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3 **Subjective cognitive complaints in end-stage renal disease: a systematic review and**
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5 **meta-analysis**
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40
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58 journal to review the data if requested.
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Abstract

Cognitive impairment is common in patients with end-stage renal disease (ESRD) and is associated with compromised quality of life and functional capacity, as well as worse clinical outcomes. Most previous research and reviews in this area were focused on objective cognitive impairment, whereas patients' subjective cognitive complaints (SCCs) have been less well-understood. This systematic review aimed to provide a broad overview of what is known about SCCs in adult ESRD patients. Electronic databases were searched from inception to January 2022, which identified 221 relevant studies. SCCs appear to be highly prevalent in dialysis patients and less so in those who received kidney transplantation. A random-effects meta-analysis also shows that haemodialysis patients reported significantly more SCCs than peritoneal dialysis patients (standardised mean difference -0.20, 95% confidence interval -0.38 to -0.03). Synthesis of longitudinal studies suggests that SCCs remain stable on maintenance dialysis treatment but may reduce upon receipt of kidney transplant. Furthermore, SCCs in ESRD patients have been consistently associated with hospitalisation, depression, anxiety, fatigue, and poorer quality of life. There is limited data supporting a strong relation between objective and subjective cognition but preliminary evidence suggests that this association may be domain-specific. Methodological limitations and future research directions are discussed.

Keywords: subjective cognitive complaint; end-stage renal disease; dialysis; kidney transplantation; systematic review; meta-analysis

Introduction

Chronic kidney disease is a progressive disease defined as the presence of kidney damage or reduced kidney function for at least three months (Levey et al., 2009). It is now recognised as a global health concern, with prevalence rates rising steadily (Eckardt et al., 2013; Jha et al., 2013). According to the level of glomerular filtration rate, which is a measure of kidney function, chronic kidney disease can be classified into five stages, with stage 5 (glomerular filtration rate $< 15 \text{ mL/min/1.73 m}^2$) being the most severe stage where kidneys are no longer able to remove waste products and toxins from the body effectively (Levey & Coresh, 2012). Stage 5 chronic kidney disease is also known as end-stage renal disease (ESRD) or kidney failure. At this stage, life expectancy is drastically shortened if kidney replacement therapy is not initiated (Bello et al., 2022).

There are three main modalities of kidney replacement for ESRD patients: kidney transplantation (KTx), haemodialysis (HD), and peritoneal dialysis (PD). KTx is the preferred treatment option because it completely replaces kidney function and is associated with lower mortality risk and improved quality of life (Fleming, 2011; Sawinski & Poggio, 2021). However, due to the shortage of donor organs, dialysis remains the predominant modality globally (Himmelfarb et al., 2020). HD is an intermittent treatment that typically entails three- to four-hour-long sessions thrice-weekly in dialysis centres, during which blood is circulated and filtered through a dialyser (Fleming, 2011; Vadakedath & Kandi, 2017). In contrast, PD uses a paracorporeal method where patients' own peritoneum serves as a natural semipermeable membrane to filter blood either through three to five manual exchanges daily or overnight by a PD cycler (Fleming, 2011; Vadakedath & Kandi, 2017). PD offers more flexibility as it can be performed at home (self-care or assisted PD) and allows for regular/daily clearance of waste products and excess fluid (Fleming, 2011; Vadakedath & Kandi, 2017). ESRD entails various treatment transitions such as initiation onto renal

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2
3 26 replacement therapies, or switching from one modality to another with receipt of KTx or
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5 27 return back to dialysis following acute or chronic rejection of transplant graft.
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8 28 While medical innovation related to renal replacement therapies has transformed ESRD
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10 29 from an acute life-limiting illness to a chronic disease, treatment and symptom burden remain
11
12 30 extremely high in ESRD and especially dialysis patients. Dialysis patients are required to
13
14 31 adhere to complex guidelines concerning their diet, fluid intake, and medication, and to
15
16 32 permanently rearrange their schedules to accommodate treatment. On average, dialysis
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18 33 patients report 9-12 symptoms or treatment side effects (e.g., fatigue, pain, insomnia, etc.) at
19
20 34 any given time (Himmelfarb et al., 2020), contributing to impaired daily functioning, poor
21
22 35 quality of life, and psychological distress (Goh & Griva, 2018; Hedayati & Finkelstein, 2009;
23
24 36 K. Zhang et al., 2020).
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28 37 An additional burden of ESRD is the cognitive impairments that start to manifest in
29
30 38 early renal dysfunction with progressive deterioration (Berger et al., 2016; Brodski et al.,
31
32 39 2019) and persist upon dialysis initiation or KTx (Joshee et al., 2018; San et al., 2017; Shea et
33
34 40 al., 2019; Wolfgram, 2018). ESRD patients are at significantly greater risks of cardiovascular
35
36 41 disease and related factors such as hypertension and diabetes, and cerebrovascular disease
37
38 42 such as stroke and white matter disease, which may all contribute to cognitive decline (Crowe
39
40 43 et al., 2021; Drew et al., 2019; Murray, 2008). The accumulation of uraemic toxins in ESRD
41
42 44 patients also has pathological effects on the neurological system (Crowe et al., 2021). In
43
44 45 addition, the dialysis treatment itself may further accelerate cognitive decline by inducing
45
46 46 repetitive cerebral ischemia (i.e., reduction of cerebral blood flow) during HD sessions,
47
48 47 which in the long term may result in neurological injury (Crowe et al., 2021; Cukor et al.,
49
50 48 2020; Drew et al., 2019; Murray, 2008). Cognitive impairments in ESRD patients involve
51
52 49 deficits in various domains such as attention, memory, and executive function, with severity
53
54 50 ranging from mild impairments to dementia (Berger et al., 2016; Kurella Tamura et al., 2017;
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3 51 O’Lone et al., 2016; Viggiano et al., 2020). Compared to age-matched healthy controls, HD
4
5 52 patients are more than three times more likely to have severe cognitive impairments (Murray
6
7 53 et al., 2006). Both HD and PD patients have poorer cognitive performance than patients at
8
9 54 earlier stages of chronic kidney disease and healthy controls (O’Lone et al., 2016;
10
11 55 Vanderlinden et al., 2019). In contrast, KTx patients have better cognitive performance than
12
13 56 dialysis patients and non-dialysis-dependent chronic kidney disease patients, but still perform
14
15 57 worse than healthy controls in areas such as executive function, suggesting that KTx is also
16
17 58 unable to fully restore cognition to a premorbid level (Joshee et al., 2018).

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21 59 Cognitive impairments in ESRD patients are associated with increased hospitalisation
22
23 60 (Murray, 2008; Murray & Knopman, 2010; Sehgal et al., 1997; Shea et al., 2019) and
24
25 61 mortality risks (Griva et al., 2010; Kurella et al., 2006; Murray, 2008), and ultimately
26
27 62 increased cost of care. Cognitive impairments may also interfere with patients’ daily
28
29 63 functioning, treatment adherence, self-management skills, and decision-making capacities
30
31 64 because all these processes hinge upon patients’ cognition (Iyasere et al., 2017; Murray &
32
33 65 Knopman, 2010; Wolfgram, 2018). Given the high prevalence and potential consequences of
34
35 66 cognitive impairments in ESRD patients, substantial research has been conducted in the past
36
37 67 two decades, with evidence synthesised in several recent systematic reviews and meta-
38
39 68 analyses (Ali et al., 2020; Brodski et al., 2019; Joshee et al., 2018; Shea et al., 2019; Tian et
40
41 69 al., 2019; Vanderlinden et al., 2019). However, all these reviews were focused on objective
42
43 70 cognitive function assessed by standardised neuropsychological tests, which albeit sensitive
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45 71 in detecting cognitive impairments, may provide limited understanding of patients’ subjective
46
47 72 experience with cognitive difficulties in everyday context.

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51 73 The concept of subjective cognitive complaints (SCCs), or subjective cognitive decline,
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53 74 refers to self-reported difficulties in one or more cognitive domains (e.g., memory, attention,
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55 75 etc.) experienced in one’s daily life or a perceived decrease in cognitive capacity in
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3 76 comparison with a previously normal status (Jessen et al., 2014; Mendonça et al., 2015;
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5 77 Molinuevo et al., 2017; Pullens et al., 2010; Van Rijsbergen et al., 2014). In 2014, a group of
6
7 78 Alzheimer's disease researchers published a conceptual model for SCCs, which proposed that
8
9 79 SCCs occur at the preclinical stage of cognitive impairments where individuals experience
10
11 80 increasing compensatory cognitive efforts and subtle cognitive decline not yet detectable by
12
13 81 objective testing (Jessen et al., 2014). SCCs are therefore considered as an indicator of the
14
15 82 earliest symptomatic manifestation of cognitive impairments (Jessen et al., 2014) which may
16
17 83 be present as long as 15 years before the onset of objective impairments (Molinuevo et al.,
18
19 84 2017; Rabin et al., 2017). However, as individuals progress to more advanced stages of
20
21 85 cognitive impairments (i.e., dementia), SCCs may gradually level off, consistent with
22
23 86 anosognosia (i.e., lack of self-awareness about cognitive impairments) (Rabin et al., 2017).
24
25 87 This may be related to the presence of cognitive impairments interfering with an individual's
26
27 88 ability to detect everyday cognitive task failure, to consolidate the experience of failure, and
28
29 89 to accurately estimate one's own cognitive ability compared to previous knowledge
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31 90 (Mazancieux et al., 2019; Morris & Mograbi, 2013).

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37 91 Although SCCs may attenuate along the course of cognitive decline, these complaints
38
39 92 have been shown to be associated with objective markers of cognitive impairments (Farias et
40
41 93 al., 2013; Rueda et al., 2015) and are considered as a reliable predictor of future progression
42
43 94 to dementia (Farias et al., 2017; Y. C. Lee et al., 2020; Liew, 2020a, 2020b; Mendonça et al.,
44
45 95 2015; Mitchell et al., 2014; Neto & Nitrini, 2016). The importance of SCCs is also
46
47 96 exemplified by its inclusion as a core feature of mild cognitive impairment in consensus
48
49 97 reports (Winblad et al., 2004). SCCs may have potential value in identifying patients at risk
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51 98 of cognitive impairments before these cognitive changes become more severe and irreversible
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53 99 (Jessen et al., 2014).
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1
2
3 100 SCCs are also important as they reflect individuals' accumulative everyday experience
4
5 101 rather than cognitive performance at a single time point as assessed by objective
6
7 102 neuropsychological tests (Rabin et al., 2017). Studies on ESRD patients have found that
8
9 103 SCCs are indeed better predictors of real-world outcomes including functional capacity (Song
10
11 104 et al., 2015) and decision-making (Jayanti et al., 2016) compared to objective cognition, and
12
13 105 are consistently associated with psychological well-being and quality of life (Duarte et al.,
14
15 106 2005; Song et al., 2018). The self-awareness of cognitive deficits may also influence
16
17 107 judgements about behavioural efficacy, self-care ability, and independence of daily living
18
19 108 (Crowe et al., 2021; Morris & Mograbi, 2013). Understanding SCCs may thus be essential in
20
21 109 improving patient-centred care for ESRD-related cognitive impairments (Crowe et al., 2021).
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26 110 To date, a fair amount of research has been conducted to examine SCCs in ESRD
27
28 111 patients, but the results have not been drawn together to provide a broad overview of what is
29
30 112 known about these complaints in the context of ESRD. As such, we conducted a systematic
31
32 113 review and meta-analysis to synthesise existing data on SCCs in ESRD patients. Specifically,
33
34 114 the aims of this review include: (1) to identify instruments assessing SCCs used in ESRD
35
36 115 research; (2) to quantify the frequency and severity of SCCs as measured by these different
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38 116 instruments in the target population(s); (3) to compare differences (if any) in SCCs between
39
40 117 renal replacement modalities (i.e., HD, PD, and KTx); (4) to evaluate the course of SCCs
41
42 118 over time and across treatment transitions; and (5) to synthesise evidence on the associations
43
44 119 of SCCs with sociodemographic profile, clinical characteristics, clinical and patient-reported
45
46 120 outcomes (e.g., hospitalisation, quality of life, etc.), and objective cognitive function. Based
47
48 121 on previous research on objective cognition, we hypothesised that KTx patients would have
49
50 122 lower frequency and severity of SCCs than dialysis patients and that SCCs will improve with
51
52 123 KTx; as evidence on cognitive impairments across dialysis modalities (HD vs. PD) is mixed
53
54 124 no a priori hypotheses were formulated.
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125 **Methods**

126 The protocol was registered within the PROSPERO database (registration number:
127 CRD42021250125). Findings were reported following the Preferred Reporting Items for
128 Systematic reviews and Meta-Analyses (PRISMA) guideline (Moher et al., 2009; Page et al.,
129 2021).

130 **Eligibility criteria**

131 Studies were included if they (1) involved adult patients (≥ 18 years) diagnosed with ESRD
132 (stage 5 chronic kidney disease with glomerular filtration rate < 15 mL/min/1.73 m²) either
133 on renal replacement therapy (any dialysis modality or kidney transplantation), conservative
134 management (i.e., management without renal replacement therapy where the goal is to
135 minimise symptoms and maximise the quality and length of life), or with ESRD but not yet
136 initiated treatment, (2) used at least one measure of SCCs, and (3) reported data on
137 frequency/severity of SCCs, differences in SCCs between treatment modalities, changes in
138 SCCs over time, or associations of SCCs with sociodemographic and/or clinical
139 characteristics, clinical and/or patient-reported outcomes, and/or objective cognitive function.

140 Studies that included only children or adolescents (under 18 years of age) or patients in
141 stages 1-4 of chronic kidney disease were excluded. We defined SCCs as the self-reported
142 difficulties in one or more cognitive domains or a perceived decrease in cognitive capacity in
143 comparison with a previously normal status (Jessen et al., 2014; Mendonça et al., 2015;
144 Molinuevo et al., 2017; Pullens et al., 2010; Van Rijsbergen et al., 2014). SCCs can be
145 measured using self- or proxy-reported questionnaires assessing individuals' perceptions
146 about cognitive capacity or experience of cognitive difficulties (e.g., "How much of the time
147 in the past four weeks did you become confused?"). Self-reported measures of daily
148 functioning (e.g., managing finances, shopping, etc.) were not considered as measures of
149 SCCs because the capacity to carry out these activities does not solely rely on cognitive

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3 150 skills. Studies using a composite measure (e.g., a measure of quality of life or depression that
4
5 151 has a subdomain of SCCs) were included if they reported the separate SCC domain score.
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8 152 Studies that reported only the composite score that included the SCC domain were excluded.
9
10 153 Unpublished studies and grey literature were excluded due to the absence of peer review.
11
12 154 Non-English articles were excluded due to resource constraints and the research team's
13
14
15 155 language skills. Only published journal articles with available English full-text were included
16
17 156 in the final sample.

19 157 **Search strategy & selection process**

21 158 To identify relevant studies the following databases were searched (inception to 21 April
22
23 159 2021): CINAHL (EBSCOhost), Ovid – All Resources (Books@Ovid, Journals@Ovid Full
24
25 160 Text, Your Journals@Ovid, EBM Reviews, Embase, MEDLINE), MEDLINE (PubMed),
26
27 161 PsycINFO (EBSCOhost), and Web of Science. The search terms included exact words or
28
29 162 synonyms of: subjective cognitive complaints, end-stage renal disease, dialysis, and kidney
30
31 163 transplantation. We also included “kidney disease quality of life” as one of the keywords
32
33 164 because a large number of studies in this area assessed SCCs using a subscale within this
34
35 165 measure. Subject headings were not used because there was no subject heading in the
36
37 166 selected databases specific to the concept of SCCs, and the use of relevant terms such as
38
39 167 “Cognitive Dysfunction” and “Quality of Life” may decrease the specificity of the search.
40
41 168 We performed the search in all fields including full-text because previous studies showed that
42
43 169 full-text search is more sensitive than title/abstract search (Lin, 2009; Penning de Vries et al.,
44
45 170 2020). An updated search was conducted to retrieve records published between the end date
46
47 171 of the initial search and 11 January 2022. The detailed search strategy is presented in Table
48
49 172 S1.

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52 173 Titles and abstracts were scanned independently by two authors (FC & ZG) using
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54 174 Covidence (<https://www.covidence.org>) to exclude studies that were irrelevant. Full-texts of
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3 175 the remaining articles were then independently screened by FC and ZG to determine
4
5 176 eligibility. Discrepancies between the two reviewers were resolved by discussion with a third
6
7 177 reviewer (KG). The reference lists of included articles were also examined to identify
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9
10 178 additional studies.

11 12 179 **Data extraction**

13
14 180 Due to the large number of relevant articles included in the current review, we adopted an
15
16 181 accelerated approach to data extraction recommended by Cochrane (Moons et al., 2021). One
17
18 182 reviewer (FC) extracted data from all individual studies. The correctness and completeness of
19
20 183 extracted data were then verified by two independent reviewers (ZG & XZ). Any errors
21
22 184 detected by the two reviewers were discussed among the three reviewers and corrected if
23
24
25 185 necessary.

26
27
28 186 The following data items were extracted: article citation, study location, study design,
29
30 187 sample size, participant characteristics (i.e., gender, age, treatment modality, etc.), measure of
31
32 188 SCCs, frequency and severity of SCCs, differences in SCCs between treatment modality
33
34 189 groups, longitudinal change in SCCs over time, associations of SCCs with sociodemographic
35
36 190 and clinical variables, patient-reported outcomes, and objective cognition. If data concerning
37
38 191 the outcomes were missing or unclear from an article, the review team contacted the
39
40 192 corresponding authors to obtain original data or for clarification.

41 42 193 **Quality assessment**

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45 194 The quality of selected studies were assessed using the quality assessment tools developed by
46
47 195 the National Institute of Health ([https://www.nhlbi.nih.gov/health-topics/study-quality-](https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools)
48
49 196 [assessment-tools](https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools)). This tool provides study design-specific items to assess methodological
50
51 197 quality of observational cohort and cross-sectional studies, controlled intervention studies,
52
53 198 and before-after (pre-post) studies with no control group (Ma et al., 2020). Reviewers could
54
55 199 select “yes”, “no”, “not reported”, “cannot determine”, or “not applicable” in response to
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1
2
3 200 each item for each individual study. Similar to data extraction, the first author (FC) rated each
4
5 201 item for each included study, with verification performed by two other reviewers (ZG & XZ).
6
7
8 202 Discrepancies in quality ratings between the reviewers were resolved by discussion and
9
10 203 consensus.

11 12 204 **Data synthesis**

13
14 205 We first performed qualitative narrative synthesis of the included studies. We summarised
15
16 206 patient responses to SCC measures that indicate different levels of frequency/severity of
17
18 207 SCCs. For this specific aim, the mean values reported by cross-sectional studies and baseline
19
20 208 scores in longitudinal studies were used. We also summarised the number of studies that
21
22 209 reported significant ($p < .05$) or non-significant differences between treatment modalities
23
24 210 (i.e., HD, PD and KTx), as well as the direction of these differences. The longitudinal course
25
26 211 of SCCs was determined based on observational cohort studies that analysed changes in
27
28 212 SCCs over time and intervention studies that reported changes in the control groups.
29
30 213 Furthermore, the number of studies reporting positive, negative, or null associations of SCCs
31
32 214 with sociodemographic, clinical and patient-reported variables, as well as objective cognitive
33
34 215 function, were synthesised.

35
36 216 Meta-analyses were further conducted where data were sufficient (i.e., at least two
37
38 217 studies using similar measurement and analysis methods). Specifically, we conducted a
39
40 218 random-effects meta-analysis with a restricted maximum likelihood estimator to compare
41
42 219 differences in SCCs between HD and PD patients based on the reported means, standard
43
44 220 deviations, and sample sizes of each treatment group. Standardised mean differences and
45
46 221 corresponding 95% confidence intervals were calculated. Meta-analyses comparing other
47
48 222 treatment modalities (e.g., HD vs. KTx) were not performed due to the small number of
49
50 223 studies reporting these findings. We also performed random-effects meta-analyses of
51
52 224 correlation coefficients between SCCs and 10 patient-reported outcomes (i.e., depression,
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3 225 anxiety, overall health rating, general health perception, pain, fatigue, physical functioning,
4
5 226 social functioning, role limitation due to physical health, and role limitation due to emotional
6
7 227 problems). The Fisher's *r*-to-*z* transformed correlation coefficient and corresponding 95%
8
9 228 confidence intervals were calculated. Meta-analyses of correlation between SCCs and
10
11 229 sociodemographic/clinical variables and objective cognition were not deemed possible due to
12
13 230 the unavailability of original data and heterogeneity across studies in terms of the
14
15 231 measurement and analyses methods of these variables. For all meta-analyses, heterogeneity
16
17 232 was determined by forest plots, including summary effects along with the 95% confidence
18
19 233 intervals and 95% prediction intervals, as well as the *Q* and *I*² statistics (IntHout et al., 2016).
20
21 234 Small study effects were examined through Egger's linear regression test of funnel plot
22
23 235 asymmetry. All meta-analyses were performed using the "metafor" package (Viechtbauer,
24
25 236 2010) in R 4.1.2 (R Core Team, 2018).

237 **Results**

238 **Study selection**

239 The search flow is illustrated in Figure 1 (Page et al., 2021). The initial search (21 April
240 2021) retrieved 5248 records, of which 2435 were duplicates. Two reviewers (FC & ZG)
241 independently screened titles and abstracts of the remaining 2813 articles and excluded 1543
242 irrelevant records. A total of 1027 full-text papers were assessed for eligibility, of which 814
243 were excluded due to reasons presented in Figure 1. The updated search (11 January 2022)
244 identified eight additional relevant articles. Thus, a total of 221 studies were included.

245 **Study characteristics**

246 Tables S2 present characteristics and key findings of each individual study, as well as the full
247 reference list of included studies. The 221 studies represented 105064 patients with ESRD,
248 with the majority (*N* = 89188) receiving haemodialysis (HD), 9113 patients on peritoneal
249 dialysis (PD) and 4449 patients who received kidney transplantation (KTx). Studies were

250 mainly conducted in the United States ($k = 33$), Brazil ($k = 29$), Japan ($k = 19$), South Korea
251 ($k = 13$), United Kingdom ($k = 11$), Canada ($k = 11$), Iran ($k = 10$), Norway ($k = 10$) and
252 mainland China ($k = 8$). Over half of the studies ($k = 134$) used an observational cross-
253 sectional design, while 49 used an observation cohort design. Moreover, there were 30
254 controlled intervention studies and eight pre-post studies with no control group.

255 **Quality assessment**

256 The quality ratings of each individual study is presented in Tables S3-S6. Quality ratings
257 were reported separately for observational cross-sectional (Table S3), observational cohort
258 (Table S4), controlled intervention (Table S5), and pre-post studies (Table S6).

259 Within the 134 cross-sectional studies, only 22.4% fulfilled at least 70% of the criteria
260 list, whereas 31.3% fulfilled less than 50% of the criteria. Some key methodological
261 shortcomings of the cross-sectional studies included insufficient description of patient
262 recruitment procedure, absence of sample size justification, and outcome assessors not
263 blinded to exposure status where possible. Methodological quality of observational cohort
264 studies appeared to be higher compared to cross-sectional studies, with 49.0% and 93.9%
265 fulfilling at least 70% and 50% of the criteria, respectively. Main methodological
266 shortcomings of observational cohort studies were similar to those identified in cross-
267 sectional studies, but include additionally the high rate of or inadequate information on loss
268 to follow-up.

269 Regarding controlled intervention studies, only 26.7% of the 30 studies met at least
270 70% of the criteria. Areas of improvement include inadequacy of randomisation, allocation
271 concealment, and blinding, as well as insufficient/unjustified sample size and absence of
272 intention-to-treat analysis. Finally, within the eight pre-post studies with no control group, the
273 majority of studies did not report response rate or provide sample size justification, and had

274 high rates of loss to follow-up. Despite these limitations, almost all included studies,
275 regardless of the design, adopted reliable and valid outcome measures of SCCs.

276 **Measures of SCCs**

277 Thirteen measures of SCCs were identified and the characteristics of these measures are
278 presented in Table 1. Of these, six questionnaires were developed specifically for SCCs,
279 whereas the remaining were multidomain measures of quality of life or symptom checklist
280 that included an SCC subscale/item. All measures identified in the current review were
281 validated except for Henry et al. (2018) where four items from two validated questionnaires
282 were selected and used as a measure of SCCs. The most commonly used measure ($k = 207$,
283 93.7%) was the Kidney Disease Quality of Life Cognitive Function subscale (KDQOL-CF), a
284 3-item scale that assesses patients' experience of slow reaction, concentration difficulty, and
285 confusion in the past four weeks (Hays et al., 1994; Kurella et al., 2004), followed by the
286 Patient's Assessment of Own Functioning Inventory ($k = 3$, 1.4%) (Chelune et al., 1986) and
287 a single item assessing concentration difficulty from Dialysis Symptom Index ($k = 2$, 0.9%)
288 (Weisbord et al., 2004). All other measures were only used once. Number of items ranged
289 from 1 to 39 and instruments varied in cognitive domains assessed: attention/concentration
290 (11 measures), memory (10 measures), language/comprehension (five measures), and
291 problem-solving (four measures). Measures mainly assessed severity (seven measures) and
292 frequency (six measures) of SCCs.

293 **Frequency and severity of SCCs**

294 We first synthesised data on frequency of SCCs (i.e., number of times patients experienced
295 SCCs within a given timeframe) in ESRD patients. The KDQOL-CF data across treatment
296 modalities (HD: $k = 120$, $N = 37212$; PD: $k = 42$, $N = 6304$; KTx: $k = 17$, $N = 2693$) were
297 synthesised by comparing the distribution of mean scores across modalities (see Table 2).
298 The majority of studies on HD and PD patients reported mean KDQOL-CF scores between

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299 60 and 100 (HD: 103 studies, 85.8%; PD: 38 studies, 90.5%), indicating that SCCs were
300 noted from “none of the time” to “some of the time” during the past month. In contrast, the
301 majority of studies on KTx patients reported mean KDQOL-CF scores between 80 and 100
302 (11 studies, 64.7%), indicating that SCCs were reported from “none of the time” to “a little of
303 the time” during the past month. When analysing Table 2 in terms of number of patients, the
304 majority of HD (N = 28431, 76.4%) and PD (N = 4409, 69.9%) patients reported mean scores
305 lower than 80, indicating that SCCs were experienced sometimes or more often. In contrast,
306 the majority of KTx patients (N = 1922, 71.4%) reported mean scores higher than 80,
307 indicating SCCs no more than “a little of the time”.

