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ORIGINAL ARTICLE

Alcohol Use in Older Adults: A Systematic Review of Biopsychosocial Factors, Screening Tools, and Treatment Options

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Abstract
Alcohol use among older adults, often denied, is a real public health problem in view of the harmful consequences it induces. The objective of this systematic review was to identify articles on the biopsychosocial factors, assessment tools, and treatment options that have proved useful for the early detection and management of alcohol use among older adults. With a view to producing a narrative synthesis from several databases, 66 articles were identified and studied, of which 45.4% ($n=30$) were published between 2015 and 2020. The review is reported according to PRISMA guidelines. Although differences appear to exist between the samples studied, the analyses show that biopsychosocial factors such as quality of life, well-being, emotions, perceived stress, coping strategies, and mood disorders are associated with unhealthy alcohol use. Psychosocial factors such as strong social support appear to be correlated with low levels of alcohol use and abstinence. In general, the tools used to screen for alcohol use are AUDIT, CAGE, DPI, CARET, and SMAST-G. Interventions to prevent and manage alcohol use in older adults include CBT and brief interventions. This review of the literature provides a better understanding of which assessment tools should be used for screening. Emphasis should be placed on process-oriented scientific studies, which to date do not exist. Psychological processes mediated by biopsychosocial factors would enable the development of effective prevention interventions to be conducted in order to improve the quality of life of older adults.

Keywords Alcohol use · Older adults · Biopsychosocial factors · Assessment tools · Treatment options

The world's population is rapidly aging (Beard & Bloom, 2015) and older adults (OA) are now living healthier and longer lives than previous generations (Bloom et al. 2015; Skirbekk et al. 2013). The rapid growth of the population combined with the improvement in health and life expectancy raises questions about alcohol use disorders (AUD) among OA and the various risks to their health. These unprecedented demographic and

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epidemiological changes have been associated in studies with increased prevalence of alcohol use (AU) and heavy drinking (HD) among OA in many countries (B. H. Han et al. 2017; Wilsnack et al. 2009). AU is very common and increasing among OA, especially the baby boom generation who are now reaching old age (Kelly et al. 2018a; Kuerbis & Sacco, 2013; Palle et al. 2017).

Knowledge about AU among OA is low. Prevalence studies are sporadic, underestimated, or restricted to estimates (Khadjesari et al. 2019; Menecier et al. 2015; Paille, 2014). In addition to cross-sectional studies defining HD among OA differently, global prevalence estimates suggest that approximately 52% of OA drink alcohol in the USA, China, Korea, Mexico, Chile, and 16 European countries, and 12% of them are heavy drinkers (Calvo et al. 2020). HD among OA varies across countries, with 4% in South Africa (Peltzer & Phaswana-Mafuya, 2013), 8.2% in Finland (Immonen et al. 2011b), and 13% in Japan (Midorikawa et al. 2019). In the USA, the rate of HD in OA is estimated to range from 9.7 to 14.5% (Blazer & Wu, 2009; B. H. Han et al. 2019; Parikh et al. 2015) or even as high as 22% (Breslow et al. 2017). For over 30 years, alcohol has been the most frequently used substance among OA worldwide and the number of at-risk users is expected to increase over the next two decades (Beck et al. 2015; Khan, 2017; Moore et al. 2009). AU tends to increase over time among OA, particularly among women (Beck et al. 2015; Breslow et al. 2017; Khan, 2017; Kuerbis & Sacco, 2012). AUD among OA have increased by 107% over the past 10 years (Grant et al. 2017). However, these prevalence rates may face several biases including underreporting of AU, social desirability bias, and memory bias (Richard et al. 2019). Findings from epidemiological studies are limited due to definitions and diagnostic criteria that are considered problematic (Rolland et al. 2017). Nonetheless, these trends are concerning and suggest that more research on later-life AU is needed (Menecier et al. 2018). The term of "unhealthy alcohol use" (UAU) used in this study is commonly defined as AU that exposes OA to multiple health risks through a range of behaviors including risky AU, problematic AU, HD, and AUD (Bazzi & Saitz, 2018; Holt & Tetrault, 2016; Williams et al. 2017).

Currently, there remains a social denial of UAU among OA. This topic is little known and generally taboo (Menecier et al. 2016). Increased vigilance for these behaviors in OA is encouraged by several authors in light of the impact on individual health but also on public health (B. H. Han et al. 2017; Nubukpo et al. 2012).This research is especially relevant because AU among OA is a public health problem in terms of the adverse consequences of increased morbidity and mortality, with a role in dementia and loss of autonomy, particularly in the case of falls (Ortolá et al. 2019; Shield et al. 2016; Wang & Andrade, 2013). OA are particularly vulnerable to alcohol-related harm because of the psycho-physiological changes associated with the aging process. OA are generally exposed to numerous cognitive, environmental, and biopsychosocial risk factors, so much so that the harmful effects of alcohol are likely to manifest themselves with low-dose consumption (lower than two drinks per day) (Arndt & Schultz, 2014; Rao & Roche, 2017). Among OA, UAU is often accompanied by multiple somatic, psychiatric, and psychological disorders, which are particularly detrimental to health. OA are more likely to have co-occurring mental health disorders and comorbidities including cognition (Kaufmann et al. 2018; Sachdeva et al. 2016), depression (Lai et al. 2015), anxiety (Grant et al. 2015), liver, cardiovascular, kidney, or neurological disorders that make any AU risky (Menecier et al. 2017; Wu & Blazer, 2014). In addition, heightened sensitivity to the effects of alcohol may be exacerbated by interactions between AU and concurrent use of medication, cannabis, or other narcotics (prescribed or not). These unhealthy behaviors in OA are important and growing parallel risk factors and concerns (Blazer & Wu, 2011; Daskalopoulou et al. 2018; Hoeck & Van Hal, 2013; Li et al. 2017, 2019).

The scientific literature highlights a real difficulty for health professionals in diagnosing the signs and symptoms of UAU (Menecier et al. 2015; Rolland et al. 2017). There are many barriers to the detection and diagnosis of UAU among OA. These include the lack of awareness, knowledge, and positive caring attitudes of health professionals regarding UAU among OA (Bhatia et al. 2015; Kuerbis et al. 2015). In particular, the lack of universal diagnostic criteria specific to OA, the use of non-specific diagnostic tools, the challenges of integrating systematic screening, and the difficulties of differential diagnosis of AUD associated with unidentified co-morbidities (Gell et al. 2015; Kuerbis et al. 2017). Indeed, other age-related conditions have similar physiological and psychological consequences, making screening complicated (Maynard et al. 2016). In Europe and the USA, projections indicate that the number of OA over 65 years of age requiring treatment for problematic AU is expected to triple by 2050 (Bobak et al. 2016; B. Han et al. 2009). Today, treatments implemented to treat AUD are not specific to OA (Bhatia et al. 2015; I. B. Crome & Crome, 2018). International research on treatments for UAU in OA (Moy et al. 2011) and evidence-based preventive practices and effective policies are scarce (Anderson et al. 2012; Veerbeek et al. 2019).

Given these challenges, and in the light of the lack of empirical evidence in the scientific literature, the aim of this systematic review is to identify articles on biopsychosocial factors, assessment tools, and treatment and prevention options to treat UAU among OA. A biopsychosocial model is a multidimensional approach to addictive behaviors that considers the biomedical, psychological, and social dimensions that interact closely and underlie the emergence of addiction (Barman, 2008; Lucchini, 1985). AU involves mechanisms through a "person-substance-environment triad" that responds to this biopsychosocial approach. Each component of the model takes into account all the factors that can lead to AU by considering multifactorial individual causes, from social contexts and those specific to the substance (Berquin, 2010; Brisson, 2014; Morel & Couteron, 2019). Recently, to refine the biopsychosocial model a study by Zegarra-Parodi et al. (2019) introduced the dimensions of religion and spirituality into the clinical scenarios. This study intends to answer the following questions: (a) what biopsychosocial factors have an impact on UAU in OA? (b) what screening tools for AU can be used in OA? (c) what therapeutic approaches are useful in the care of UAU in OA?

Search Methods Employed

This literature review was written following the guidelines for writing and reading PRISMA systematic reviews (Moher et al. 2015; Shamseer et al. 2015; Zorzela et al. 2016). We conducted a search targeting only quantitative and qualitative scientific studies that specifically investigate AU among OA. Article titles and abstracts were independently reviewed by two reviewers and full-text articles were retrieved for possible inclusion. Figure 1 shows the PRISMA flow chart which illustrates the study selection process followed to identify relevant studies, with numbers and reasons for exclusion.

