	2	6
Netuveli [86]	–	1	1	–	–	–	2	2	6
Street [27]	–	1	1	–	–	–	2	2	6
Wada [28]	–	1	1	–	–	–	2	2	6
Wada [29]	–	1	1	–	–	–	2	2	6
Yoon [87]	–	1	1	–	–	–	2	2	6
Galhardo [88]	–	1	–	1	–	–	2	2	6
Hayes [89]	–	1	–	1	–	–	2	2	6
Lam [90]	–	1	–	1	–	–	2	2	6
McCurren [91]	–	1	–	1	–	–	2	2	6
Ricarte [32]	–	1	–	1	–	2	–	2	6
Werngren-Elgström [92]	–	1	–	1	–	–	2	2	6
Kemp [93]	–	1	–	–	–	–	2	2	5

Table 2. Quality assessment of the longitudinal studies (n = 22)

First author [Ref.]	Prospective design	Setting defined	n > 100	Cognitive functioning	Definition of QOL with reference to literature	Diagnosis of depression (DSM/ICD)	Well-established assessment of depression	Well-established assessment of QOL	Score +/– (max 11)
Solomon [49]	1	1	1	1	1	2	2	2	11
Enkvist [44]	1	1	1	–	1	2	2	2	10
Hasche [45]	1	1	1	1	–	2	2	2	10
Shmuely [21]	1	1	1	1	–	2	2	2	10
Helvik [46]	1	1	1	1	1	–	2	2	9
Lavretsky [20]	1	1	–	1	–	2	2	2	9
Preschl [48]	1	1	–	1	–	2	2	2	9
Shrira [7]	1	1	1	–	–	2	2	2	9
Zhang [34]	1	1	1	1	1	–	2	2	9
de Jonge [10]	1	1	1	1	–	–	2	2	8
Feng [2]	1	1	1	1	–	–	2	2	8
Garcia-Pena[3]	1	1	1	1	–	–	2	2	8
Ho [4]	1	1	1	1	–	–	2	2	8
Lapid [25]	1	1	–	1	1	–	2	2	8
Wolinsky [8]	1	1	1	1	–	–	2	2	8
Chan [18]	1	1	–	1	–	–	2	2	7
Hsu [5]	1	1	1	–	–	–	2	2	7
Lue [6]	1	1	1	–	–	–	2	2	7
Mazumdar [47]	1	1	1	–	–	–	2	2	7
McCurren [26]	1	1	–	1	–	–	2	2	7
Tatulian [50]	1	1	–	–	1	2	2	–	7
Wang [51]	1	1	–	–	–	–	2	2	6

studies varied between 62.8 and 86.5 years. The proportion of females for all studies was 70% or higher in 26 (35.1%) of the studies we reviewed.

High-quality cross-sectional studies (32 studies) were conducted in clinical settings (16 studies), hospitals (11 studies), and primary health care (5 studies). The remaining 16 studies were community based. The high-quality longitudinal studies (21 studies) were conducted in clinical settings in 11 studies, in hospitals (8 studies), and primary health-care settings (3 studies), while the remaining 10 studies were community based.

Geographical Region

The 74 published studies showed notable differences in the usage of diagnostic procedures and assessments of depression/depressive symptoms across regions of the world (tables 3, 4). While structured clinical interviews were commonly used in North America (USA and Canada; 43.5%) and Asia (including Russia and the United Arab Emirates; 36.8%), they were less frequently used in Europe (23.8%). The use of QOL assessment instruments across regions varied. While the use of the WHO Quality of Life Scale (WHOQOL-BREF, WHOQOL-100, and WHOQOL-OLD) instruments dominated in Europe (8 of 21 studies), LS instruments dominated in the USA (13 of 23 studies), whereas in South America (Mexico and Brazil) almost all studies used the Medical Outcomes Study short form (SF-36; 6 of 7 studies). In Asia, no instrument seemed to dominate.

All continents were represented among the 74 studies. Studies from North America (31.1%), Asia, the Middle East and Russia (28.4%), and Europe (27%) were most common, followed by South America (9.5%) and Oceania (Australia; 2.7%). One study (1.4%) included 20 countries from four continents [80].

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Table 3. Cross-sectional studies (n = 52)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Instruments used to assess global QOL (WB-LS) and/or generic HQOL	Instruments used to assess (indicate) depression	Findings on relationship between depression and quality of life	Comments on method
Akyol [9] 2010 Turkey	To evaluate the relation between the level of depressive symptoms and HQOL and health aspects	120 older persons in medical hospitals M = 71.5 (SD = 4.7) years, 88.3% female	n.a.	Generic HQOL: SF-36	GDS (30 items)	HQOL was negatively correlated with level of depressive symptoms	Spearman's rank-order correlation analysis
Boey [22] 2000 China	To examine the psychometric properties of GDS-15 and its relation to LS and other measures	511 + 48 community-dwelling persons *511 participants:* M = 69.2 (SD = 6.9) years, 52.8% female *48 participants:* M = 68.4 years, 46.8% female	n.a.	LS: LSI-A (8 items) and SWLS (5 items)	GDS (15 items)	Higher depressive symptom score was negatively correlated with LS	Spearman's rank-order correlation analysis
Brown [23] 2011 USA	To investigate if depressive symptomatology is associated with reduced HQOL and other variables	443 community-dwelling persons M = 65.3 (SD = 16.5) years, 70% female	n.a.	Generic HQOL: WHOQOL-BREF	GDS (15 items)	Higher depressive symptom score was negatively associated with physical QOL	Hierarchical linear regression analysis Adjusted for age, education, anxiety and interactions
Chachamovich [80] 2008 20 countries in Europe, Asia, North and South America	To assess the association of depression and subsyndromal depression on HQOL	4,316 persons from university hospitals, nursing homes, and community-dwelling *Depressed participants:* M = 73.1 (SD = 3.1) years, 64.4% female *Nondepressed participants:* M = 71.8 (SD = 7.9) years, 56.8% female	n.a.	Generic HQOL: WHOQOL-OLD and WHOQOL-BREF	GDS (15 items) ≥6	Depression was associated with all domains of HQOL, also in a subsample of persons with only subsyndromal depression	Hierarchical linear regression analysis Adjusted for gender, age, marital status and education
Chan [17] 2006 China	To investigate the relationship between depressive symptoms score and HQOL and other variables in depressed persons	80 community-dwelling persons diagnosed with depression M = 73.3 years, 76.3% female	Exclusion: if cognitive impairment (MMSE ≤18–22 depending on education)	Generic HQOL: WHOQOL-BREF	DSM-IV HAM-D (17 items) GDS (15 items)	Higher depressive score was negatively associated with WHOQOL total score	Stepwise multiple linear regression analysis Adjusted for number of physical health conditions and IADL impairment
Chan [58] 2006 China	To compare HQOL in older persons with and without depression	80 depressed outpatients from psychogeriatric centers and 179 nondepressed persons *Depressed:* M = 73.2 years, 76.3% female *Nondepressed:* M = 79.5 years, 42.5% female	Exclusion: if cognitive impairment (MMSE ≤18–22 depending on education)	Generic HQOL: WHOQOL-BREF	DSM-IV GDS (15 items)	The depressed group had significantly lower HQOL scores (all domains) compared to nondepressed group Higher depression symptom score was negatively correlated with HQOL	Group comparison (t test) Pearson's product moment correlation analysis
Chan [63] 2006 China	To investigate the relationship between depression and HQOL and other health conditions	71 community-dwelling persons diagnosed with depression M = 71.6 years, 73.2% female	Exclusion: if cognitive impairment or communication difficulties	Generic HQOL: WHOQOL-BREF	DSM-IV GDS (15 items)	Higher depressive symptom score was associated with all aspects of HQOL, except the social aspect of HQOL	Multiple linear regression analysis Adjusted for MMSE, PADL, IADL, number of medical conditions and social support
Cheng [69] 2008 China	To study the relationship between depression and LS and other variables	205 persons from social centers M = 73.1 (SD = 6) years, 68.8% female	Exclusion: if cognitive impairment (MMSE ≤20)	LS: SWLS (5 items)	CES-D (10 items) ≥12	Depression was negatively correlated with LS	Correlation analysis (type not stated)