308 Considering other measures assessing frequency of SCCs, three studies found that
309 SCCs in HD patients were experienced from “rarely” to “sometimes” on average (Brickman
310 et al., 1996; Fan et al., 2020; Jassal et al., 2006), which were similar to findings from
311 KDQOL-CF. Additionally, using the concentration difficulty item in the Dialysis Symptom
312 Index (yes/no), 30.2% to 32.3% of HD patients in Columbia reported the presence of
313 concentration difficulties during a one-year course (Alarcon et al., 2021), whereas 57.8% of
314 HD patients in Korea reported presence of these difficulties (Cho et al., 2018).

315 There is a paucity of research on severity of SCCs in ESRD (i.e., level of difficulty in
316 performing cognitive tasks or degree of seriousness). Five studies were identified and these
317 had used different indices assessing different cognitive domains. One study used the
318 cognition subscale of the WHO Disability Assessment Schedule and noted that HD patients
319 reported “no difficulty” to “mild difficulty” in daily cognitive tasks (i.e., concentration,
320 memory, problem-solving, learning, comprehension, conversation) (Castro et al., 2018).
321 Another study used a single item in Dialysis Symptom Index and HD patients reported that
322 their concentration difficulties were “somewhat bothersome” to “quite bothersome” (Cho et
323 al., 2018). A further study used the cognition subscale of Health Utilities Index Mark 3,

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3 324 where HD patients reported on average that they were “somewhat forgetful, but able to think
4
5 325 clearly and solve everyday problems” (Gorodetskaya et al., 2005). When using the British
6
7 326 Columbia Cognitive Complaints Inventory which assesses SCC severity in six domains (i.e.,
8
9 327 memory, concentration, thought expression, word finding, thinking, problem-solving) and
10
11 328 classifies patients into four levels of severity (0-4: normal; 5-9: mild; 10-14: moderate; 15-18:
12
13 329 severe), one study reported that 86.9% of HD patients had mild to severe SCCs (Zubair &
14
15 330 Butt, 2017). No study assessed severity of SCCs in PD patients. The only study to assess
16
17 331 SCC severity in KTx used the cognition subscale of ESRD Symptom Checklist and
18
19 332 concluded that SCCs in concentration and memory were only very mild in the first year
20
21 333 following KTx (M = 13.0-14.3 on a scale of 0 = not at all - 100 = extreme) (Ortega et al.,
22
23 334 2007).

335 **Differences in SCCs between treatment modalities**

336 Of the 23 studies which compared frequency of SCCs between HD and PD patients, 17
337 reported no difference (Chen et al., 2021; Czyżewski et al., 2014; Frimat et al., 2006;
338 Fructuoso et al., 2011; Gonçalves et al., 2015; Kang et al., 2017; Kostro et al., 2016; Kutner,
339 Zhang, Barnhart, et al., 2005; Malekmakan et al., 2016; Manavalan et al., 2017; Molsted et
340 al., 2007; Neumann et al., 2018; Okpechi et al., 2013; Rebollo Rubio et al., 2017; Song et al.,
341 2015; Tannor et al., 2017; Wright & Wilson, 2015), whereas six reported more frequent
342 SCCs in HD compared to PD patients (Carmichael et al., 2000; Chrifi Alaoui et al., 2022;
343 Kutner, Zhang, & Brogan, 2005; A. J. Lee et al., 2005; Tanaka et al., 2020; Türk et al., 2020).

344 Of these 23 studies, 20 provided data necessary for a random-effects meta-analysis (see
345 Figure 2). All 20 studies used the KDQOL-CF as the measure of SCCs. There was a small
346 but significant difference between the HD and PD groups (standardised mean difference -
347 0.20, 95% confidence interval -0.38 to -0.03), with HD patients reporting more frequent
348 SCCs than PD patients. The prediction interval for this comparison was large and included

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3 349 zero (95% prediction interval -0.92 to 0.51). There was high heterogeneity across studies (Q
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5 350 = 90.81, $df = 19$, $p < .001$; $I^2 = 89.5\%$). Egger's test did not detect funnel plot asymmetry ($z =$
6
7 351 -0.52 , $p = .600$). It is of note however that this significant difference may be mainly driven by
8
9 352 one study with a particularly large sample size (total $N = 3302$) that almost equals the total
10
11 353 sample sizes of the rest of the studies (Kutner, Zhang, & Brogan, 2005).

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13
14 354 Four studies using the KDQOL-CF compared frequency of SCCs between HD and KTx
15
16 355 patients, with three reporting no difference (Barotfi et al., 2006; Czyżewski et al., 2014;
17
18 356 Painter et al., 2012) and one reporting more frequent SCCs in HD patients (A. J. Lee et al.,
19
20 357 2005). Two studies compared KDQOL-CF scores between PD and KTx patients and both
21
22 358 reported no difference (Czyżewski et al., 2014; A. J. Lee et al., 2005). No study compared
23
24 359 severity of SCCs among HD, PD and KTx patients.

25 26 27 28 360 **Course of SCCs**

29
30 361 A subset of included studies ($k = 46$) reported on changes in SCCs over time in ESRD
31
32 362 patients. These include observational cohort studies ($k = 26$), pre-post studies ($k = 1$), and
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34 363 intervention studies that reported changes in the control groups ($k = 19$).

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36
37 364 Twenty studies assessed SCCs at multiple time points in patients on HD, with 19
38
39 365 reporting no change over time (Alarcon et al., 2021; Boudville et al., 2009; Duarte et al.,
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41 366 2009; Frimat et al., 2006; Hayashi et al., 2017; Korevaar et al., 2002; L. C. C. Lopes et al.,
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43 367 2019; Maynard et al., 2019; Mazairac et al., 2013; Neumann et al., 2018; Painter et al., 2012;
44
45 368 Poulsen et al., 2017; Scott et al., 2009; Shahnavaizi et al., 2018; Simic-Ogrizovic et al., 2009;
46
47 369 Soares et al., 2017; Unruh et al., 2004; Wu et al., 2014; Zheng et al., 2019). The follow-up
48
49 370 periods of these studies ranged from six weeks to six years. Similarly, 11 out of 12 studies on
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51 371 PD patients with follow-up periods ranging from one month to three years also reported no
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53 372 change in SCCs over time (Chow & Wong, 2010; Frimat et al., 2006; Jiao et al., 2017; Jung
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55 373 et al., 2016; Korevaar et al., 2002; Li et al., 2014; Lo et al., 1998; Michels et al., 2011;

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3 374 Neumann et al., 2018; Uchiyama et al., 2019; Wong et al., 2010). Of note, all these studies
4
5 375 reporting no change in SCCs in dialysis patients adopted the KDQOL-CF which only
6
7 376 contains three items. When using a more comprehensive measure (i.e., Patient's Assessment
8
9 377 of Own Functioning Inventory), Song et al. (2018) found a significant reduction in SCCs over
10
11 378 a one-year course in both HD and PD patients.

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14 379 Regarding the effect of KTx, there is evidence of a significant reduction in SCCs
15
16 380 among HD, PD, or pre-emptive patients from pre- to post-KTx (Kostro et al., 2016;
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18 381 McAdams-DeMarco et al., 2018; Ortega et al., 2007; Peipert et al., 2020; Rajkumar et al.,
19
20 382 2019; Tsarpali et al., 2021). Following KTx, SCCs appear to be stable over time and may be
21
22 383 maintained for up to six years post-KTx (Costa-Requena et al., 2017; Czyżewski et al., 2014;
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24 384 Hernández Sánchez et al., 2021; Lønning et al., 2018; Ortega et al., 2007; Peipert et al., 2020;
25
26 385 Ryu et al., 2021; Tsarpali et al., 2021).

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28
29 386 The effect of transplant graft rejection and return to dialysis and the effect of dialysis
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31 387 initiation on SCCs could not be synthesised since there is a paucity of research comparing
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33 388 SCCs across these treatment transitions (i.e., KTx to dialysis and pre- to post-initiation of
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35 389 dialysis).

36 37 38 39 40 390 **Associations with sociodemographic, clinical, and patient-reported variables**

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42 391 Evidence concerning associations of SCCs with sociodemographic, clinical, and patient-
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44 392 reported variables were synthesised by the number and percentage of studies that reported a
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46 393 positive, negative, or null association with each variable (see Table 3). There was high
47
48 394 heterogeneity in terms of the quantification of these variables. Study authors were contacted
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50 395 for data on correlations or between-group comparisons but the response rate was very low.
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52 396 Associations with sociodemographic and clinical variables were therefore not meta-analysed
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54 397 due to the lack of data.
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3 398 Among sociodemographic variables, the majority of studies found no association
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5 399 between SCCs and age, gender, marital status, household income, and smoking status.
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8 400 Regarding education level, seven studies reported that lower education was associated with
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10 401 higher SCCs (Brickman et al., 1996; Duarte et al., 2005; Kontodimopoulos & Niakas, 2005;
11
12 402 Kutner et al., 2007; A. A. Lopes et al., 2007; Ortega et al., 2007; Song et al., 2015) whereas
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14 403 seven others found no association (Anees et al., 2018; Boudida et al., 2014; Fan et al., 2020;
15
16 404 Ho et al., 2013; Neumann et al., 2018; Sorensen et al., 2012; Zubair & Butt, 2017). It
17
18 405 appeared that the seven studies reporting a significant association with education had
19
20 406 generally larger sample sizes, and adopted more lengthy and comprehensive measures of
21
22 407 SCCs, compared to studies reporting null associations. In terms of employment status, four
23
24 408 studies found a significant association between SCCs and unemployment (de Oliveira et al.,
25
26 409 2012; A. A. Lopes et al., 2007; Ortega et al., 2007; Vázquez et al., 2005) and these studies
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28 410 had generally larger sample sizes compared to the two that reported no association (Anees et
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30 411 al., 2018; Neumann et al., 2018).

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35 412 Clinical parameters were largely unrelated to SCCs as shown in Table 3, where null
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37 413 associations were reported in at least 70% of the studies for most variables. However,
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39 414 hospitalisation was consistently associated with SCCs in all six studies assessing this
40
41 415 outcome. Specifically, four cross-sectional studies reported that patients with more frequent
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43 416 and/or longer hospitalisation events in the preceding 12 months reported higher frequency of
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45 417 ensuing SCCs (Hays et al., 1994; Kontodimopoulos & Niakas, 2005; Poulsen et al., 2017;
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47 418 Türk et al., 2020). Two other prospective cohort studies with very large sample sizes (N =
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49 419 6151 and 10030 respectively) reported that higher SCCs at baseline were associated with
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51 420 significantly greater risk of future hospitalisation (A. A. Lopes et al., 2003; Mapes et al.,
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53 421 2003).
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3 422 In terms of patient-reported outcomes (see Table 3), SCCs have been consistently
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5 423 associated higher depressive symptoms (18 studies, 85.7%), higher anxious symptoms (9
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7 424 studies, 90.0%), higher bodily pain (6 studies, 85.7%), higher fatigue symptoms (6 studies,
8
9 425 100.0%), worse physical functioning (5 studies, 83.3%), more overall physical symptoms (5
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11 426 studies, 100.0%), poorer sleep quality (3 studies 75.0%), and lower functional capacity (3
12
13 427 studies 75.0%). Results regarding some other quality-of-life domains (i.e., overall health
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15 428 rating, social functioning, general health perception, role limitation due to physical health or
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17 429 emotional problems, and physical inactivity) were less consistently reported but still showed
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19 430 an overall association between higher SCCs and worse quality of life.

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24 431 For 10 of these patient-reported outcomes (i.e., depression, anxiety, overall health
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26 432 rating, general health perception, bodily pain, fatigue, physical functioning, social
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28 433 functioning, role limitation due to physical health, and role limitation due to emotional
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30 434 problems) where data were sufficient, random-effects meta-analyses of correlation
31
32 435 coefficients were further conducted to determine the strength of associations. Results and
33
34 436 forest plots of these meta-analyses are presented in Figures S1-S10. The pooled effects
35
36 437 showed significant correlations between SCCs and all 10 patient-reported outcomes (95%
37
38 438 confidence interval not including zero). The strength of these associations ranged from small
39
40 439 (0.22) to moderate (0.49), with depressive symptoms (correlation coefficient 0.46, 95%
41
42 440 confidence interval 0.39 to 0.53), anxious symptoms (correlation coefficient 0.40, 95%
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44 441 confidence interval 0.33 to 0.47), fatigue symptoms (correlation coefficient 0.49, 95%
45
46 442 confidence interval 0.45 to 0.54), and role limitation due to emotional problems (correlation
47
48 443 coefficient 0.43, 95% confidence interval 0.37 to 0.48) showing the strongest correlations
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50 444 with SCCs. Details with regards to the prediction interval, heterogeneity, and funnel plot
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52 445 asymmetry, are presented in Figures S1-S10.

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56 446 **Association with objective cognitive function**
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3 447 Only five studies evaluated association between SCCs and objective cognitive function in
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5 448 ESRD patients (Brickman et al., 1996; Henry et al., 2018; Jayanti et al., 2016; Song et al.,
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7 449 2015; Sorensen et al., 2012). Some studies assessed objective cognition using global
8
9 450 screening tests that provides a total sum score across cognitive domains such as the Mini-
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11 451 Mental State Examination (Henry et al., 2018; Sorensen et al., 2012) and the Modified Mini-
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13 452 Mental State test (Jayanti et al., 2016), while others used individual neuropsychological tests
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15 453 assessing specific domains, such as the Trail-Making Test and the Digit Span Task
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17 454 (Brickman et al., 1996; Henry et al., 2018; Jayanti et al., 2016; Sorensen et al., 2012).

21 455 When operationalising objective cognition and/or SCCs as a single construct (i.e.,
22
23 456 calculating only the total score of global cognitive tests or sum score of SCC measures),
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25 457 studies generally found no association between objective and subjective cognition (Brickman
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27 458 et al., 1996; Henry et al., 2018; Jayanti et al., 2016; Song et al., 2015; Sorensen et al., 2012).
28
29 459 However, there is preliminary evidence suggesting that this association may be domain-
30
31 460 specific. In particular, although Henry et al. (2018) found no association between overall
32
33 461 SCCs and global cognitive test scores, complaints about slow reaction in this study was
34
35 462 associated with poorer performance on Digit Span Task (short-term verbal memory) and
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37 463 Trail-Making Test (attention/concentration and executive function), and self-reported
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39 464 confusion was also associated with poorer performance on Digit Span Task, Visual Retention
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41 465 Test (visual memory), and Trail-Making Test. Similarly, Jayanti et al. (2016) found that self-
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43 466 reported concentration difficulties (but not memory complaints) were associated with poorer
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45 467 performance in the Trail-Making Test (but not performance on global cognitive test).

51 468 All five studies assessing the association between objective tests and subjective
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53 469 complaints adopted a cross-sectional design (Brickman et al., 1996; Henry et al., 2018;
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55 470 Jayanti et al., 2016; Song et al., 2015; Sorensen et al., 2012). Therefore, it was not possible to
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57 471 determine whether SCCs in ESRD patients may predict future risks of progression to mild
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3 472 cognitive impairments or dementia. We were also unable to determine the relationship
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5 473 between objective and subjective cognition over time and how they may interact with one
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7 474 another along the course of kidney disease, renal replacement therapies, and/or treatment
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9 475 transitions.

12 476 **Discussion**

14 477 To the best of our knowledge, this is the first systematic review and meta-analysis on SCCs
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16 478 in patients with ESRD. By including 221 relevant articles, we provided a comprehensive
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18 479 overview of this commonly experienced but poorly understood problem. We synthesised
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20 480 evidence of the frequency, severity, and course of SCCs in ESRD patients, differences
21
22 481 between treatment modalities, associations of SCCs with sociodemographic, clinical, and
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24 482 patient-reported variables, and relationship between subjective and objective cognition.
25
26 483 Although there is substantial heterogeneity across studies in terms of the study design, sample
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28 484 characteristics, and measures used to assess SCCs, some preliminary conclusions can be
29
30 485 drawn. First, SCCs are highly prevalent in dialysis patients, with over two thirds of HD
31
32 486 (76.4%) and PD (69.9%) patients reporting SCCs sometimes or more often. Within dialysis
33
34 487 patients, those who are on HD experience significantly more frequent SCCs compared to
35
36 488 those on PD, with a small effect size. In contrast, SCCs are much less prevalent in KTx
37
38 489 patients with over two thirds (71.4%) reporting these complaints only a little of time or never.
39
40 490 When analysing the longitudinal course, SCCs appear relatively stable over time on HD and
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42 491 PD treatments but may reduce significantly upon receipt of KTx. In addition, there is either
43
44 492 no or mixed evidence on associations between SCCs and most sociodemographic/clinical
45
46 493 variables, except for hospitalisation which has been consistently associated with higher
47
48 494 SCCs. Patient-reported outcomes including depression, anxiety, fatigue, and quality of life in
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50 495 various domains appear to be more consistently associated with SCCs, with small to medium
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52 496 magnitude. Finally, the association between subjective and objective cognition in ESRD
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3 497 patients could not be established due to the lack of data but there is preliminary evidence
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5 498 suggesting domain-specificity of this association.
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8 499 Our findings regarding the prevalence of SCCs and differences between treatment
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10 500 modalities are generally in line with the objective cognition literature. Two recent meta-
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12 501 analyses have confirmed that PD patients have better performance on objective cognitive
13
14 502 tests and lower risk of cognitive impairments compared to HD patients (Ali et al., 2020; Tian
15
16 503 et al., 2019). Our meta-analysis extends these findings to subjective reports. PD, by being a
17
18 504 daily treatment, offers a more gentle and continuous clearance of toxins and waste products,
19
20 505 without the more acute and variable haemodynamic changes and fluid shifts reported in HD
21
22 506 (Viggiano et al., 2020). As such, PD is expected to provoke fewer and less severe instances of
23
24 507 brain injury, hence better preserving cognitive function (Drew et al., 2019; Murray, 2008;
25
26 508 Tian et al., 2019). However, caution is needed when interpreting this meta-analysis since the
27
28 509 prediction interval was very wide and contained zero, suggesting that the comparison in
29
30 510 future similar studies can fluctuate across a wide range of effects (IntHout et al., 2016). It is
31
32 511 also important to note that according to our quality assessment, the outcome assessors in
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34 512 studies comparing HD and PD groups were often not blinded to patients' exposure status,
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36 513 which may introduce experimenter bias where the assessors expect HD patients to have more
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38 514 SCCs than PD patients. Furthermore, it is possible that this observed difference is a mere
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40 515 reflection of pre-existing differences between those who opt for HD versus PD (Crowe et al.,
41
42 516 2021). One included study found that more severe SCCs in pre-dialysis patients were
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44 517 associated with a higher likelihood of choosing fully-assisted (i.e., HD) over self-care dialysis
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46 518 (i.e., PD) (Jayanti et al., 2016). These confounding factors are important to address in future
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48 519 studies as they may undermine interpretation of the true effect of dialysis modality on
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50 520 cognition. To date, transplantation remains the optimal treatment for restoring cognition in
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52 521 ESRD patients as it completely replaces the kidneys and has been associated with cerebral
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3 522 benefits and improvements in objective cognitive performance (Crowe et al., 2021; Joshee et
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5 523 al., 2018). Our review further supported the advantages of KTx by showing a lower
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8 524 prevalence rate of SCCs in KTx than in dialysis patients, and a reduction in SCCs from pre-
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10 525 to -post-KTx.

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12 526 Regarding the longitudinal course, SCCs appear relatively stable in patients receiving
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14 527 HD or PD treatments. This conclusion was inconsistent with the objective cognition literature
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17 528 where several longitudinal studies showed a significant decline in executive function over the
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19 529 course of HD/PD (Drew et al., 2017; Iyasere et al., 2017; Kurella Tamura et al., 2017). The
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21 530 majority of studies assessing change in SCCs in our review used the KDQOL-CF measure
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23
24 531 which does not assess executive function and thus may have missed the opportunity to
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26 532 observe changes in complaints about this important domain. Indeed, one study used a more
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28 533 comprehensive questionnaire that includes memory, language, sensory-perceptual, and
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30 534 executive function domains and found a significant reduction in overall SCCs over a one year
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33 535 course in both HD and PD patients (Song et al., 2018). This again seems to contradict the
34
35 536 studies using objective tests in the direction of change. However, according to the conceptual
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37 537 model of SCCs mentioned earlier, SCCs may be the most evident during preclinical cognitive
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39 538 impairments when objective performance is still within normal limits (Jessen et al., 2014). As
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41 539 cognitive impairments become more severe, SCCs may recede due to diminished accuracy in
42
43 540 estimating own cognitive abilities (Mazancieux et al., 2019; Morris & Mograbi, 2013; Rabin
44
45 541 et al., 2017). In the context of ESRD, the decline in executive function over the dialysis
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47 542 treatment course may interfere with patients' ability to monitor everyday task performance
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49 543 and detect failure/lapses which are essential for updating self-perception of cognitive ability
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51 544 (Morris & Mograbi, 2013), thus contributing to decreasing SCCs. Besides the course of SCCs
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53 545 on dialysis, future longitudinal investigations are also needed to determine the effect of
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55 546 dialysis initiation on SCCs, as well as change in SCCs shifting across treatment modalities
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3 547 (e.g., shifting from HD to PD) since SCCs may become particularly frequent/severe during
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5 548 these transition periods due to the associated symptoms, side effects, complications, and
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8 549 changes to treatment and self-care requirements (Broers et al., 2015).
9

10 550 The analyses of associations between SCCs and sociodemographic/clinical variables
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12 551 revealed mainly no or mixed evidence. Hospitalisation was the only variable shown to be
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14 552 consistently associated with higher SCCs across six studies (Hays et al., 1994;
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16 553 Kontodimopoulos & Niakas, 2005; A. A. Lopes et al., 2003; Mapes et al., 2003; Poulsen et
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18 554 al., 2017; Türk et al., 2020), in line with previous research which showed significantly greater
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20 555 hospitalisation risks in dialysis patients with objective cognitive impairments compared to
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22 556 those without (Murray, 2008; Sehgal et al., 1997; Shea et al., 2019; Y. Zhang et al., 2018). It
23
24 557 is noteworthy that this relation may be bi-directional. On one hand, hospitalisation entails
25
26 558 potential surgical procedures, associated need for anaesthesia, heightened risks for infection
27
28 559 and other adverse events, medication exposure, and depression and sleep difficulty that may
29
30 560 all contribute to cognitive impairments (Mathews et al., 2014). On the other hand, SCCs
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32 561 reflect everyday cognitive difficulties that may interfere with patients' independence in daily
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34 562 functioning, medication taking, diet and fluid control, and other self-care activities and may
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36 563 therefore result in poor disease management which may increase hospitalisation risk (Murray
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38 564 & Knopman, 2010). Future studies that include serial assessments and long-term follow-ups
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40 565 are needed to confirm the nature and direction of this relation.
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46 566 Similarly, the observed associations of SCCs with patient-reported outcomes are likely
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48 567 to be bi-directional. The strongest and most consistent associations were found between
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50 568 SCCs and depression, anxiety, and fatigue, consistent with previous research in other patient
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52 569 populations, including cancer, stroke, and Alzheimer's (O'Farrell et al., 2017; Pullens et al.,
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54 570 2010; Rabin et al., 2017; Van Rijsbergen et al., 2014). SCCs often overlap with psychological
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56 571 distress and fatigue and are considered as symptoms of these problems. For example, the
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3 572 Chalder Fatigue Scale includes items assessing concentration difficulties, memory, and word
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5 573 finding (Cella & Chalder, 2010). The experience of cognitive difficulties or failure in daily
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7 574 living may also increase individuals' distress and worry about these problems. In addition,
8
9 575 individuals with depression and anxiety exhibit attentional biases toward negative
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11 576 information and therefore may be hypersensitive to cognitive failure, resulting in an
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13 577 overreporting of SCCs (Rabin et al., 2017). Future longitudinal studies are required to
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15 578 disentangle whether these mood and fatigue symptoms are the precursors, consequences, or
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17 579 concurrent factors of SCCs.
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21 580 There is very limited data concerning the relation between objective and subjective
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23 581 cognition in ESRD patients. Overall studies indicated no or weak association between these
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25 582 two assessment methods, yet we found some preliminary evidence that the relationship
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27 583 between SCCs and objective cognition may be domain-specific. For example, one study
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29 584 suggests that SCCs specific to concentration ability (e.g., "I am good at concentrating when
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31 585 reading") were associated with poorer performance in part B of the Trail-Making Test, which
32
33 586 is a measure of attention/concentration and executive function (Jayanti et al., 2016). Studies
34
35 587 in the Alzheimer's disease literature have also found support for the domain-specificity
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37 588 hypothesis of the objective-subjective cognition relation (Farias et al., 2008, 2013) and
38
39 589 therefore may be worth replicating in the context of ERSD. Future studies should adopt
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41 590 multi-domain measures of objective and subjective cognition and should align the specific
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43 591 SCC items/domains with the corresponding objective cognitive domain tests (e.g., association
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45 592 between memory complaints and delayed recall task performance).
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51 593 Nevertheless, there are several reasons why SCCs may not be consistently associated
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53 594 with objective cognition. First, SCCs are reported based on accumulative everyday
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55 595 experience whereas objective tests may only reflect performance in a controlled environment
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57 596 at a single time point (Molinuevo et al., 2017; Rabin et al., 2015, 2017). Second, theories
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3 597 suggest that SCCs may recede as objective cognitive impairments progress due to
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5 598 anosognosia (Jessen et al., 2014; Morris & Mograbi, 2013; Rabin et al., 2017). The
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7 599 relationship between subjective and objective cognition may therefore be expected to be
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9 600 modest and may vary along the course of cognitive decline and renal replacement therapies.
10
11 601 SCCs have been proposed as a more accurate and meaningful measure at preclinical and early
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13 602 stages of cognitive impairments, whereas objective tests become increasingly sensitive at
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15 603 advanced stages (Jessen et al., 2014). Relatedly, informant-reports of SCCs may be a useful
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17 604 alternative to self-reports at stages of established cognitive impairments. In the current
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19 605 review, we did not identify any study using an informant measure of SCCs, but research has
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21 606 shown that informant-reports are more closely linked to objective test scores and markers
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23 607 such as brain atrophy compared to self-reports (Rueda et al., 2015), and may also predict
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25 608 future progression (Farias et al., 2017). Longitudinal studies assessing objective performance
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27 609 and self- and informant-reported SCCs at multiple time points are needed to understand the
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29 610 temporal dynamic relations among various cognitive assessment tools in ESRD patients.
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35 611 It is important to note that the disconnect between subjective ratings and objective
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37 612 assessments has been shown not just in terms of cognition, but also other symptoms and
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39 613 functioning outcomes. For example, subjective (e.g., questionnaires) and objective measures
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41 614 of sleep quality (e.g., polysomnography) are typically weakly associated, yet subjective sleep
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43 615 complaint remains an essential component of insomnia diagnosis (Savard & Ganz, 2016).
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45 616 Research has also shown that the intensity of physical symptoms is not always associated
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47 617 with the meaning that individuals attribute to the symptoms (Petersen et al., 2011) and that
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49 618 clinical markers of disease severity are not always correlated with individuals' perceptions of
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51 619 severity (Haverstock & Feldman, 2006). According to Leventhal's Common-Sense Model,
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53 620 individuals construct meanings or mental representations for their illness or symptoms
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55 621 (Hagger & Orbell, 2003; Leventhal et al., 1984, 2016). These representations include
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3 622 individuals' interpretations and beliefs about illness/symptom identity (i.e.,
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5 623 frequency/severity), as well as perceived causes, anticipated timeline, consequences, and
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7 624 controllability of these illness/symptoms (Leventhal et al., 2016). These representations can
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9 625 appear inconsistent with medical models or clinical indicators, but may determine how
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11 626 patients respond to or cope with the illness/symptoms (Donovan et al., 2008; Hagger &
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13 627 Orbell, 2003; Leventhal et al., 2016). The lack of association between subjective and
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15 628 objective cognition therefore does not necessarily imply that SCCs are inaccurate because
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17 629 SCCs can also be viewed as patients' representations of cognitive failure/lapses which
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19 630 influence their coping or compensatory responses.