Keywords

The search strategies were designed using the thematic headings of the MeSH thesaurus. Table 1 shows the keywords used in online databases to identify relevant articles. The keywords were grouped under four search headings: Older adults; Alcohol; Psychological and

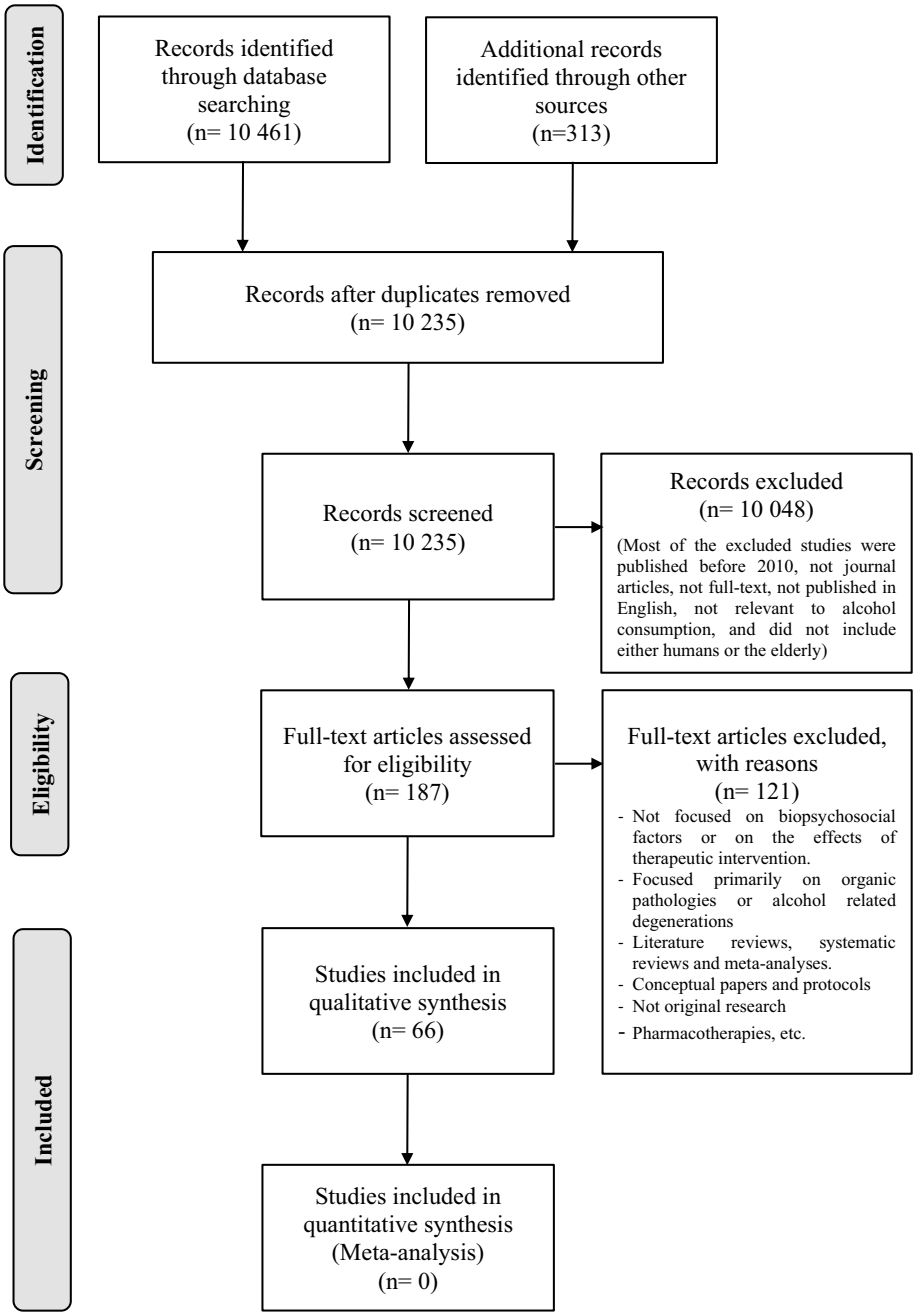

Fig. 1 PRISMA Flow diagram for article selection

psychiatric factors; Therapy and intervention. Also, given the number of studies conducted on alcohol specifically among young people, the term "binge-drinking" was deliberately omitted from the search. The Boolean operators 'OR', 'AND' and 'NOT' were used to separate, combine, or exclude terms or headings.

Database

The studies were identified via the following search engines and digital databases: Medline, PsycINFO, PubPsych, and Google Scholar. The bibliographic references of the included studies and similar literature reviews and meta-analyses were also consulted to identify articles that met the eligibility criteria.

Inclusion Criteria

Articles were selected according to the following inclusion criteria: (a) articles published in scientific journals; (b) original full-text qualitative or quantitative research articles written in English and published between 2010 and 2020, in order to have recent data; (c) all cross-sectional, longitudinal, randomized controlled trial, qualitative, cohort, and pilot studies; (d) studies involving people aged 65 and over (studies involving middle-aged adults (45–65 years) were accepted if they were associated or compared with OA); (e) studies in which AU in OA was the main variable studied. AU is defined as consumption in the past 12 months or over a lifetime, regardless of the amount and type of alcohol consumed;

Table 1 Keywords used in the database search

Search concept	Keywords
Population	*Older adults*; elderly*; older people*; aging*; olders*; senior*; seniors*; aged 65*; 65 years of age and older*; over 65 years of age*; older patients**
Alcohol use	*alcohol*; alcohol consumption; alcohol dependence*; alcohol use disorder*; alcohol use*; alcohol abuse*; alcohol addiction*; substance use*; substance abuse*; substance use disorder*; drinking*; drinkers*; heavy drinking*; heavy drinkers*; binge drinking*; unhealthy alcohol use**
Psychiatric and psychological factors	*psychological factors*; depression*; depressive disorder*; depressive symptoms*; major depressive disorde*; depression symptoms*; anxiety disorders*; anxiety*; generalized anxiety disorder*; social support*; social isolation*; family support*; stress*; perceived stress*; stress and coping*; coping strategy*; coping stress*; coping stress mental health*; mental health*; mood disorder*; well-being*; wellbeing*; well being*; subjective weel-being*; life satisfaction*; happiness*; life quality*; quality of life*; emotions**
Treatment and intervention	*therapy*; treatment*; intervention*; psychotherapy*; cognitive behavioral therapy*; cognitive behavioral therapy*; cognitive behavior therapy*; cognitive behavioral treatment *; cognitive behavior treatment*; outpatient treatment*; ambulatory treatment*; brief interventions*; brief therapies*; alcohol withdrawal*; alcoholics anonymous**

(f) studies evaluating the relationship between psychological factors and AU in OA and/or studies reporting findings on the effects of therapy or intervention on AU in OA.

Exclusion Criteria

Articles were excluded according to the following criteria: (a) full papers published before 2010; (b) papers not published in English; (c) studies including persons under 65 years of age; (d) studies comparing OA and young adults aged 18–45 years are discarded as they do not provide results specific to OA; (e) studies focusing mainly on organic pathologies or degenerations related to AU, e.g., metabolic syndromes, diabetes, periodontal diseases, the decline in kidney function, stroke, limitations in cognitive and physical function, cancers, coronary heart disease, etc. Because the results of these articles do not relate to alcohol consumption in older adults; (f) articles such as conference abstracts, conceptual papers, syntheses, literature reviews, or meta-analyses.

Data Extraction and Analysis

Data from the included articles were extracted in analytical grids to evaluate the international literature. The grids included, among other things, authors' names, year of publication, period of data collection, country where the study was conducted, type of study, target outcome, method of screening for AU, psychiatric and psychological scale, demographic data, gender, average age, objectives, results of data analysis, and main outcomes.

Results of the Literature Search

Sixty-six studies were included in this review (Fig. 1). Of the 10,235 articles in the initial search results, 98% ($n = 10{,}048$) were initially excluded because they did not meet the inclusion criteria. The remaining 187 articles underwent full-text review and of these, 121 did not meet the inclusion criteria, leaving 66 separate articles deemed compliant for final inclusion. The descriptive characteristics of the articles and populations studied are summarized in Table 2. Among the 66 eligible studies, there were 459,00 participants (approximately 55% female), with a sample size ranging from 25 to 61,240 and an average age of 69.63 years. Studies were published from 2010 to 2020, of which 53% were conducted in the USA ($n = 35$). Studies were conducted in Europe (30.3%), Australia (7.5%), and Asia (7.5%), among others. Two studies examined only men.

Results of the Reviewed Studies

Biopsychosocial Factors

The biopsychosocial model conceptualized by Engel (Engel, 1977) systematically considers biomedical, psychological, and social factors and their complex interactions in understanding human health, illness, and health care delivery. The main outcomes reported by articles investigating biopsychosocial factors related to AU among OA are outlined in Table 3.

Table 2 Descriptive characteristics of articles and populations studied

Authors	Data collection period	Countries of the study	Type of study	Target outcome	Alcohol related measures	Participants *N*	Age	Mean age	Gender	
								Years (SD)	% F	% M
Agahi et al. (2019)	2010–2014	Sweden	Longitudinal	BF; ST	Q	1043	66–101	F: 75.7 (7.2) M: 74 (6.4)	54.8	45.2
Andersen et al. (2019)	2004–2016	Denmark; Germany; USA	Randomized controlled trial	ST; TO	Q; DSM-IV; DSM-5; ADS; FORM90	693	≥ 60	64	40.3	59.7
Blazer and Wu (2011)	2005–2007	USA	Longitudinal	BF; ST	Q; DSM-IV	16,304	≥ 65	NR	NR	NR
Bobo et al. (2013)	1998–2008	USA	Longitudinal	BF; ST	CAGE; Q	3105	≥ 50	NR	0	100
Brennan et al. (2010)	NR	USA	Cross-sectional	BF; ST	Q; HDL; DPI	1291	55–76	NR	41	59
Bright et al. (2015)	NR	Australia	Validation	ST	ARPS; A-ARPS	50	55–89	69.82 (7.52)	43.1	38.8
Bryan et al. (2017)	2014–2015	USA	Cross-sectional	BF; ST	Q	2351	≥ 50	61.6 (8.2)	46	54
Bryant and Kim (2013)	2009	USA	Cross-sectional	BF; ST	Q	13,265	≥ 60	71.06 (7.93)	57.5	42.5
Canham et al. (2016)	2008	USA	Cross-sectional	BF; ST	Q	2004	53–96	64.93 (0.24)	43.1	56.9
Carvalho et al. (2018)	2009–2013	Ireland	Longitudinal	BF; ST	CAGE; Q	6095	≥ 50	63.3 (9.0)	51.7	48.3
Cheng et al. (2016)	2013–2014	China	Longitudinal	BF; ST	Q	15,628	≥ 45	57.7 (10.1)	52.4	47.6
Choi and DiNitto (2011a, b, c)a	2008	USA	Cross-sectional	BF; ST	Q	5325	≥ 50	NR	53.8	46.2
Choi and DiNitto (2011a, b, c) b	2008	USA	Cross-sectional	BF; ST	Q	5262	≥ 50	NR	53.7	46.3

Table 2 (continued)