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Table 3 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Instruments used to assess global QOL (WB-LS) and/or generic HQOL	Instruments used to assess (indicate) depression	Findings on relationship between depression and quality of life	Comments on method
Coleman [81] 1995 UK	To study similarities and differences in depression and WB assessment instruments in persons in acute elderly care wards and rehabilitation units	*Sample 1:* 101 persons from acute elderly care ward M = 84.7 (SD = 6.1) years, 71.7% female *Sample 2:* 120 persons from acute elderly care ward M = 85.8 (SD = 5.0) years, 88.8% female *Sample 3:* 100 persons from acute elderly rehabilitation unit M = 77.9 (SD = 6.7) years, 62% female	n.a.	WB: PGC	GDS (30 and 15 items)	Higher depressive symptoms score was negatively associated with WB Those with depression had lower QOL than those without depression	Spearman's rank-order correlation Two-sample t test
Cummings [24] 2004 USA	To examine depression and LS	145 assisted living persons in community M = 84.4 (SD = 7.2) years, 77.4% female	Exclusion: if cognitive impairment	LS: LSI-Z (13 items)	CES-D (10 items)	Higher depressive symptom score was negatively associated with LS	Correlation analysis (type not stated)
Demura [82] 2003 Japan	To investigate the relation between depression, lifestyle and QOL	1,302 community-dwelling persons Age ≥65 years, 49.5% female	n.a.	WB: PGC LS: LSI	GDS (15 items) ≥10	Depression was associated with low QOL in terms of 'morale'	Multiple logistic regression analysis Adjusted for age, gender, smoking, lifestyle and physical health variables
Deslandes [64] 2008 Brazil	To observe correlations between measures, including depressive symptoms and HQOL	22 patients hospitalized in geriatric psychiatry with depression and 14 healthy subjects *Depressed:* M = 71.6 (SD = 1.2) years, 95% female *Healthy:* M = 72.4 (SD = 1.7) years, 93% female	Exclusion: if dementia (DSM-IV)	Generic HQOL: SF-36	DSM-IV BDI MADRS HAM-D (17 items)	Higher depressive symptom score was negatively correlated with HQOL The depressed group had lower HQOL scores compared to the group without depression	Spearman's rank-order correlation analysis ANOVA
Dezutter [65] 2013 Belgium	To investigate the relationship between depression and LS and other variables	100 persons from community and organizations M = 76.5, (SD = 6.9) years, 61% female	Exclusion: if geriatric cognitive disorders	LS: SWLS	CES-D (12 items)	Higher depressive symptom score was negatively associated with LS	Pathway analysis Additional variables included were sense of coherence, integrity and despair
Diefenbach [66] 2012 USA	To study the contribution of depressive and anxiety symptoms to HQOL	66 community-dwelling persons with in-home care M = 76.4 (SD = 7.04) years, 83.3% female	Exclusion: if cognitive impairment (MSQ ≤8 or MMSE ≤20)	Generic HQOL: SF-12	DSM-IV GDS (15 items)	Depressive symptom score was associated with impaired domains of HQOL (role physical, role emotional, mental health and bodily pain)	Hierarchical linear regression analysis Adjusted for physical health variables and cognitive, functional status and anxiety
Doraiswamy [70] 2002 USA	To compare HQOL in depressed older persons with a matched control group	100 somatic outpatients with depression and a disabling condition M = 70.2 (SD = 7.8) years, 57% female Sample compared with population norms	n.a.	Generic HQOL: SF-36	DSM-IV HAM-D (21 items)	Higher depressive score was negatively correlated with domains of HQOL (physical functioning, role physical and mental health) in depressed persons Older persons without depression had better HQOL than the depressed persons in 5 of 8 domains (general health, mental health index, role emotional, social function and vitality)	Correlation analysis (type not stated) Group comparison (t test)

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First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Instruments used to assess global QOL (WB-LS) and/or generic HQOL	Instruments used to assess (indicate) depression	Findings on relationship between depression and quality of life	Comments on method
Dragomirecka [71] 2008 Czech Republic, Norway, Germany, Denmark, Sweden and Switzerland	To compare HQOL in persons from different countries and study factors related to QOL	1,981 community-dwelling persons from 6 countries in Europe M = 73.1 (SD = 8.0) years, 53.2% female	n.a.	Generic HQOL: WHOQOL-OLD and WHOQOL-BREF	GDS (15 items) ≥6	Depression was negatively associated with most HQOL domains	Hierarchical cluster analysis with the Ward's method Aggregated data were analyzed with logistic regression Adjusted for age, gender, education, satisfaction with grand/children, financial situation and living circumstances
Flood [72] 2006 USA	To study the relationship between depression and LS and other variables	152 persons in assisted living facility M = 75.7 (SD = 9.7) years, 76.3% female	Exclusion: if cognitive impairment (set test)	WB: PIL (20 items) LS: LSI-A	GDS (15 items)	Higher depressive symptom score was negatively correlated with LS	Spearman's rank-order correlation analysis
Friedman [60] 2005 USA	To validate the GDS-15	960 community primary care patients M = 79.3 (SD = 7.4) years, 74.6% female	Exclusion: if cognitive impairment (CPS ≥2)	LS: One item 'How would you rate your satisfaction with your current life?'	MINI GDS (15 items)	Higher depressive symptoms score was negatively correlated with LS	Spearman's rank-order correlation analysis
Galhardo [88] 2010 Brazil	To study the relationship between HQOL and depression in older persons with pressure ulcers	42 community outpatients *Persons with ulcers (n = 21):* M = 76.5 years *Persons without ulcers (n = 21):* M = 79.4 years Predominantly female in both groups	Exclusion: if cognitive impairment (MMSE, cut score unknown)	Generic HQOL: SF-36	GDS (15 items)	Higher depression symptom score was negatively correlation with domains of HQOL, general health, mental health and vitality	Spearman's rank-order correlation analysis
Gallegos-Carrillo [19] 2009 Mexico	To study the influence of depressive symptoms on HQOL	1,085 community-dwelling persons *Depressed persons (n = 290):* M = 75.4 (SD = 8.4) years, 59% female *Nondepressed persons (n = 795):* M = 69.7 (SD = 6.3) years, 57.7% female	Exclusion: if cognitive impairment (MMSE ≤23)	Generic HQOL: SF-36	GDS (15 items)	Higher depressive score was negatively associated with HQOL	Multiple linear regression analysis Adjusted for age, gender, marital status, education, activity, lifestyle and acute and chronic morbidity
Garcia-Pena [73] 2008 Mexico	To examine the association between depression and HQOL	7,449 community-dwelling persons M = 70.5 years, 61.4% female	Exclusion: if cognitive impairment (MMSE ≤23)	Generic HQOL: SF-36	GDS (30 items) ≥11	Presence of depressive symptoms influenced HQOL total and all the domains negatively, especially with additional morbidity compared with those without depressive symptoms	Group comparison Adjusted for age, gender, education, marital situation, illness of someone close, retirement, trouble with neighbors and financial situation
Garner [83] 2007 USA	To examine the relationship between depression and LS and other variables	30 healthy community-dwelling persons M = 71.7 (SD = 7.1) years, 63.3% female	n.a.	WB: LPQ LS: LSI-A	BDI-II	Lower LS was negatively associated with depression symptom score	Stepwise multiple linear regression analysis Adjusted for purpose in life