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24 631 A key limitation of studies included in this review is the overreliance on the KDQOL-
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26 632 CF measure. The KDQOL-CF contains three items assessing the frequency of slow reaction,
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28 633 concentration difficulties, and confusion in the past four weeks (Kurella et al., 2004). Despite
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30 634 its ease of administration and potential value in clinical settings, KDQOL-CF is limited in its
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32 635 content as it fails to cover domains such as memory and executive function shown to be most
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34 636 impaired in ESRD patients (Joshee et al., 2018; O'Lone et al., 2016). Therefore, the reported
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36 637 prevalence of SCCs are most likely underestimated and the comparison between treatment
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38 638 modalities may fail to capture differences in certain important domains. Additional
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40 639 limitations of the KDQOL-CF include the use of double-barrelled items (e.g., did you have
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42 640 difficulty concentrating or thinking) which may undermine accuracy of responses, and the
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44 641 use of generic/broad wording (e.g., did you become confused) rather than specific items (e.g.,
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46 642 do you have difficulty recalling conversations a few days later) (Rabin et al., 2015). There is
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48 643 hence a need to refine existing or develop new SCC measures specifically for ESRD that
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50 644 capture multiple cognitive domains (in particular memory and executive function) and
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52 645 include specific items that are simple and easy to understand (Rabin et al., 2015).
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3 646 It should be acknowledged that non-English articles and grey literature were excluded
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5 647 from the current review and therefore some relevant papers may have been missed. Also,
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7 648 within the included studies, there was limited information on the severity of SCCs, effect of
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9 649 treatment transitions (i.e., dialysis initiation or return to dialysis after KTx rejection) on
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11 650 SCCs, and associations of SCCs with key outcomes such as treatment adherence, self-care
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13 651 capacity, dementia risk, and mortality. In addition, we were not able to perform meta-
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15 652 analyses for all research questions because data were not always reported in the included
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17 653 studies and there was high heterogeneity in terms of how SCCs and other factors were
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19 654 operationalised. Although study authors were contacted for original data or additional
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21 655 analyses, the response rate was very low.

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26 656 Despite the limitations, we believe that this paper provides a comprehensive overview
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28 657 of current evidence regarding the extent and course of SCCs, as well as factors associated
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30 658 with these complaints in patients living with ESRD. This field of research remains in its
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32 659 infancy since the majority of studies only considered SCCs as a secondary outcome that
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34 660 reflects a subdomain of quality of life or overall symptoms. We call for further research on
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36 661 SCCs in ESRD patients that are well-grounded in relevant theories, utilise longitudinal
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38 662 designs, adopt valid and reliable measures of multiple cognitive domains and symptom
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40 663 representation dimensions, and include both patients and informants. Improving our
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42 664 understanding of SCCs in ESRD patients have important clinical implications because
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44 665 subjective reports may improve the clinical meaningfulness of objective tests and may allow
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46 666 early detection and early intervention for patients with higher risk of progression to objective
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48 667 cognitive impairments.

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Table 1. *Measures used to assess SCCs in ESRD patients.*

Measures	No. of Items	Recall Period	Response Format	Measurement Dimensions	Content Dimensions	Frequency of Use
<i>SCC-specific measures</i>						
Brief Metacognition Questionnaire	9	N/A	5-point Likert - Strongly disagree - Disagree - Neither agree nor disagree - Agree - Strongly agree	Severity of SCCs	1. Memory 2. Concentration	1
British Columbia Cognitive Complaints Inventory (BC-CCI)	6	Past 7 days	4-point Likert - Not at all - Some - Quite a bit - Very much	Severity of SCCs	1. Memory 2. Concentration 3. Thought Expression 4. Word Finding 5. Thinking Speed 6. Problem Solving	1
Cognitive Difficulties Scale (CDS)	39	Past month	5-point Likert - Not at all - Rarely - Sometimes - Often - Very often	Frequency of SCCs	1. Attention & Concentration 2. Praxis 3. Prospective Memory 4. Speech 5. People's Names 6. Temporal Orientation	1

Measures	No. of Items	Recall Period	Response Format	Measurement Dimensions	Content Dimensions	Frequency of Use
Henry et al., 2017	4	Current	Smartphone-based electronic diary reports (6 times/day for a week) with 6-point Likert - None of the time - A little of the time - Some of the time - A good bit of the time - Most of the time - All of the time	Frequency of SCCs	1. Reaction time 2. Concentration & Thinking 3. Confusion 4. Decision Making	1
Patient's Assessment of Own Functioning Inventory (PAOFI)	33	Recent	6-point Likert - Almost always - Very often - Fairly often - Once in a while - Very infrequently - Almost never	Frequency of SCCs Change in SCCs	1. Memory 2. Language & Communication 3. Use of Hands 4. Sensory-Perceptual 5. Higher Level Cognitive & Intellectual Functions	3
Perceived Deficits Questionnaire 5-item version (PDQ-5)	5	Past 7 days	5-point Likert - Never - Rarely - Sometimes - Often - Almost always	Frequency of SCCs	1. Attention 2. Retrospective memory 3. Prospective memory 4. Planning & Organization	1

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4 Measures	5 No. of Items	6 Recall Period	7 Response Format	8 Measurement Dimensions	9 Content Dimensions	10 Frequency of Use
11 <i>Composite measures with SCC subscale</i>						
12 Dialysis Symptom Index (DSI)	1	Past 7 days	13 Yes/No; 14 5-point Likert 15 - Not at all bothersome 16 - A little bothersome 17 - Somewhat bothersome 18 - Quite bothersome 19 - Very bothersome	20 Presence of SCCs 21 Severity of SCCs	22 1. Concentration	23 2
24 End-Stage Renal Disease Symptom Checklist (ESRD-SCL)	5	N/A	25 5-point Likert 26 - 0 = Not at all 27 - 4 = Extremely	28 Severity of SCCs	29 1. Concentration 30 2. Memory 31 3. Moodiness	32 1
33 Health Utilities Index Mark 3 (HUI3)	1	N/A	34 6 levels ranging from "Able to remember most things, think clearly and solve day to day problems." to "Unable to remember anything at all, and unable to think or solve day to day problems."	35 Severity of SCCs	36 1. Memory 37 2. Thinking 38 3. Problem Solving	39 1
40 Kidney Disease Quality of Life (KDQOL)	3	Past 4 weeks	41 6-point Likert 42 - None of the time 43 - A little of the time 44 - Some of the time 45 - A good bit of the time 46 - Most of the time 47 - All of the time	48 Frequency of SCCs	49 1. Reaction time 50 2. Concentration & Thinking 51 3. Confusion	52 207

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Measures	No. of Items	Recall Period	Response Format	Measurement Dimensions	Content Dimensions	Frequency of Use
Patient-Reported Outcomes Measurement Information System (PROMIS)	4 to 12	Past 7 days	5-point Likert - Never - Rarely (Once) - Sometimes (Two or three times) - Often (About once a day) - Very often (Several times a day)	Frequency of SCCs	1. Mental Acuity 2. Concentration 3. Verbal and Nonverbal Memory 4. Verbal Fluency 5. Interference with Daily Functioning 6. Other People's Observation 7. Impact on Quality of Life	1
Visual Analogue Scale (10 items of quality of life)	1	Current	Visual Analogue Scale (0-100)	Severity of SCCs	1. Memory	1
WHO Disability Assessment Schedule (WHODAS 2.0)	6	Past 30 days	5-point Likert - No difficulty - Mild difficulty - Moderate difficulty - Severe difficulty - Extreme difficulty or inability to do	Severity of SCCs	1. Concentration 2. Memory 3. Problem Solving 4. Learning 5. Communication	1

Notes. SCCs = Subjective cognitive complaints; ESRD = End-stage renal disease.

Table 2. *Distribution of mean KDQOL-CF scores within different ranges across treatment modalities.*

Score Range	In-centre Haemodialysis		Peritoneal Dialysis		Kidney Transplantation	
	k (%)	N (%)	k (%)	N (%)	k (%)	N (%)
0-19	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (11.8%)	119 (4.4%)
20-39	7 (5.8%)	796 (2.1%)	2 (4.8%)	955 (15.1%)	0 (0.0%)	0 (0.0%)
40-59	10 (8.3%)	1058 (2.8%)	2 (4.8%)	97 (1.5%)	0 (0.0%)	0 (0.0%)
60-79	52 (43.3%)	26577 (71.4%)	19 (45.2%)	3357 (53.3%)	4 (23.5%)	652 (24.2%)
80-100	51 (42.5%)	8781 (23.6%)	19 (45.2%)	1895 (30.1%)	11 (64.7%)	1922 (71.4%)
Overall	120 (100.0%)	37212 (100.0%)	42 (100.0%)	6304 (100.0%)	17 (100.0%)	2693 (100.0%)

Notes. Studies that reported medians were not included in this table; For longitudinal studies that reported mean KDQOL-CF scores at multiple time points, only the baseline data were included; A score of 0, 20, 40, 60, 80, and 100 on the KDQOL-CF indicates that cognitive difficulties are experienced all of the time, most of the time, a good bit of the time, some of the time, a little of the time, and none of the time, respectively; KDQOL-CF = Cognitive Function subscale of the Kidney Disease Quality of Life questionnaire; k = Number of studies that reported means within each range; N = Total sample size of studies that reported means within each range.

Table 3. Associations of subjective cognitive complaints with sociodemographic, clinical, and patient-reported variables reported by at least two studies.

Variables	Total	Higher SCCs	Lower SCCs	No Association
	Number of studies (percentage)			
Sociodemographic				
Older age	29	2 (6.9%)	2 (6.9%)	25 (86.2%)
Female gender	17	2 (11.8%)	-	15 (88.2%)
Lower education level	14	7 (50.0%)	-	7 (50.0%)
Unemployment	6	4 (66.7%)	-	2 (33.3%)
Marital status	4	-	-	4 (100.0%)
Lower household income	3	1 (33.3%)	-	2 (66.7%)
Smoking	3	-	-	3 (100.0%)
Clinical				
Longer dialysis vintage	15	1 (6.7%)	2 (13.3%)	12 (80.0%)
Comorbidity	13	4 (30.8%)	-	9 (69.2%)
Higher albumin	13	2 (15.4%)	3 (23.1%)	8 (61.5%)
Higher dialysis adequacy	11	1 (9.1%)	1 (9.1%)	9 (81.8%)
Higher haemoglobin	8	1 (12.5%)	1 (12.5%)	6 (75%)
Diabetes	8	-	1 (12.5%)	7 (87.5%)
BMI	8	-	-	8 (100.0%)
Hospitalisation	6	6 (100.0%)	-	-
Mortality	6	2 (33.3%)	-	4 (66.7%)
Higher GFR	5	1 (20.0%)	-	4 (80.0%)
Higher creatinine	3	2 (66.7%)	-	1 (33.3%)
Higher phosphorus	3	1 (33.3%)	-	2 (66.7%)
Hematocrit	3	-	-	3 (100.0%)
nPNA	3	-	-	3 (100.0%)
Lower SGA score	3	1 (33.3%)	-	2 (66.7%)
Lower systolic blood pressure	3	1 (33.3%)	-	2 (66.7%)
Time after KTx	2	-	-	2 (100.0%)
Cancer	2	-	-	2 (100.0%)
Sarcopenia	2	-	-	2 (100.0%)
Sodium	2	-	-	2 (100.0%)
Calcium	2	-	-	2 (100.0%)
Cholesterol	2	-	-	2 (100.0%)
cPENS	2	-	-	2 (100.0%)
Higher TNF- α	2	1 (50.0%)	-	1 (50.0%)
Higher IL-6	2	1 (50.0%)	-	1 (50.0%)
Higher Ferritin	2	1 (50.0%)	-	1 (50.0%)
Patient-reported				
Higher depressive symptoms	21	18 (85.7%)	1 (4.8%)	2 (9.5%)
Higher anxious symptoms	10	9 (90.0%)	1 (10.0%)	-

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	Total	Higher SCCs	Lower SCCs	No Association
Variables	Number of studies (percentage)			
Lower overall health rating	9	6 (66.7%)	-	3 (33.3%)
Higher level of pain	7	6 (85.7%)	-	1 (14.3%)
Higher fatigue symptoms	6	6 (100.0%)	-	-
Worse physical functioning	6	5 (83.3%)	-	1 (16.7%)
Worse social functioning	6	4 (66.7%)	-	2 (33.3%)
Worse perceived general health	5	3 (60.0%)	-	2 (40.0%)
Role limitation due to physical health	5	3 (60.0%)	-	2 (40.0%)
Role limitation due to emotional problems	5	3 (60.0%)	-	2 (40.0%)
More overall symptoms	5	5 (100.0%)	-	-
Poorer sleep quality	4	3 (75.0%)	-	1 (25.0%)
Lower functional capacity	4	3 (75.0%)	-	1 (25.0%)
Physical inactivity	3	2 (66.7%)	-	1 (33.3%)
Medication adherence	2	-	-	2 (100.0%)

Notes. SCCs = Subjective cognitive complaints; BMI = Body mass index; GFR = Glomerular filtration rate; nPNA = Normalised protein nitrogen appearance; SGA = Subjective global assessment; KTx = Kidney transplantation; cPENS = Composite score on protein-energy nutritional status; TNF- α = Tumour Necrosis Factor alpha; IL-6 = Interleukin 6.

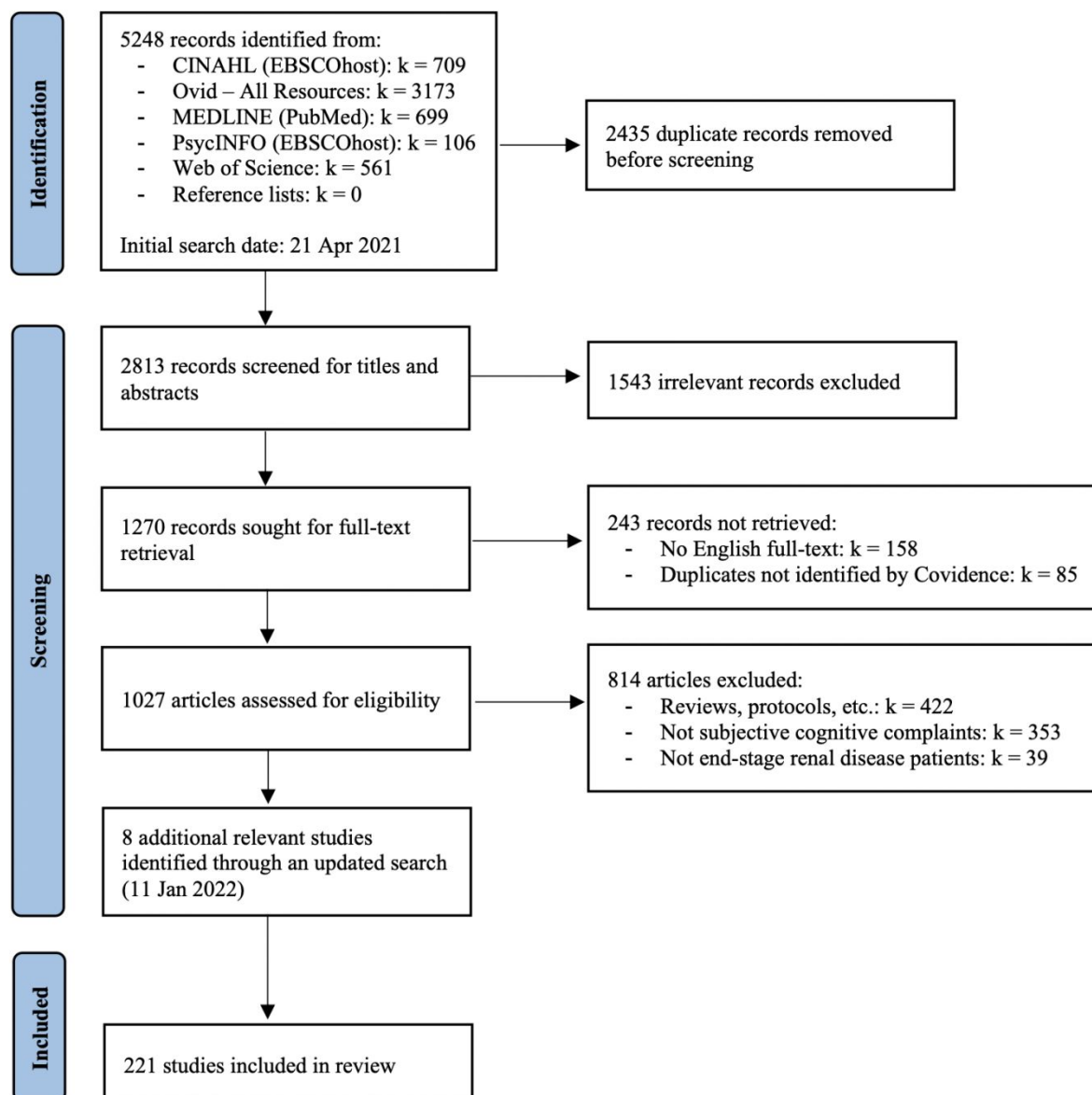


Figure 1. PRISMA flow diagram

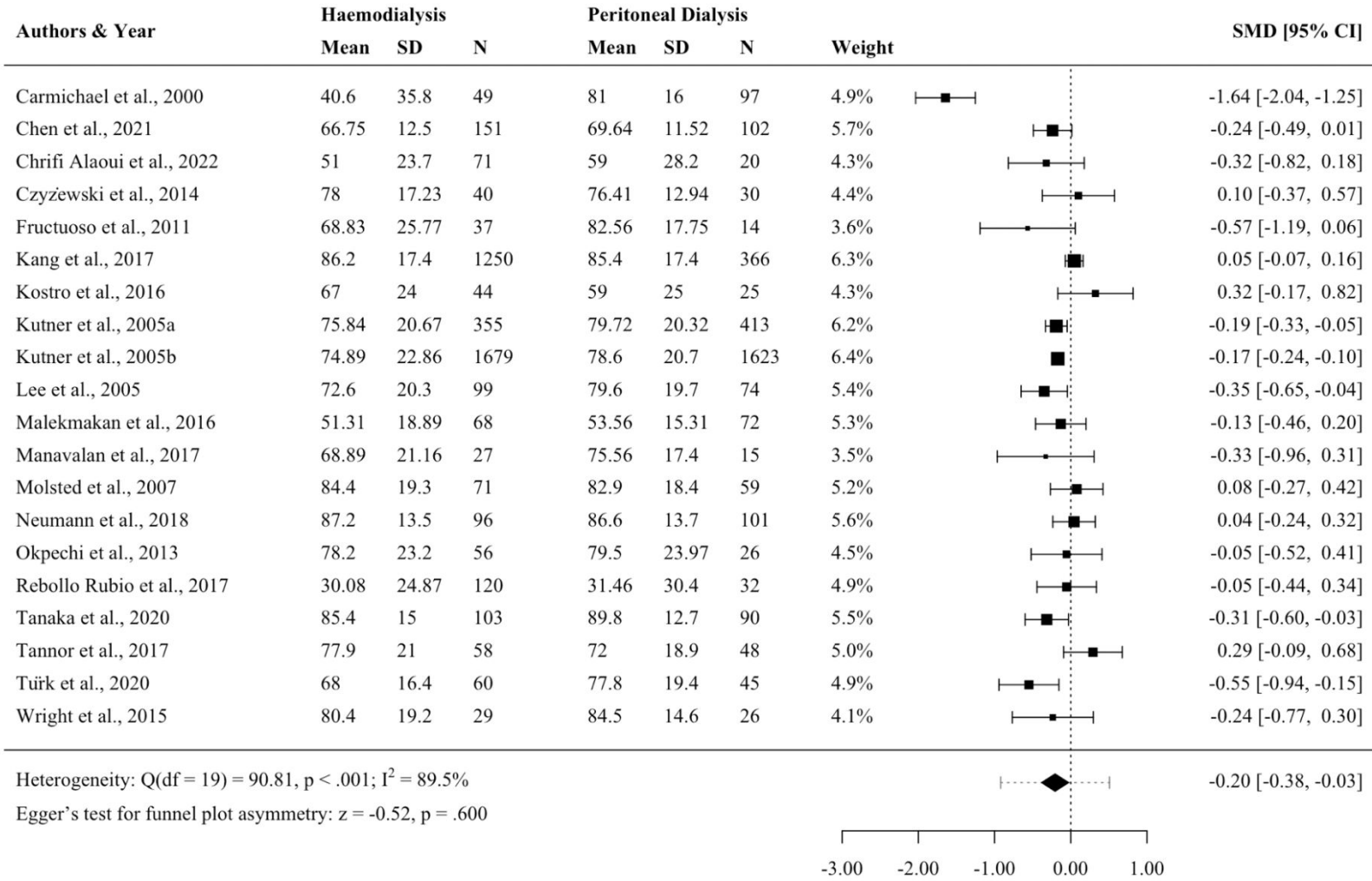


Figure 2. Forest plot showing the results of 20 studies examining difference in subjective cognitive complaints between haemodialysis and peritoneal dialysis patients. SD = Standard deviation; SMD = Standardised mean difference; CI = Confidence interval.

Table S1. Search strategy

Database	S#	Search Terms
CINAHL (EBSCOhost)	1	TX (“subjective cogniti*” OR “self-reported cogniti*” OR “patient-reported cogniti*” OR “self-perceived cogniti*” OR “patient-perceived cogniti*” OR “cognitive complaint*” OR “cognitive concern*” OR “cognitive failure*” OR “cognitive difficult*” OR “everyday cogniti*” OR metacogniti* OR “kidney disease quality of life” OR KDQOL OR “patient’s assessment of own functioning” OR PAOF*)
	2	TX (“chronic kidney disease*” OR “end-stage kidney disease*” OR “end-stage renal disease*” OR “renal insufficien*” OR “kidney failure” OR dialy* OR hemodia* OR haemodia* OR “renal transplant*” OR “kidney transplant*” OR “renal replacement” OR “kidney replacement” OR “artificial kidney”)
	3	#1 AND #2
Ovid – All Resources (Books@Ovid, Journals@Ovid Full Text, Your Journals@Ovid, EBM Reviews, Embase, MEDLINE)	1	(“subjective cogniti*” or “self-reported cogniti*” or “patients-reported cogniti*” or “self-perceived cogniti*” or “patient-perceived cogniti*” or “cognitive complaint*” or “cognitive concern*” or “cognitive failure*” or “cognitive difficult*” or “everyday cogniti*” or “metacogniti*” or “kidney disease quality of life” or KDQOL or “patient's assessment of own functioning” or PAOF*).mp. [mp=tx, bt, ti, ot, ab, ct, sh, kw, fx, hw, tn, dm, mf, dv, kf, dq, nm, ox, px, rx, an, ui, ds, on, sy]
	2	(“chronic kidney disease*” or “end-stage kidney disease” or “end-stage renal disease” or “renal insufficien*” or “kidney failure” or dialy* or hemodia* or haemodia* or “renal transplant*” or “kidney transplant*” or “renal replacement” or “kidney replacement” or “artificial kidney”).mp. [mp=tx, bt, ti, ot, ab, ct, sh, kw, fx, hw, tn, dm, mf, dv, kf, dq, nm, ox, px, rx, an, ui, ds, on, sy]
	3	#1 AND #2
MEDLINE (PubMed)	1	“subjective cogniti*”[All Fields] OR “self reported cogniti*”[All Fields] OR “patient reported cogniti*”[All Fields] OR “self perceived cogniti*”[All Fields] OR “patient perceived cogniti*”[All Fields] OR “cognitive complaint*”[All Fields] OR “cognitive concern*”[All Fields] OR “cognitive failure*”[All Fields] OR “cognitive difficult*”[All Fields] OR “everyday cogniti*”[All Fields] OR “metacogniti*”[All Fields] OR “kidney disease quality of life”[All Fields] OR “KDQOL”[All Fields] OR “patient’s assessment of own functioning”[All Fields] OR “PAOF*”[All Fields]
	2	“chronic kidney disease*”[All Fields] OR “end stage kidney disease*”[All Fields] OR “end stage renal disease*”[All Fields] OR “renal insufficien*”[All Fields] OR “kidney failure”[All Fields] OR “dialy*”[All Fields] OR “hemodia*”[All Fields]

		OR “haemodia*”[All Fields] OR “renal transplant*”[All Fields] OR “kidney transplant*”[All Fields] OR “renal replacement”[All Fields] OR “kidney replacement”[All Fields] OR “artificial kidney”[All Fields]
	3	#1 AND #2
PsycINFO (EBSCOhost)	1	TX (“subjective cogniti*” OR “self-reported cogniti*” OR “patient-reported cogniti*” OR “self-perceived cogniti*” OR “patient-perceived cogniti*” OR “cognitive complaint*” OR “cognitive concern*” OR “cognitive failure*” OR “cognitive difficult*” OR “everyday cogniti*” OR metacogniti* OR “kidney disease quality of life” OR KDQOL OR “patient’s assessment of own functioning” OR PAOF*)
	2	TX (“chronic kidney disease*” OR “end-stage kidney disease*” OR “end-stage renal disease*” OR “renal insufficien*” OR “kidney failure” OR dialy* OR hemodia* OR haemodia* OR “renal transplant*” OR “kidney transplant*” OR “renal replacement” OR “kidney replacement” OR “artificial kidney”)
	3	#1 AND #2
Web of Science	1	(ALL=(“subjective cogniti*” OR “self-reported cogniti*” OR “patient-reported cogniti*” OR “self-perceived cogniti*” OR “patient-perceived cogniti*” OR “cognitive complaint*” OR “cognitive concern*” OR “cognitive failure*” OR “cognitive difficult*” OR “everyday cogniti*” OR metacogniti* OR “kidney disease quality of life” OR karol OR “patient’s assessment of own functioning” OR PAOF*)) AND ALL=(“chronic kidney disease*” OR “end-stage kidney disease*” OR “end-stage renal disease*” OR “renal insufficien*” OR “kidney failure” OR dialy* OR hemodia* OR haemodia* OR “renal transplant*” OR “kidney transplant*” OR “renal replacement” OR “kidney replacement” OR “artificial kidney”)

Notes. Kidney Disease Quality of Life (KDQOL) was included in the keywords because it contains a cognitive function subscale and has been frequently used in patients with end-stage renal disease. Patient’s Assessment of Own Functioning (PAOF) is a comprehensive questionnaire of subjective cognitive complaints that has been used in several key studies relevant to this review.