Authors	Data collection period	Countries of the study	Type of study	Target outcome	Alcohol related measures	Participants *N*	Age	Mean age	Gender	
								Years (SD)	% F	% M
Choi and DiNitto (2011a, b, c)c	2005–2006	USA	Cross-sectional	BF; ST	Q	2924	57–85	68.07 (7.70)	51.78	48.22
Choi et al. (2015)	2008–2012	USA	Longitudinal	BF; ST	Q; DSM-IV	11,191	≥ 65	NR	56.4	43.6
Cousins et al. (2014)	2009–2011	Ireland	Cross-sectional	BF; ST	Q; CAGE	3815	60–99	69.7 (7.3)	53.4	46.6
Dare et al. (2014)	2011	Australia	Qualitative	BF; ST	Clinical interview	42	65–74	NR	52.4	47.6
Duru et al. (2015)	2005–2007	USA	Cluster-randomized trial	ST; TO	CARET	1186	≥ 60	70.95 (7.27)	34.32	65.68
Ettner et al. (2014)	2005–2007	USA	Cluster-randomized trial	ST; TO	CARET	1186	≥ 60	70.95 (7.27)	34.32	65.68
Forlani et al. (2014)	2006	Italy	Cross-sectional	BF; ST	Q	366	74–99	83.7 (6.2)	50.3	49.7
Fornazar et al. (2013)	2008–2011	Sweden	Longitudinal	BF; ST	AUDIT-C	576	≥ 80	NR	62.3	37.7
Fuentes et al. (2017)	2011–2012	Europe	Cross-sectional	BF; ST	Q	58,489	≥ 55	F: 67.4 (10.9) M: 65.4 (9.5)	57	43
Gea et al. (2013)	2003–2010	Spain	Randomized controlled trial	BF; ST	FFQ	5505	55–80	67	51.26	48.74
Gilson et al. (2019)	NR	Australia	Validation	ST	CEOA; AUDIT-C	380	≥ 60	71.6 (7.94)	61	39
Gugushvili et al. (2018)	2014–2015	Russia	Longitudinal	BF; ST	Q	57,907	≥ 50	NR	44.6	55.4
Han et al. (2018)	2013	USA	Cross-sectional	ST; TO	Q	2371	66–80	NR	33	67
Han et al. (2017)	2005–2014	USA	Longitudinal	BF; ST	Q; DSM-IV	61,240	≥ 50	NR	53.6	46.4
Hoeck and Van Hal (2013)	2001–2004	Belgium	Cross-sectional	BF; ST	CAGE; CAGE65+; Q	3954	≥ 65	74.9 (0.1)	55.7	44.3

Table 2 (continued)

Authors	Data collection period	Countries of the study	Type of study	Target outcome	Alcohol related measures	Participants *N*	Age	Mean age	Gender	
								Years (SD)	% F	% M
Ilomäki et al. (2013)	2005–2007	Australia	Cross-sectional	BF; ST	CAGE; Q	1705	≥ 70	77	0	100
Immonen et al. (2011a, b)	NR	Finland	Cross-sectional	BF; ST	Q; AUDIT	831	≥ 65	NR	85.9	14.1
Iparraguirre (2015)	2008–2011	UK	Cross-sectional	BF; ST	Q	9251	≥ 50	66.6	NR	NR
Ivan et al. (2014)	2008–2012	USA	Randomized controlled trial	BF; ST	Q	223	≥ 65	66.9 (6.64)	53.4	46.6
Kaplan et al. (2012)	1994–2009	Canada	Longitudinal	BF; ST	Q	5404	≥ 50	NR	54	46
Kim et al. (2015)	2002–2007	South Korea	Cross-sectional	BF; ST	AUDIT	1819	≥ 60	NR	64.8	35.2
Knightly et al. (2016)	NR	UK	Cross-sectional	ST	FAST; MAST-G	100	65–94	NR	61	39
Kuerbis et al. (2017)	2016	USA	Experimental pilot study	ST; TO	CARET; Q; QFV30	138	≥ 50	NR	45.9	54.1
Kuerbis et al. (2015)	2011–2012	USA	Randomized controlled trial	ST; TO	CARET	86	≥ 50	64.7 (8.4)	44	66
Li et al. (2017)	2006–2009	China; Norway	Cross-sectional	BF; ST	Q	27,954	≥ 65	NR	52.8	47.2
Li et al. (2019)	2006–2009	China; Norway	Cross-sectional	BF; ST	Q	9433	≥ 65	NR	34.4	65.6
Lin et al. (2010a, b) a	2008	USA	Randomized controlled trial	ST; TO	Q	239	≥ 55	68.7 (6.6)	27.6	72.4
Lin et al. (2014)	2001–2002	USA	Cross-sectional	BF; ST	AUDADIS-IV; DSM-IV	8205	≥ 65	NR	62.2	37.8
Lin et al. (2010a, b) b	2008	USA	Randomized controlled trial	ST; TO	Q	310	≥ 55	68.7 (6.8)	28.4	71.6

Table 2 (continued)

Authors	Data collection period	Countries of the study	Type of study	Target outcome	Alcohol related measures	Participants *N*	Age	Mean age	Gender	
								Years (SD)	% F	% M
Martinez et al. (2014)	2007–2010	South Africa	Cross-sectional	BF; ST	Q; WHO STEPS	3047	≥ 50	NR	59.4	40.6
Moore et al. (2011)	2004–2007	USA	Randomized controlled trial	ST; TO	CARET; TLFB	631	55–89	68.4 (6.9)	29	71
Moos et al. (2010a, b, c) a	1986–2008	USA	Longitudinal	BF; ST	Q; HDL; DPI; DSM-III-R	719	55–85	NR	44.5	55.5
Moos et al. (2010a, b, c) b	1986–2008	USA	Longitudinal	BF; ST	Q; HDL; DPI; DSM-III-R	719	55–85	NR	44.5	55.5
Moos et al. (2010a, b, c) c	1986–2008	USA	Longitudinal	BF; ST	Q; HDL	719	55–85	NR	44.5	55.5
Muñoz et al. (2018)	2011	Europe; Switzerland; Israel	Cross-sectional	BF; ST	CIDI65 + ; DSM-IV-TR; Q	3140	65–84	NR	50.6	49.4
Ortola et al. (2016)	2008–2012	Spain	Cross-sectional	BF; ST	Q	2163	≥ 60	NR	53.8	46.8
Parikh et al. (2015)	2008	USA	Cross-sectional	BF; ST	Q	4815	≥ 65	NR	52.85	47.15
Paulson et al. (2018)	2006–2014	USA	Longitudinal	BF; ST	Q	3177	≥ 65	74.3 (7.0)	57.3	42.7
Platt et al. (2010)	1992–2006	USA	Longitudinal	BF; ST	Q; CAGE	6787	≥ 60	NR	55.4	44.6
Rodriguez et al. (2010)	2000–2004	USA	Cross-sectional	BF; ST	SMAST-G AUDIT	1552	53–100	73.8	61.1	38.9
Sacco et al. (2014)	2004–2005	USA	Cross-sectional	BF; ST	DSM-IV; Q; AUDADIS-IV	4360	≥ 60	NR	51.2	48.8
Sacco et al. (2016)	NR	USA	Longitudinal	BF; ST	Q; AUDIT	25	≥ 65	85.9 (6.0)	44	56
Schonfeld et al. (2010)	2004–2007	USA	Cross-sectional	BF; ST; TO	AUDIT-C; SMAST-G; Q	3497	52–104	74.86 (9.21)	69.46	30.54

Table 2 (continued)

Authors	Data collection period	Countries of the study	Type of study	Target outcome	Alcohol related measures	Participants *N*	Age	Mean age	Gender	
								Years (SD)	% F	% M
Tait et al. (2012)	2010	Australia	Longitudinal	BF; ST	Q; AUDIT	39,104	45–103	60	79.8	20.2
Tredal et al. (2013)	2009	Europe	Cross-sectional	BF; ST	Q; AUDIT	4467	60–84	NR	57.3	42.7
Van denBerg et al. (2014)	2007–2010	Netherlands	Cross-sectional	BF; ST	AUDIT	373	60–90	70.6 (7.3)	66	44
Vaughan et al. (2014)	2001–2002	USA	Cross-sectional	BF; ST	Q; DSM-IV	2142	≥ 50	62.02 (0.08)	54.4	45.6
Villalonga-Olives et al. (2020)	2006–2014	USA	Longitudinal	BF; ST	Q	19,140	≥ 65	66.8 (10.3)	NR	NR
Villiers-Tuthill et al. (2016)	2009–2010	Ireland	Cross-sectional	BF; ST	Q; AUDIT-C	6576	≥ 50	63.18 (8.98)	54.34	45.7
Vrdoljak et al. (2014)	2008–2010	Croatia	Randomized controlled trial	ST; TO	Q	738	≥ 65	72.3 (5.2)	61.4	38.6
Watson et al. (2013)	2008–2010	UK	Randomized controlled trial	ST; TO	AUDIT-C; DPI	529	55–85	63 (5.8)	19.7	80.3
Wieben et al. (2018)	2003–2011	Denmark	Cohort study	ST; TO	Q; ASI; ICD-10-R	1398	40–82	NR	NR	NR
Zanjani et al. (2018)	2015	USA	Cross-sectional	ST; TO	Q; BAM	36	≥ 50	76 (8.87)	NR	NR

ARPS or A-ARPS (Australian) Alcohol-Related Problems Survey; *ASI* Addiction Severity Index; *AUDADIS-IV* Alcohol Use Disorder and Associated Disabilities Interview Schedule DSM-IV Edition; *AUDIT or AUDIT-C* Alcohol Use Disorders Identification Test; *BAM* Brief Addiction Monitor; *BF* biopsychosocial factors; *CAGE* Cut down, Annoyed, Guilty, Eye-opener; *CARET* Comorbidity Alcohol Risk Evaluation Tool; *CEOA* comprehensive effects of alcohol; *CIDI65* + Composite International Diagnostic Interview; *ICD-10-R* International Classification of Diseases 10th Revision; *DPI* Drinking Problems Index; *DSM*:Diagnostic and Statistical Manual of Mental Disorders; *F* female; *FAST* Fast Alcohol Screening Test; *FFQ* Food-Frequency Questionnaire; *HDL* Health and Daily Living form;*M* mal; *MAST-G and SMAST-G* Michigan Alcoholism Screening Test-Geriatric version; *NR* not reported; *Q* questionnaire; *QFV-30* Quantity-Frequency Variability 30 items; *SD* standard deviation; *ST* Screening Tools; *TLFB* time line follow back; *TO* treatment options; *WHO STEPS* WHO STEPwise approach to Surveillance