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Table 3 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Instruments used to assess global QOL (WB-LS) and/or generic HQOL	Instruments used to assess (indicate) depression	Findings on relationship between depression and quality of life	Comments on method
Ghubach [74] 2010 United Arab Emirates	To examine the relationship between psychiatric disorder (depression and anxiety) and LS and other physical disorders	610 community-dwelling persons M = 68.6 (SD = 8.3) years, 43.1% female	n.a.	LS: One item 'How satisfied are you with your present life situation?'	GMS-AGECAT 3	Depression was associated with lower LS	Multiple logistic regression analysis Adjusted for other health conditions (physical and anxiety)
González-Celis [84] 2013 Spain	To evaluate the relationship between depression and QOL and related variables	75 community-dwelling persons with and without depression assigned to a health clinic M = 65 (SD = 9.4) years, 60% female	n.a.	WB: PGC Generic HQOL: WHOQOL-100	GDS (15 items) ≥5	Depression was negatively associated with domains of HQOL (physical health, psychological health, independence, social relations, and environmental), but not with spirituality	Group comparison ANOVA
Halvorsrud [85] 2010 Norway and Denmark	To study the relationship between depressive symptoms and QOL and other health and environmental conditions	89 persons receiving community health care M = 78.6 (SD = 7.4) years, 73% female	n.a.	Generic HQOL: WHOQOL-OLD and WHOQOL-BREF (environment domain, health satisfaction 1 item) SF-12 (physical function)	GDS (15 items)	Depressive symptoms had an indirect negative effect on HQOL, via physical functioning and health satisfaction	Pathway analysis Additional variables included were age, physical function, health satisfaction and environmental support
Hayes [89] 2001 USA	To validate the HLDS instrument	73 community residents in senior apartments Age ≥60 (range 60–95), 83.8% female	Exclusion: if cognitive impairment (MMSE ≤22)	LS: LSI-Z (13 items)	HLDS (20 items)	Higher depression symptom score was negatively correlated with LS	Correlation analysis (type not stated)
Helvik [30] 2010 Norway	To explore how health-related factors were associated with HQOL	484 acutely ill patients in medical ward M = 80.7 (SD = 7.4) years, 50.2% female	Exclusion: if severe dementia (CDR = 3)	Generic HQOL: WHOQOL-BREF	HADS-D ≥8	Depression was negatively associated with HQOL (all domains)	Multiple linear regression analysis Adjusted for cognition, PADL, anxiety and physical health variables
Helvik [11] 2011 Norway	To compare how health-related factors were related to LS in acutely ill and hospitalized older persons and community residents	484 acutely ill patients in medical ward 10,474 community-dwelling persons *Patients:* M = 80.7 (SD = 7.4) years, 50.2% female *Community-dwelling persons:* M = 73.3 (SD = 6.3) years, 54.2% female	Exclusion: *Patients:* if severe dementia (CDR = 3) *Community-dwelling persons:* n.a.	LS: One item 'When you think about your present situation, are you on the whole satisfied or dissatisfied with your life?'	HADS-D ≥8	Depression was negatively associated with LS	Multiple linear regression analysis Adjusted for age, gender, living alone, impairment, subjective health, friends and participation in social life and anxiety
Kemp [93] 1997 USA	To study depression and LS in aging polio survivors with age-matched controls	121 aging postpolio persons and 60 matched persons not postpolio, all community dwelling *Postpolio:* M = 62.8 years, 65.3% female *Not postpolio:* M = 63.7 years, 58% female	n.a.	LS: LS scale (unknown, 11 items)	GDS (30 items)	Higher depressive symptom score was negatively correlated with LS in aging postpolio persons, but not in matched controls	Correlation analysis (type not stated)

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Table 3 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Instruments used to assess global QOL (WB-LS) and/or generic HQOL	Instruments used to assess (indicate) depression	Findings on relationship between depression and quality of life	Comments on method
Korte [67] 2011 The Netherlands	To investigate adaption to critical life events and related factors	171 persons with mild to moderate depressive symptoms living in the community M = 64 (SD = 7.4) years, 73% female	n.a.	LS: MANSA (12 items)	MINI CES-D (20 items)	Higher depressive symptoms score was negatively correlated with LS	Pearson's product-moment correlation analysis
Lam [90] 1997 Canada	To assess depressive symptomatology and its correlates	45 Chinese-Americans living in the community. M = 71.8 years, 53.3% female	Exclusion: if cognitive impairment (MMSE ≤20)	LS: LSI-A (10 items)	GDS (30 items)	Higher depressive symptom score was negatively correlated with LS	Pearson's product-moment correlation analysis
Lee [75] 2012 USA	To explore the role of stress and coping in depression and LS	316 persons in assisted living facilities M = 82.6 years, 70.9% female	Exclusion: if cognitive impairment	LS: SWLS (5 items)	GDS (15 items)	Higher depressive symptom score was negatively correlated with LS	Correlation analysis (type not stated)
Margis [31] 2010 Brazil	To assess depressive symptoms, other health indicators and HQOL in patients with Parkinson's disease	57 patients in medical hospital M = 70.3 (SD = 6.8) years, 47% female	Exclusion: if cognitive impairment (MMSE ≤24 and ≤20 without any schooling)	Generic HQOL: WHOQOL-OLD	GDS (30 items)	Depressed persons had lower HQOL than nondepressed persons	Two-sample t test
McCurren [91] 1993 USA	To examine correlation between depressive symptoms, HQOL and LS	40 community-dwelling persons M = 77 years, 52.5% female	Exclusion: if cognitive impairment (MSQ ≤5)	LS: Cantril's ladder WB: PGC and generic HQOL One item about health in general	CES-D (20 items)	Higher depressive symptoms were negatively correlated with HQOL and LS	Correlation analysis (type not stated)
Minardi [76] 2004 UK	To investigate the incidence of depression and its associations with perceptions	24 community-dwelling persons attending community day care centers M = 82 years (female), 77 years (male), 83.3% female	Exclusion: if dementia	LS: SWLS	GMS-AGECAT	Depressed persons had lower LS than nondepressed persons	Group comparison (Mann-Whitney U test)
Naumann [61] 2004 Australia	To validate a WHOQOL measure and examine associations between depression and HQOL and other variables	41 clinically depressed persons from psychogeriatric centers M = 78.1 (SD = 6.7) years, 68.3% female	n.a.	Generic HQOL: WHOQOL-BREF and VAS	DSM-IV CIDI HAM-D (17 items) GDS (30 items)	Higher depressive symptom score was negatively correlated with aspects of HQOL, except social relationships	Spearman's rank-order correlation analysis
Netuveli [86] 2006 UK	To study factors associated with LS	11,234 community-dwelling persons M = 65.1 (SD = 10.2) years, 54.4% female	n.a.	LS: CASP-19	CES-D (8 items) ≥3	Depression was negatively associated with LS	Multiple linear regression Adjusted for age, gender, socioeconomic factors, social relations, ADL and other health variables
Ní Mhaolain [59] 2012 Ireland	To explore factors associated with LS in older persons who were successfully aging	466 community-dwelling persons M = 75.5 (SD = 6.1) years, 55.4% female	Exclusion: if dementia	LS: LSI-A	SCID CES-D (4 items)	Depression was negatively associated with LS	Stepwise linear regression Adjusted for age, gender, marital status, education, physical and instrumental activity, social situation, cognitive function and personality

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Table 3 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Instruments used to assess global QOL (WB-LS) and/or generic HQOL	Instruments used to assess (indicate) depression	Findings on relationship between depression and quality of life	Comments on method
O'Brien [77] 2006 11 European countries	To investigate the relationship between location and burden of white matter hyperintensities and lacunar infarcts on depressive features	626 community-dwelling persons with indications on MRI for white matter hyperintensities M = 74.1 (SD = 5.0) years, 55.4% female	Exclusion: if severe cognitive impairment or inability to give informed consent	Generic HQOL: VAS	GDS (15 items)	Negative correlation between higher quintiles of depression score and HQOL	Spearman's rank-order correlation analysis
Ordu Gokkaya [12] 2012 Turkey	To investigate factors correlated with HQOL	275 geriatric inpatients in medical ward M = 72.8 (SD = 5.7) years, 76% female	Exclusion: if severe dementia (MMSE ≤9) or unable to give informed consent	Generic HQOL: NHP	GDS (15 items)	Higher depressive symptom score was negatively associated with HQOL domains (pain, social isolation and emotional pain)	Multiple linear regression Adjusted for pain and I-ADL
Park [68] 2010 Korea	To investigate depression in older persons	714 community-dwelling persons M = 71.9 (SD = 5.7) years, 58.9% female	n.a.	Generic HQOL: SF-36	MINI GDS-K (30 items) CES-D (20 items) HAM-D (17 items)	The groups of depressed persons had lower mental and physical HQOL than the group of nondepressed persons	ANOVA Adjusted for age, gender, education
Ricarte [32] 2011 Spain	To investigate characteristics of a group of depressed persons compared with a control group of same age without depression	79 community-dwelling persons in contact with GP *Depressed persons (n = 34):* M = 74.6 (SD = 5.5) years, 85.2% female *Nondepressed persons (n = 34):* M = 75.1 (SD = 7.6) years, 79.4% female	Exclusion: if cognitive impairment (MMSE ≤28)	LS: LSI-A (18 items)	DSM-IV	The group of depressed persons had lower LS than the persons without depression	Simple group comparison (type not stated)
Rogers [78] 1999 USA	To study the influence of psychosocial constructs on LS and depression	79 frail and homebound older persons at risk of nursing home living in the community M = 79 (SD = 8.1) years, 89% female	Exclusion: if unable to complete interview (MMSE)	LS: LSI-Z (14 items) Generic HQOL: MOS (20 items)	CES-D (20 items) ≥16	Higher depressive symptoms score was negatively correlated with LS	Correlation (type not stated)
Ryu [79] 2013 Korea	To study the effect of LS and risk of depressive symptoms	6,410 community-dwelling persons M = 72.6 (SD = 8.0) years, 56.7% female	n.a.	LS: SWLS (4 items)	CES-D (10 items) ≥10	Higher score in all domains of LS independently reduced the odds for depression	Multiple logistic regression Adjusted for gender and marital status
Scocco [62] 2006 Italy	To study HQOL in persons who were healthy or suffering from depression and/or Alzheimer's disease	138 community-dwelling persons M = 75.6 (SD = 6.2) years, 72.5% female	Exclusion: if cognitive impairment (MMSE in depressed and in healthy persons: ≤26; in Alzheimer and in patients with Alzheimer and depression: <16 or >25)	Generic HQOL: WHOQOL-100	DSM-IV GDS (30 items) ≥11	The more severe depression (from none, to moderate to severe) the lower the HQOL score	Group comparison (Kruskal-Wallis test)
Street [27] 2007 Australia	To study the relationship between depression and HQOL by goal setting style	187 persons from age care facilities M = 74.7 years, 55% female	n.a.	Generic HQOL: SF-12 (physical component)	CES-D (18 items)	Higher depressive symptom score was negatively correlated with the physical component of HQOL	Partial correlation Adjusted for goal progression