Table S2. *Characteristics and key findings of included studies.*

Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Abbasi Abianeh et al., 2020, Iran (1)	Pre-post study with no control group	HD: 45, 58.5 (10.0), 46.7%	KDQOL-CF	HD: M = 58.56	N/A	N/A	N/A
Ahmadzadeh et al., 2017, Iran (2)	Pre-post study with no control group	HD: 53, 54.0 (N/A), 41.5%	KDQOL-CF	HD: M = 62.66	N/A	N/A	N/A
Al-Jumaih et al., 2011, Saudi Arabia (3)	Observational cross-sectional study	HD: 100, 53.4 (10.3), 31.3%	KDQOL-CF	HD: M = 25.60	N/A	N/A	N/A
Alarcon et al., 2021, Colombia (4)	Observational cohort study	HD: 992, 60.5 (15.1), 37.6%	DSI-Difficulty Concentrating	HD: prevalence = 30.23%	N/A	No change in SCCs from baseline (high-flux) to 6 and 12 months (medium cut-off) in HD patients	No difference in SCCs between high-flux and medium cut-off HD
Amro et al., 2014, Norway (5)	Observational cross-sectional study	HD & PD: 243 (HD), 58 (PD), 59.8 (16.2), 33.9%	KDQOL-CF		N/A	N/A	SCCs positively associated with three symptom clusters: uraemic (nausea, lack of appetite, dizziness/faintness, feeling squeezed out, shortness of breath, chest pain), neuromuscular (numbness in extremities, sore muscles, cramps) and skin (itching, dry skin)
Anees et al., 2016, Pakistan (6)	Observational cross-sectional study	HD: 130, 43.1 (13.5), 35.9%	KDQOL-CF	HD: Median = 33.33	N/A	N/A	N/A
Anees et al., 2018, Pakistan (7)	Observational cohort study	HD: 135, N/A (N/A), N/A	KDQOL-CF	HD: M = 31.78	N/A	N/A	SCCs not associated with education level, employment status, household income, funding for dialysis, or mortality at 2 years
Aoun et al., 2020, Lebanon (8)	Observational cohort study	HD: 71, 68.4 (13.1), 36.6%	KDQOL-CF	HD: M = 83.00	N/A	N/A	SCCs not associated with mortality at 1 year or at 2 years; SCCs not associated with Duchenne smile
Aramwit et al., 2012, Thailand (9)	Pre-post study with no control group	HD: 47, 49.6 (11.2), 63.8%	KDQOL-CF	HD: M = 65.53	N/A	N/A	N/A

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Bacci et al., 2018, 14 Brazil (10)	15 Observational cross- sectional study	16 HD: 30, 41.0 (N/A), 55.0%	17 KDQOL-CF	18 HD: Median = 5.00	19 N/A	20 N/A	21 SCCs not associated with inflammatory markers (TNF-alpha, IL-6, CRP, Hcy, Ferritin) or anthropometric parameters (abdominal circumference, BMI, triceps skinfold, arm circumference)
22 Bagasha et al., 2021, 23 Uganda (11)	24 Observational cross- sectional study	25 HD: 124, N/A (N/A), 34.2%; Conservative management: 240, N/A (N/A), 42.6%	26 KDQOL-CF	27 HD: M = 63.66; Conservative management: M = 67.39	28 No difference in SCCs between HD and conservative management patients	29 N/A	30 N/A
31 Bakewell et al., 2001, 32 UK (12)	33 Observational cross- sectional study	34 HD: 40, 52.5 (14.8), 35.0%; PD: 40, 49.0 (14.4), 30.0% KTx: 40, 46.0 (10.4), 30.0%	35 KDQOL-CF	36 N/A	37 N/A	38 N/A	39 Asian patients reported more SCCs than white patients
40 Barbosa et al., 2017, 41 Brazil (13)	42 Observational cross- sectional study	43 HD: 47, 50.9 (13.3), 44.7%	44 KDQOL-CF	45 HD: M = 80.14	46 N/A	47 N/A	48 No difference in SCCs between patients on HD < 3 years and patients on HD > 3 years
49 Barotfi et al., 2006, 50 Hungary (14)	51 Observational cross- sectional study	52 HD: 418, 53.0 (14.0), 44.0%; KTx: 418, 49.0 (12.0), 41.0%	53 KDQOL-CF	54 HD: M = 78.00; KTx: M = 79.00	55 No difference in SCCs between HD and KTx patients	56 N/A	57 SCCs associated with lower overall health rating and higher depressive symptoms; SCCs not associated with age or GFR
58 Barzegar et al., 2017, 59 Iran (15)	60 Observational cross- sectional study	61 HD: 246, 56.5 (12.8), 41.5%	62 KDQOL-CF	63 HD: M = 54.30	64 N/A	65 N/A	66 No difference in SCCs between patients on HD < 3 years and patients on HD > 3 years
67 Bataclan et al., 2009, 68 Philippines (16)	69 Observational cross- sectional study	70 HD: 80, 53.0 (2.0), 56.0%	71 KDQOL-CF	72 HD: M = 89.11	73 N/A	74 N/A	75 SCCs not associated with overall health rating
76 Bawazier et al., 2018, 77 Indonesia (17)	78 Observational cohort study	79 HD: 39, N/A (N/A), 53.8%	80 KDQOL-CF	81 HD: M = 82.05	82 N/A	83 N/A	84 Patients reported more SCCs with reusable dialyser than with single-use dialyser
85 Bele et al., 2012, 86 India (18)	87 Observational cross- sectional study	88 HD: 54, 42.1 (13.5), 27.8%	89 KDQOL-CF	90 HD: M = 71.85	91 N/A	92 N/A	93 SCCs associated with greater concerns about death, hopelessness, meaninglessness, and futility

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Bettoni et al., 2017, 14 Brazil (19)	15 Observational cross- 16 sectional study	17 HD: 100, 53.3 (14.7), 34.0%	18 KDQOL-CF	19 N/A	20 N/A	21 N/A	22 SCCs associated with lower perceived 23 self-care capacity
24 Boudville et al., 2009, 25 Australia (20)	26 Controlled 27 intervention study	28 HD: 33, 59.1 (19.4), 39.0%	29 KDQOL-CF	30 N/A	31 N/A	32 No change in SCCs 33 switching between 34 dialysers in HD patients	35 No difference in SCCs between FX and 36 HF80 dialysers
37 Boudida et al., 2014, 38 Morocco (21)	39 Observational cross- 40 sectional study	41 HD & PD: 62 (HD), 18 (PD), 42 43.9 (14.2), N/A	43 KDQOL-CF	44 N/A	45 N/A	46 N/A	47 Females reported more SCCs than males; 48 SCCs associated with lower overall 49 health rating; SCCs not associated with 50 age, education level, or dialysis vintage
51 Braga et al., 2011, 52 Brazil (22)	53 Observational cross- 54 sectional study	55 HD: 223, 69.5 (7.1), 43.5%	56 KDQOL-CF	57 HD: M = 84.78	58 N/A	59 N/A	60 N/A
61 Brickman et al., 1996, 62 US (23)	63 Observational cross- 64 sectional study	65 HD: 426, 42.9 (12.7), 59.0%	66 CDS	67 HD: M = 33.80	68 N/A	69 N/A	70 SCCs associated with lower education 71 level, higher haemoglobin, higher 72 depressive symptoms, higher state 73 anxiety, and neuroticism; SCCs 74 negatively associated with extraversion; 75 SCCs not associated with age, sex, race, 76 first language, marital status, HD vintage, 77 albumin, diabetes, glucose, sodium, or 78 creatinine; SCCs not associated with 79 performance on WAIS-R Vocabulary 80 Scale, Trail Making Test Part B, Stroop 81 Color-Word Interference Test, 82 Continuous Performance Test, WAIS-R 83 Digit Symbol, WAIS-R Digit Span, 84 Enhanced Cued Recall, or Wechsler 85 Memory Test-Revised
86 Carmichael et al., 87 2000, UK (24)	88 Observational cross- 89 sectional study	90 HD: 49, 57.8 (13.0), 34.7%; 91 PD: 97, 57.0 (15.0), 40.2%	92 KDQOL-CF	93 HD: M = 40.6; 94 PD: M = 81.0	95 HD patients reported 96 more SCCs than PD 97 patients	98 N/A	99 SCCs not associated with age or 100 haemoglobin

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and 13 clinical variables, patient-reported 14 outcomes, and objective cognition
15 Castro et al., 2018, 16 Brazil (25)	17 Observational cross- 18 sectional study	19 HD: 51, 54.6 (15.8), 39.2%	20 KDQOL-CF; 21 WHODAS 22 2.0-Cognition	23 HD (KDQOL-CF): M 24 = 93.72; 25 HD (WHODAS 2.0- 26 Cognition): M = 27 11.17	N/A	N/A	28 SCCs (KDQOL-CF) associated with 29 poorer quality of life in getting alone, life 30 activities, and participation domains of 31 WHODAS 2.0; SCCs (KDQOL-CF) not 32 associated with mobility or self-care 33 domains of WHODAS 2.0; SCCs 34 (WHODAS 2.0-Cognition) associated 35 with poorer quality of life in physical, 36 psychological, social, and environmental 37 domains of WHOQOL-BREF; SCCs 38 (WHODAS 2.0-Cognition) associated 39 with poorer quality of life in 40 symptom/problem list, burden of kidney 41 disease, physical functioning, pain, 42 emotional well-being, and energy/fatigue 43 domains of KDQOL; SCCs (WHODAS 44 2.0-Cognition) not associated with effects 45 of kidney disease, work status, quality of 46 social interaction, sexual function, sleep, social support, dialysis staff encouragement, overall health rating, patient satisfaction, role physical, general health perceptions, role emotional, and social function domains of KDQOL
47 Cavalcante et al., 48 2013, Brazil (26)	49 Observational cross- 50 sectional study	51 HD: 291, N/A (N/A), 44.7%	52 KDQOL-CF	53 HD: Median = 93.30	N/A	N/A	54 N/A
55 Cepeda Marte et al., 56 2019, Dominican 57 Republic (27)	58 Observational cross- 59 sectional study	60 HD: 21, N/A (N/A), 19.0%	61 KDQOL-CF	62 HD: M = 26.35	N/A	N/A	63 N/A
64 Chan et al., 2010, 65 Hong Kong (28)	66 Observational cross- 67 sectional study	68 PD: 153, 60.0 (14.0), 45.8%	69 KDQOL-CF	70 PD: M = 72.11	N/A	N/A	71 N/A
72 Chen et al., 2021, 73 Mainland China (29)	74 Observational 75 cohort study	76 HD: 151, 56.5 (17.0), 46.4%; 77 PD: 102, 59.7 (17.3), 51.0%	78 KDQOL-CF	79 HD: M = 66.75; 80 PD: M = 69.64	81 No difference in SCCs 82 between HD and PD 83 patients	N/A	84 N/A

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Cheung et al., 2012, 14 Singapore (30)	15 Observational cohort study	16 Conservative management: 78, N/A (N/A), 44.9%	17 KDQOL-CF	18 Conservative management: M = 92.10	19 N/A	20 N/A	21 SCCs not associated with GFR; SCCs associated with functional disability assessed by Karnofsky Performance Status, self-rated change of general health compared to one year ago, and poorer quality of life in the physical functioning, role physical, emotion well-being, role emotional, and energy/fatigue domains of RAND 36; SCCs not associated with quality of life in the pain, general health, and social function domains of RAND 36
22 Cho et al., 2018, 23 Korea (31)	24 Observational cross- sectional study	25 HD: 230, 60.5 (14.0), 47.4%	26 DSI-Difficulty Concentrating	27 HD: M = 2.08; prevalence = 57.8%	28 N/A	29 N/A	30 N/A
31 Chow et al., 2010, 32 Hong Kong (32)	33 Controlled intervention study	34 PD: 85, 56.9 (13.5), 38.8%	35 KDQOL-CF	36 PD: M = 66.18	37 N/A	38 No change in SCCs from baseline to 6 and 12 weeks in PD patients (control group)	39 N/A
40 Chrifi Alaoui et al., 41 2022, Morocco (33)	42 Observational cross- sectional study	43 HD: 71, N/A (N/A), 52.1%; PD: 20, N/A (N/A), 40.0%	44 KDQOL-CF	45 HD: Median = 53.30; PD: Median = 60.00	46 HD patients reported more SCCs than PD patients	47 N/A	48 N/A
49 Costa-Requena et al., 50 2017, Spain (34)	51 Observational cohort study	52 KTx: 124, 53.2 (14.2), 32.3%	53 KDQOL-CF	54 N/A	55 N/A	56 SCCs reduced from 1 to 6 months post-KTx; no change in SCCs from 6 to 24 months post-KTx	57 N/A
58 Czyżewski et al., 59 2014, Poland (35)	60 Observational cohort study	61 HD: 40, N/A (N/A), 42.5%; PD: 30, N/A (N/A), 50.0%; KTx: 47, N/A (N/A), 44.7%	62 KDQOL-CF	63 HD: M = 78.00; PD: M = 76.41; KTx: M = 68.89	64 No difference in SCCs between HD, PD, and KTx patients	65 No change in SCCs from 3 to 12 months post-KTx	66 N/A
67 Czyżewski et al., 68 2018, Poland (36)	69 Observational cross- sectional study	70 KTx: 118, 45.0 (N/A), 53.4%	71 KDQOL-CF	72 KTx: M = 68.50	73 N/A	74 N/A	75 No difference in SCCs between patients who received KTx < 1 year, patients who received KTx between 1 and 10 years, and patients who received KTx > 10 years

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and 13 clinical variables, patient-reported 14 outcomes, and objective cognition
15 D'Onofrio et al., 16 2017, Italy (37)	17 Observational cross- 18 sectional study	19 HD: 103, 66.2 (N/A), 37.9%	20 KDQOL-CF	21 HD: M = 70.00	22 N/A	23 N/A	24 N/A
25 Dai et al., 2020, 26 Mainland China (38)	27 Controlled 28 intervention study	29 HD (thrice-weekly): 70, 50.6 (4.9), 40.0%; 30 HD (twice-weekly): 70, 50.9 (4.3), 44.3%	31 KDQOL-CF	32 HD: M = 73.10	33 N/A	34 N/A	35 Thrice-weekly HD associated with more 36 SCCs than twice-weekly HD
37 de Oliveira Cordeiro 38 et al., 2020, Brazil 39 (39)	40 Observational cross- 41 sectional study	42 KTx: 222, 45.8 (12.8), 39.6%	43 KDQOL-CF	44 KTx: M = 82.80	45 N/A	46 N/A	47 N/A
48 de Oliveira et al., 49 2012, Brazil (40)	50 Observational cross- 51 sectional study	52 PD: 82, 61.0 (N/A), 61.0%	53 KDQOL-CF	54 PD: M = 83.23	55 N/A	56 N/A	57 Patients who do not work reported more 58 SCCs than patients who work
59 de Roij van 60 Zuijdewijn et al., 61 2016, Netherlands, 62 Norway, and Canada 63 (41)	64 Observational cross- 65 sectional study	66 HD: 489, 63.3 (13.8), 39.5%	67 KDQOL-CF	68 HD: M = 77.00	69 N/A	70 N/A	71 SCCs associated with higher Malnutrition 72 Inflammation Score, lower Subjective 73 Global Assessment score, and higher 74 creatinine; SCCs not associated with 75 Geriatric Nutritional Risk Index, 76 Composite Score on Protein-Energy 77 Nutritional Status, albumin, BMI, or 78 Normalized Protein Nitrogen Appearance
79 Debnath et al., 2018, 80 US (42)	81 Observational cross- 82 sectional study	83 HD: 40, N/A (N/A), 65.0%	84 KDQOL-CF	85 N/A	86 N/A	87 N/A	88 SCCs associated with higher depressive 89 symptoms
90 Dehesa-Lopez et al., 91 2016, Mexico (43)	92 Observational cross- 93 sectional study	94 HD: 194, 54.0 (16.0), 45.4%	95 KDQOL-CF	96 HD: M = 21.80	97 N/A	98 N/A	99 SCCs associated with higher serum 100 phosphorus and serum albumin; SCCs not 101 associated with age, HD vintage, 102 haemoglobin, serum calcium, or dialysis 103 adequacy (Kt/V)
104 Behghan et al., 2020, 105 Iran (44)	106 Observational cross- 107 sectional study	108 HD: 113, 58.1 (13.6), 40.7%	109 KDQOL-CF	110 HD: M = 68.35	111 N/A	112 N/A	113 SCCs not associated with use of 114 relaxation methods
115 Diamant et al., 2011, 116 Canada (45)	117 Observational cross- 118 sectional study	119 HD: 277, 65.9 (14.8), 41.8%	120 KDQOL-CF	121 HD: M = 79.28	122 N/A	123 N/A	124 No difference in SCCs between patients 125 receiving HD in satellite units and in- 126 center units

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Duarte et al., 2005, 14 Brazil (46)	15 Observational cross- 16 sectional study	17 HD & PD: 53 (HD), 41 (PD), 18 49.0 (13.0), 45.0%	19 KDQOL-CF	20 N/A	21 N/A	22 N/A	23 SCCs associated lower education level; 24 SCCs not associated with age, HD 25 vintage, number of comorbidities, or 26 hematocrit; SCCs associated with poorer 27 quality of life in the level of energy, pain, 28 emotional reaction, sleep, social isolation, 29 and physical capacity domains of the 30 Nottingham Health Profile; SCCs 31 associated with poorer quality of life in 32 the physical symptom, fatigue, 33 depression, relationship with others, and 34 frustration domains of the Kidney 35 Disease Questionnaire; SCCs not 36 associated with functional disability 37 assessed by Karnofsky Performance 38 Status
39 Duarte et al., 2009, 40 Brazil (47)	41 Controlled 42 intervention study	43 HD: 85, 53.2 (14.3), 58.8%	44 KDQOL-CF	45 HD: M = 66.83	46 N/A	47 No change in SCCs from 48 baseline to 3 and 9 49 months in HD patients 50 (control group)	51 N/A
52 Fan et al., 2020, 53 Taiwan (48)	54 Observational cross- 55 sectional study	56 HD: 200, 62.0 (11.4), 49.5%	57 PDQ-5	58 HD: M = 1.80	59 N/A	60 N/A	61 SCCs associated with older age, lower 62 serum albumin, and higher depressive 63 symptoms; SCCs not associated with sex, 64 education level, marital status, family 65 history of mental disorders, BMI, HD 66 vintage, dialysis adequacy (urea reduction 67 ratio), smoking, alcohol use, diabetes, 68 cardiovascular disease, hypertension, 69 cancer, serum sodium, haemoglobin, 70 cholesterol, triglycerides, or uric acid
71 Fiderkiewicz et al., 72 2011, Poland (49)	73 Observational cross- 74 sectional study	75 HD: 196, 63.9 (13.2), 39.8%	76 KDQOL-CF	77 N/A	78 N/A	79 N/A	80 SCCs associated with irritable bowel 81 syndrome symptoms
82 Foley et al., 2009, 83 Canada (50)	84 Controlled 85 intervention study	86 HD: 596, 50.8 (N/A), 39.6%	87 KDQOL-CF	88 HD: M = 66.62	89 N/A	90 N/A	91 N/A

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4 Author & Year & Location	5 Study Design	6 Sample Characteristics (Modality: N, Age M (SD), % Female)	7 SCC Measure	8 Frequency/Severity of SCCs	9 Modality Difference	10 Course of SCCs	11 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
12 Fong et al., 2007, Canada (51)	13 Observational cross-sectional study	14 PD: 57, 61.0 (13.0), 45.0%; NHD: 36, 49.0 (12.0), 33.0%	15 KDQOL-CF	16 PD: M = 81.40; NHD: M = 75.60	17 No difference in SCCs between PD and NHD patients	18 N/A	19 N/A
20 Primat et al., 2006, France (52)	21 Observational cohort study	22 HD: 284, 67.6 (11.3), 40.1%; PD: 103, 70.8 (11.4), 43.7%	23 KDQOL-CF	24 HD: M = 63.50; PD: M = 63.40	25 No difference in SCCs between HD and PD patients at any time point	26 No change in SCCs from predialysis to 6 or 12 months post-initiation of HD/PD	27 N/A
28 Fructuoso et al., 2011, Portugal (53)	29 Observational cross-sectional study	30 HD: 37, 67.3 (14.9), 43.2%; PD: 14, 38.9 (13.3), 42.9%	31 KDQOL-CF	32 HD: M = 68.83; PD: M = 82.56	33 No difference in SCCs between HD and PD patients	34 N/A	35 N/A
36 Fukuhara et al., 2003, US, France, Germany, Italy, Spain, UK, and Japan (54)	37 Observational cross-sectional study	38 HD: 7378, 59.4 (N/A), 42.7%	39 KDQOL-CF	40 HD: M = 77.30	41 N/A	42 N/A	43 European patients reported more SCCs than Japanese and US patients
44 G. B. Lopes et al., 2014, Brazil (55)	45 Observational cross-sectional study	46 HD: 800, 49.0 (13.9), 39.6%	47 KDQOL-CF	48 HD: Median = 86.70	49 N/A	50 N/A	51 Patients who reported needing some time to recover after HD sessions had more SCCs than patients who felt well immediately after the end of HD sessions
52 Garcia et al., 2010, Brazil (56)	53 Observational cross-sectional study	54 HD: 47, 39.4 (8.9), 0.0%	55 KDQOL-CF	56 HD: Median = 93.30	57 N/A	58 N/A	59 SCCs not associated with depressive symptoms
60 Giglio et al., 2018, Brazil (57)	61 Observational cross-sectional study	62 HD: 170, 70.6 (7.2), 34.7%	63 KDQOL-CF	64 HD: Median = 86.70, 87.00, 80.00, 93.30, 80.00, 93.00 in patients with low and appropriate muscle mass, low and appropriate muscle strength, and with and without sarcopenia, respectively	65 N/A	66 N/A	67 SCCs associated lower muscle strength; SCCs not associated with muscle mass or sarcopenia status

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Goldfarb-Rumyantzev et al., 2006, US (58)	14 Pre-post study with no control group	15 HD (week 1-4) switching to DHD (week 5-12) and then to HD (week 13-16): 12, 52.0 (18.0), 50.0%	16 KDQOL-CF	17 HD: M = 74.50; DHD: M = 84.80	18 No difference in SCCs between HD (week 1-4 & 13-16) and DHD (week 5- 12)	19 No change in SCCs switching from HD (weeks 1-4) to DHD (weeks 5-12) and back to HD (weeks 13-16)	20 N/A
21 Gonçalves et al., 2015, Brazil (59)	22 Observational cross- sectional study	23 HD: 222, 54.4 (15.2), N/A; PD: 116, 58.0 (13.9), N/A	24 KDQOL-CF	25 HD: M = 79.64; PD: M = 81.09	26 No difference in SCCs between HD and PD patients	27 N/A	28 N/A
29 Gorodetskaya et al., 2005, US (60)	30 Observational cohort study	31 HD: 38, 57.3 (16.5), 34.0%	32 HUI3- Cognition	33 HD: M = 0.93	34 N/A	35 N/A	36 N/A
37 Green et al., 2001, Japan (61)	38 Observational cross- sectional study	39 HD & PD: 690 (HD), 103 (PD), 55.0 (N/A), 45.9%	40 KDQOL-CF	41 N/A	42 N/A	43 N/A	44 Patients who received assistance in filling out the survey had more SCCs than those who filled out the survey themselves
45 Givira et al., 2012, UK (62)	46 Observational cross- sectional study	47 KTx: 218, 49.7 (12.3), 40.4%	48 KDQOL-CF	49 N/A	50 N/A	51 N/A	52 SCCs not associated with medication adherence
53 Gumprecht et al., 2010, Poland (63)	54 Observational cross- sectional study	55 HD: 114, 55.7 (15.1), 47.4%	56 KDQOL-CF	57 HD: M = 75.89	58 N/A	59 N/A	60 SCCs not associated with diabetes
61 Hasan et al., 2021, Egypt (64)	62 Observational cohort study	63 HD: 100, 48.8 (5.9), 49.0%	64 KDQOL-CF	65 HD: M = 84.27	66 N/A	67 N/A	68 SCCs associated with lower dialysis adequacy (Kt/V); improvement of Kt/V associated with reduction of SCCs over 3 months
69 Hayashi et al., 2017, Japan (65)	70 Controlled intervention study	71 HD: 18, 54.7 (13.6), 35.0%	72 KDQOL-CF	73 HD: M = 86.54	74 N/A	75 No change in SCCs from baseline to 16 weeks in HD patients (control group)	76 N/A