Table 3 Synthesis of results from studies on biopsychological factors

Authors	Participants *N*	Biopsychosocial scale	Main results
Agahi et al. (2019)	1043	Q	"OA, particularly women with high levels of social activity at baseline were more likely to have increasing (RRR = 2.91**) or stable daily or weekly AU frequency (RRR = 2.44***) over the 4-year follow-up period. OA with low levels of social contact and/or social activity were less likely to have a stable daily or weekly frequency of AU (RRR = 0.09*; RRR = 0.11*), compared with OA in the low and stable frequency group."
Blazer and Wu (2011)	16,304	DSM–IV	"The prevalence of AUD among older drinkers was associated with major depression; AUD: 12.6% (SD = 2.32) χ^2 23.3 (3)***. Major depression in OA increases the risk of alcohol dependence (OR = 4.5; 95% CI (–2.74, 7.51))*."
Bobo et al. (2013)	3105	CES-D	"OA who drank moderately were more likely to decrease their AU if they were depressed (OR = 2.18; 95% CI (1.09, 4.37))*. Compared with moderate drinkers, at-risk drinkers were significantly more likely to be depressed (OR = 2.43; 95% CI (1.28, 4.61))."
Brennan et al. (2010)	1291	CRI; LISRES; HDL	"Approval of HD by friends is associated with higher levels of AU (β = 0.24**) and faster decreases in the number of drinks per day (β = −0.01*) among OA. OA who have more frequent interactions with family members and friends were likely to have lower levels of drinking (β = −0.09*) and experience a slower rate of decline in their drinking as they aged (β = 0.01*). OA with alcohol problems at baseline who used substances including alcohol to reduce tension experienced a decrease in alcohol consumption over time (mediating effect = –0.027; ACI = (–0.0644, –0.0036). The use of avoidance strategies by OA to manage stressors was correlated with a statistically significantly greater decrease over time in the number of drinks per day (mediating effect = –0.114; AIT = (–0.2720, –0.0152)."
Bryan et al. (2017)	2351	PSS	"The higher a woman's social support, the more likely she was to be a high-risk drinker (RRR = 1.60; 95% CI (1.20, 2.12))*. Among older men only, greater daily discrimination was positively associated with high-risk AU (RRR = 1.46; 95% CI (1.10, 1.92))*. Among older women only, perceived stress was associated with a lower likelihood of high-risk AU (RRR = 0.60; 95% CI (0.43, 0.84))*."

Table 3 (continued)

Authors	Participants *N*	Biopsychosocial scale	Main results
Bryant and Kim (2013)	13,265	K6	"The frequency of HD was significantly positively correlated with psychological distress ($\beta = 0.05$; $t = 5.49$***). The lowest frequency of HD associated with increased psychological distress was more than once but less than once per month ($\beta = 0.02$; $t = 2.72$**). Except for binge drinking more than monthly and less than weekly, all high frequencies of HD were found to be significantly associated with higher levels of psychological distress. ($\beta = 0.04$; $t = 4.42$***; $\beta = 0.03$; $t = 3.69$***)."
Carvalho et al. (2018)	6095	CES-D	"HD increased the risk of depressive (OR = 2.11; 95% CI (1.12, 4.00))* and anxiety (OR = 2.22; 95% CI (1.01, 4.86))* disorders in older women (OR = 2.11; 95% CI (1.12–4.00))*, but not in older men. In addition, problematic AU increased the risk of persistent depressive symptoms in women (OR = 2.43; 95% CI (1.05, 5.06))*."
Cheng et al. (2016)	15,628	CES-D	"People with depressive symptoms at baseline were less likely to start drinking (OR = 0.70; 95% CI (0.50, 0.90))*. Similarly, baseline drinkers were less likely to develop depressive symptoms (OR = 0.60; 95% CI (0.50, 0.70))*."
Choi and DiNitto (2011a, b, c) a	5325	K6	"Among older women but not among older men, heavy/binge drinking was related to psychological distress (30-day K6 score Mean: 4.18 (SD: 5.24***); K6 score ≤ 13% 7.0**; Worst-month K6 during preceding year K6 score Mean: 5.44 (SD: 6.07***)."
Choi and DiNitto (2011a, b, c) c	2924	CES-D; Q	"Frequency of AU and heavy/binge drinking were significantly positively associated with men's CES-D scores, but not with women's (CES-D score Mean: 7.72 (SD = 7.75***). Given their perceived higher levels of social support, it appears that heavy/binge drinking women are more socially active than their abstinent or light/moderate AU peers. (Mean: 20.83 (SD: 2.07*))."
Choi et al. (2015)	11,191	K6; DSM-IV	"Among those aged 65 and older, HD was associated with a higher likelihood of having a mental health problem (OR = 1.60; 95% CI (1.05, 2.45))*."

Table 3 (continued)

Authors	Participants *N*	Biopsychosocial scale	Main results
Dare et al. (2014)	42	This qualitative study used clinical research interviews	"AU was related to social engagement in activities across both settings, and that moderate AU appears to serve an important "social lubricant" function. The main factors facilitating AU were the frequency of social engagement opportunities and access to an already established social group in retirement communities. AU use is important in enhancing social engagement and that there appear to be significant associations between residential settings and AU."
Forlani et al. (2014)	366	GAI-SF; ICD-10	"Among OA, anxiety was significantly associated with AU two or more units of alcohol per day (OR = 2.483; 95% CI (1.030, 5.988), $p = 0.043$; OR = 4.242; 95% CI (1.189, 15.142), $p = 0.026$)."
Fornazar et al. (2013)	576	GDS	"Excessive AU among older women (17.9%*) was significantly related to depression during the one-year follow-up compared to baseline."
Fuentes et al. (2017)	58,489	CASP-12	"Former, never, and heavy drinkers had a significant negative correlation with well-being compared to abstainers ($\beta = -1.48$; 95% CI ($-1.98, -0.99$)***; $\beta = -1.41$; 95% CI ($-1.95, -0.86$)***; $\beta = -0.98$; 95% CI ($-1.49, -0.46$)***; respectively). The negative correlation of HD with well-being was especially strong in Southern European women ($\beta = -3.80$; 95% CI ($-5.16, -2.44$))***."
Gea et al. (2013)	5505	NR	"Compared with abstainers, moderate AU was significantly associated with a lower risk of depression (HR = 0.72; 95% CI (0.53, 0.98)). In particular, wine consumption between two and seven drinks per week was significantly related to lower rates of depression (HR = 0.68; 95% CI (0.47, 0.98))."
Gugushvili et al. (2018)	57,907	NR	"Men who do not communicate with family or friends (OR = 2.51; 95% CI (1.4, 4.23)) or who communicate about once a year (OR = 1.86; 95% CI (1.23, 2.81)) have a significant likelihood of being regular alcohol users compared with those who stay in daily contact with their relatives. Also, women who are in contact with family members only a few times a year use alcohol more often (OR = 1.81; 95% CI (1.08, 3.03)) than those who stay in contact every day."

Table 3 (continued)

Authors	Participants *N*	Biopsychosocial scale	Main results
Han et al. (2017)	61,240	Q	"OA with major depressive episode (OR = 2.33; 95% CI (1.9, 2.74)***; AOR = 1.31; 95% CI (1.07, 1.61)**), anxiety disorders (OR = 2.09; 95% CI (1.75, 2.49))*** or who had received mental health treatment (OR = 2.40; 95% CI (2.10, 2.73)***; AOR = 1.95; 95% CI (1.62, 2.35)***) in the past year were also at higher risk of AUD."
Hoeck et Van Hal, 2013	3954	Q; SCL-90R	"Abstainers or occasional drinkers were more likely to had fewer social contacts compared to moderate drinkers (OR = 1.89; 95% CI (1.32, 2.69))***."
Immonen et al. 2011a, b	831	NR	"Older at-risk alcohol users reported using alcohol because of "meaningless life", "for relieving loneliness" (34.9% OR = 3.76; 95% CI (1.94, 7.29))***, "relieving depression"(52% OR = 7.62; 95% CI (3.38, 17.16))***, and "relieving anxiety"(34.3% OR = 3.58; 95% CI (1.73, 7.42))***."
Ivan et al. (2014)	223	GADSS; PSWQ-A; STAI-T; SIGH-A	"AU was significantly associated, among OA, with less self-reported anxiety and less clinician-rated worry and anxiety (−0.17*; −0.19**; −0.18**)."
Kaplan et al. (2012)	5404	HUI3	"Alcohol users who cut back experienced a greater decline in health-related quality of life than persistent moderate users (−0.025***)."
Kim et al. 2015	1819	BDI	"The measures of problem AU, the "linear" AUDIT, and the "quadratic" AUDIT, were significantly associated with depression, independent of other effects. These results are illustrated by the curvilinear relationship model between AUDIT and BDI after conditioning for other influential variables. Therefore, among non-problem drinkers, the effect of AU was associated positively with depression. In contrast, among excessive alcohol users, increased AU was related to lower levels of depression."
Li et al. (2017)	27,954	Q	"Chinese men and women with higher life satisfaction were less likely to use alcohol than those with low life satisfaction. (OR = 0.910; 95% CI (0.849, 0.974)**; OR = 0.889; 95% CI (0.792, 0.998)*, respectively)."
Li et al. (2019)	9433	Q	"Among Norwegian OA, greater life satisfaction was associated with a lower likelihood of HD (OR = 0.844; 95% CI (0.729, 0.977); $p = 0.023$)."