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Table 3 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Instruments used to assess global QOL (WB-LS) and/or generic HQOL	Instruments used to assess (indicate) depression	Findings on relationship between depression and quality of life	Comments on method
Van der Weele [37] 2009 The Netherlands	To examine prevalence of depression and the relation to LS	201 community-dwelling persons Age ≥90 (max 95.3) years, 72.1% female	Exclusion: if cognitive impairment (MMSE ≤18)	LS: Cantril's ladder	GDS (15 items) ≥5	Depression was negatively associated with LS	Group comparison (Mann-Whitney U test)
Wada [28] 2004 Japan	To study the relationship between depression and HQOL in persons with and without depression	5,363 community-dwelling persons M = 74.6 (SD = 7.0) years, 58.3% female	n.a.	Generic HQOL: VAS	GDS (15 items) ≥10	Depression was negatively associated with all aspects of HQOL in most of the towns studied	Group comparison (t test)
Wada [29] 2005 Indonesia, Vietnam and Japan	To study the relationship between depression and HQOL in persons with and without depression in developing and developed countries	2,695 community-dwelling persons *Indonesia (n = 411):* M = 72.3 (SD = 7.3) years, 59.9% female *Vietnam (n = 379):* M = 70.7 (SD = 8.0) years, 55.1% female *Japan (n = 1,905):* M = 74.0 (SD = 6.6) years, 58% female	n.a.	Generic HQOL: VAS	GDS (15 items) ≥6	Depression was negatively associated with all domains of HQOL in both developing and developed countries	Group comparison (t test)
Werngren-Elgström [92] 2003 Sweden	To study depression and QOL in prelingually deaf sign language users	45 prelingually deaf sign language users M = 75 (range 65–92) years, 58% female	Exclusion: if severe cognitive limitations	WB and HQOL: GQL	GDS (15 items)	Higher depressive symptom score was negatively correlated with WB	Spearman's rank-order correlation analysis
Xavier [33] 2002 Brazil	To examine prevalence of depression and the relationship to LS and HQOL	77 community-dwelling persons M = 84.4 (SD = 3.4) years, 64% female	Exclusion: if dementia (DSM-IV; CDR; MMSE)	LS: LSI Generic HQOL: SF-36	DSM-IV GDS (15 items)	Minor depression was associated with lower HQOL in health and vitality domains	Group comparison (Mann-Whitney U test)
Yoon [87] 2007 USA	To study depression, LS in relation to religiousness and social support in rural older persons	215 rural community-dwelling persons M = 72 (SD = 7.7) years, 61.5% female	n.a.	LS: SWLS	CES-D (11 items)	Higher depressive symptoms score was negatively correlated with LS	Correlation (type not stated)

Procedure to diagnose depression according to DSM or ICD: Structured Clinical Interview for DSM-IV (SCID); International Neuropsychiatric Interview (MINI); Composite International Diagnostic Interview (CIDI). Instruments to assess depressive symptoms not according to DSM or ICD: Geriatric Depression Scale (GDS; 15 and 30 versions); Center for Epidemiologic Studies Depression Scale (CES-D); Hamilton Rating Scale for Depression (HAM-D; 17-, 21-, and 24-item versions); Montgomery-Asberg Depression Rating Scale (MADRS); Beck Depression Inventory (BDI; BDI-II); Geriatric Mental State interview (GMS-A3); Geriatric Mental State-Automated Geriatric Examination for Computer Assisted Taxonomy (GMS-AGECAT); Hospital Depression and Anxiety Scale [HADS; HADS-D (depression subscale)]; Hayes and Lohse Depression Scale (HLDS). Instruments to assess global QOL as WB: Cantril's ladder; Philadelphia Geriatric Center Morale Scale (PGC); Life Purpose Questionnaire (LPQ); Purpose in Life Test (PIL). Instruments to assess global QOL as life satisfaction (LS): Cantril's 'ladder'; CASP-19 (12-item version); Life Satisfaction Index (LSI, LSR and LSI-A; LSI-Z is short form); Manchester Short Assessment Of Quality of Life (MANSA); Satisfaction with Life Scale (SWLS). Instruments for assessing generic HQOL: Nottingham Health Profile (NHP); WHO Quality of Life Scale-Bref Version (WHOQOL-100; WHOQOL-BREF; WHO-OLD); Medical Outcome Scale-SF (SF-12; SF-20; SF-36); Medical Outcomes Study General Health Study 6 items (MOS-6, MOS-20); Visual Analogue Scale (VAS). Instrument to assess global QOL (WB and HQOL): Gothenburg Quality of Life instrument (GQL). Instruments to assess cognitive function: MMSE; Mental Status Questionnaire (MSQ); Clinical Dementia Rating (CDR); Sets Test; Short Portable Mental Status Questionnaire (MSQ). n.a. = Not available; M = mean; SD = standard deviation; IADL = instrumental activities of daily living; PADL = personal activities of daily living; CPS = Cognitive Performance Scale.

[a] The aim of the published studies in relation to the purpose of this review.

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Assessment of Depression

In all, 18 different instruments were used to assess depression/depressive symptoms including self-report instruments, observational inventories, structural interviews and/or diagnostic evaluation (DSM/ICD; table 5). More than 1 assessment instrument for depression/depressive symptoms was employed in 22 studies. The Geriatric Depression Scale (GDS) [94, 95] was used in 39 studies and was the most common assessment instrument, while 10 different instruments were used only once for the specific study.

Concepts and Assessment of QOL

In all, 24 different instruments were used to assess QOL (table 6). We categorized these assessment instruments according to the QOL concept hierarchy, i.e. global QOL including WB and general LS and secondly generic HQOL. QOL was assessed at two concept levels in 6 studies [10, 33, 45, 78, 84, 91], and one study used a previously unknown assessment instrument that we categorized as a global QOL assessment [50]. The global QOL and generic HQOL assessment instruments were employed equally often, i.e. in 38 and 42 studies, respectively.

Only 24 (32.4%) of the studies used assessment instruments that had been specifically developed for older persons (≥60 years), such as the Life Satisfaction Index (LSI), the Philadelphia Geriatric Morale Scale (PGC), the WHO Quality of Life Assessment for Older Adults (WHOQOL-OLD), CASP-19, the Purpose in Life Test (PIL), the Life Purpose Questionnaire (LPQ), and the Salamon-Conte Life Satisfaction in the Elderly Scale (LSES).

Thirty-one studies assessed global QOL with instruments that evaluated LS, of which 14 relied on the LSI (LSR, LSI-A; short version LSI-Z; tables 3, 4). The concept of WB was less frequently used (11 studies). In total, 9 assessment instruments of global QOL were used in one study each, 5 of which we categorized as a WB instrument. Eleven studies used >1 assessment instrument to assess global QOL and generic HQOL. One study used a combined WB and generic HQOL assessment instrument.