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Hays et al., 1994, US (66)	Observational cross-sectional study	HD: 165, 53.0 (N/A), 52.0%	KDQOL-CF	HD: M = 78.51	N/A	N/A	SCCs associated with number of hospital days in the past 6 months; SCCs associated with number of good days in the last seven days, number of bad days in the last seven days, rating of one's life compared with people without kidney disease, extent to which the individual is able to do everything they want to do, days health caused one to stay in bed for one-half day or longer during the last 30 days, and overall health rating
Henry et al., 2018, US (67)	Observational cross-sectional study	HD: 26, 42.7 (15.8), 57.7%	Four items from KDQOL-CF and BDI	HD: M = 0.27 for reaction time, M = 0.36 for concentration and thinking, M = 0.12 for confusion, and M = 0.12 for decision-making	N/A	N/A	Patients reported more SCCs of confusion on dialysis days than non-dialysis days; patients reported more SCCs of reaction time on short interdialytic interval than on day 2 of the long interdialytic interval; SCCs of reaction time associated with poorer performance in Digit Span Task and Trail Making Test B; SCCs of confusion associated with poorer performance in Digit Span Task, Visual Retention Test, and Trail-Making Test B; SCCs not associated with MMSE scores
Hernández Sánchez et al., 2021, Spain (68)	Controlled intervention study	KTx: 16, 49.2 (9.8), 43.8%	KDQOL-CF	KTx: M = 12.00	N/A	No change in SCCs from baseline to 10 weeks in KTx patients (control group)	
Ho et al., 2013, Malaysia (69)	Observational cross-sectional study	HD: 72, N/A (N/A), 58.3%	KDQOL-CF	HD: M = 83.70	N/A	N/A	Non-Malays reported more SCCs than Malays; SCCs not associated with age, sex, education level, or presence of comorbidities
Hornik et al., 2019, Poland (70)	Observational cross-sectional study	HD: 72, 57.8 (16.0), 50.0%	KDQOL-CF	HD: M = 71.30	N/A	N/A	SCCs not associated with adherence to recommended physical activity
Hyodo et al., 2004, Japan (71)	Observational cross-sectional study	HD: 21, 55.9 (11.3), 0.0%	KDQOL-CF	HD: M = 89.27	N/A	N/A	No difference in SCCs between patients who desired Slidenafil and patients who did not

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4 Author & Year & Location	5 Study Design	6 Sample Characteristics (Modality: N, Age M (SD), % Female)	7 SCC Measure	8 Frequency/Severity of SCCs	9 Modality Difference	10 Course of SCCs	11 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
12 J. M. Lopes et al., 2014, Brazil (72)	13 Observational cross-sectional study	14 HD: 101, 56.4 (14.4), 32.0%	15 KDQOL-CF	16 HD: M = 89.31	17 N/A	18 N/A	19 N/A
20 Jansz et al., 2018, Netherlands (73)	21 Observational cross-sectional study	22 NHD: 31, 53.9 (12.5), 38.0%; KTx: 41, 54.0 (13.8), 25.0%	23 KDQOL-CF	24 NHD: M = 78.00 KTx: M = 81.00	25 No difference in SCCs between NHD and KTx patients	26 N/A	27 N/A
28 Passal et al., 2006, Canada (74)	29 Observational cohort study	30 HD (baseline) switching to NHD (6 month): 12, 39.6 (3.3), 50.0%	31 PAOFI	32 HD (baseline): M = 36.90; NHD (6 months): M = 26.70	33 Patients reported more SCCs on HD (baseline) than on NHD (6 months)	34 SCCs reduced after switching from HD (baseline) to NHD (6 months)	35 N/A
36 Jayanti et al., 2016, UK (75)	37 Observational cross-sectional study	38 Predialysis: 204, 59.4 (13.0), 38.7%	39 Brief Metacognition Questionnaire	40 Predialysis: M = 17.84 for metamemory; M = 14.48 for metaconcentration	41 N/A	42 N/A	43 SCCs of concentration (not memory) associated with lower odds of choosing self-care dialysis (PD/HHD) over a fully assisted dialysis modality (HD); SCCs of concentration (not memory) associated with poorer performance in the Trail Making Test part B (not part A or 3MS)
44 Piao et al., 2017, Mainland China (76)	45 Controlled intervention study	46 PD: 118, 58.0 (7.0), 44.1%	47 KDQOL-CF	48 PD: M = 67.32	49 N/A	50 No change in SCCs from baseline to 6 and 12 weeks in PD patients (control group)	51 N/A
52 Joshi et al., 2010, Singapore (77)	53 Observational cross-sectional study	54 HD: 980, 56.0 (21.0), 43.9%	55 KDQOL-CF	56 N/A	57 N/A	58 N/A	59 SCCs associated with lower overall health rating
60 Jung et al., 2016, Korea (78)	61 Observational cohort study	62 APD: 80, 50.9 (11.2), 33.7%; CAPD: 80, 51.4 (11.8), 35.0%	63 KDQOL-CF	64 APD: M = 83.42; CAPD: M = 79.08; PD (combining two groups): M = 81.25	65 No difference in SCCs between APD and CAPD at either time point	66 No change in SCCs from 1 to 12 months post-initiation of PD	67 N/A
68 Kanamori et al., 2012, Japan (79)	69 Observational cohort study	70 HD: 211, 59.0 (12.3), 37.4%	71 Visual Analogue Scale of Memory (0-100)	72 HD: Median = 45 and 51 in elderly and non-elderly patients	73 N/A	74 N/A	75 SCCs of memory not associated with age or mortality at 3 years

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4 Author & Year & Location	5 Study Design	6 Sample Characteristics (Modality: N, Age M (SD), % Female)	7 SCC Measure	8 Frequency/Severity of SCCs	9 Modality Difference	10 Course of SCCs	11 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
12 Kang et al., 2017, Korea (80)	13 Observational cohort study	14 HD: 1250, 56.4 (13.2), 43.4%; PD: 366, 54.1 (11.9), 46.7%	15 KDQOL-CF	16 HD: M = 86.20; PD: M = 85.40	17 No difference in SCCs between HD and PD patients	18 N/A	19 N/A
20 Kim et al., 2011, Korea (81)	21 Pre-post study with no control group	22 HD: 24, 51.9 (7.2), 41.7%	23 KDQOL-CF	24 HD: M = 81.94	25 N/A	26 N/A	27 N/A
28 Kim et al., 2020, Korea (82)	29 Observational cohort study	30 HD: 1461, 58.3 (14.2), 38.3%	31 KDQOL-CF	32 HD: M = 82.79	33 N/A	34 N/A	35 CVC associated with more SCCs than AVF at 3 months post-initiation of HD; No difference in SCCs between AVF and AVG, or between AVG and CVC at 3 months; No difference in SCCs between the three access types at 12 months
36 Kim et al., 2021, Korea (83)	37 Observational cross-sectional study	38 HD: 1247, 56.4 (13.2), 43.5%; PD: 364, 54.1 (11.9), 46.4%	39 KDQOL-CF	40 HD: Median = 93.00 and 95.00 in patients with non-high and high physical activity; PD: Median = 93.00	41 N/A	42 N/A	43 HD patients with low physical activity reported more SCCs than HD patients with high physical activity; SCCs not associated with physical activity in PD patients
44 Knudsen et al., 2016, Denmark (84)	45 Observational cross-sectional study	46 HD: 81, 66.0 (13.0), 32.1%	47 KDQOL-CF	48 HD: M = 85.00	49 N/A	50 N/A	51 N/A
52 Ko et al., 2007, US (85)	53 Observational cross-sectional study	54 HD: 112, 55.5 (16.9), 58.0%	55 KDQOL-CF	56 HD: M = 78.70	57 N/A	58 N/A	59 N/A
60 Kontodimopoulos et al., 2005, Greece (86)	61 Observational cross-sectional study	62 HD: 483, 59.9 (14.6), 38.8%	63 KDQOL-CF	64 HD: M = 74.49	65 N/A	66 N/A	67 SCCs associated with female gender, older age, lower education level, presence of comorbidities, and more times of hospitalisations in the past year; SCCs associated with poorer quality of life in the physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health domains of SF-36

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Korevaar et al., 2002, 14 Netherlands (87)	15 Observational cohort study	16 HD & PD: 234 (HD), 141 (PD), 60.0 (16.0), 39.0%	17 KDQOL-CF	18 N/A	19 N/A	20 No change in SCCs from 3 to 12 months post- initiation of HD/PD	21 SCCs associated with number of comorbidities; SCCs associated with higher dialysis adequacy (Kt/V) in HD but not PD patients; SCCs not associated with GFR; increase in SCCs from 3 to 12 months post-initiation of dialysis associated with reduction in serum albumin; SCCs associated with lower overall health rating
22 Kostro et al., 2016, 23 Poland (88)	24 Observational cohort study	25 HD switching to KTx: 44, 49.0 (N/A), 31.8%; 26 PD switching to KTx: 25, 42.0 (N/A), 44.0%	27 KDQOL-CF	28 HD (before KTx): M = 67.00; 29 PD (before KTx): M = 59.00; 30 KTx (combining two groups): M = 75.91	31 No difference in SCCs between HD and PD patients	32 SCCs reduced from pre- KTx (HD/PD) to 12 months post-KTx	33 N/A
34 Krishnasamy et al., 35 2019, Australia (89)	36 Observational cross- sectional study	37 HD: 32, 71.4 (10.6), 37.5%	38 KDQOL-CF	39 HD: M = 83.15	40 N/A	41 N/A	42 Isolation due to multidrug-resistant organisms not associated with SCCs
43 Kurella et al., 2004, 44 US (90)	45 Observational cross- sectional study	46 HD: 79, 61.2 (14.4), 41.0%	47 KDQOL-CF	48 HD: Median = 73.00	49 N/A	50 N/A	51 SCCs positively associated with benzodiazepine use and stroke; SCCs negatively associated with beta-blocker use; SCCs associated with higher depressive symptoms
52 Kusumoto et al., 53 2008, Brazil (91)	54 Observational cross- sectional study	55 HD: 194, N/A (N/A), 36.6%	56 KDQOL-CF	57 HD: M = 80.83	58 N/A	59 N/A	60 No difference in SCCs between adults (< 60 years) and elderly (> 60 years)
61 Kutner et al., 2005a, 62 US (92)	63 Observational cohort study	64 HD: 455, 61.2 (15.6), 43.3%; 65 PD: 413, 56.1 (14.7), 47.2%	66 KDQOL-CF	67 HD: M = 75.84; 68 PD: M = 79.72	69 No difference in SCCs between HD and PD patients at any time point	70 N/A	
71 Kutner et al., 2005b, 72 US (93)	73 Observational cross- sectional study	74 HD: 1679, 61.6 (15.4), 46.9%; 75 PD: 1623, 56.4 (15.3), 47.0%	76 KDQOL-CF	77 HD: M = 74.89; 78 PD: M = 78.60	79 HD patients reported more SCCs than PD patients	80 N/A	81 SCCs not associated with sex or race
82 Kutner et al., 2007, 83 US (94)	84 Observational cross- sectional study	85 HD & PD: 1170 (HD), 1116 (PD), 60.0 (16.0), 39.0%	86 KDQOL-CF	87 N/A	88 N/A	89 N/A	90 SCCs associated with lower education level, sleep medication prescription, self- reported sleep difficulty, higher depressive symptoms, and more bodily pain

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Lai et al., 2018, Italy (95)	Observational cohort study	PD: 51, 63.1 (14.6), 45.1%	KDQOL-CF	PD: M = 88.60	N/A	N/A	SCCs not associated with age
Lazarus, 2019, Oman (96)	Controlled intervention study	HD: 150, 48.8 (10.3), 44.7%	KDQOL-CF	HD: M = 61.50	N/A	N/A	N/A
Lee et al., 2005, UK (97)	Observational cross-sectional study	HD: 99, 63.0 (14.2), 39.4%; PD: 74 58.7 (15.3), 48.6%; KTx: 209, 52.8 (13.9), 40.2%	KDQOL-CF	HD: M = 72.60; PD: M = 79.60; KTx: M = 80.90	HD patients reported more SCCs than PD and KTx patients; No difference in SCCs between PD and KTx patients	N/A	N/A
Lee et al., 2020, Korea (98)	Observational cohort study	HD: 568, 60.8 (13.5), 38.4%	KDQOL-CF	N/A	N/A	N/A	SCCs not associated with mortality at 5 years
Leone et al., 2021, Brazil (99)	Observational cross-sectional study	HD: 162, N/A (N/A), 37.1%	KDQOL-CF	HD: M = 81.28	N/A	N/A	SCCs not associated with patient activation
Li et al., 2014, Mainland China (100)	Controlled intervention study	PD: 135, 56.3 (12.4), 41.5%	KDQOL-CF	PD: M = 73.09	N/A	No change in SCCs from baseline to 6 and 12 weeks in PD patients (control group)	N/A
Li et al., 2016, US (101)	Observational cross-sectional study	HD: 72, 52.0 (13.0), 32.0%	KDQOL-CF	HD: M = 82.20	N/A	N/A	SCCs associated with depressive and anxious symptoms (BAI, BDI, HADS); SCCs associated self-reported physical inactivity, but not associated with physical inactivity measured by a physical activity monitor; SCCs not associated with physical performance assessed by 6-minute walk test, sit-to-stand test, and stair climbing test
Lim et al., 2020, Korea (102)	Controlled intervention study	HD: 49, 63.0 (14.4), 32.7%	KDQOL-CF	HD: M = 83.11	N/A	N/A	No difference in SCCs between medium cut-off and high-flux dialysers

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Lo et al., 1998, Hong 14 Kong (103)	15 Controlled 16 intervention study	17 PD: 20, 45.7 (11.1), 50.0%	18 KDQOL-CF	19 PD: M = 63.18	20 N/A	21 No change in SCCs from 22 baseline to 12 weeks in 23 PD patients (control 24 group)	25 N/A
26 Lønning et al., 2018a, 27 Norway (104)	28 Observational 29 cohort study	30 KTx: 120, 71.6 (4.3), 29.0%	31 KDQOL-CF	32 N/A	33 N/A	34 No change in SCCs from 35 pre-KTx 36 (HD/PD/preemptive) to 2, 37 6, and 12 months post- 38 KTx	39 Longer waiting time for KTx associated 40 with increase in SCCs; Change in SCCs 41 not associated with age, sex, comorbidity, 42 pre-KTx dialysis vintage, GFR, donor 43 age, or HLA-DR
44 Lønning et al., 2018b, 45 Norway (105)	46 Observational 47 cohort study	48 KTx waiting list: 261, 71.2 49 (4.1), 33.0%	50 KDQOL-CF	51 N/A	52 N/A	53 No change in SCCs 54 between baseline (KTx 55 acceptance) to 6 and 12 56 months on KTx waiting 57 list	58 N/A
59 Loos-Ayav et al., 60 2008, France (106)	61 Observational 62 cohort study	63 HD & PD: 161 (HD), 34 64 (PD), 54.6 (12.8), 39.0%	65 KDQOL-CF	66 N/A	67 N/A	68 N/A	69 Non-autonomous patients reported more 70 SCCs than autonomous (independent, 71 self-care) patients at 12 months post- 72 initiation of HD/PD
73 Lopes et al., 2003, US 74 (107)	75 Observational 76 cohort study	77 HD: 6151, 60.1 (15.5), 46.8%	78 KDQOL-CF	79 HD: M = 77.29	80 N/A	81 N/A	82 Hispanic patients had more SCCs than 83 white patients: SCCs associated with 84 hospitalisation and mortality only in 85 white patients
86 Lopes et al., 2007, 87 US, France, Germany, 88 Italy, Spain, UK, and 89 Japan (108)	90 Observational cross- 91 sectional study	92 HD: 9526, 59.5 (14.8), 41.5%	93 KDQOL-CF	94 N/A	95 N/A	96 N/A	97 SCCs associated with lower household 98 income, lower education level, 99 unemployment, cerebrovascular or 100 neurological disease, cardiac disease, and 101 psychiatric disease; SCCs not associated 102 with age, sex, marital status, living status, 103 serum albumin, haemoglobin, dialysis 104 adequacy (Kt/V), dialysis access, 105 predialysis SBP, BMI, peripheral 106 vasculopathy, diabetes, lung disease, or 107 cancer

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13 Lopes et al., 2019, 14 Brazil (109)	15 Controlled 16 intervention study	17 HD: 50, 54.2 (12.4), 40.0%	18 KDQOL-CF	19 HD: M = 87.38	20 N/A	21 No change in SCCs from 22 baseline to 12 weeks in 23 HD patients (control 24 group)	25 N/A
26 Ma et al., 2021, China 27 (110)	28 Observational cross- 29 sectional study	30 HD: 190, 61.7 (13.4), 38.4%	31 KDQOL-CF	32 HD: M = 32.81	33 N/A	34 N/A	35 SCCs associated with lower scores in the 36 average positive factors, somatisation, 37 obsessive compulsive, interpersonal 38 sensitivity, depression, anxiety, hostility, 39 phobic anxiety, paranoid ideation, and 40 psychoticism domains of the SCL-90
41 Macedo et al., 2021, 42 Brazil (111)	43 Observational cross- 44 sectional study	45 HD: 170, 70.6 (7.2), 34.7%	46 KDQOL-CF	47 HD: M = 79.66	48 N/A	49 N/A	50 SCCs not associated with sarcopenia (muscle mass and muscle strength) or 51 malnutrition (Subjective Global 52 Assessment)
53 Madariaga et al., 54 2016, US (112)	55 Observational cross- 56 sectional study	57 KTx: 21, 34.4 (8.9), 52.4%	58 KDQOL-CF	59 KTx: M = 80.32	60 No difference in SCCs 61 between conventional 62 KTx patients maintained 63 on chronic 64 immunosuppression and 65 KTx patients who 66 achieved long-term 67 immunosuppression-free 68 renal allograft survival 69 after combined kidney 70 and bone marrow 71 transplantation	72 N/A	73 N/A
74 Malekmakan et al., 75 2016, Iran (113)	76 Observational cross- 77 sectional study	78 HD: 68, 54.9 (12.1), 57.4%; 79 PD: 72, 52.4 (12.1), 50.0%	80 KDQOL-CF	81 HD: M = 51.31; 82 PD: M = 53.56	83 No difference in SCCs 84 between HD and PD 85 patients	86 N/A	87 N/A
88 Malindretos et al., 89 2010, Greece (114)	90 Observational cross- 91 sectional study	92 HD: 200, 62.9 (14.7), 45.0%	93 KDQOL-CF	94 HD: M = 70.06	95 N/A	96 N/A	97 SCCs associated with number of 98 comorbidities (Index of Coexistent 99 Disease)

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4 Author & Year & Location	5 Study Design	6 Sample Characteristics (Modality: N, Age M (SD), % Female)	7 SCC Measure	8 Frequency/Severity of SCCs	9 Modality Difference	10 Course of SCCs	11 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
12 Manavalan et al., 2017, India (115)	13 Observational cross-sectional study	14 Predialysis: 57, 51.1 (12.5), 33.3%; HD & PD: 27 (HD), 15 (PD), 42.0 (13.4), 35.7%	15 KDQOL-CF	16 Predialysis: M = 62.22; HD: M = 68.89; PD: M = 75.56	17 No difference in SCCs between predialysis, HD, and PD patients	18 N/A	19 N/A
20 Manju et al., 2020, India (116)	21 Observational cross-sectional study	22 HD: 112, 60.6 (11.8), 33.9%	23 KDQOL-CF	24 HD: M = 68.86	25 N/A	26 N/A	27 N/A
28 Manns et al., 2002, Canada (117)	29 Observational cross-sectional study	30 HD: 128, 61.8 (N/A), 43.7%	31 KDQOL-CF	32 HD: M = 78.70	33 N/A	34 N/A	35 SCCs not associated with dialysis adequacy (Kt/V)
36 Mansouri et al., 2020, Iran (118)	37 Controlled intervention study	38 HD: 60, 49.7 (N/A), 11.67%	39 KDQOL-CF	40 HD: M = 45.79	41 N/A	42 N/A	43 N/A
44 Mapes et al., 2003, US, France, Germany, Italy, Spain, UK, and Japan (119)	45 Observational cohort study	46 HD: 10030, 58.9 (14.9), 42.4%	47 KDQOL-CF	48 N/A	49 N/A	50 N/A	51 SCCs associated with mortality and hospitalisation
52 Marinho et al., 2017, Brazil (120)	53 Observational cross-sectional study	54 HD: 105, N/A (N/A), 42.9%	55 KDQOL-CF	56 HD: M = 86.41	57 N/A	58 N/A	59 N/A
60 Martin et al., 2000, UK (121)	61 Observational cross-sectional study	62 PD: 72, 51.4 (14.6), 36.1%	63 KDQOL-CF	64 PD: M = 78.60	65 N/A	66 N/A	67 SCCs associated with higher depressive and anxious symptoms (HADS) and external locus of control orientation
68 Martin et al., 2001, UK (122)	69 Observational cross-sectional study	70 PD: 48, 54.0 (13.9), 33.3%	71 KDQOL-CF	72 PD: M = 80.22	73 N/A	74 N/A	75 SCCs not associated with dialysis adequacy (Kt/V)
76 Martin-Alemañy et al., 2016, Mexico (123)	77 Controlled intervention study	78 HD: 36, 34.0 (N/A), 58.3%	79 KDQOL-CF	80 HD: M = 35.03	81 N/A	82 N/A	83 N/A
84 Masina et al., 2016, Malawi (124)	85 Observational cross-sectional study	86 HD: 22, 44.8 (16.0), 40.9%	87 KDQOL-CF	88 HD: M = 83.00	89 N/A	90 N/A	91 N/A
92 Maynard et al., 2019, Brazil (125)	93 Controlled intervention study	94 HD: 40, 46.5 (13.6), 45.0%	95 KDQOL-CF	96 HD: M = 82.65	97 N/A	98 No change in SCCs from baseline to 12 weeks in HD patients (control group)	99 N/A

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Mazairac et al., 2011, Netherlands, Norway, and Canada (126)	Observational cross-sectional study	HD: 589, 64.0 (14.0), 38.0%	KDQOL-CF	HD: M = 79.00	N/A	N/A	SCCs associated with lower albumin and higher creatinine; SCCs not associated with Subjective Global Assessment score, Normalized Protein Nitrogen Appearance, BMI, cholesterol, or Composite Score on Protein-Energy Nutritional Status
Mazairac et al., 2012, Netherlands (127)	Observational cross-sectional study	HD: 570, 64.0 (14.0), 38.0%	KDQOL-CF	HD: M = 80.00	N/A	N/A	N/A
Mazairac et al., 2013, Netherlands, Norway, and Canada (128)	Controlled intervention study	HD: 356, 64.0 (13.0), 35.0%; HDF: 358, 64.0 (14.0), 40.0%	KDQOL-CF	HD: M = 78.00; HDF: M = 80.00	No difference in SCCs between HD and HDF patients at either time point	No change in SCCs over 2 years in HD patients; SCCs increased over 2 years in HDF patients	N/A
McAdams-DeMarco et al., 2018, US (129)	Observational cohort study	KTx: 443, 52.0 (14.1), 37.3%	KDQOL-CF	KTx: M = 86.70	N/A	SCCs reduced from pre-KTx (HD/PD/preemptive) to 3 months post-KTx	SCCs associated with frailty; SCCs not associated with donor type or kidney donor profile index
Medeiros et al., 2017, Brazil (130)	Observational cross-sectional study	HD: 6, 47.2 (14.9), 66.7%	KDQOL-CF	HD: M = 86.66	N/A	N/A	N/A
Mentari et al., 2005, US (131)	Observational cohort study	HD: 1600, N/A (N/A), 47.0%	KDQOL-CF	HD: M = 81.10	N/A	N/A	No impact of change in Medicare reimbursement on SCCs
Michels et al., 2011, Netherlands (132)	Observational cohort study	APD: 64, 52.0 (17.8), 21.9%; CAPD: 486, 53.6 (14.2), 35.2%	KDQOL-CF	N/A	No difference in SCCs between APD and CAPD at any time point	No change in SCCs from baseline to 6, 12, 18, 24, 30, and 36 months in PD patients	N/A
Milan Manani et al., 2020, Italy (133)	Observational cross-sectional study	PD: 73, N/A (N/A), 26.1%	KDQOL-CF	PD: Median = 80.00 and 83.30 for patients with and without remote monitoring	N/A	N/A	No difference in SCCs between PD patients with and without remote monitoring

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Moist et al., 2008, 14 US, France, Germany, 15 Italy, Spain, UK, and 16 Japan (134)	17 Observational cross- 18 sectional study	19 HD: 20994, 60.7 (14.8), 20 42.0%	21 KDQOL-CF	22 N/A	23 N/A	24 N/A	25 SCCs associated with longer travel time to HD sessions
26 Molsted et al., 2007, 27 Denmark (135)	28 Observational cross- 29 sectional study	30 HD: 71, 59.0 (16.0), 24.0%; 31 PD: 59, 59.0 (13.0), 44.0%	32 KDQOL-CF	33 HD: M = 84.40; 34 PD: M = 82.90	35 No difference in SCCs between HD and PD patients	36 N/A	37 SCCs associated with lower blood haemoglobin, lower plasma albumin, longer dialysis vintage, and comorbidity; SCCs not associated with age, sex, or dialysis adequacy (Kt/V)
38 Montinaro et al., 39 2010, Italy (136)	40 Observational cross- 41 sectional study	42 HD: 30, 57.8 (14.1), 33.0%	43 KDQOL-CF	44 N/A	45 N/A	46 N/A	47 SCCs associated with higher IL-6, TNF- alpha, and IL-10; SCCs associated with higher depressive and anxious symptoms (HADS)
48 Moura et al., 2014, 49 Portugal (137)	50 Observational cross- 51 sectional study	52 HDF: 322, 64.9 (14.3), 40.4%	53 KDQOL-CF	54 HDF: M = 77.70	55 N/A	56 N/A	57 CVC associated with more SCCs than AVF; SCCs not associated with diabetes or location of AVF (right forearm, left forearm, right upper arm, left upper arm)
58 Moura et al., 2015a, 59 Portugal (138)	60 Observational cross- 61 sectional study	62 HDF: 322, 64.9 (14.3), 40.4%	63 KDQOL-CF	64 HDF: M = 77.77	65 N/A	66 N/A	67 N/A
68 Moura et al., 2015b, 69 Portugal (139)	70 Observational cross- 71 sectional study	72 HDF: 305, 64.9 (14.3), 40.3%	73 KDQOL-CF	74 HDF: M = 78.26	75 N/A	76 N/A	77 SCCs not associated with age or sex
78 Naderifar et al., 2019, 79 Iran (140)	80 Observational cross- 81 sectional study	82 HD: 200, 48.4 (14.9), 50.0%	83 KDQOL-CF	84 HD: M = 48.36	85 N/A	86 N/A	87 N/A
88 Nagasawa et al., 89 2018a, Japan (141)	90 Observational cross- 91 sectional study	92 HD: 51, 67.7 (12.1), 29.4%	93 KDQOL-CF	94 HD: M = 91.20	95 N/A	96 N/A	97 SCCs not associated with caregivers' quality of life (EQ-5D, SF-36)
98 Nagasawa et al., 99 2018b, Japan (142)	100 Observational cross- 101 sectional study	102 HD: 92, 67.0 (11.6), 22.8%	103 KDQOL-CF	104 HD: M = 94.10	105 N/A	106 N/A	107 SCCs not associated with medication adherence
108 Nayana et al., 2017, 109 India (143)	110 Observational cross- 111 sectional study	112 HD: 50, 51.9 (14.7), 20.0%	113 KDQOL-CF	114 HD: M = 61.86	115 N/A	116 N/A	117 N/A
118 Neumann et al., 2018, 119 Germany (144)	120 Observational 121 cohort study	122 HD: 96, 51.9 (15.9), 25.0%; 123 PD: 101, 55.7 (14.7), 35.6%	124 KDQOL-CF	125 HD: M = 87.20; 126 PD: M = 86.60	127 No difference in SCCs between HD and PD patients	128 No change in SCCs from baseline to 12 months in HD/PD patients	129 SCCs not associated with age, comorbidity, psychotropic drug intake, education level, employment status, or dialysis vintage; SCCs associated with higher depressive symptoms