Table 3 (continued)

Authors	Participants *N*	Biopsychosocial scale	Main results
Lin et al. (2014)	8205	AUDADIS-IV	"OA having lifetime mood (OR = 1.39; 95% CI (1.06, 1.83))* and anxiety disorders (OR = 1.51; 95% CI (1.16, 1.97))** or any other personality disorder (OR = 1.39; 95% CI (1.09, 1.85))* also had a somewhat increased likelihood of having a lifetime AUD. But the likelihood of having an AUD in the past 12 months was statistically significant only for OA with lifetime mood disorders (OR = 1.78; 95% CI (1.16, 2.74))*."
Martinez et al. (2014)	3047	WHOQoL-8; Q	"Men with At-risk AU had the lowest quality of life score, which was lower compared to lifetime abstainers (OR = 0.21; 95% CI (0.06, 0.81); $p = 0.02$). At-risk AU men declared a significantly lower proportion of "high" satisfaction QoL items related to health (OR = 0.57; 95% CI (0.30, 1.08); $p = 0.08$), oneself (OR = 0.43; 95% CI (0.21, 0.88); $p = 0.02$) and money (OR = 0.42; 95% CI (0.18, 1.01))*. Compared with lifetime abstainers, older men with a low risk of AU reported the least regular attendance at club or group meetings (OR = 0.55; 95% CI (0.25, 0.92); $p = 0.03$) or religious activities(OR = 0.20; 95% CI (–0.44, 0.23))***, but reported the most regular visits from friends (OR = 1.79; 95% CI (1.02, 3.09); $p = 0.04$) or people from another neighborhood to their homes(OR = 2.05; 95% CI (1.29, 3.34); $p = 0.003$). Compared with lifetime abstainers, low-risk AU women had the lowest proportion of regular participation in community improvement activities (OR = 0.39; 95% CI (0.17, 0.85); $p = 0.02$) and public meetings (OR = 0.50; 95% CI (0.24, 1.04); $p = 0.06$). But at-risk AU women had the lowest proportion of regular attendance at religious services (OR = 0.23; 95% CI (0.09, 0.59); $p = 0.002$)."
Moos et al. (2010a, b, c) a	719	LISRES; HDL	"High levels of social resources, such as participation in social activities ($\beta = 0.11$**; $\beta = 0.08$*; $\beta = 0.07$*), approval of AU by friends ($\beta = 0.40$*; $\beta = 0.48$*; $\beta = 0.15$*; $\beta = 0.10$*; $\beta = 0.14$*), and and partner relationship quality ($\beta = 0.44$**; $\beta = 0.07$*; $\beta = 0.50$**) were associated with a high likelihood of high-risk AU In contrast, high-risk AU at 10 years predicted lower quality of relationships ($\beta = -0.08$*) with extended family members at 20 years."
Moos et al. (2010a, b, c) b	719	Q	"Among OA, depressive symptoms were related to a higher likelihood of abstinence (Over the 10 year interval: $\beta = 0.13$***; Over the 20-year interval: $\beta = 0.09$***) and a significantly negative frequency of AU at 20 years ($\beta = 0.07$*)."

Table 3 (continued)

Authors	Participants *N*	Biopsychosocial scale	Main results
Moos et al. (2010a, b, c) c	719	HDL; LISRES; CRI	"Higher participation in social activities (At 10 years: OR = 1.10*; 1.09**), approval of AU by friends (At 10 years: OR = 1.15***; OR = 1.18***; At 20 years: OR = 1.16***; OR = 1.19***), dependence on substances to reduce tension (At 10 years: OR = 1.80***; OR = 2.92***; At 20 years: 1.47**), and low religious involvement (At 10 years: OR = 0.89*; OR = 0.85*) were significantly correlated with a higher likelihood of high-risk AU and AUD among older women."
Muñoz et al. (2018)	3142	CIDI65 +	"There were significant correlations between having developed a depressive disorder (OR = 0.10; 95% CI (0.00, 0.30))*** or affective disorder (OR = 4.3; 95% CI (1.8, 10.1); $p \leq 0.002$) in the past year and alcohol abuse or dependence in the past 12 months."
Ortola et al. (2016)	2163	SF-12	"Compared to non-drinkers, higher scores on the summary of the physical component of SF-12 were reported among moderate drinkers ($\beta = 1.59$; 95% CI (0.61, 2.58))** and heavy drinkers ($\beta = 2.18$; 95% CI (0.57, 3.79))**. However, no association was observed between mean AU or Mediterranean drinking pattern and the summary of the mental component of the SF-12."
Paulson et al. (2018)	3177	CES-D	"Moderate AU had a statistically significant indirect effect on depressive symptoms via CRP ($\beta = -0.013$; SE = 0.006, $t = -2.242$; $p = 0.025$). These results highlight the hypothesis that inflammation, as measured by CRP level, mediates the relationship between moderate AU and depressive symptomatology."

Table 3 (continued)

Authors	Participants *N*	Biopsychosocial scale	Main results
Platt et al. (2010)	6787	CES-D	"The most depressed OA at baseline were statistically more likely to be abstinent. An increase of 1 on the CESD score decreased the likelihood of being a regular drinker by 10% (RRR = 0.90; 95% CI (0.84, 0.97))**, the likelihood of being an increasing drinker by 24% (RRR = 0.76; 95% CI (0.62, 0.94))* and the likelihood of being a decreasing drinker by 7% (RRR = 0.93; 95% CI (0.87, 0.99))*. More frequent socializing with neighbors was correlated with increased AU (RRR = 1.22; 95% CI (1.06, 1.40))**, although having close friends nearby was associated with decreased AU (RRR = 1.31; 95% CI (1.05, 1.64))*. Having relatives living nearby was correlated with a higher likelihood of abstinence (RRR = 0.60; 95% CI (0.49, 0.72))***. Giving importance to religion was fairly strongly correlated with decreasing AU (RRR = 0.608; 95% CI (0.393, 0.94))* and not increasing alcohol consumption (RRR = 0.28; 95% CI (0.12, 0.66))**."
Rodriguez et al. 2010	1552	S-GDS	"Among OA with moderate levels of depressive symptoms, the probability of a positive alcohol screen was significantly reduced for each additional year of age (OR = − 0.96; 95% CI (0.92, 1.00))*."
Sacco et al. 2014	4360	PSS-4; ISEL-12; DSM-IV	"Stressful life events were correlated with an increased likelihood of developing AUD in the past year for both men (OR = 1.32; 95% CI (1.10, 1.57))** and women (OR = 1.23; 95% CI (1.0, 1.4)*), and higher levels of perceived stress were correlated with AUD among men only (OR = 1.06; 95% CI (1.0, 1.13))*. Victimization was associated with AUD in recent years among men only (OR = 1.84; 95% CI (1.01, 3.36))*."
Schonfeld et al. (2010)	3497	S-GDS	"A SMAST-G score of 2 or higher was positively and significantly correlated with depression (r = 0.35)***."
Tait et al. 2012	39,104	CES-D; MHC-SF; SF-36; PAS	"All women alcohol users in the short-term risk (OR = 1.54; 95% CI (1.22, 1.95))***, long-term risk (OR = 1.22; 95% CI (1.08, 1.38))*, and abstainer groups (OR = 1.23; 95% CI (1.14, 1.32))***, had an increased likelihood of depression compared with low-risk drinking. Among men, short-term risky AU (OR = 1.30; 95% CI (1.06, 1.59))* and abstinence (OR = 1.47; 95% CI (1.22, 1.78))*** were correlated with an increased likelihood of depression compared with low-risk AU."

Table 3 (continued)

Authors	Participants *N*	Biopsychosocial scale	Main results
Tredal et al. (2013)	4467	HAD	"Depression was significantly associated with AU (OR = 0.947; 95% CI (0.92, 0.974))***."
Van denBerg et al. (2014)	501	IDS-SR; BAI	"At-risk alcohol users had more severe symptoms than moderate alcohol users (OR = 1.05; 95% CI (1.01, 1.09)**). Abstainers (OR = 0.52; 95% CI (0.31, 0.88))* and at-risk alcohol users (OR = 0.49; 95% CI (0.26, 0.92))* had significantly lower social support compared to moderate alcohol users."
Vaughan et al. (2014)	2142	DSM–IV	"In OA, lifetime anxiety and depressive disorders also increase the odds of binge drinking (OR = 2.34; 95% CI (1.99, 2.75)***; OR = 1.55; 95% CI (1.41, 1.70)***, respectively) and lifetime AUD (OR = 2.20; 95% CI (1.80, 2.69)***; OR = 1.88; 95% CI (1.55, 2.27)***, respectively)."
Villalonga-Olives et al. (2020)	19,140	Q	"Among women, the association between positive social support and number of binge drinking days was stronger than men (–0.59 (SE = 0.12); (0.40 (SE = 0.18), respectively), whereas neighborhood social cohesion was significantly associated with binge drinking among women but not men (–0.59 (SE = 0.12))."
Villiers-Tuthill et al. (2016)	6576	BAPQ	"Positive consequences were significantly and negatively associated with UAU and were identified as a protective factor (RRR = 0.90; 95% CI (0.81, 1.00))*, whereas emotional representations increased the risk of UAU (RRR = 1.18; 95% CI (1.07, 1.30))** and moderate AU (RRR = 1.11; 95% CI (1.01, 1.22))*."