The most frequently used generic HQOL assessment instrument (21 studies) was the Medical Outcomes Study General Health, including older (MOS; 6- and 20-item versions) and newer versions (SF-8, 12, 20, and 36). Generic HQOL was assessed as the only QOL concept in 35 studies.

High-Quality Studies

Fifteen of the high-quality studies with a cross-sectional design (a total of 32 studies) used global QOL assessment instruments (including assessments of LS in 14 of the studies, and WB and LS in 1 study). Seven studies recruited persons in clinical settings (1 study in medical hospital; 6 in primary health care), and 6 studies recruited persons from the community. Persons with cognitive impairment were excluded in nearly all of these (12 of 15 global QOL studies). Generic HQOL assessment instruments were used in 17 studies, where 11 studies recruited persons in clinical settings (5 studies in psychogeriatric hospitals; 5 studies in medical hospitals; 1 study in primary care), and 6 studies recruited persons in the community. Persons with cognitive impairment were excluded in 11 of these studies. In addition, 2 studies used global QOL (LS) and generic HQOL instruments. Both of these studies recruited persons from the community and excluded individuals with cognitive impairment.

Global QOL assessment instruments were used in 9 of the 21 high-quality methodological studies with a longitudinal design (including assessment of LS in 4 studies, WB in 2 studies and both LS and WB in 3 studies). Of these, 3 studies recruited persons in clinical settings (2 studies in a psychogeriatric hospital; 1 study in primary care) and 6 studies recruited persons from the community. Persons with cognitive impairment were excluded in 3 studies. Generic

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Table 4. Longitudinal studies (n = 22)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Intervention	Instruments used to assess global QOL (WB, LS) and/or generic HQOL	Instruments used to assess depression (indicate depression)	Time of assessment	Findings on relationship between depression and quality of life	Comments on method
Chan [18] 2009 China	To identify variables associated with change in HQOL	77 community outpatients diagnosed with severely depressive disorder M = 72.7 (SD = 5.1) years, 79.2% female	Exclusion: if dementia		Generic HQOL: WHOQOL-BREF	GDS (15 items)	T1: baseline T2: 12 months	Decrease in depressive symptom score at follow-up was significantly associated with higher final HQOL score	Multiple linear regression analysis Adjusted for demographic variables, baseline WHOQOL score and change in personal and instrumental ADL and physical health conditions
de Jonge [10] 2004 The Netherlands	To study the role of depression for WB and other variables	644 older community residents with premorbid depression and somatic illness Age ≥57 (mostly between 60 and 80 years), 55.4% female	Exclusion: if cognitive problems (MMSE short version ≤5)		WB: Cantril's 'ladder' Generic HQOL: SF-20	HADS-D	T1: post-baseline episode T2: 2 months T3: 6 months T4: 12 months	Those with poor adjustment of WB during T4 had a significantly higher depressive symptom score before the somatic event happened	Multiple linear regression analysis Adjusted for age, gender, age, type of somatic event and corresponding baseline score
Enkvist [44] 2012 Sweden	To identify variables affecting LS in the oldest old	681 community residents Age range 78–93 years, 61% female	n.a.		LS: LSI-A WB: One item 'How are you feeling today'	CPRS (10 items) ≥35	T1: baseline T2: 3 years	Having depression at baseline was negatively associated with low LS at T2	Multiple logistic regression analysis Adjusted for age, gender, marital status, socioeconomic status (education economical), cognitive functioning, physical health, LOC and ADL social network
Feng [2] 2013 Singapore	To investigate the relationship between depressive symptoms and HQOL and other variables	362 community-dwelling persons with chronic kidney disease M = 70.3 (SD = 7.8) years, 61% female	Exclusion: if cognitive impairment (MMSE ≤23)		Generic HQOL: SF-36	GDS (15 items) ≥5	T1: baseline T2: 2 years	Depression at baseline was negatively associated with HQOL at T2 for the total HQOL score, and the role functioning, social functioning and mental health domains of the HQOL, but not at the others	The ANCOVA analysis Adjusted for HQOL baseline, age, gender, marital status, cognitive function, diabetes, hypertension, cardiovascular disease, other illnesses, smoking, physical activity, eGFR, albumin, and hemoglobin
Garcia-Pena [3] 2013 Mexico	To study depressive symptoms and change in depressive symptoms	7,882 community-dwelling persons with and without depression M = 71.0 years, 61.1% female	Exclusion: if severe cognitive impairment		Generic HQOL: SF-36	GDS (30 items) ≥11	T1: baseline T2: 12 months T3: 24 months	Higher HQOL in most domains at baseline decreased the risk for depression at T3 in persons with and without depression at baseline	Multilevel longitudinal logistic regression analysis

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Table 4 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Intervention	Instruments used to assess global QOL (WB, LS) and/or generic HQOL	Instruments used to assess depression (indicate depression)	Time of assessment	Findings on relationship between depression and quality of life	Comments on method
Hasche [45] 2010 USA	To compare outcomes of HQOL and LS for depressed and nondepressed after community long-term care	551 community long-term home care of persons with a disability and/or low income *Depressed persons (n = 266):* M = 70.8 (SD = 7.9) years, 79.3% female *Nondepressed persons (n = 285):* M = 73.9 (SD = 7.6) years, 75.1% female	Exclusion: if cognitive impairment		LS: DDES (two items) Generic HQOL: SF-8	DIS CES-D (20 items) ≥9	T1: baseline T2: 6 months T3: 12 months	Depression was consistently and negatively associated with HQOL and LS Depressed clients had significantly worse scores of HQOL and LS than nondepressed clients at baseline and 6- and 12-month follow-up Clients depressed at baseline had significantly better improvement in mental HQOL and LS at 1-year follow-up than nondepressed clients	The mixed effects models analysis Adjusted for age, gender, race, education, marital status, living arrangements, locale, count of medical condition, severity of functional impairment and cognitive functioning
Helvik [46] 2013 Norway	To study factors associated with HQOL 1 year after hospitalization	363 medical inpatients M = 80.2 (SD = 7.5) years, 51.8% female	Exclusion: if severe dementia (CDR = 3)		Generic HQOL: WHOQOL-BREF	HADS-D ≥8	T1: baseline T2: 12 months	No depression at baseline and reduced depressive score at follow-up were associated with improved individual physical, psychological, social and environmental HQOL at 1-year follow-up	Multiple linear regression analysis Adjusted for age, gender and level of respective HQOL domain at baseline
Ho [4] 2014 Singapore	To investigate how depression and medical comorbidity were associated with HQOL in depressed and nondepressed older persons	1,844 community-dwelling persons *Depressed persons (n = 211):* M = 66.4 (SD = 8.23) years, 65.9% female *Nondepressed persons (n = 1,633):* M = 65.9 (SD = 7.27) years, 65.3% female	Exclusion: if profound dementia		Generic HQOL: SF-12	GDS-15	T1: baseline T2: 2-year follow-up	Depression and medical comorbidity at baseline were negatively associated with HQOL (mental and physical components) at baseline and follow-up Depressed persons with two medical conditions or more had lower HQOL than those without depression and those with fewer medical conditions with or without depression	Multiple logistic regression analysis Adjusted for age, gender, education, ethnicity, marital status, housing type, living arrangement, cognitive impairment and corresponding baseline outcome measurements
Hsu [5] 2009 Taiwan, Republic of China	To examine subjective LS	3,155 persons living in community (99%) and institutions (1%) M = 71.4 (SD = 5.9) years, 43.5% female	n.a.		LS: LSR	CES-D (10 items)	T1: baseline T2: 6-years	Higher depressive symptom scores were negatively associated with LS at each time point	Repeated multivariate analysis using linear mixed models including age, ADL, cognitive function, social support education, marital status, gender and physical health variables