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Ohtake et al., 2014, Japan (145)	Controlled intervention study	HD: 68, 69.7 (10.8), 33.8%	KDQOL-CF	HD: M = 84.65	N/A	N/A	N/A
Okpechi et al., 2013, South Africa (146)	Observational cross-sectional study	HD: 56, 38.6 (1.4), 53.6%; PD: 26, 36.0 (2.2), 34.6%	KDQOL-CF	HD: M = 78.20; PD: M = 79.50	No difference in SCCs between HD and PD patients	N/A	N/A
Oliveira et al., 2016, Brazil (147)	Observational cross-sectional study	HD: 286, 54.7 (14.1), 39.9%	KDQOL-CF	HD: M = 80.97	N/A	N/A	SCCs associated with more missed HD sessions
Grocco-González et al., 2021, Mexico (148)	Observational cross-sectional study	PD: 151, 36.8 (16.2), 43.7%	KDQOL-CF	PD: Median = 87.00, 67.00, and 67.00 in patients with normal nutrition, mild to moderate protein-energy wasting, and severe protein-energy wasting	N/A	N/A	SCCs associated with worse nutrition (more severe protein-energy wasting)
Ortega et al., 2007, Spain (149)	Observational cohort study	KTx: 307, 51.6 (12.0), 40.8%	ESRD-SCL-Limited Cognitive Capacity	KTx: M = 14.3	N/A	SCCs reduced from pre-KTx to 3 months post-KTx; no change in SCCs from 3 to 6 and 12 months post-KTx	SCCs associated with lower education levels, longer duration on RRT, and nonactive working status; SCCs associated with poorer quality of life in the physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health domains of SF-36; SCCs associated with poorer quality of life assessed by EuroQol-5D
Osthus et al., 2012, Norway (150)	Observational cross-sectional study	HD & PD: 301, 59.8 (16.2), 33.9%	KDQOL-CF	N/A	N/A	N/A	No difference in SCCs between patients accepted for KTx waiting list, permanently rejected for KTx, and pending for KTx acceptance
Ottaviani et al., 2016, Brazil (151)	Observational cross-sectional study	HD: 100, 53.3 (14.7), 34.0%	KDQOL-CF	HD: M = 88.06	N/A	N/A	SCCs associated with higher depressive and anxious symptoms (HADS)

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Painter et al., 2012, 14 US (152)	15 Observational cohort study	16 HD: 13, 45.5 (10.4), 15.4%; HD switching to DHD: 10, 42.6 (12.4), 10.0%; HD switching to KTx: 20, 43.5 (10.9), 15.0%	17 KDQOL-CF	18 HD: M = 89.70; DHD: 91.30; KTx: 88.30	19 No difference in SCCs between HD, DHD, and KTx patients	20 No change in SCCs from baseline to 6 months in HD patients; No change in SCCs switching from HD (baseline) to DHD or KTx (6 months)	21 N/A
22 Pakpour et al., 2011, 23 Iran (153)	24 Observational cross- sectional study	25 HD: 212, 57.5 (14.7), 43.8%	26 KDQOL-CF	27 HD: M = 55.70	28 N/A	29 N/A	30 SCCs not associated with overall health rating
31 Palanova et al., 2019, 32 Czech Republic (154)	33 Pre-post study with no control group	34 PD: 14, 61.9 (8.7), 57.1%	35 KDQOL-CF	36 PD: M = 91.90	37 N/A	38 N/A	39 N/A
40 Paniagua et al., 2005, 41 Mexico (155)	42 Controlled intervention study	43 PD: 923, 47.1 (13.9), 42.3%	44 KDQOL-CF	45 PD: M = 28.20	46 N/A	47 N/A	48 PD patients with enhanced creatinine clearance target reported more SCCs at 6 months than patients on standard PD; presence of diabetes associated with fewer SCCs; SCCs not associated with age, sex, serum albumin, GFR, dialysis vintage, hematocrit, or nPNA
49 Park et al., 2007, 50 Korea (156)	51 Observational cross- sectional study	52 HD & PD: 132 (HD), 32 (PD), 54.1 (13.0), 41.5%	53 KDQOL-CF	54 N/A	55 N/A	56 N/A	57 SCCs associated with lower overall health rating
58 Park et al., 2012, 59 Korea (157)	60 Observational cross- sectional study	61 PD: 105, 49.3 (13.6), 47.6%	62 KDQOL-CF	63 N/A	64 N/A	65 N/A	66 SCCs associated with higher depressive symptoms (BDI)
67 Park et al., 2017, 68 Korea (158)	69 Observational cohort study	70 HD (thrice-weekly): 207, 61.7 (13.4), 40.1%; HD (incremental): 105, 60.2 (13.3), 41.9%	71 KDQOL-CF	72 HD: M = 83.24	73 N/A	74 N/A	75 No difference in SCCs between thrice- weekly and incremental HD
76 Parsons et al., 2006, 77 Canada (159)	78 Pre-post study with no control group	79 HD: 13, 53.0 (18.0), 38.5%	80 KDQOL-CF	81 HD: M = 92.00	82 N/A	83 N/A	84 N/A
85 Peipert et al., 2020, 86 US (160)	87 Observational cohort study	88 KTx: 477, 49.0 (N/A), 40.0%	89 KDQOL-CF	90 KTx: M = 81.99	91 N/A	92 SCCs reduced from pre- KTx (HD/PD/preemptive) to 3 months post-KTx; No change in SCCs from 3 to 12 months post-KTx	93 Increase in SCCs from 3 to 12 months post-KTx associated with death-censored graft failure; Change in SCCs associated with age at KTx, and use of HD or PD prior to KTx; Change in SCCs not associated with sex, race, education level, or BMI

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Pereira et al., 2019, Brazil (161)	Observational cross-sectional study	HD: 258, 56.8 (14.5), 59.7%	KDQOL-CF	HD: M = 94.16	N/A	N/A	N/A
Portela et al., 2020, Brazil (162)	Observational cross-sectional study	HD: 103, 84.4 (3.9), 38.8%	KDQOL-CF	HD: M = 81.00	N/A	N/A	N/A
Posegger et al., 2020, Brazil (163)	Observational cross-sectional study	KTx waiting list: 57, 36.7 (6.1), 28.1%; KTx: 103, 40.0 (8.2), 48.5%	KDQOL-CF	KTx: M = 8.80	N/A	N/A	No difference in SCCs between patients who received KTx < 1 year, patients who received KTx between 1 and 3 years, and patients who received KTx > 3 years
Poulsen et al., 2017, Denmark (164)	Observational cohort study	HD: 82, 62.0 (15.0), 32.0%	KDQOL-CF	N/A	N/A	No change in SCCs from baseline to 6 and 12 months in HD patients	SCCs associated with lower age, increased hospitalisation, higher GFR, and higher albumin; SCCs not associated with sex, diabetes, number of comorbidities, or number of serious adverse events
Pucheu et al., 2004, France (165)	Observational cross-sectional study	PD: 47, 56.6 (17.4), 38.3%	KDQOL-CF	PD: M = 68.20	N/A	N/A	N/A
Rajkumar et al., 2019, Australia (166)	Observational cohort study	KTx: 75, 47.0 (13.0), 44.0%	KDQOL-CF	KTx: M = 81.00	N/A	SCCs reduced from pre-KTx (HD/PD/preemptive) to 12 months post-KTx	N/A
Ramatillah et al., 2017, Malaysia (167)	Observational cross-sectional study	HD: 78, N/A (N/A), 38.5%	KDQOL-CF	HD: M = 75.66	N/A	N/A	SCCs not associated with age, sex, or race
Rebollo Rubio et al., 2017, Spain (168)	Observational cross-sectional study	HD & PD: 120 (HD), 32 (PD), 62.5 (14.1), 28.3%	KDQOL-CF	HD: M = 30.08; PD: M = 31.46	No difference in SCCs between HD and PD patients	N/A	N/A
Romano-Zelekha et al., 2017, Israel (169)	Observational cross-sectional study	HD: 1102, 65.5 (14.2), 48.8%	KDQOL-CF	HD: M = 71.70	N/A	N/A	SCCs not associated with race
Yu et al., 2021, Korea (170)	Observational cohort study	KTx: 842, 45.3 (11.7), 36.9%	KDQOL-CF	N/A	N/A	No change in SCCs from 2 to 4 and 6 years post-KTx	N/A

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Salamon et al., 2018, Australia (171)	Controlled intervention study	PD: 13, N/A (N/A), 54.0%	KDQOL-CF	PD: Median = 73.33	N/A	N/A	N/A
Sawada et al., 2021, Japan (172)	Observational cross-sectional study	KTx: 67, N/A (N/A), 40.3%	KDQOL-CF	N/A	N/A	N/A	SCCs associated with poorer quality of life (EQ-5D-5L)
Scott et al., 2009, US (173)	Controlled intervention study	HD: 88, 54.7 (14.7), 46.6%	KDQOL-CF	HD: M = 76.50	N/A	No change in SCCs from baseline to 3 months in HD patients (control group)	N/A
Geica et al., 2009, Romania (174)	Observational cross-sectional study	HD: 606, 51.7 (12.6), 45.3%	KDQOL-CF	HD: M = 78.80	N/A	N/A	N/A
Shahnavazi et al., 2016, Iran (175)	Observational cross-sectional study	HD: 98, N/A (N/A), 41.9%	KDQOL-CF	HD: M = 42.88	N/A	N/A	N/A
Shahnavazi et al., 2018, Iran (176)	Controlled intervention study	HD: 43, N/A (N/A), 41.9%	KDQOL-CF	HD: M = 40.76	N/A	No change in SCCs from baseline to 6 and 12 weeks in HD patients (control group)	N/A
Shimoyama et al., 2003, Japan (177)	Observational cross-sectional study	PD: 26, 49.8 (14.7), 34.0%	KDQOL-CF	PD: M = 82.90	N/A	N/A	SCCs associated with worse quality of life in the bodily pain, general health, vitality, and mental health domains of SF-36; SCCs not associated with the physical functioning, role physical, social functioning, or role emotional domains of SF-36
Shombing et al., 2017, Indonesia (178)	Observational cohort study	HD: 113, N/A (N/A), 46.9%	KDQOL-CF	HD: M = 84.13	N/A	N/A	N/A
Simic-Ogrizovic et al., 2009, Serbia (179)	Observational cohort study	HD: 102, 55.4 (13.8), 53.9%	KDQOL-CF	N/A	N/A	No change in SCCs from baseline to 3 and 6 years in HD patients	N/A

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Soares et al., 2017, Brazil (180)	Controlled intervention study	HD: 50, 51.4 (13.3), 0.0%	KDQOL-CF	HD: M = 87.39	N/A	No change in SCCs from baseline to 6 months in HD patients (control group)	N/A
Zong et al., 2015, US (181)	Observational cross-sectional study	HD & PD: 125 (HD), 10 (PD), 58.4 (12.8), 46.7%	PAOFI	N/A	No difference in SCCs between HD and PD patients	N/A	SCCs associated with fewer years of education; SCCs not associated with age, history of stroke, comorbidity, dialysis vintage, or dialysis adequacy (Kt/V); SCCs associated with more severe pain and other symptoms (ESAS), worse physical functioning (ADL, IADL), and higher depressive (CES-D-SF) and anxious symptoms (STAI); SCCs associated with poorer performance in backward counting task in BTACT; SCCs not associated with performance in other tests in BTACT
Zong et al., 2018, US (182)	Observational cohort study	HD & PD: 216 (HD), 11 (PD), 58.7 (12.6), 48.0%	PAOFI	N/A	N/A	SCCs reduced from baseline to 12 months in HD and PD patients	White patients reported more SCCs than nonwhite patients; SCCs not associated with age or comorbidity; SCCs associated with more severe overall symptoms (ESAS), worse physical functioning (ADL, IADL), worse emotional well-being (CESD-SF, SAI, PANAS-PA), and worse spiritual well-being (FACIT-Sp)
Lorenzen et al., 2007, Denmark (183)	Observational cross-sectional study	HD & PD: 66 (HD), 12 (PD), 62.5 (12.5), 25.6%	KDQOL-CF	N/A	N/A	N/A	SCCs not associated with diabetes

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Sorensen et al., 2012, US (184)	Observational cross-sectional study	HD: 168, 62.0 (17.0), 49.0%	KDQOL-CF	HD: M = 76.00	N/A	N/A	SCCs associated with lower SBP; SCCs not associated with age, sex, race, education level, HD vintage, cause of ESRD, smoking status, comorbidity, DBP, BMI, dialysis adequacy (Kt/V), albumin, or phosphorus; SCCs associated with higher depressive symptoms (CES-D); SCCs associated with immediate recall (from the Wechsler Memory Scale-III); SCCs not associated with MMSE score, verbal IQ, delayed recall, short delay, percent retention, recognition, block design, digit symbol, digit span, Trail Making Test A & B, COWAT, or mental alterations
Stavrianou et al., 2007, Greece (185)	Observational cross-sectional study	HD: 146, 57.0 (15.7), N/A	KDQOL-CF	HD: M = 84.00	N/A	N/A	N/A
Stumm et al., 2019, Brazil (186)	Pre-post study with no control group	HD: 63, 58.9 (13.1), 33.3%	KDQOL-CF	HD: M = 86.98	N/A	N/A	N/A
turgill et al., 2020, US (187)	Observational cross-sectional study	HD & PD & HHD: 71 (HD), 14 (PD), 7 (HHD), 56.1 (14.8), 40.2%	PROMIS-Cognition	HD: M = 49.57	N/A	N/A	SCCs not associated with dialysis adequacy (Kt/V), albumin, or haemoglobin
Yamilselvan et al., 2021, India (188)	Controlled intervention study	HD: 37, 47.5 (11.6), 35.1%	KDQOL-CF	HD: M = 48.50	N/A	N/A	N/A
Yanaka et al., 2020, Japan (189)	Observational cross-sectional study	HD: 103, 62.7 (13.8), 20.4%; PD: 90, 65.5 (12.3), 31.1%; HD+PD: 36, 57.4 (9.1), 25.0%	KDQOL-CF	HD: M = 85.40; PD: M = 89.80; HD+PD: M = 91.70	HD patients reported more SCCs than PD and HD+PD patients; No difference in SCCs between PD and HD+PD patients	N/A	N/A

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4 Author & Year & 5 Location	6 Study Design	7 Sample Characteristics (Modality: N, Age M (SD), % Female)	8 SCC Measure	9 Frequency/Severity of SCCs	10 Modality Difference	11 Course of SCCs	12 Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
13 Tannor et al., 2017, 14 South Africa (190)	15 Observational cross- 16 sectional study	17 HD: 58, 42.8 (9.8), 70.7%; 18 PD: 48, 36.1 (10.7), 56.3%	19 KDQOL-CF	20 HD: M = 77.90; 21 PD: M = 72.00	22 No difference in SCCs 23 between HD and PD 24 patients	25 N/A	26 N/A
27 Ting et al., 2003, US 28 (191)	29 Observational 30 cohort study	31 HD switching to DHD: 42, 32 59.9 (16.7), 33.0%	33 KDQOL-CF	34 HD: M = 71.60; 35 DHD: M = 85.10	36 Patients reported more 37 SCCs on HD (baseline) 38 than on DHD (3 and 12 39 months)	40 SCCs reduced after 41 switching from HD 42 (baseline) to DHD (3 43 months); No change in 44 SCCs from 3 to 12 45 months post-initiation of 46 DHD	47 N/A
48 Tsarpali et al., 2021, 49 Norway (192)	50 Observational 51 cohort study	52 KTx: 136, 71.5 (4.1), 30.1%	53 KDQOL-CF	54 KTx: M = 92.10	55 N/A	56 SCCs reduced from pre- 57 KTx (HD/PD/preemptive) 58 to 1 year post-KTx; no 59 change in SCCs from 1 to 60 3 years post-KTx	61 N/A
62 Yürk et al., 2020, 63 Turkey (193)	64 Observational cross- 65 sectional study	66 HD: 60, 56.6 (14.1), 41.7%; 67 PD: 45, 52.0 (13.2), 51.1%	68 KDQOL-CF	69 HD: M = 68.00; 70 PD: M = 77.80	71 HD patients reported 72 more SCCs than PD 73 patients	74 N/A	75 SCCs associated with number of 76 hospitalisation, duration of 77 hospitalisation, and higher serum ferritin 78 levels
79 Uchiyama et al., 80 2019a, Japan (194)	81 Controlled 82 intervention study	83 PD: 47, 64.1 (9.3), 25.5%	84 KDQOL-CF	85 PD: M = 91.33	86 N/A	87 No change in SCCs from 88 baseline to 12 weeks in 89 PD patients (control 90 group)	91 N/A
92 Uchiyama et al., 93 2019b, Japan (195)	94 Observational cross- 95 sectional study	96 PD: 50, 63.8 (9.6), 26.0%	97 KDQOL-CF	98 PD: M = 90.40	99 N/A	100 N/A	101 SCCs associated with poorer exercise 102 capacity (Incremental Shuttle Walking 103 Test, handgrip strength, quadriceps 104 strength)
105 Unruh et al., 2004, US 106 (196)	107 Controlled 108 intervention study	109 HD: 1813, 57.6 (14.0), 56.3%	110 KDQOL-CF	111 HD: M = 75.40	112 N/A	113 No change in SCCs from 114 baseline to 1, 2, and 3 115 years in HD patients	116 No effect of HD dose (Kt/V 1.05 vs. 117 1.45) or flux membranes (high vs. low) 118 on SCCs
119 Unruh et al., 2008, US 120 (197)	121 Observational 122 cohort study	123 HD: 1813, 57.6 (14.0), 56.3%	124 KDQOL-CF	125 N/A	126 N/A	127 N/A	128 SCCs not associated with age at baseline; 129 Patients aged 70 and older reported larger 130 increase in SCCs over 3 years than 131 patients younger than 70 years old

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
van Doorn et al., 2004, Belgium (198)	Observational cross-sectional study	HD: 70, 67.9 (N/A), N/A	KDQOL-CF	HD: M = 81.10	N/A	N/A	SCCs not associated with age
van Eps et al., 2010, Australia (199)	Observational cohort study	HD switching to NHD: 63, 52.0 (13.0), 21.0%	KDQOL-CF	HD: Median = 13.33; NHD: Median = 6.67	No difference in SCCs between HD (baseline) and NHD (6-12 months)	No change in SCCs switching from HD (baseline) to NHD (6-12 months)	N/A
Varela et al., 2011, Spain (200)	Observational cross-sectional study	PD: 53, 49.5 (17.0), 54.7%	KDQOL-CF	PD: M = 77.73	N/A	N/A	SCCs associated with higher depressive and anxious symptoms (HADS)
Vázquez et al., 2005, Spain (201)	Observational cross-sectional study	HD: 194, 48.6 (16.1), 56.7%	KDQOL-CF	HD: M = 78.82	N/A	N/A	SCCs associated with unemployment; SCCs not associated age, sex, social class, comorbidity, albumin, or haemoglobin; SCCs associated with higher anxious symptoms (STAI-T); SCCs not associated with depressive symptoms (CDI)
von der Lippe et al., 2014, Norway (202)	Observational cross-sectional study	HD & PD: 301, 59.8 (16.2), 33.9%	KDQOL-CF	N/A	N/A	N/A	SCCs associated with lower age; SCCs associated with previous renal graft loss; SCCs not associated with comorbidity, BMI, dialysis vintage
Von der Lippe et al., 2016, Norway (203)	Observational cohort study	KTx: 142, 51.0 (15.5), 32.4%	KDQOL-CF	KTx: M = 88.00	No change in SCCs from pre-KTx (HD/PD) to post-KTx	N/A	
Walters et al., 2002, US (204)	Observational cross-sectional study	HD: 422, 59.0 (15.8), 46.4%	KDQOL-CF	HD: M = 75.16	N/A	N/A	SCCs not associated with age or sex; SCCs associated with higher depressive symptoms
Wang et al., 2008, Canada (205)	Controlled intervention study	HD: 18, 56.0 (N/A), 5.6%	KDQOL-CF	HD: M = 81.35	N/A	N/A	No difference in SCCs between standard HD, HD with increased dialysate flow, HD with increased session time, and HD with 2 dialysers
Warsame et al., 2018, US (206)	Observational cross-sectional study	HD: 431, 54.0 (13.0), 35.3%	KDQOL-CF	N/A	N/A	N/A	SCCs not associated with intradialytic activity levels

Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Watanabe et al., 2014, Japan (207)	Observational cross-sectional study	HD: 34, 57.1 (7.6), 23.6%; HHD: 46, 54.0 (8.3), 13.0%	KDQOL-CF	HD: M = 87.50; HHD: M = 90.10	No difference in SCCs between HD and HHD patients	N/A	N/A
Watanabe et al., 2018, Japan (208)	Observational cohort study	PD switching to HD+PD: 10, 53.3 (7.8), 50.0%	KDQOL-CF	PD: M = 83.30; HD+PD: M = 88.70	No difference in SCCs between PD (baseline) and HD+PD (12 months)	No change in SCCs switching from PD (baseline) to HD+PD (12 months)	N/A
Wong et al., 2010, Singapore (209)	Controlled intervention study	PD: 98, 62.4 (N/A), 46.9%	KDQOL-CF	PD: M = 76.60	N/A	No change in SCCs from baseline to 7 and 13 weeks in PD patients (control group)	N/A
Woźniak et al., 2018, Poland (210)	Observational cross-sectional study	KTx: 136, 50.4 (N/A), 45.6%	KDQOL-CF	KTx: M = 81.35	N/A	N/A	SCCs not associated with number of prescribed drugs
Wright et al., 2015, US (211)	Observational cross-sectional study	HD: 29, N/A (N/A), 44.8%; PD: 26, N/A (N/A), 61.5%; HHD: 22, N/A (N/A), 40.9%	KDQOL-CF	HD: M = 80.40; PD: M = 84.50; HHD: M = 81.20	No difference in SCCs between HD, PD, and HHD patients	N/A	N/A
Yu et al., 2014, Mainland China (212)	Controlled intervention study	HD: 65, 48.8 (13.9), 15.4%	KDQOL-CF	HD: M = 65.32	N/A	No change in SCCs from baseline to 12 weeks in HD patients (control group)	N/A
Yamana, 2009, Japan (213)	Observational cross-sectional study	HD: 44, 57.0 (13.8), 27.3%	KDQOL-CF	HD: Median = 93.30	N/A	N/A	SCCs associated with shorter HD vintage; SCCs not associated with age, sex, primary disease, complications, length of HD sessions, IDWG, cardiothoracic ratio, hematocrit, albumin, systolic blood pressure, potassium, phosphorus, or calcium
Yang et al., 2021, Mainland China (214)	Observational cohort study	HD: 273, 59.9 (14.4), 41.4%	KDQOL-CF	N/A	N/A	N/A	SCCs associated with higher posttraumatic stress symptoms
Yıldırım et al., 2007, Turkey (215)	Observational cross-sectional study	HD: 82, 51.0 (12.0), 65.0%	KDQOL-CF	HD: M = 83.21	N/A	N/A	N/A

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Author & Year & Location	Study Design	Sample Characteristics (Modality: N, Age M (SD), % Female)	SCC Measure	Frequency/Severity of SCCs	Modality Difference	Course of SCCs	Association with sociodemographic and clinical variables, patient-reported outcomes, and objective cognition
Yoon et al., 2016, Korea (216)	Observational cohort study	PD: 481, 51.3 (11.1), 46.8%	KDQOL-CF	PD: M = 83.50	N/A	N/A	SCCs associated with increased hydration status
Zabel et al., 2012, Australia (217)	Observational cross-sectional study	HD: 62, 63.0 (16.0), 60.0%	KDQOL-CF	HD: M = 80.00	N/A	N/A	SCCs associated with poorer self-reported appetite
Zheng et al., 2019, Mainland China (218)	Controlled intervention study	HD: 46, 78.0 (5.1), N/A	KDQOL-CF	HD: M = 68.87	N/A	No change in SCCs from baseline to 3 months in HD patients (control group)	N/A
Ziaja et al., 2009, Poland (219)	Observational cross-sectional study	KTx: 38, N/A (N/A), N/A	KDQOL-CF	KTx: Median = 80.00; KTx (simultaneous pancreas transplantation): Median = 93.33	KTx patients reported more SCCs than patients who received simultaneous pancreas and kidney transplantation	N/A	N/A
Gimmerman et al., 2003, Canada (220)	Observational cohort study	HD switching to HF: 7, 60.0 (N/A), 14.3%	KDQOL-CF	HD: M = 81.90; HF: M = 93.33	No difference in SCCs between HD (baseline) and HF (4 weeks)	No change in SCCs switching from HD (baseline) to HF (4 weeks)	N/A
Zubair et al., 2017, Pakistan (221)	Observational cross-sectional study	HD: 137, N/A (N/A), 27.7%	BC-CCI	HD: prevalence = 86.90%	N/A	N/A	SCCs associated with shorter HD vintage and poorer sleep quality (PSQI); SCCs not associated with age, sex, family income, marital status, HD frequency, smoking status, education level, BMI, occupation, or use of naswar

Notes. ESRD = End-Stage Renal Disease; HD = Haemodialysis; PD = Peritoneal Dialysis; KTx = Kidney Transplantation; NHD = Nocturnal Haemodialysis; HHD = Home Haemodialysis; DHD = Daily Haemodialysis; HDF = Hemodiafiltration; HF = Hemofiltration; HD+PD = Combined haemodialysis and peritoneal dialysis therapy; APD = Automated Peritoneal Dialysis; CAPD = Continuous Ambulatory Peritoneal Dialysis; RRT = Renal Replacement Therapy; SCC = Subjective Cognitive Complaint; PAOFI = Patient's Assessment of Own Functioning Inventory; BC-CCI = British Columbia Cognitive Complaints Inventory; CDS = Cognitive Difficulties Scale; PDQ = Perceived Deficits Questionnaire; KDQOL-CF = Kidney Disease Quality of Life Cognitive Function subscale; HUI = Health Utilities Index; WHODAS = World Health Organisation Disability Assessment Schedule; PROMIS = Patient-Reported Outcomes