Weighted results with robust CI: ***$p \leq 0.001$; **$p \leq 0.01$; *$p < 0.05$; *AOR* adjusted odds ratio; *AU* alcohol use; *AUD* alcohol use disorder; *AUDADIS-IV* Alcohol Use Disorder and Associated Disabilities Interview Schedule DSM-IV Edition; *BAI* Beck Anxiety Inventory; *BAP* Brief Ageing Perceptions Questionnaire; *BDI* Beck Depression Inventory; *CASP-12* Control, Autonomy, Self-realization and Pleasure scale; *CES-D* Center for Epidemiologic Studies Depression Scale; *CI* confidence interval; *CIDI65* + Composite International Diagnostic Interview; *CRI* Coping Responses Inventory; *CRP* C-reactive protein; *DSM* Diagnostic and Statistical Manual of Mental Disorders; *GADSS* Generalized Anxiety Disorder Severity Scale; *GAI-SF* Geriatric Anxiety Inventory Short Form; *GDS or S-GDS* Geriatric Depression Scale; *HAD* Hospital Anxiety and Depression scale; *HD* heavy drinking; *HDL* Health and Daily Living form; *HR* hazard ratio; *ICD-10-R* International Classification of Diseases 10th Revision; *IDS-SR* Inventory of Depressive Symptoms–Self-Report; *ISEL-12* Interpersonal Support and Evaluation List-12; *K6* Kessler 6 scale; *LISRES* Life Stressors and Resources Inventory; *MHC-SF* Mental Health Continuum Short Form; *MHT* mental health treatment; *NR* not reported; *OA* older adults; *OR* odds ratio; *PAS* Psychogeriatric Assessment Scales; *PSS* Perceived Stress Scale, *PSWQ-A* Penn State Worry Questionnaire; *Q* questionnaire; *RRR* relative risk reduction; *SCID-I* Structured Clinical Interview for DSM-IV Axis I Disorders; *SCL-90 or SCL-90R* Symptom Checklist-90; *SD* standard deviation; *SF-12 or 36* Short Form 12 or 36; *SIGH-A* Structured Interview Guidelines for the Hamilton Anxiety Rating Scale; *SST* Stop-Signal Task; *STAI-T* State-Trait Anxiety Inventory; *UAU* unhealthy alcohol use

Quality of Life and Well-being

In a Spanish study (Ortolá et al. 2016), the authors found that compared to non-drinkers, the physical component score of the SF-12 QoL scale was significantly and slightly better for both moderate and heavy drinkers in the fully fitted model. On the other hand, there was no significant association between OAs' AU and scores on the mental component of the SF-12 scale. Two studies (Li et al. 2017, 2019) found that lower life satisfaction was associated with a higher likelihood of AU in the Chinese sample and that higher life satisfaction was associated with a lower likelihood of high AU in the Norwegian sample. In a European study (Fuentes et al. 2017) the authors found that former drinkers, OA who had never drunk, and heavy drinkers had lower self-reported well-being than moderate drinkers. The significant negative association of HD with well-being was particularly strong in Southern Europe, especially among women. In South Africa, a study (Martinez et al. 2014) showed that quality of life (health, self-satisfaction, and money) was significantly lower among older men with UAU compared to abstainers, although this association was not significant in the adjusted analysis. Canadian research (Kaplan et al. 2012) has shown that the rate of decline in health-related quality of life over time was significantly greater among OA with declining AU than among moderate drinkers.

Coping Strategies

In studying the impact of coping strategies on UAU in OA, the authors of one study (Sacco et al. 2014) noted that stressful life events were associated with an increased likelihood of AUD among OA. Higher levels of perceived stress and victimization were also associated with AUD, but only among older men. However, there was no significant association between stressful events and perceived stress with UAU in OA. In a study of the older lesbian, gay, and bisexual (LGB) population the authors (Bryan et al. 2017) suggested that UAU is not motivated by a coping strategy to cope with a stressful situation, as day-to-day discrimination was a positive stressor positively associated with UAU only among men. Identity stigma was not significantly associated with AU among LGB OA. Withdrawal from alcohol dependence was associated with a lower likelihood of UAU among LGB OA, particularly among women. No significant association was found between perceived stress and UAU among men, but perceived stress was associated with a lower likelihood of low-risk AU among women. This suggests that women are more likely to use coping strategies other than AU under stressful conditions. A statistically significant ($p < 0.01$) mediating process was found in a US study (Brennan et al. 2010) among OA initiated by AU to reduce tension and the use of avoidance coping strategies to cope with stressors that were correlated with a statistically significant decrease over time in AU. According to several studies (Martinez et al. 2014; Moos et al. 2010a, b, c), AU to reduce tension, low religious involvement and/or low regular participation in religious activities predicted a higher likelihood of UAU among OA. In a longitudinal study (Platt et al. 2010), the authors reported that the importance of religion among OA was strongly correlated with a low risk of UAU, with a decrease in AU over time, not an increase. They argued that religious involvement offers more opportunities for contact with people who disapprove of excessive AU and is therefore an effective social coping strategy to deal with stressful situations. In an Irish study (Villiers-Tuthill et al. 2016), the authors reported that the perception of the positive consequences of aging in OA was negatively correlated with UAU, while a strong negative emotional representation of aging significantly increased the risk of UAU. According to the

authors, these results suggest that UAU and positive behavior in the aging process could be identified as coping strategies for coping with life-changing events.

Psychosocial Factors

Six studies have shown in their analyses significant and positive associations between high levels of perceived social support and/or social activity and UAU among older women (Agahi et al. 2019; Bryan et al. 2017; Choi & DiNitto, 2011c; Dare et al. 2014; Moos et al. 2010a; Moos, Schutte, et al. 2010a, b, c). Another study (Platt et al. 2010) reports findings that that more frequent socialization with neighbors and having relatives living nearby were significantly associated with increased AU among OA. In two studies (Moos et al. 2010a; Moos et al. 2010a, b, c), the authors showed that OA who had positive relationships with their spouses or partners and peer approval of AU were significantly associated with the likelihood of having UAU over time. One study (Brennan et al. 2010) reports similar results and also pointed out that OA who have more frequent interactions with family members and friends are more likely to experience a slower rate of decline in AU as they age. In contrast, three studies (Agahi et al. 2019; Hoeck & Van Hal, 2013; Martinez et al. 2014) showed that older women with low levels of social contact and low levels of social activity were less likely to drink. However, studies report conflicting results. Two studies (Martinez et al. 2014; Platt et al. 2010) reported that having regular visits from friends or neighbors in close proximity was associated with a low risk of UAU, decreased AU, and abstention among OA. A Netherlands study (Van den Berg et al. 2014) showed that OA who abstained or had UAU had significantly less social support than OA who consumed moderately. Another study (Martinez et al. 2014) highlighted a significant association between OA low-risk AU and very low social engagement compared to abstainers. Russian(Gugushvili et al. 2018) and American(Moos et al. 2010a) research has found that OA who communicate less than once a year with their families or relatives were regular drinkers compared to those who stayed in daily contact. In 2020, one study (Villalonga-Olives et al. 2020) shows a negative interaction of positive social support on the number of drinking days that was stronger among women than men, while negative social support and social cohesion were significantly associated with AU only among women. However, four studies in this literature review found no significant association between psychosocial factors and AU among OA (Canham et al. 2016; Iparraguirre, 2015; Martinez et al. 2014; Sacco et al. 2014).

Psychiatric Comorbidities

Twelve studies showed correlations between psychiatric comorbidities and AU in OA. Among them, six studies (Blazer & Wu, 2011; Forlani et al. 2014; B. H. Han et al. 2017; Lin et al. 2014; Muñoz et al. 2018; Vaughan et al. 2014) showed that OA with mood disorders, anxiety disorders or personality disorders have a significantly higher probability of developing an AUD in their lifetime. Similarly, six studies (Bobo et al. 2013; Bryant & Kim, 2013; Choi et al. 2015; Choi & DiNitto, 2011c; Schonfeld et al. 2010; Van den Berg et al. 2014) showed that UAU among OA was significantly associated with a high likelihood of having a psychiatric comorbidity. An Irish study (Carvalho et al. 2018) found that older women, rather than men, reported that HD increased the risk of depression and anxiety. These results are comparable in three studies with different methodologies (Choi & DiNitto, 2011a; Fornazar et al. 2013; Tait et al. 2012). (Immonen et al. 2011a) reported

that older at-risk drinkers differed from moderate drinkers in their reasoning when they reported drinking for a "meaningless life," "to relieve anxiety," or "to relieve depression." However, nine studies (Bobo et al. 2013; Cheng et al. 2016; Gea et al. 2013; Ivan et al. 2014; Kim et al. 2015; Moos et al. 2010b; Paulson et al. 2018; Platt et al. 2010; Rodriguez et al. 2010) found significant negative correlations between alcohol consumption and low anxiety, low depression, or decreased or no depression in OA. Nevertheless, several studies (Choi & DiNitto, 2011b; Cousins et al. 2014; Hoeck & Van Hal, 2013; Ilomäki et al. 2013; Iparraguirre, 2015; Parikh et al. 2015; Sacco et al. 2016) have shown no significant association between AU and psychiatric comorbidities.

Alcohol Screening Tools

Several articles (Table 2) relied on different self-report, hetero-report, multidimensional, and self-reported quantity and frequency tools. Table 4 presents a summary of the results of studies specific to alcohol screening tools for OA.

Self-Declared Quantity and Frequency

In this systematic review of the literature, 78.8% of the studies analyzed ($n=52$) used self-reported quantities and frequencies of AU by OA. In an American research (Kuerbis et al. 2017), participants reported their consumption through a series of questions from the Quantity-Frequency Variability—30 items (QFV-30; Miller & Del Boca, 1994; Tonigan et al. 1997).

Multidimensional Tools

The frequency, quantity, and trajectories of AU among OA were measured in four studies (Brennan et al. 2010; Moos et al. 2010a, b; Moos, Schutte, et al. 2010a, b, c) using adapted components of the Health and Daily Living form (HDL; Moos et al. 1990) assessing different health-related factors including AU. In a Danish research (Wieben et al. 2018), to assess the AU of OA, the authors used the Addiction Severity Index scale (ASI; McLellan et al. 1992). The ASI provides a multidimensional assessment of AU behavior. It uses generic composite scores that reflect the level of problems in seven domains including alcohol. An inverse association for the ASI composite score of alcohol with abstinence was found, showing that a worse baseline ASI is significantly associated with lower abstinence. In another Spanish research (Gea et al. 2013), the Food-Frequency Questionnaire (FFQ; Fernández-Ballart et al. 2010) was administered to assess AU. The FFQ is a validated food assessment tool that estimates the frequency and quantity of foods and beverages including alcohol.