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Table 4 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Intervention	Instruments used to assess global QOL (WB, LS) and/or generic HQOL	Instruments used to assess depression (indicate depression)	Time of assessment	Findings on relationship between depression and quality of life	Comments on method
Lapid [25] 2011 USA	To assess HQOL and examine correlations between depression and HQOL	45 depressed geropsychiatric in patients M = 74.3 (SD = 6.7) years, 67% female	Exclusion: if cognitive impairment (MMSE ≤17)	Pharmaco-logical, psycho-therapeutic or electro-convulsive therapy (no control group)	Generic HQOL: SF-36	DSM-IV HAM-D (24 items)	T1: baseline T2: discharge	Higher depressive symptom score was negatively correlated with most domains of HQOL at baseline and discharge, the exception was the mental health of SF-36 at baseline	Spearman's rank-order correlation analysis
Lavretsky [20] 2004 USA	To study gender differences in brain structures and its relationship to HQOL in depressed persons and controls	82 depressed outpatients and nondepressed controls *Depressed (n = 41):* M = 70.5 (SD = 7.6) years, 78% female *Nondepressed (n = 41):* M = 72.2 (SD = 7.3) years, 48.8% female	Exclusion: dementia or symptoms of dementia (MMSE ≤24)	MRI	Generic HQOL: SF-36	DSM-IV HAM-D (17 items)	All image data were processed with a series of steps	The depression group reported poorer HQOL in both emotional and physical domains than the controls for both genders	Univariate analysis of covariance ANCOVA
Lue [6] 2010 Taiwan	To explore risk factors for depression	1,487 nondepressed community residents M (T1) = 78.2 years, 41.7% female	n.a.		LS: LSI-A (10 items)	CES-D (10 items) ≥10	T1: 1999 T2: 2003	Change to greater dissatisfaction was associated with depression at follow-up	Multiple logistic regression analysis Adjusted for age, sex, marital status, health stress, support, financial distress, functional level
Mazumdar [47] 1996 USA	To examine treatment in patients with recurrent major depression and the relationship between depression and WB	110 geriatric outpatients with major depression M = 67.5 (SD = 5.8) years, 78% female	n.a.	Pharmaco-therapy and psycho-therapy (no control group)	WB: GLF	SADS-L HAM-D (17 items) BDI	T1: baseline T2–T13: every week for 12 weeks T14–T19: every second week for 3 months	WB improved in elderly depressed, even in subjects who did not fully recover from the depressive episode The improvements of WB were significantly greater in recovered than nonrecovered persons	ANCOVA Adjusted for the effects of the HAM-D depression scores
McCurren [26] 1999 USA	To evaluate intervention and study the relationship between depression and LS and other variables	85 nursing home residents M = 86.5 (SD = 7.1) years, 81% female	Exclusion: if diagnosis or symptoms of dementia (MMSE ≤19)	Nurse treatment intervention over 24 weeks (no control group)	LS: LSES (40 items)	GDS (30 items)	T1: baseline T2: 12 weeks T3: 24 weeks	Cross-sectional outcome: higher depressive symptom score was negatively correlated with LS	Correlation analysis (type not stated)

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Table 4 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Intervention	Instruments used to assess global QOL (WB, LS) and/or generic HQOL	Instruments used to assess depression (indicate depression)	Time of assessment	Findings on relationship between depression and quality of life	Comments on method
Preschl [48] 2012 Spain	To investigate whether life review therapy leads to a reduction in depressive symptoms increased WB, LS and other variables	36 community-dwelling older persons M = 70.0 (SD = 4.4) years, 66.7% female	Exclusion: if cognitive impairment (MMSE <27)	Life review therapy (control group)	LS: LSI-A WB: WHO-5	DSM-IV (SCID) BDI-II	T1: baseline T2: end of treatment T3: 3 months	In the intervention group: decreased depressive symptom score at T3 was correlated with increased WB at T3	Partial Pearson's product moment correlation analysis (adjusted for age)
Shmuely [21] 2001 USA	To study the change in HQOL of depressed inpatients from admission to 3 months' follow-up after discharge	100 geriatric psychiatric inpatients at baseline M = 77.1 (SD = 7) years, 77% female	Exclusion: if dementia		Generic HQOL: MOS-6	DSM-IV MPSE-D GDS (15 items)	T1: baseline T2: discharge T3: 3 months	Patients with more severe depressive symptoms at baseline were less likely to have improved their HQOL at T3	Multiple logistic regression analysis Adjusted for age, living alone, MMSE at admission, the baseline score of outcome variable under study and physical health status
Shrira [7] 2012 11 European countries	To examine the relationship between depression and QOL and other variables	9,154 community-dwelling persons M (T1) = 63.8 (SD = 9.2) years, 55% female	n.a.		LS: CASP-19 (12 items)	Euro-D (12 items)	T1: 2004–2006 T2: 2006–2008 T3: 2008–2009	Higher depressive symptom score at baseline was negatively correlated with QOL at T2	Pearson's product moment correlation analysis
Solomon [49] 2010 USA	To examine QOL among persons with advanced illness	185 community-dwelling persons with advanced chronic somatic illness M = 73.0 (SD = 7) years, 46% female	Exclusion: if cognitive impairment (MSQ, Executive Interview)		WB: One item 'How would you rate your overall quality of life?'	PRIME-MD (2 items)	T1: baseline T2: 4 months T3: 8 months T4: 12 months T5: 16 months T6: 20 months T7: 24 months	Depression was significantly associated with lower WB, assessed at each time point	Generalized linear mixed effect regression analysis Adjusted for activity of daily living, church relations, family support, pain intensity, anxiety, breathing problems and perceived life expectancy
Tatulian [50] 2004 Russia	To study the effect of psychopathology of depression on QOL of patients with a syndromic disease picture	92 geriatric psychiatric outpatients M = 66 years, 82% female	n.a.	Treatment using three separate strategies (no control group)	QOL questionnaire (unknown)	ICD-10 HAM-D (21 items)	T1: baseline T2: end of treatment	A negative correlation between the total depression score at baseline and QOL score at discharge Patients categorized with melancholic syndrome or anxious-depressive syndrome had significantly better QOL on discharge than anxious-senesto-hypochondriac syndrome patients	Correlation (type not stated) Simple group comparison

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Table 4 (continued)

First author [Ref.] year country	Aim of study[a]	Sample characteristics	Cognitive criteria for exclusion	Intervention	Instruments used to assess global QOL (WB, LS) and/or generic HQOL	Instruments used to assess depression (indicate depression)	Time of assessment	Findings on relationship between depression and quality of life	Comments on method
Wang [51] 2014 Japan	To investigate the effect of the treatment on depressive symptoms and HQOL	96 older persons in community senior apartments *Treatment group (n = 12):* M = 79.2 (SD = 6.8) years, 75% female *Control group (n = 12):* M = 81.4 (SD = 4.3) years, 75% female	n.a.	Psycho-therapy	Generic HQOL: WHOQOL-BREF	GDS (15 items) ≥5 HAM-D (24 items)	T1: baseline T2: 4 weeks T3: 8 weeks	Total HQOL after 8 weeks was influenced by the depression score in the treatment and control group of persons with depression When adjusting for the depressive score at follow-up the HQOL in the intervention group was not significantly different from the control group	Group comparisons (t test) Generalized estimating equations regression
Wolinsky [8] 2006 USA	To evaluate cognitive intervention to avoid extensive decline in HQOL and other variables	2,802 community-dwelling older persons without formal care M = 73.4 years, 77% female	Exclusion: if cognitive impairment (MMSE <23)	Three intervention groups (memory, reasoning, speed) and one control group	Generic HQOL: SF-36	CES-D (12 items)	T1: baseline T2: 12 months T3: 24 months	Higher depressive symptom score at T1 reduced the odds for extensive decline in HQOL at T3 follow-up independent of the intervention provided	Multiple logistic analyses Adjusted for depressive score, age, gender, race, degree of education, MMSE, PADL, IADL, cognitive ADL, and chronic conditions
Zhang [34] 2006 Canada	To assess the responsiveness of the HQOL inventory HUI2 to changes in health	192 community-dwelling persons at home receiving health care M = 83 years, 67.1% female	Exclusion: if primary diagnosis was dementia		Generic HQOL: HUI2	MDS-DRS	T1: baseline T2: 6 months	Persons with worsening degree of depressive symptoms at 6-month follow-up had a significant decline in HQOL over the same time of follow-up	Multiple linear regression analysis Adjusted for age, gender, marital status, somatic health, ADL and communication