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3 Measurement Information System; DSI = Dialysis Symptoms Index; ESRD-SCL = End-Stage Renal Disease Symptom Checklist; MMSE = Mini-Mental State Examination; 3MS = Modified
4 Mini-Mental State test; WAIS-R = Wechsler Adult Intelligence Scale-Revised; BTACT = Brief Test of Adult Cognition by Telephone; COWAT = Controlled Oral Word Association Test;
5 WHOQOL-BREF = Abbreviated World Health Organisation Quality of Life questionnaire; SF-36 = 36-item Short Form survey; BDI = Beck Depression Inventory; CES-D = Centre for
6 Epidemiologic Studies Depression scale; HADS = Hospital Anxiety and Depression Scale; STAI = State-Trait Anxiety Inventory; ESAS = Edmonton Symptom Assessment System; ADL =
7 Activities of Daily Living; IADL = Instrumental Activities of Daily Living; PSQI = Pittsburgh Sleep Quality Index; BMI = Body Mass Index; GFR = Glomerular Filtration Rate; SBP = Systolic
8 Blood Pressure; DBP = Diastolic Blood Pressure; AVF = Arteriovenous Fistula; AVG = Arteriovenous Graft; CVC = Central Venous Catheter; IDWG = Interdialytic Weight Gain; M = Mean;
9 SD = Standard Deviation; N = Sample size.
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Table S3. *Quality assessment of observational cross-sectional studies.*

Author & Year	1. Was the research question or objective in this paper clearly stated?	2. Was the study population clearly specified and defined?	3. Was the participation rate of eligible persons at least 50%?	4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	5. Was a sample size justification, power description, or variance and effect estimates provided?	6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	10. Was the exposure(s) assessed more than once over time?	11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	12. Were the outcome assessors blinded to the exposure status of participants?	13. Was loss to follow-up after baseline 20% or less?	14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?
AL-Jumaih et al., 2011	Y	Y	NR	N	N	NA	NA	N	N	NA	Y	NA	NA	N
Amro et al., 2014	Y	Y	Y	N	N	NA	NA	Y	Y	N	Y	N	NA	Y
Anees et al., 2016	Y	Y	NR	Y	N	NA	NA	N	N	NA	Y	NA	NA	N
Bacci et al., 2018	Y	N	Y	Y	N	NA	NA	Y	Y	N	Y	Y	NA	N
Bagasha et al., 2021	Y	N	Y	N	Y	NA	NA	N	N	NA	Y	NR	NA	N
Bakewell et al., 2001	Y	N	CD	CD	N	NA	NA	Y	N	NA	Y	NA	NA	N
Barbosa et al., 2017	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	N
Barotfi et al., 2006	Y	N	Y	N	N	NA	NA	Y	Y	N	Y	NR	NA	Y
Barzegar et al., 2017	Y	Y	NR	Y	N	NA	NA	Y	Y	NA	Y	N	NA	N
Bataclan et al., 2009	Y	N	NR	CD	Y	NA	NA	Y	Y	N	Y	N	NA	N
Bele et al., 2012	Y	Y	Y	Y	N	NA	NA	Y	N	N	Y	NR	NA	N
Bettoni et al., 2017	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	N	NA	N
Bouidida et al., 2014	Y	N	NR	NR	N	NA	NA	Y	Y	N	Y	NR	NA	N
Braga et al., 2011	Y	Y	Y	Y	N	NA	NA	N	Y	NA	Y	NA	NA	N
Brickman et al., 1996	Y	N	NR	NR	N	NA	NA	Y	Y	N	Y	N	NA	Y
Carmichael et al., 2000	Y	N	Y	NR	N	NA	NA	Y	Y	N	Y	NR	NA	Y
Castro et al., 2018	Y	Y	NR	Y	N	NA	NA	Y	Y	N	Y	N	NA	N
Cavalcante et al., 2013	Y	N	Y	NR	N	NA	NA	N	Y	NA	Y	NA	NA	N
Cepeda Marte et al., 2019	Y	Y	NR	Y	N	NA	NA	N	Y	NA	Y	NA	NA	N
Chan et al., 2010	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	N	NA	Y
Cho et al., 2018	Y	Y	Y	Y	Y	NA	NA	N	Y	NA	Y	NA	NA	N
Chrifi Alaoui et al., 2022	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	Y
Czyzewski et al., 2018	Y	Y	NR	N	N	NA	NA	Y	Y	NA	Y	NR	NA	N
D'Onofrio et al., 2017	Y	Y	Y	Y	N	NA	NA	N	Y	NA	Y	NA	NA	N
de Oliveira Cordeiro et al., 2020	Y	Y	Y	N	N	NA	NA	NA	Y	NA	Y	NA	NA	N

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de Oliveira et al., 2012	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	N
de Roij van Zuidewijn et al., 2016	Y	Y	NR	N	N	NA	NA	Y	Y	Y	Y	NR	NA	Y
Debnath et al., 2018	Y	N	Y	N	N	NA	NA	Y	Y	N	Y	N	NA	Y
Dehesa-Lopez et al., 2016	Y	N	NR	CD	N	NA	NA	Y	N	NR	Y	NR	NA	N
Dehghan et al., 2020	Y	N	Y	N	Y	NA	NA	Y	Y	N	Y	N	NA	N
Diamant et al., 2011	Y	Y	Y	N	N	NA	NA	Y	Y	NA	Y	NR	NA	Y
Duarte et al., 2005	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	N	NA	N
Fan et al., 2020	Y	Y	NR	Y	N	NA	NA	Y	Y	Y	Y	NR	NA	Y
Fiderkiewicz et al., 2011	Y	N	Y	CD	N	NA	NA	Y	Y	N	Y	N	NA	Y
Fong et al., 2007	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	Y
Fructuoso et al., 2011	Y	N	Y	NR	N	NA	NA	Y	Y	NA	Y	NR	NA	N
Fukuhara et al., 2003	Y	N	Y	N	N	NA	NA	Y	Y	NA	Y	NA	NA	Y
G. B. Lopes et al., 2014	Y	Y	NR	N	N	NA	NA	Y	N	N	Y	N	NA	Y
Garcia et al., 2010	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	N	NA	N
Giglio et al., 2018	Y	Y	NR	Y	N	NA	NA	Y	Y	N	Y	Y	NA	N
Gonçalves et al., 2015	Y	N	NR	N	Y	NA	NA	Y	Y	NA	Y	NR	NA	CD
Green et al., 2001	Y	N	NR	N	N	NA	NA	Y	Y	NA	Y	NA	NA	N
Griva et al., 2012	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	N	NA	N
Gumprecht et al., 2010	Y	Y	Y	N	N	NA	NA	NA	Y	NR	Y	NR	NA	N
Hays et al., 1994	N	Y	Y	CD	N	NA	NA	Y	Y	N	Y	N	NA	N
Henry et al., 2017	Y	N	NR	N	N	NA	NA	Y	Y	N	N	Y	NA	N
Ho et al., 2013	Y	Y	Y	Y	Y	NA	NA	Y	Y	NA	Y	NA	NA	N
Hornik et al., 2019	Y	N	NR	NR	N	NA	NA	N	Y	N	Y	N	NA	N
Hyodo et al., 2004	N	Y	NR	Y	N	NA	NA	N	Y	N	Y	N	NA	N
J. M. Lopes et al., 2014	Y	N	NR	N	N	NA	NA	N	Y	NA	Y	NA	NA	N
Jansz et al., 2018	Y	Y	Y	N	N	NA	NA	Y	Y	NA	Y	NR	NA	Y
Jayanti et al., 2016	Y	N	Y	N	N	NA	NA	Y	Y	N	Y	NR	NA	Y
Joshi et al., 2010	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	N	NA	N
Kim et al., 2021	Y	Y	NR	N	N	NA	NA	N	Y	N	Y	N	NA	Y
Knudsen et al., 2016	Y	Y	Y	N	N	NA	NA	N	N	NA	Y	NA	NA	N
Ko et al., 2007	Y	Y	Y	N	N	NA	NA	N	N	NA	Y	NA	NA	N
Kontodimopoulos et al., 2005	Y	N	Y	N	N	NA	NA	Y	Y	N	Y	N	NA	Y
Krishnasamy et al., 2019	Y	N	NR	N	N	NA	NA	N	Y	NA	Y	NR	NA	N
Kurella et al., 2004	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	N	NA	Y
Kusumoto et al., 2008	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	N	NA	N
Kutner et al., 2005b	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NA	NA	Y
Kutner et al., 2007	N	Y	NR	Y	N	NA	NA	Y	N	N	Y	N	NA	Y
Lee et al., 2005	Y	Y	N	NR	N	NA	NA	Y	Y	NA	Y	N	NA	N
Leone et al., 2021	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	N	NA	Y
Li et al., 2016	Y	N	NR	NR	N	NA	NA	Y	Y	N	Y	N	NA	Y
Lopes et al., 2007	Y	Y	NR	N	Y	NA	NA	Y	Y	N	Y	NR	NA	Y
Ma et al., 2021	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	N	NA	N
Macedo et al., 2021	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NR	NA	N
Madariaga et al., 2016	Y	Y	NR	CD	N	NA	NA	Y	Y	NA	Y	Y	NA	N
Malekmakan et al., 2016	Y	N	NR	CD	Y	NA	NA	Y	Y	NA	Y	NR	NA	N
Malindretos et al., 2010	Y	N	Y	CD	Y	NA	NA	Y	Y	N	Y	NR	NA	N
Manavalan et al., 2017	Y	Y	NR	Y	N	NA	NA	Y	Y	NA	Y	N	NA	N

1															
2															
3	Manju et al., 2020	Y	Y	Y	Y	Y	NA	NA	N	Y	NA	Y	NA	NA	N
4	Manns et al., 2002	Y	Y	Y	CD	N	NA	NA	Y	Y	Y	Y	Y	NA	N
5	Marinho et al., 2017	Y	Y	Y	Y	Y	NA	NA	N	Y	NA	Y	NA	NA	N
6	Martin et al., 2000	Y	N	Y	N	N	NA	NA	Y	Y	N	Y	N	NA	Y
7	Martin et al., 2001	Y	N	NR	CD	Y	NA	NA	Y	Y	N	Y	NR	NA	N
8	Masina et al., 2016	Y	Y	Y	N	N	NA	NA	N	Y	NA	Y	NA	NA	N
9	Mazairac et al., 2011	Y	Y	NR	N	N	NA	NA	Y	Y	N	Y	NR	NA	Y
10	Mazairac et al., 2012	Y	N	NR	Y	N	NA	NA	N	Y	NA	Y	NA	NA	N
11	Medeiros et al., 2017	Y	Y	N	Y	N	NA	NA	N	Y	NA	Y	NA	NA	N
12	Milan Manani et al., 2020	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	N
13	Moist et al., 2008	Y	Y	Y	N	N	NA	NA	Y	Y	NA	Y	N	NA	Y
14	Molsted et al., 2007	Y	Y	Y	N	N	NA	NA	Y	Y	N	Y	NR	NA	Y
15	Montinaro et al., 2010	Y	N	NR	N	N	NA	NA	Y	Y	N	N	N	NA	N
16	Moura et al., 2014	Y	N	NR	N	N	NA	NA	Y	Y	NA	Y	NR	NA	Y
17	Moura et al., 2015a	Y	N	NR	N	N	NA	NA	N	Y	NA	Y	NA	NA	N
18	Moura et al., 2015b	Y	N	NR	N	N	NA	NA	Y	Y	NA	Y	NR	NA	N
19	Naderifar et al., 2019	Y	Y	NR	Y	Y	NA	NA	N	Y	NA	Y	NA	NA	N
20	Nagasawa et al., 2018a	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NR	NA	Y
21	Nagasawa et al., 2018b	Y	Y	Y	N	N	NA	NA	Y	Y	N	Y	NR	NA	Y
22	Nayana et al., 2016	Y	Y	Y	Y	Y	NA	NA	N	Y	NA	Y	NA	NA	N
23	Okpechi et al., 2013	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	NR	NA	N
24	Oliveira et al., 2016	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	Y	NA	N
25	Orozco-González et al., 2021	Y	Y	NR	Y	N	NA	NA	Y	Y	N	Y	NR	NA	N
26	Østhus et al., 2012	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NR	NA	N
27	Ottaviani et al., 2016	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	N	NA	N
28	Pakpour et al., 2011	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	N	NA	N
29	Park et al., 2007	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	N	NA	N
30	Park et al., 2012	Y	Y	Y	CD	N	NA	NA	Y	Y	N	Y	N	NA	N
31	Pereira et al., 2019	Y	Y	Y	N	N	NA	NA	Y	Y	N	Y	NR	NA	CD
32	Portela et al., 2020	Y	Y	NR	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	N
33	Posegger et al., 2019	Y	N	Y	N	N	NA	NA	Y	Y	NA	Y	CD	NA	N
34	Pucheu et al., 2004	Y	Y	NR	Y	N	NA	NA	N	Y	NA	Y	NA	NA	N
35	Ramatillah et al., 2017	Y	N	NR	N	N	NA	NA	Y	Y	NA	Y	N	NA	N
36	Rebollo Rubio et al., 2017	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	N
37	Romano-Zelekha et al., 2017	Y	Y	Y	Y	Y	NA	NA	Y	Y	NA	Y	NA	NA	Y
38	Sawada et al., 2020	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	N	NA	N
39	Seica et al., 2009	Y	N	Y	N	N	NA	NA	N	N	NA	Y	NA	NA	N
40	Shahnavazi et al., 2016	Y	Y	NR	Y	N	NA	NA	N	Y	NA	Y	NA	NA	N
41	Shimoyama et al., 2003	Y	Y	Y	CD	N	NA	NA	Y	Y	N	Y	N	NA	N
42	Song et al., 2015	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	N	NA	Y
43	Sørensen et al., 2007	Y	Y	Y	N	N	NA	NA	N	Y	N	Y	NR	NA	N
44	Sorensen et al., 2012	Y	N	Y	N	N	NA	NA	Y	Y	N	Y	N	NA	Y
45	Stavrianou et al., 2007	Y	Y	Y	CD	N	NA	NA	N	N	NA	Y	NA	NA	N
46	Sturgill et al., 2020	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	Y	NA	Y
47	Tanaka et al., 2020	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	Y
48	Tannor et al., 2017	Y	Y	Y	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	N
49	Türk et al., 2020	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NR	NA	Y

Uchiyama et al., 2019b	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NR	NA	Y
van Doorn et al., 2004	Y	Y	Y	N	N	NA	NA	Y	Y	NA	Y	NR	NA	N
Varela et al., 2011	Y	N	Y	N	N	NA	NA	Y	Y	N	Y	N	NA	Y
Vázquez et al., 2005	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	NR	NA	Y
von der Lippe et al., 2014	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NR	NA	Y
Walters et al., 2002	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NR	NA	N
Warsame et al., 2018	Y	Y	NR	CD	N	NA	NA	Y	Y	N	Y	N	NA	Y
Watanabe et al., 2014	Y	Y	NR	Y	N	NA	NA	Y	Y	NA	Y	NR	NA	N
Wozniak et al., 2018	Y	N	NR	N	N	NA	NA	Y	Y	N	Y	NR	NA	Y
Wright et al., 2015	Y	N	Y	N	Y	NA	NA	Y	Y	NA	Y	N	NA	N
Yamana, 2009	Y	Y	NR	Y	N	NA	NA	Y	Y	N	Y	NR	NA	N
Yıldırım et al., 2007	Y	N	NR	N	N	NA	NA	N	N	NA	Y	NA	NA	N
Zabel et al., 2012	Y	Y	N	Y	N	NA	NA	Y	Y	N	Y	N	NA	N
Ziaja et al., 2009	Y	N	Y	N	N	NA	NA	Y	Y	NA	Y	Y	NA	N
Zubair et al., 2017	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	N	NA	Y

Notes. Quality assessment was performed using the quality assessment tool for observational cohort and cross-sectional studies developed by the National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH); Y = Yes; N = No; NR = Not reported; CD = Cannot determine; NA = Not applicable.

Table S4. *Quality assessment of observational cohort studies.*

Author & Year	1. Was the research question or objective in this paper clearly stated?	2. Was the study population clearly specified and defined?	3. Was the participation rate of eligible persons at least 50%?	4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	5. Was a sample size justification, power description, or variance and effect estimates provided?	6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	10. Was the exposure(s) assessed more than once over time?	11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	12. Were the outcome assessors blinded to the exposure status of participants?	13. Was loss to follow-up after baseline 20% or less?	14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?
Alarcon et al., 2021	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	
Anees et al., 2018	Y	N	NR	Y	N	Y	Y	Y	Y	N	Y	Y	NR	N
Aoun et al., 2020	Y	Y	NR	Y	N	Y	Y	Y	Y	N	Y	Y	NR	Y
Bawazier et al., 2018	N	Y	NR	Y	Y	Y	CD	Y	Y	Y	N	N	NR	Y
Chen et al., 2021	Y	Y	Y	Y	N	NR	CD	Y	Y	CD	Y	NR	NR	N
Cheung et al., 2012	Y	Y	NR	Y	Y	N	N	Y	Y	Y	Y	N	Y	N
Costa-Requena et al., 2017	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	NA	N	N
Czyzewski et al., 2014	Y	Y	NR	N	N	Y	Y	Y	Y	Y	Y	NR	NR	N
Frimat et al., 2006	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	NR	N	Y
Gorodetskaya et al., 2005	Y	Y	NR	N	N	Y	Y	Y	N	Y	Y	NR	Y	Y
Hasan et al., 2021	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	NR	Y	N
Jassal et al., 2006	Y	Y	NR	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N
Jung et al., 2016	Y	Y	NR	Y	N	Y	Y	Y	Y	Y	Y	NR	N	Y
Kanamori et al., 2012	Y	N	Y	N	N	Y	Y	Y	Y	N	Y	NA	NA	Y
Kang et al., 2017	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	NR	NA	Y
Kim et al., 2020	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	NR	N	Y
Korevaar et al., 2002	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y
Kostro et al., 2016	Y	N	NR	N	N	Y	Y	Y	Y	Y	Y	NR	NR	N
Kutner et al., 2005a	Y	Y	NR	Y	N	Y	Y	Y	Y	Y	Y	NR	Y	Y
Lai et al., 2018	Y	Y	NR	Y	N	Y	Y	N	Y	NA	Y	NR	NR	N
Lee et al., 2020	Y	Y	NR	Y	N	Y	Y	Y	Y	N	Y	NA	NA	Y
Lønning et al., 2018a	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	NR	Y	Y
Lønning et al., 2018b	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	NR	N	N
Loos-Ayav et al., 2008	Y	Y	NR	N	N	Y	Y	NA	Y	Y	Y	N	N	Y
Lopes et al., 2003	Y	Y	NR	N	N	Y	CD	Y	Y	N	Y	NA	NA	Y

Mapes et al., 2003	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	NA	NA	Y
McAdams-DeMarco et al., 2018	Y	Y	NR	N	N	Y	N	Y	Y	N	Y	NR	NR	Y
Mentari et al., 2005	Y	Y	NR	N	N	Y	CD	NA	Y	NA	Y	N	NR	N
Michels et al., 2011	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	NR	N	Y
Neumann et al., 2018	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	NR	N	Y
Ortega et al., 2007	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N
Painter et al., 2012	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	CD
Park et al., 2017	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y
Peipert et al., 2020	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Poulsen et al., 2017	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y
Rajkumar et al., 2019	Y	Y	NR	Y	N	Y	Y	N	Y	Y	Y	NA	N	N
Ryu et al., 2021	Y	Y	NR	CD	N	Y	Y	N	Y	Y	Y	NR	Y	N
Sihombing et al., 2017	Y	Y	NR	Y	N	Y	CD	N	Y	Y	Y	NR	NR	N
Simic-Ogrizovic et al., 2009	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	NA	N	N
Song et al., 2018	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y
Ting et al., 2003	Y	Y	NR	Y	N	Y	Y	Y	Y	Y	Y	NR	N	N
Tsarпали et al., 2021	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	NR	N	Y
Unruh et al., 2008	Y	Y	Y	N	N	Y	Y	Y	Y	NA	Y	NA	N	Y
van Eps et al., 2010	Y	Y	NR	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N
von der Lippe et al., 2016	Y	Y	NR	N	N	Y	Y	N	Y	Y	Y	NR	N	N
Watanabe et al., 2018	Y	N	NR	N	N	Y	Y	Y	N	Y	Y	NR	NR	N
Yang et al., 2021	Y	Y	NR	N	N	N	CD	Y	Y	CD	Y	CD	Y	N
Yoon et al., 2016	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	NR	Y	Y
Zimmerman et al., 2003	Y	N	NR	N	N	Y	N	Y	Y	Y	Y	NR	Y	N

Notes. Quality assessment was performed using the quality assessment tool for observational cohort and cross-sectional studies developed by the National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH); Y = Yes; N = No; NR = Not reported; CD = Cannot determine; NA = Not applicable.

Table S5. *Quality assessment of controlled intervention studies.*

Author & Year	1. Was the study described as randomized, a randomized trial, a randomized clinical trial, or an RCT?	2. Was the method of randomization adequate (i.e., use of randomly generated assignment)?	3. Was the treatment allocation concealed (so that assignments could not be predicted)?	4. Were study participants and providers blinded to treatment group assignment?	5. Were the people assessing the outcomes blinded to the participants' group assignments?	6. Were the groups similar at baseline on important characteristics that could affect outcomes (e.g., demographics, risk factors, co-morbid conditions)?	7. Was the overall drop-out rate from the study at endpoint 20% or lower of the number allocated to treatment?	8. Was the differential drop-out rate (between treatment groups) at endpoint 15 percentage points or lower?	9. Was there high adherence to the intervention protocols for each treatment group?	10. Were other interventions avoided or similar in the groups (e.g., similar background treatments)?	11. Were outcomes assessed using valid and reliable measures, implemented consistently across all study participants?	12. Did the authors report that the sample size was sufficiently large to be able to detect a difference in the main outcome between groups with at least 80% power?	13. Were outcomes reported or subgroups analyzed prespecified (i.e., identified before analyses were conducted)?	14. Were all randomized participants analyzed in the group to which they were originally assigned, i.e., did they use an intention-to-treat analysis?
Boudville et al., 2009	Y	Y	Y	N	N	NR	Y	NR	NR	NR	Y	N	Y	CD
Chow et al., 2010	Y	Y	NR	NR	NR	Y	Y	Y	Y	Y	Y	Y	Y	N
Dai et al., 2020	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Duarte et al., 2009	Y	N	Y	Y	Y	N	Y	Y	Y	NR	Y	N	Y	CD
Foley et al., 2009	Y	CD	Y	Y	Y	Y	N	NR	Y	Y	Y	Y	Y	Y
Hayashi et al., 2017	N	N	N	NR	NR	N	N	Y	Y	NR	Y	N	Y	N
Hernández Sánchez et al., 2021	Y	Y	Y	NR	NR	Y	Y	Y	Y	NR	Y	N	Y	Y
Jiao et al., 2017	N	Y	Y	N	N	Y	Y	Y	NR	NR	Y	N	Y	N
Lazarus, 2019	Y	N	Y	Y	Y	Y	Y	Y	NR	NR	Y	Y	Y	Y
Li et al., 2014	Y	Y	Y	Y	Y	Y	Y	Y	NR	Y	Y	Y	Y	N
Lim et al., 2020	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N
Lo et al., 1998	N	N	N	N	N	Y	Y	N	NR	Y	Y	N	CD	N
Lopes et al., 2019	Y	N	NR	N	Y	Y	N	Y	Y	Y	Y	N	Y	N
Mansouri et al., 2020	N	N	Y	N	NR	Y	Y	Y	Y	Y	Y	Y	Y	N
Martin-Alemañy et al., 2016	Y	Y	NR	N	NR	Y	Y	Y	Y	NR	Y	N	Y	N
Maynard et al., 2019	Y	Y	Y	N	NR	Y	Y	Y	Y	Y	Y	Y	Y	N
Mazairac et al., 2013	Y	N	N	N	N	Y	N	Y	N	Y	Y	N	CD	Y
Ohtake et al., 2014	Y	N	NR	NR	NR	Y	Y	Y	Y	Y	Y	N	Y	N
Paniagua et al., 2005	Y	NR	NR	NR	NR	Y	N	Y	NR	NR	Y	N	Y	Y
Salamon et al., 2017	Y	Y	Y	NR	NR	Y	N	Y	NR	NR	Y	N	Y	N
Scott et al., 2009	N	N	N	N	NR	Y	Y	Y	Y	NR	Y	Y	Y	N
Shahnavazi et al., 2018	Y	Y	NR	NR	NR	Y	Y	Y	Y	Y	Y	N	Y	N
Soares et al., 2017	Y	CD	Y	NR	NR	CD	N	N	NR	NR	Y	N	Y	N
Tamilselvan et al., 2021	N	Y	NR	NR	NR	CD	Y	NR	NR	NR	Y	Y	Y	N
Uchiyama et al., 2019a	Y	N	NR	N	N	Y	Y	Y	N	NR	Y	Y	Y	Y
Unruh et al., 2004	Y	CD	NR	NR	Y	Y	N	NR	NR	NR	Y	N	Y	N

Wang et al., 2008	Y	CD	Y	Y	Y	NR	N	NR	Y	NR	Y	N	Y	Y
Wong et al., 2010	Y	CD	NR	NR	Y	Y	Y	Y	Y	NR	Y	Y	Y	N
Wu et al., 2014	N	Y	NR	NR	NR	Y	Y	Y	NR	NR	Y	N	Y	N
Zheng et al., 2019	Y	Y	NR	NR	NR	Y	Y	Y	Y	Y	Y	N	Y	N

Notes. Quality assessment was performed using the quality assessment tool for controlled intervention studies developed by the National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH); Y = Yes; N = No; NR = Not reported; CD = Cannot determine; NA = Not applicable.