WHO STEPwise approach to Surveillance (STEPS) standardized instrument guidelines were followed by the authors of one study(Martinez et al. 2014) to measure blood alcohol content (WHO, 2006). The diagnosis of AUD in OA was carried out in two studies (Lin et al. 2014; Sacco et al. 2014) using the Alcohol Use Disorder and Associated Disabilities Interview Schedule DSM-IV edition (AUDADIS-IV; Grant et al. 1995) an assessment method that included AU, smoking, family history of depression and selected psychiatric disorders from Axis I and II of the DSM-IV. The Brief Addiction Monitor (BAM; Cacciola et al. 2013) was used in a study to assess substance use behaviors, including alcohol.

Table 4 Synthesis of results from studies on alcohol screening tools

Authors	Participants *N*	Alcohol screening tools	Main results
Bobo et al. (2013)	3105	Q; CAGE	«At-risk alcohol users were significantly more likely to report recent binge drinking (OR = 6.39; 95% CI (4.84, 8.44)) and to have a high CAGE score compared with moderate alcohol users (OR = 1,95; 95% CI (1,42, 2,67)).»
Gilson et al. (2019)	380	CEOA; AUDIT-C	«The final CEOA model showed excellent goodness of fit (χ^2/df = 2.25; B-S *p*-value: 0.002*; CFI = 0.95; RMSEA = 0.05; 90% CI (0.05, 0.06) and SRMR = 0.05) and internal consistency. The results confirm the empirical validity of a 2-factor expectancy model consisting of a 10-item negative expectancy factor and a 10-item positive expectancy factor.»
Knightly et al. (2016)	100	FAST; MAST-G	«The difference in patient scores between the MAST-G and FAST was statistically significant ($p < 0.0001$). Of 18 patients who scored positive on the MAST-G, 12 had negative alcohol abuse scores on the FAST, 4 patients were unable to respond to the FAST in the accident and emergency department, and 2 patients were not asked the FAST screening questions. In the accident and emergency department, 8 patients were informed of the risks of UAU and only 6 of these had answered the FAST questions but none scored positive. 87.5% subsequently scored positive on the MAST-G. The positive MAST-G score was significant in OA adults who had a background of UAU ($p < 0.0001$).»
Platt et al. (2010)	6787	Q; CAGE	«An increase of one point in the CAGE score correlated with an increase in the likelihood of being an increasing alcohol user (RRR = 1.28; 95% CI (1.04–1.58)*) and a decrease in the likelihood of being a decreasing alcohol user than being an abstainer (RRR = 0.85, 95% CI (0.75, 0.96))**.»
Sacco et al. (2016)	25	Q; AUDIT	«AUDIT scores were significantly correlated with daily reports of number of total drinks consumed in a day (0.476***) and with AU alone (0.499***).»
Wieben et al. (2018)	208	Q; ASI; ICD-10-R	«An inverse association was observed between the alcohol ASI composite score and abstinence, showing that a worse baseline ASI was related to lower abstinence (OR = 0.83; 95% CI (0.75, 0.92)**).»

Weighted results with robust CI: ***$p \leq 0.001$; **$p \leq 0.01$; *$p < 0.05$; *ASI* Addiction Severity Index; *AUDIT or AUDIT-C* Alcohol Use Disorders Identification Test, *CAGE* cut down, annoyed, guilty, eye-opener; *CEOA* comprehensive effects of alcohol; *CFI* Comparative Fit Index; *CI* confidence interval; *ICD-10-R* International Classification of Diseases 10th Revision; *OR* odds ratio; *RMSEA* root mean square error of approximation; *RRR* relative risk reduction; *Q* questionnaire; *SRMR* standardized root mean square residual; *UAU* unhealthy alcohol use

Hetero-assessment Tools

Eleven studies diagnosed AUD in OA by referring to different versions of the Diagnostic and Statistical Manual of mental disorders (DSM). Two studies (Moos et al. 2010b; Moos, Schutte, et al. 2010a, b, c) used the DSM-III-R (American Psychiatric Association, 1990) to assess AU problems. Eight studies (Andersen et al. 2019; Blazer & Wu, 2011; Choi et al. 2015; B. H. Han et al. 2017; Lin et al. 2014; Muñoz et al. 2018; Sacco et al. 2014; Vaughan et al. 2014) used the abuse or dependence criteria defined by DSM-IV (American Psychiatric Association, 1998). One study (Andersen et al. 2019) used DSM-5 (American Psychiatric Association, 2013) substance use criteria to analyze AUD in OA. To make the diagnosis and include OA, one study (Wieben et al. 2018) used the criteria for alcohol abuse or dependence from the Classification of Mental and Behavioral Disorders (ICD-10-R; World Health Organization, 2009). Two studies (Andersen et al. 2019; Moore et al. 2011) used retrospective assessment methods to track AU over time have using the Time Line Follow Back (TLFB (Sobell & Sobell, 1992)) and the FORM 90 (Miller, 1996). One study (Sacco et al. 2016) evaluated the feasibility, acceptability, and validity of a modified daily diary to measure AU. In this study, OA were interviewed by telephone about their AU the previous day, the type of alcohol consumed, the number of units of alcohol consumed, the setting in which they drank, and whether they were alone when they drank. The results highlighted that a modified daily diary is acceptable and non-binding, especially for OA with physical limitations.

Self-Assessment Tools

Eight international studies (Immonen et al. 2011a; Kim et al. 2015; Rodriguez et al. 2010; Sacco et al. 2016; Schonfeld et al. 2010; Tait et al. 2012; Tredal et al. 2013; Van den Berg et al. 2014) used the Alcohol Use Disorders Identification Test (AUDIT Aalto et al. 2011; Babor et al. 2001)) and four studies (Fornazar et al. 2013; Gilson et al. 2019; Villiers-Tuthill et al. 2016; Watson et al. 2013) used the short version, AUDIT-C (Bush et al. 1998). In one study (Sacco et al. 2016), AUDIT scores were significantly associated with daily statements about the total number of drinks consumed and drinking alone. Six studies (Bobo et al. 2013; Carvalho et al. 2018; Cousins et al. 2014; Hoeck & Van Hal, 2013; Ilomäki et al. 2013; Platt et al. 2010) used the CAGE scale to screen for AUD (Cut down, Annoyed, Guilty, Eye-opener (Mayfield et al. 1974). Another study (Platt et al. 2010) found in their study that a unit increase in the CAGE score was associated with an increased likelihood of being in the group of OA with increasing AU. On the other hand, an increase in the CAGE score made the OA less likely to be in the group with declining AU than in the abstentionist group. In addition, in one research study (Bobo et al. 2013), the authors noted that at-risk drinkers were significantly more likely to self-report recent HD and to have a high CAGE score compared to moderate drinkers. The Michigan Alcoholism Screening Test-Geriatric version was developed specifically for OA (MAST-G; (Blow et al. 1992)). In their study, the authors compared the MAST-G to the Fast Alcohol Screening Test (FAST (Hodgson et al. 2002)). The prevalence of alcohol abuse in OA was significantly underreported with the FAST ($p < 0.0001$). No subjects scored positive on this test, whereas the MAST-G recorded positive scores in OA. Two studies (Rodriguez et al. 2010; Schonfeld et al. 2010) used the shortened version of the MAST-G, the SMAST-G (Blow et al. 1998). An Australian version of the Alcohol Related Problems Survey(ARPS Fink et al. 2002; Moore et al. 2000, 2002; Oishi et al. 2001) renamed A-ARPS) was adapted and

validated by authors of a study (Bright et al. 2015). The recalibrated scoring algorithms of the A-ARPS were used to reliably classify OA to reduce the incidence of AUD. Three studies (Ettner et al. 2014; Kuerbis et al. 2015; Moore et al. 2011) used the Comorbidity Alcohol Risk Evaluation Tool (CARET (Barnes et al. 2010)). CARET is an updated and revised version of the short version of ARPS (ShARPS). Four studies (Brennan et al. 2010; Moos et al. 2010b; Moos, Schutte, et al. 2010a, b, c; Watson et al. 2013) used the Drinking Problems Index (DPI (Finney et al. 1991)) to assess AU problems in OA. In 2019, One study (Gilson et al. 2019) validated the "Comprehensive Effects of Alcohol" (CEOA) questionnaire, which measures an OA's expected outcome from AU in various domains (sociability, tension reduction, courage, sexuality, cognitive and behavioral problems, risk and aggression, and self-perception). The results highlighted the empirical validity with excellent fit and internal consistency of a two-factor expectation model comprising a negative 10-item expectation factor and a positive 10-item expectation factor. They concluded that the CEOA may provide a correct and more efficient measure of AU among OA.

Treatment Options

The outcomes of studies on therapies and interventions for the care of OA who consume alcohol are summarized in Table 5.