Procedure to diagnose depression according to DMS or ICD: Comprehensive Psychiatric Rating Scale (CPRS); Diagnostic Interview Schedule (DIS); International Classification of Diseases-10 (ICD-10); Structured Clinical Interview for DSM-IV (SCID). Instruments to assess depressive symptoms, not according to DSM or ICD: Beck Depression Inventory Second Edition (BDI-II); Center for Epidemiologic Studies Depression Scale (CES-D); Hamilton Rating Scale for Depression (HAM-D; 17-, 21-, and 24-item versions); Mini Present State Exam for Depression (MPSE-D); Minimum Data Set for Home Care Depression Rating Scale (MDS-DRS); Primary Care Evaluation of Mental Disorders (PRIME-MD); Schedule for Affective Disorders and Schizophrenia-Lifetime version (SADS-L); The Geriatric Depression Scale (GDS; 15- and 30-item versions); The Hospital Depression and Anxiety Scale (HADS; HADS-D depression subscale). Instruments to assess global QOL as WB: Cantril's 'ladder'; General Life Functioning Scale (GLF); WHO-Five Well-being Index (WHO-5). Instruments to assess global QOL as life satisfaction (LS): CASP-19 (12-item version); Duke Depression Evaluation Schedules (DDES; two items on satisfaction); Life Satisfaction Index-A (LSR and LSI-A); Salamon-Conte Life Satisfaction in the Elderly Scale (LSES). Instruments to assess generic HQOL: Medical Outcomes Study General Health Study 6 items (MOS-6); Medical Outcome Scale-SF (SF-8; SF-12; SF-20; SF-36); Health Utilities Index Mark 2 (HUI2); WHO Quality of Life Scale-Bref Version (WHOQOL-BREF). Instruments to assess cognitive function: Executive Interview; MMSE; Short Portable Mental Status Questionnaire (MSQ). MRI = Magnetic resonance imaging; n.a. = not available; M = mean; SD = standard deviation; eGFR = estimated glomerular filtration rate; LOC = locus of control; IADL = instrumental activities of daily living; PADL = personal activities of daily living.

[a] The aim of the published studies in relation to the purpose of this review.

Table 5. Diagnostic evaluation and instruments used assessing depression or depressive symptoms

Diagnostic evaluation or instrument	Number of studies
GDS [94, 95]	39 [2–4, 9, 12, 17–19, 21–23, 26, 28, 29, 31, 33, 37, 51, 58, 60–63, 66, 68, 71–73, 75, 77, 80–82, 84, 85, 88, 90, 92, 93]
CES-D [96]	16 [5, 6, 8, 24, 27, 45, 59, 65, 67–69, 78, 79, 86, 87, 91]
DSM-IV (SCID) [97]	15 [17, 20, 21, 25, 32, 33, 48, 58, 59, 61–64, 66, 70]
HAM-D [98]	10 [17, 20, 25, 47, 50, 51, 61, 64, 68, 70]
BDI [99, 100]	4 [47, 48, 64, 83]
HADS-D [101]	4 [10, 11, 30, 46]
MINI [102]	3 [60, 67, 68]
GMS [103]	2 [74, 76]
MADRS (CPRS) [104]	2 [44, 64]
CIDI [105]	1 [61]
DIS [106]	1 [45]
Euro-D [107]	1 [7]
HLDS [89]	1 [89]
ICD-10 [108]	1 [50]
MDS-DRS [109]	1 [34]
MPSE-D [110]	1 [21]
PRIME-MD [111]	1 [49]
SADS-L [112]	1 [47]

Diagnostic evaluation of depression according to DMS or ICD: Diagnostic Interview Schedule (DIS); Structured Clinical Interview for DSM-IV (SCID); ICD-10; Composite International Diagnostic Interview (CIDI), Primary Care Evaluation of Mental Disorders (PRIME-MD); Mini Present State Exam for Depression (MPSE-D); Mini-International Neuropsychiatric Interview (MINI). Assessments for depressive symptoms, not according to DSM or ICD: European Depression scale (Euro-D); Geriatric Depression Scale (15- and 30-item versions; GDS); Center for Epidemiologic Studies Depression Scale (4-, 8-, 10-, 11-, 12-, 18-, and 20-item versions; CES-D; self-report); Comprehensive Psychiatric Rating Scale (CPRS); Hamilton Rating Scale for Depression (17-, 21-, and 24-item versions; HAM-D); Schedule for Affective Disorders and Schizophrenia-Lifetime version (SADS-L); Minimum Data Set for Home Care Depression Rating Scale (MDS-DRS); Beck Depression Inventory (BDI) Second Edition (BDI-II; self-report); Montgomery-Asberg Depression Rating Scale (MADRS); Geriatric Mental State interview (GMS-A3; clinical interview); Geriatric Mental State-Automated Geriatric Examination for Computer-Assisted Taxonomy (GMS-AGECAT, A3); Hospital Depression and Anxiety Scale (HADS-D); Hayes and Lohse Depression Scale (HLDS).

HQOL assessment instruments were used in 10 longitudinal high-quality studies, where 6 studies recruited persons in clinical settings (5 in psychogeriatric hospital; 1 in medical hospital; 1 in primary care), and 4 studies recruited persons in the community. Two studies used both global QOL (LS or WB) and generic HQOL assessment instruments and recruited persons from the clinical and community setting. Persons with cognitive impairment were excluded in all of the studies that used any of the generic HQOL instruments (12 studies), with one exception [50].

The Relationship between Depression and QOL

In the 53 studies with a quality score of ≥7 points (tables 1, 2), the main finding was that the severity of depression was associated with poorer QOL. This association appeared to be stable over time and independent of whether a global QOL or a generic HQOL assessment instrument was employed (tables 3, 4).

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Table 6. QOL instruments

Instrument	Number of studies
SF (MOS) [113–117]	21 [2–4, 8–10, 19–21, 25, 27, 33, 45, 64, 66, 68, 70, 73, 78, 85, 88]
LSI [118–120]	14 [5, 6, 22, 24, 32, 33, 44, 48, 59, 72, 78, 83, 89, 90]
WHO-BREF [121]	12 [17, 18, 23, 30, 46, 51, 58, 61, 63, 71, 80, 85]
SWLS [122]	7 [22, 65, 69, 75, 76, 79, 87]
Global QOL (single item)	5 [11, 44, 49, 60, 74]
VAS [123]	4 [28, 29, 61, 77]
PGC [124]	4 [81, 82, 84, 91]
WHOQOL-OLD [41, 125]	4 [31, 71, 80, 85]
Cantril's ladder [126]	3 [10, 37, 91]
CASP-19 [127, 128]	2 [7, 86]
LS scale unknown	2 [82, 93]
WHOQOL-100 [41]	2 [62, 84]
WHO-5 [129]	1 [48]
DDES [130]	1 [45]
GLF [131, 132]	1 [47]
GQL [133]	1 [92]
HUI2 [134]	1 [34]
LPQ [135]	1 [83]
LSES [136]	1 [26]
MANSA [137]	1 [67]
NHP [138]	1 [12]
PIL [139]	1 [72]
QOL scale (unknown)	1 [50]
HQOL (single item)	1 [91]

Instruments for assessing global QOL as well-being (WB): Cantril's 'ladder'; General Life Functioning Scale (GLF); Philadelphia Geriatric Morale Scale (PGC); Purpose in Life Test (PIL); Life Purpose Questionnaire (LPQ); WHO-Five Well-being Index (WHO-5). Instruments for assessing global QOL as life satisfaction (LS): CASP-19 (and 12-item version included); Duke Depression Evaluation Schedule's (DDES; 2 items on satisfaction); Life Satisfaction Index (LSR and LSI-A; LSI-Z is short form); Manchester Short Assessment of Quality of Life (MANSA); Satisfaction with Life Scale (SWLS); Salamon-Conte Life Satisfaction in the Elderly Scale (LSES). Instruments for assessing generic HQOL: Gothenburg Quality of Life instrument (GQL); Medical Outcomes Study (version MOS-6; MOS-20 SF-8; SF-12; SF-36 included); Nottingham Health Profile (NHP); Health Utilities Index Mark 2 (HUI2); Visual Analogue Scale (VAS); WHO Quality of Life Scale (WHOQOL-100; WHOQOL-BREF; WHOQOL-OLD).

Studies on the Relationship between Depression and Global QOL

All of the high-quality cross-sectional studies that solely assessed global QOL (11 studies) reported a negative association between depression and global QOL. A higher depression symptom score was associated with poorer global QOL. Depressed persons had poorer QOL than nondepressed persons.