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Table S5. *Quality assessment of before-after (pre-post) studies with no control group.*

Author & Year	1. Was the study question or objective clearly stated?	2. Were eligibility/selection criteria for the study population prespecified and clearly described?	3. Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	4. Were all eligible participants that met the prespecified entry criteria enrolled?	5. Was the sample size sufficiently large to provide confidence in the findings?	6. Was the test/service/intervention clearly described and delivered consistently across the study population?	7. Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?	8. Were the people assessing the outcomes blinded to the participants' exposures/interventions?	9. Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	10. Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided p values for the pre-to-post changes?	11. Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)?	12. If the intervention was conducted at a group level (e.g., a whole hospital, a community, etc.) did the statistical analysis take into account the use of individual-level data to determine effects at the group level?
Abbasi Abianeh et al., 2020	Y	Y	Y	NR	CD	Y	Y	NR	NR	Y	N	NA
Ahmadzadeh et al., 2017	Y	Y	Y	NR	CD	Y	Y	NR	N	Y	N	NA
Aramwit et al., 2012	Y	Y	Y	NR	CD	Y	Y	Y	N	N	N	NA
Goldfarb-Rumyantzev et al., 2006	N	Y	Y	N	CD	Y	Y	NR	Y	Y	Y	NA
Kim et al., 2011	Y	Y	Y	Y	CD	Y	Y	Y	Y	Y	Y	NA
Palanova et al., 2019	N	Y	Y	N	CD	Y	Y	NR	N	Y	N	NA
Parsons et al., 2006	Y	Y	Y	NR	N	Y	Y	NR	N	N	Y	NA
Stumm et al., 2019	Y	Y	Y	Y	CD	Y	Y	N	Y	Y	N	NA

Notes. Quality assessment was performed using the quality assessment tool for before-after (pre-post) studies with no control group developed by the National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH); Y = Yes; N = No; NR = Not reported; CD = Cannot determine; NA = Not applicable.

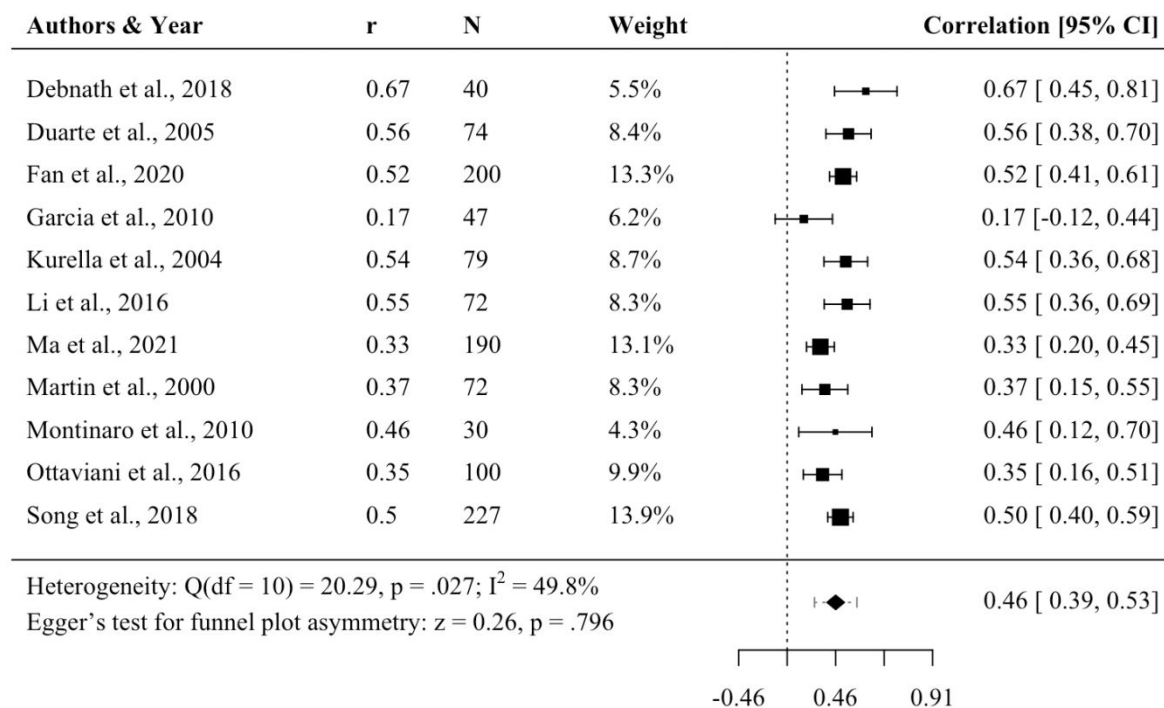


Figure S1. Forest plot showing the results of 11 studies reporting correlation coefficients between subjective cognitive complaints and depressive symptoms. r = Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.46 (95% confidence interval 0.39 to 0.53; 95% prediction interval 0.27 to 0.62), suggesting that subjective cognitive complaints were associated with higher depressive symptoms. There was evidence of heterogeneity across studies ($Q = 20.29, df = 10, p = .027; I^2 = 49.8\%$). Egger's test did not detect funnel plot asymmetry ($z = 0.26, p = .796$).

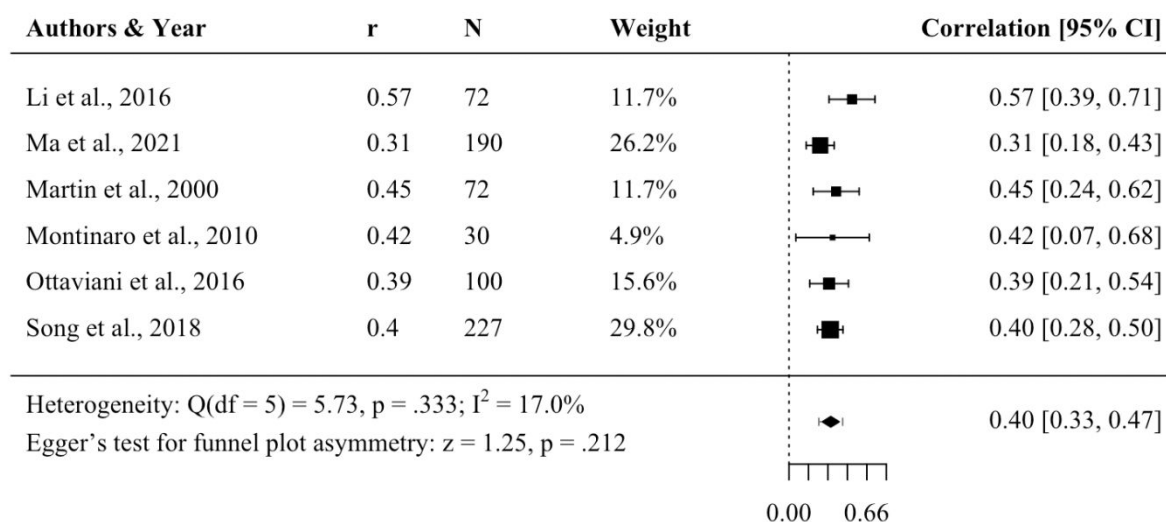


Figure S2. Forest plot showing the results of six studies reporting correlation coefficients between subjective cognitive complaints and anxious symptoms. r = Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.40 (95% confidence interval 0.33 to 0.47; 95% prediction interval 0.30 to 0.50), suggesting that subjective cognitive complaints were associated with higher anxious symptoms. There was no evidence of heterogeneity across studies ($Q = 5.73, df = 5, p = .333; I^2 = 17.0\%$). Egger's test did not detect funnel plot asymmetry ($z = 1.25, p = .212$).

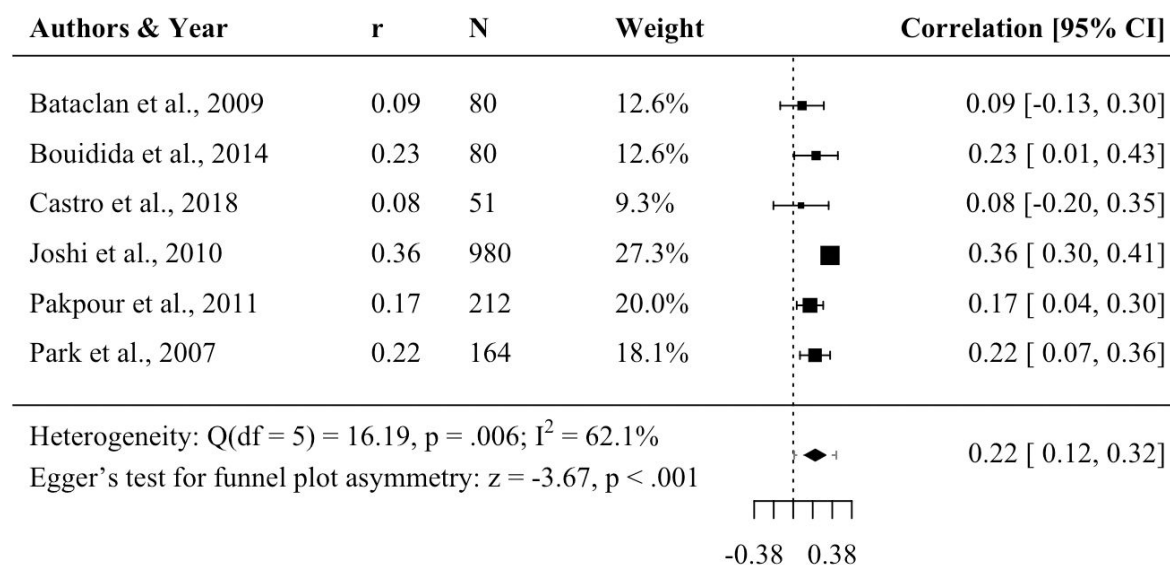


Figure S3. Forest plot showing the results of six studies reporting correlation coefficients between subjective cognitive complaints and overall health ratings. r = Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.22 (95% confidence interval 0.12 to 0.32; 95% prediction interval 0.01 to 0.42), suggesting that subjective cognitive complaints were associated with worse overall health ratings. There was evidence of heterogeneity across studies ($Q = 16.19, df = 5, p = .006; I^2 = 62.1\%$). Egger's test detected funnel plot asymmetry ($z = -3.67, p < .001$).

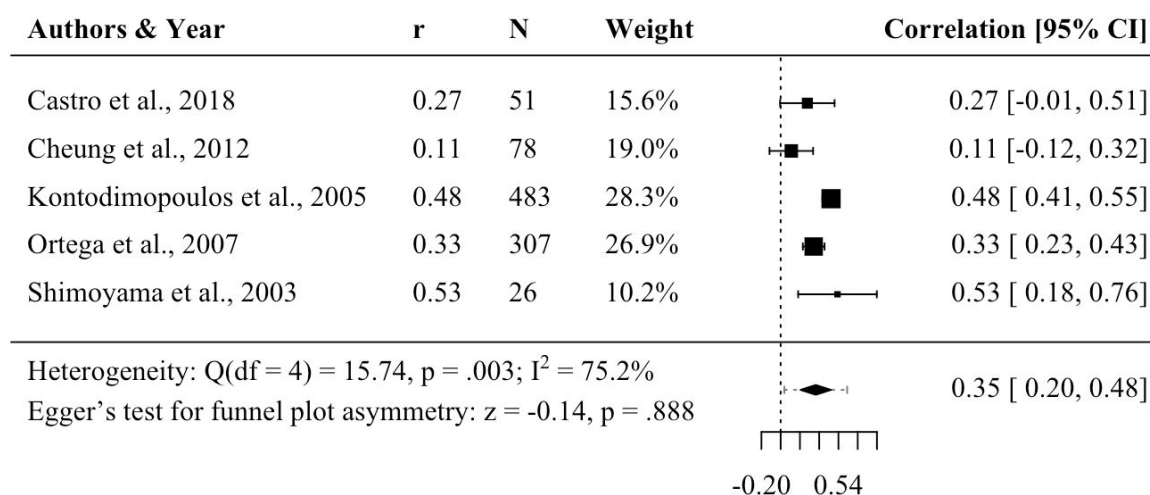


Figure S4. Forest plot showing the results of five studies reporting correlation coefficients between subjective cognitive complaints and general health perception. r = Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.35 (95% confidence interval 0.20 to 0.48; 95% prediction interval 0.04 to 0.60), suggesting that subjective cognitive complaints were associated with worse perceived general health. There was evidence of heterogeneity across studies ($Q = 15.74, df = 4, p = .003; I^2 = 75.2\%$). Egger's test did not detect funnel plot asymmetry ($z = -0.14, p = .888$).

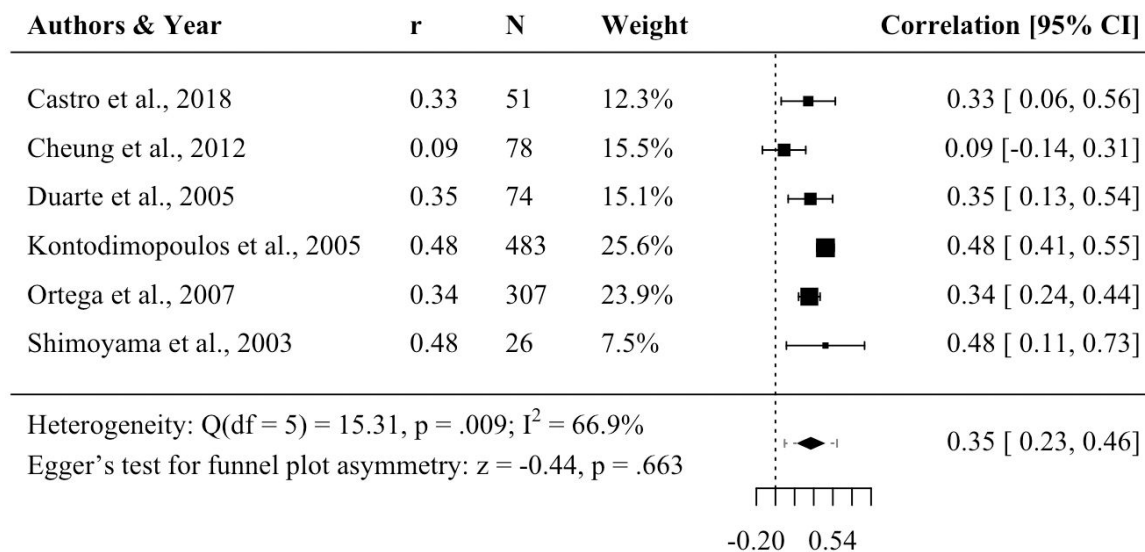


Figure S5. Forest plot showing the results of six studies reporting correlation coefficients between subjective cognitive complaints and bodily pain. r = Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.35 (95% confidence interval 0.23 to 0.46; 95% prediction interval 0.09 to 0.57), suggesting that subjective cognitive complaints were associated with higher level of bodily pain. There was evidence of heterogeneity across studies ($Q = 15.31, df = 5, p = .009; I^2 = 66.9\%$). Egger's test did not detect funnel plot asymmetry ($z = -0.44, p = .663$).

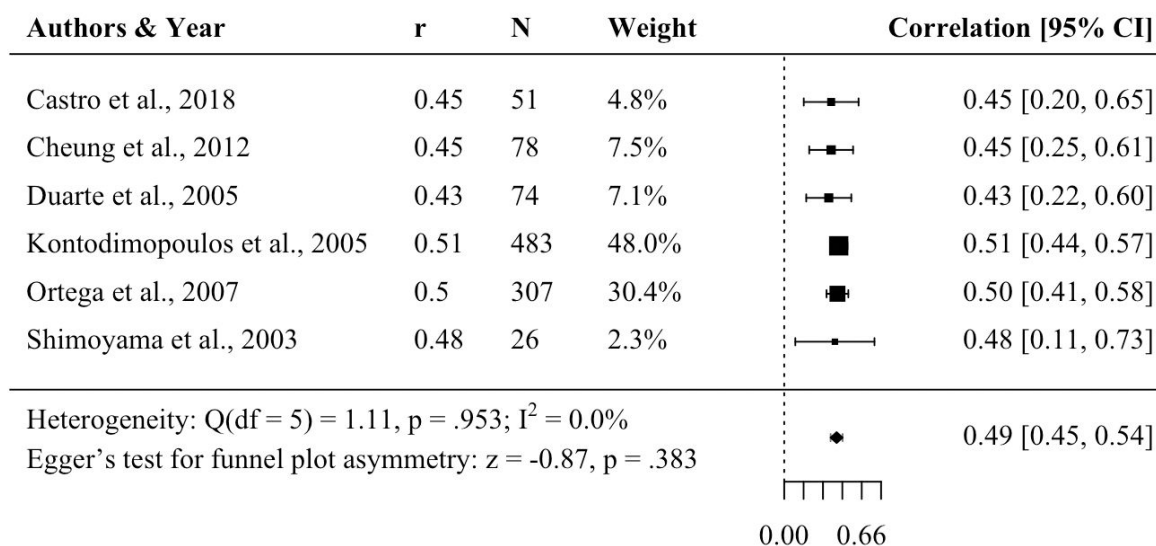


Figure S6. Forest plot showing the results of six studies reporting correlation coefficients between subjective cognitive complaints and fatigue symptoms. r = Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.49 (95% confidence interval 0.45 to 0.54; 95% prediction interval 0.45 to 0.54), suggesting that subjective cognitive complaints were associated with higher fatigue symptoms. There was no evidence of heterogeneity across studies ($Q = 1.11, df = 5, p = .953; I^2 = 0.0\%$). Egger's test did not detect funnel plot asymmetry ($z = -0.87, p = .383$).

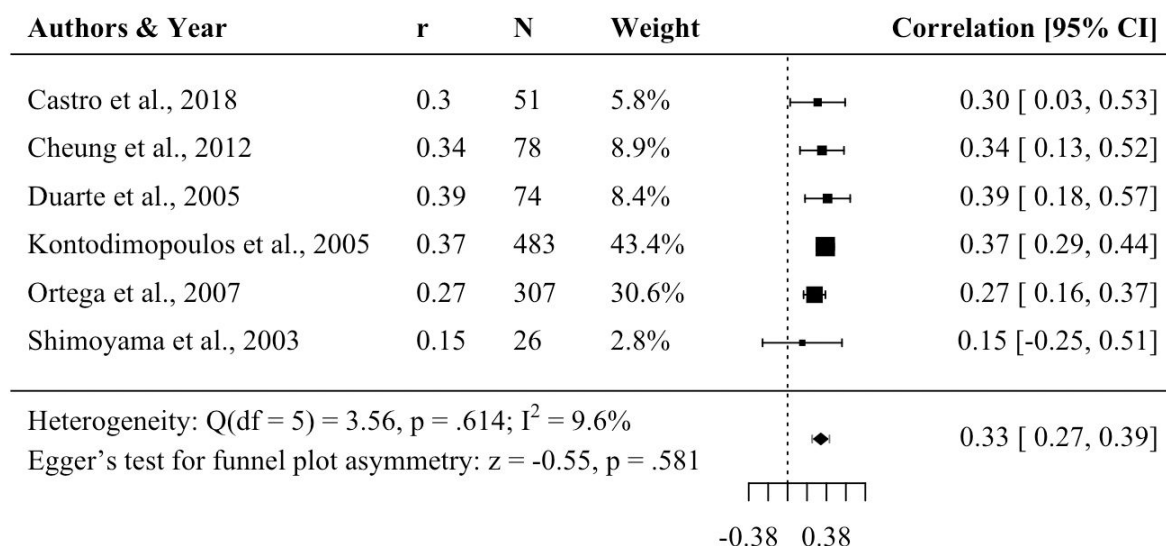


Figure S7. Forest plot showing the results of six studies reporting correlation coefficients between subjective cognitive complaints and self-reported physical functioning. $r =$ Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.33 (95% confidence interval 0.27 to 0.39; 95% prediction interval 0.25 to 0.41), suggesting that subjective cognitive complaints were associated with worse physical functioning. There was no evidence of heterogeneity across studies ($Q = 3.56, df = 5, p = .614; I^2 = 9.6\%$). Egger's test did not detect funnel plot asymmetry ($z = -0.55, p = .581$).

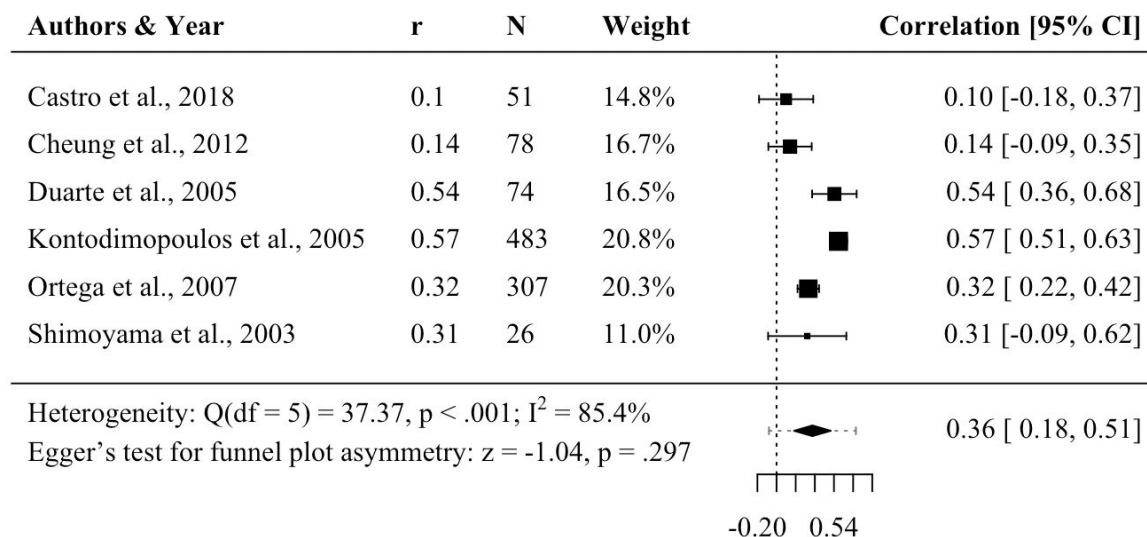


Figure S8. Forest plot showing the results of six studies reporting correlation coefficients between subjective cognitive complaints and social functioning. r = Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.36 (95% confidence interval 0.18 to 0.51; 95% prediction interval -0.08 to 0.68), suggesting that subjective cognitive complaints were associated with worse social functioning. There was evidence of heterogeneity across studies ($Q = 37.37, df = 5, p < .001; I^2 = 85.4\%$). Egger's test did not detect funnel plot asymmetry ($z = -1.04, p = .297$).

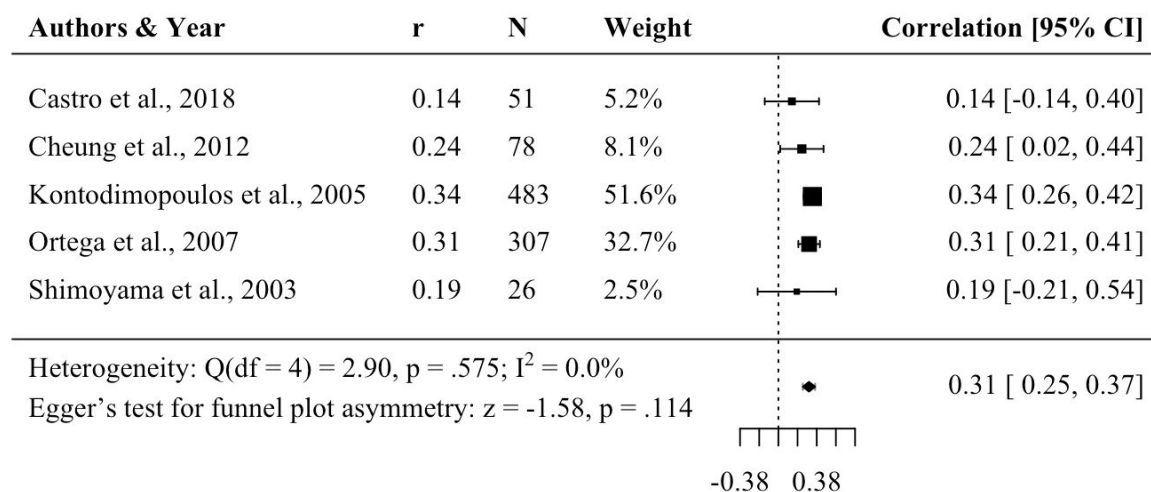


Figure S9. Forest plot showing the results of five studies reporting correlation coefficients between subjective cognitive complaints and role limitation due to physical health. $r =$ Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.31 (95% confidence interval 0.25 to 0.37; 95% prediction interval 0.25 to 0.37), suggesting that subjective cognitive complaints were associated with role limitation due to physical health. There was no evidence of heterogeneity across studies ($Q = 2.90, df = 4, p = .575; I^2 = 0.0\%$). Egger's test did not detect funnel plot asymmetry ($z = -1.58, p = .114$).

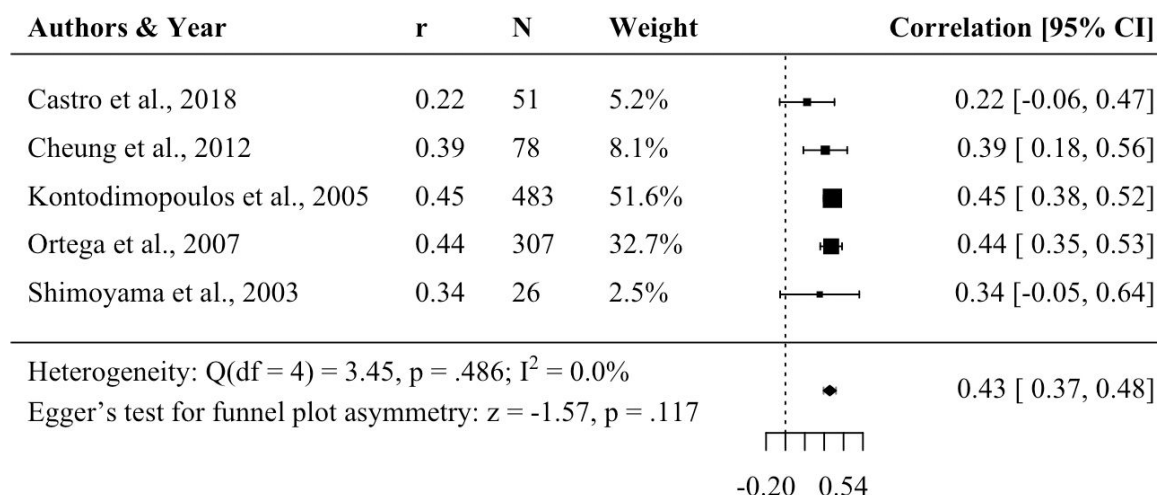


Figure S10. Forest plot showing the results of five studies reporting correlation coefficients between subjective cognitive complaints and role limitation due to emotional problems. $r =$ Correlation coefficient; CI = Confidence interval. The pooled correlation coefficient was 0.43 (95% confidence interval 0.37 to 0.48; 95% prediction interval 0.37 to 0.48), suggesting that subjective cognitive complaints were associated with role limitation due to emotional problems. There was no evidence of heterogeneity across studies ($Q = 3.45, df = 4, p = .486; I^2 = 0.0\%$). Egger's test did not detect funnel plot asymmetry ($z = -1.57, p = .117$).