In the high-quality longitudinal studies that solely assessed global QOL (9 studies), a depressive disorder or a high depression symptom score at baseline was related to poorer QOL at follow-up. An improvement in QOL was seen in fully and not fully recovered depressed persons compared to those with persistent depression.

Studies on the Relationship between Depression and Generic HQOL

The high-quality cross-sectional studies that assessed generic HQOL (19 studies) reported that a depressive disorder and a higher depressive symptom score were associated with

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poorer generic HQOL. Older persons with depressive symptoms and additional physical comorbidity had poorer generic HQOL than those without any comorbidity, independent of the depressive symptom load.

In the high-quality longitudinal studies (10 studies) that relied solely on generic HQOL, a depressive disorder and a higher depressive symptom score were consistently associated with poorer generic HQOL. Persons with a depressive disorder at baseline had poorer generic HQOL at follow-up than nondepressed individuals, and the severity of depressive symptoms at baseline had a negative effect on an improvement in generic HQOL at follow-up. Depression with physical comorbidity at baseline was associated with poorer generic HQOL at follow-up. Depressed persons with two physical conditions or more had poorer generic HQOL compared with persons with fewer physical conditions.

Generally, most of the generic HQOL domains were affected in a negative way by a depressive disorder or a severe degree of depressive symptoms, except for physical functioning (role limitations due to physical health) and in the mental domain (emotional, psychological functioning) [3, 10, 21, 25, 45, 82]. Two studies found that general health and vitality (and energy level) were not affected by depression [2, 21] while spiritual, body pain, and satisfaction with living arrangements domains were not affected by depression in 1 study each [2, 25, 45].

Discussion

The 74 studies we examined used a large number of assessment instruments assessing depression or depressive symptoms and QOL. Most of the instruments for assessing depressive symptoms were self-report instruments. This diversity in the use of instruments hinders comparisons between studies and limits the potential to summarize data into estimates of the relationship between depression and QOL. Nevertheless, as one would expect, the main findings were that depression (at both the symptom and the disease level) was associated with poorer QOL, and that this association appeared to be stable over time and independent of whether global QOL or generic HQOL were studied. Furthermore, the high-quality cross-sectional studies reported that depressed persons had poorer QOL than nondepressed persons. The high-quality longitudinal studies established that depression at baseline predicted poorer QOL at follow-up. A higher baseline depression symptom score was related to poorer QOL and improvements in QOL were less likely to be detected at follow-up.

There is considerable agreement that QOL should be seen as a multilevel and multidimensional concept, but there is an absence of consensus on how to define QOL and dimensions of generic HQOL [38, 41]. Some of the operationalized constructs partly overlap [38], which results in different QOL constructs being assessed. To interpret the findings of the studies, it is important to explicitly define which QOL concept has been used and use a well-tested assessment instrument that covers the chosen definition. In this review, we found that QOL was defined or conceptualized explicitly in only about one third (25/74) of all the studies and that about one sixth (12/74) of the QOL assessment instruments were used only once.

Our review revealed that the choice of assessment instruments seemed to be made for cultural or geographical reasons, and did not appear to be related to a theoretical framework. Assessment instruments of generic HQOL dominated in Europe and South America, while assessments of global QOL dominated in the USA. There were also geographical differences as to how to assess depression. Structural clinical interviews to diagnose depression were most commonly used in North America and Asia, but were seldom used in Europe.

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Furthermore, the negative association between depression and QOL was consistent in high-quality cross-sectional and longitudinal studies, independent of the type of sample studied. In the longitudinal studies of psychogeriatric patients, global QOL and generic HQOL domains were negatively affected by the severity of depression. Recovering from depression after treatment resulted in higher QOL, and the QOL increased even in patients who did not fully recover from the depressive episode. As time goes by, older persons may accept their loss of health and function due to biological and psychosocial changes to some extent, and thus may lower their expectations and adjust their internal standards to level out the discrepancy between the possible and the actual situation ('response shift') [140]. Consequently, QOL may be rated higher at follow-up even if an individual's health has not improved substantially. However, our review revealed that patients with more severe depression at baseline before treatment were less likely to experience improved QOL. We do not have a firm explanation for this, but it may be that persons with severe depression do not have the internal resources or capacity to adapt or adjust over time in the same way. It is evident that poor resources and coping strategies are associated with depressive disorder or severity of depressive symptoms in older persons [16].

The cross-sectional and longitudinal studies of medical and primary health-care patients also showed that the severity of depression was related to poorer global QOL and generic HQOL at baseline and follow-up. The prevalence of depression in older medical inpatients and patients in primary health care has been reported to be high in several studies [12, 30, 45, 60, 75]. Depression or depressive symptoms are the most common comorbidity in older persons with physical health difficulties [15, 141, 142]. Because depression affects QOL negatively regardless of medical health, it is important to detect depression and treat depressed patients. Thus, it is highly recommended that the health personnel in specialist and primary health-care settings have a dual treatment perspective, including both mental and physical health.

The negative association between depression and QOL was confirmed in numerous cross-sectional and longitudinal epidemiological community studies. In the longitudinal studies, as presented in table 4, the follow-up period varied from 3 months to 6 years, and there were mostly 2 assessments, with a variation from 2 to 7. In addition to depression, the studies also looked at and controlled for a wide range of risk factors for poor QOL. In the studies that had long-term follow-up, factors other than the risk factors considered by the studies might also influence QOL, such as a functional decline, stressful life events [36], locus of control [16], or a response shift in the participants' view of standards and expectations for life [49]. Despite this, the findings in the longitudinal community studies we reviewed are unambiguous: depression affects QOL negatively over time. In addition, since depression may be overlooked due to atypical symptomatology [26, 30, 143] or mistaken as grief over loss of health or close persons [143], it is important for health-care professionals working with older persons, health-care administrators, and health-care planners to address depression in older persons.

Limitations

Our review does have its limitations. First, the literature search was mainly conducted by one reviewer. However, the computer search strategy was discussed with the co-authors, and a scientific librarian assisted in the search. Second, the search was limited to articles published in English. Thus, there may be studies in other languages with results that are different from those we reported. Third, the examination and synthesis of the outcomes were complicated due to conceptual differences in the definition of QOL and differences in study designs, sample compositions, instruments used to assess depression and QOL, settings, length of follow-up, and adjustment variables. This heterogeneity may cause validity and reliability problems, and a meta-analytic approach in evaluating the studies statistically had to be omitted due the vari-

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ability in these factors. Fourth, in about 60% of the studies included in our review, it was explicitly stated that the authors had excluded persons with some degree of cognitive impairment. Assessment of QOL in persons with some degree of cognitive impairment may be difficult when using general global QOL and generic HQOL instruments; thus, disease-specific assessment instruments should be developed and used. However, the exclusion criteria for the definition of cognitive impairment varied considerably between studies. Thus, we cannot generalize the findings of this review to groups with cognitive impairment. Fifth, the approach in selecting quality criteria was chosen after advice from the Handbook for Reviews [55], but the criterion of sample size may be debatable since sample size by itself does not directly tell about the quality of the study. However, a low number of participants (<100) can influence the validity of the study due to low statistical power [53].

Sixth, only one third of the studies defined the concept of QOL. As previously stated, the lack of a theoretical foundation for QOL and the multitude of instruments make it difficult to compare study results [38, 41] and draw firm conclusions. For example, global QOL most often covers a range of appraisals including economic, health, social and/or spiritual aspects of life [43] and may be expressed as overall QOL, general LS, or general feelings of WB [38, 42]. Some studies seem to have defined WB not as a concept of global QOL, but as the diametrical opposite of depression. Consequently, the assessment instruments used in these studies are one-dimensional scales where the best outcome is high levels of WB, and severe depression is the worst outcome either by the use of a visual analogue scale [144] or an index of several items [129]. Thus, these studies did not examine the relationship between depressive symptom score and WB as a global assessment of QOL [145], and therefore they were not included in the review.

Conclusion

This review reports findings from cross-sectional and longitudinal studies and suggests a clear and consistent relationship between depression and poorer QOL in older persons in clinical and community settings. However, the diversity of assessment instruments used in the various studies limits direct comparison between studies and the potential to summarize data as estimates of the relationship between depression and QOL. There is also a need for additional studies that review the relationship between depression and QOL in older persons with cognitive impairment.

Disclosure Statement

The authors declare that they have no competing interests.

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