Brief Intervention

The development and examination of the effectiveness of the Florida Brief Intervention and Treatment for Elders (BRITE) project was conducted in one study (Schonfeld et al. 2010). Individuals who screened positive in SMAST-G were offered brief intervention and treatment with evidence-based practices and were reviewed at the exit of the intervention program and in follow-up interviews. The authors found that OA who received the brief intervention had a significant decrease in their SMAST-G score and also at the 30-day follow-up. A randomized controlled trial was conducted in a research study (Moore et al. 2011) to test the effectiveness of a multi-component primary care-based screening and education intervention to reduce at-risk AU among OA. After three months, compared to the control group, the authors found that there were fewer at-risk alcohol users in the group of participants who received the educational intervention. OA reported consuming fewer drinks in the past seven days, consuming less alcohol and having lower risk scores. After 12 months, only the difference in the number of drinks consumed remained statistically significant, but the educational intervention did not reduce UAU. Similar results were observed in another study of a brief mail intervention (Kuerbis et al. 2015). However, in two educational intervention studies, the authors (Duru et al. 2015; Ettner et al. 2014) showed that at 12 months discussing alcohol risk with a doctor, entering into an AU agreement and/or self-reporting the use of an AU diary was associated with a lower likelihood of UAU during therapeutic follow-up. In an attempt to compare the clinical and cost-effectiveness of a staged intensive care intervention versus a brief intervention in primary care, the authors of two studies (Vrdoljak et al. 2014; Watson et al. 2013) showed that there were no significant differences. Staggered intensive care did not confer an advantage over brief interventions in terms of reducing AU in the treatment of OA. In two studies (Lin et al. 2010a, b; Lin et al. 2010a, b), the authors found that brief telephone interventions were effective in reducing AU among OA in primary care settings. OA who answered the calls were more likely to switch to moderate AU at 3 months than those who did not answer any

Table 5 Synthesis of results from studies on therapies and brief interventions in elderly alcohol use care

Authors	Participants *N*	Protocol or intervention content	Main results
Andersen et al. (2019)	693	MET: MI; functional analysis; involvement of a third party (family caregiver); Development of a personal change plan CRAS-S: Coping with craving; managing emotions; sobriety network; social counseling; adaptation to aging	"The MET group had a success rate of 48.9%; 95% CI (42.9%, 54.9%) versus 52.3%; 95% CI (46.2%, 58.3%) in the MET + CRA-S group. The odds of success in the two conditions did not differ (OR = 1.22; 95% CI (0.86, 1.75); $p = 0.26$, Bayes factor = 0.10). Sensitivity analyses involving alternative approaches to missing values did not alter the results."
Duru et al. (2015)	1186	Personalized reports; educational materials; au diaries; in-person physician advice; telephone counseling by health educators	"At 12 months, a discussion between physician and patient (OR = 0.61; 95% CI (0.38–0.98); $p < 0.004$), or agreement and self-reported use of a diary (OR = 0.45; 95% CI (0.25, 0.82)**) were related to a lower likelihood of at-risk AU."
Ettner et al. 2014	1186	Personalized reports; educational materials; au diaries; physician advice during office visits; telephone counseling delivered by health educator	"At 12 months, the intervention was significantly associated with an increase in alcohol-related conversations with physicians (23% vs. 13%)** and a reduction in at-risk AU (56% vs. 67%)**, AU (-2.19 drinks per week)**, physician visits (−1.14 visits; $p = 0.03$), emergency room visits (16% vs. 25%)**, and lay caregiver visits (12% vs. 17%)**."
Han et al. 2018	2371	The Alcoholscreening.org website	"In the adjusted model, OA (AOR = 1,591; 95% CI (1.379, 1.87))*** were more likely to receive a plan to change AU behavior."
Kuerbis et al. (2017)	138	Brief online normative or personalized feedback; Information; CARET	"Participants indicated that the feedback was useful and 43.9% developed a plan for change. Participants with normative feedback were significantly more likely to prepare a change plan than those with personalized feedback ($\beta = -0.26$, SE = 0.13)*. Participants indicated that they most preferred an online intervention (40.9%) or a brief in-person intervention (31.8%)."

Table 5 (continued)

Authors	Participants *N*	Protocol or intervention content	Main results
Kuerbis et al. (2015)	86	Brief postal intervention with personalized mail back highlighting their specific alcohol-related risks, educational booklets and information on alcohol and aging; The NIH Rethinking Drinking: Alcohol and Your Health booklet; Or nothing (control group)	"At 3 months, compared to the controls, there were fewer participants in the intervention group: at-risk drinkers (66% vs. 88%; OR = 0.27; 95% CI (0.09, 0.84); $p \leq 0.03$), heavy drinkers (45% vs. 68%; OR = 0.28; 95%CI (0.10, 0.79); $p \leq 0.02$), drinkers with a medical or psychiatric problem (3% vs. 17%; OR = 0.08; 95% CI (0.01, 0.82); $p \leq 0.03$) or with symptoms of such a problem (29% vs. 49%; OR = 0.31; 95% CI (0.11, 0.90); $p \leq 0.03$). To intervene with at-risk alcohol users aged 50 years or older, a brief mail intervention can be effective."
Lin et al. (2010a, 2010b) a	239	Personalized risk reports; alcohol risk booklets; physician health advice; follow-up call from health educator	"39% of the sample had reduced their AU within 2 weeks of the initial intervention. The final multiple logistic regression model found that those who were concerned about alcohol-related risks (OR = 2.03; 95% CI (1.01–4.07);$p = 0.045$), who had read the educational booklet (OR = 2.97; 95% CI (1.48, 5.95); $p = 0.002$) or who perceived that their physician discussed risks and advised changing AU behavior (OR = 4.1; 95% CI (2.02–8.32))*** were more likely to reduce their AU on the first health educator call."
Lin et al. (2010a, b) b	310	Three telephone calls at approximately 2, 4, and 8 weeks after baseline visit; personalized risk reports; medical advice; MI; educational booklet on alcohol and ageing	"In mixed-effects logistic regression models, responding to all three health educator calls increased the odds of not becoming an at-risk alcohol user compared with not responding to any calls at 3 months (OR = 5.31; 95% CI (1.92, 14.7)) ***, but not at 12 months (OR = 2.01; 95% CI (0.71, 5.67; $p = 0.18$)."

Table 5 (continued)

Authors	Participants *N*	Protocol or intervention content	Main results
Moore et al. 2011	631	Educational booklet with information on AU and aging; personalized report; drinking diary; oral and written advice; MI	"At three months, compared with the control group, participants in the intervention group were fewer at-risk alcohol users (OR = 0.41; 95% CI (0.22, 0.75))**, reported fewer alcoholic drinks in the past 7 days (RR = 0.79; 95% CI (0.70, 0.90))***, lower binge drinking (OR = 0.46; 95% CI (0.22, 0.99))**, and had lower risk scores (RR = 0.77; 95% CI (0.63, 0.94))***. At 12 months, only the difference in number of drinks remained statistically significant (RR = 0.87; 95%CI (0.76, 0.99))**. But the educational intervention did not reduce at-risk AU."
Schonfeld et al. 2010	3497	Brief intervention: the BRITE health promotion manual, counseling, education and MI. Brief treatment: relapse prevention program; CBT. 6-month follow-up by phone or in-person visits	"Mean MAST-G score decreased significantly in participants who had both a screening score (3.06 SD: 2.48; 95% CI (2.48, 3.44))*** and an exit score (1.70 SD: 2.52; 95% CI (1.00, 1.92))***; but the results were not significant between exit and 30-day follow-up."
Vrdoljak et al. 2014	738	Health advice and lifestyle intervention, delivered by GPs; educational leaflets; making a follow-up appointment;	"Chi-square test revealed no significant differences between the intervention and control groups concerning alcohol ($\chi 2 = 0.73$, df = 1; $p = 0.394$)."
Watson et al. 2013	529	Minimal intervention: brief advice intervention; screening results feedback; discussion about health consequences of UAU; brief self-help booklet Stepwise intervention: behavior change advice; MI; Brief telephone assessment; AUDIT-C; MET; referral to local alcohol services for specialized intervention	"Both groups reduced AU between baseline and 12 months. There was no significant difference in average AU per day between the treatment groups at 6 and 12 months."

Table 5 (continued)

Authors	Participants *N*	Protocol or intervention content	Main results
Wieben et al. (2018)	208	CBT; Family therapy; supportive consultations; MI; diagnostic interview; if relapse, proposal for detoxification. Proposal of disulfiram in combination with therapy	"Compared with middle-aged patients, compliance rates among elderly patients (63.9%) were significantly higher (51.3%)**. The number of elderly patients who completed their planned treatment within the first 6 months was also significantly higher than middle-aged patients (19.7% and 9.7%, respectively***). Improvements in AU patterns during the first 6 months of treatment were therefore statistically higher in the elderly patient group, where 64.9%*** reported being abstinent or having no more than 3 drinks per day, compared with 46.2%*** of middle-aged patients. Having received cognitive behavioral therapy was positively associated with abstinence, (OR = 1.42 95%CI (1.10, 1.83))**. Better compliance obtained by elderly patients was similarly associated with abstinence (OR = 2.46, 95% CI (1.95–3.11))**."
Zanjani et al. (2018)	36	Poster; patient and pharmacist brochures; public service announcement	"Post-test data revealed positive feedback and an increase in participants' understanding of AMI prevention, with statistically significant changes in the perceived importance of messages focusing on at-risk AU and the consequences of AMI ($p < 0.05$)."

Weighted results with robust CI: ***$p \leq .001$; **$p \leq .01$; *$p < .05$; *AU* alcohol use; *AMI* alcohol medication interactions; *AOR* adjusted odds; *ASI* Addiction Severity Index; *AUD* Alcohol Use Disorder; *AUDIT-C* Alcohol Use Disorders Identification Test-Court; *BRITE* BRief Intervention and Treatment for Elders; *CARET* Comorbidity Alcohol Risk Evaluation Tool; *CBT* cognitive behavioral techniques; *CI* confidence interval; *CRA-S* community reinforcement approach for seniors; *GP* general practitioner; *OA* older adults; *OR* odds ratio; *MAST-G and SMAST-G* Michigan Alcoholism Screening Test-Geriatric version; *MET* motivational enhancement therapy; *MI* motivational interviewing; *NIH* National Institutes of Health; *RR* relative risk; *SD* standard deviation; *UAU* unhealthy alcohol use; *VLO AUD* very-late-onset alcohol use disorder

of the calls. Concerns about risk, reading the educational booklets and the perception of physicians advising OA to reduce AU were associated with early reductions in AU among OA with UAU at the first phone call from a health educator. Two other studies (B. H. Han et al. 2018; Kuerbis et al. 2017) demonstrated the effectiveness of an online screening and intervention tool that identified many OA with UAU. Most OA were receptive to the idea of receiving a plan to change their AU behavior. Moreover, in a study (Zanjani et al. 2018), the authors reported that preventive interventions consisting of posters, brochures for patients and pharmacists and public service announcements provided positive feedback and increased OA's understanding of preventing alcohol and medication interactions (AMI), with statistically significant changes in the perceived importance of messages about UAU and the potential consequences of AMI.

Cognitive and Behavioral Therapies

Authors of one research study (Wieben et al. 2018) found that OA who consumed alcohol and received cognitive and behavioral therapies (CBT) had significantly higher compliance rates than middle-aged adults. Moreover, OA achieved a significant improvement in AU patterns in the first six months of CBT and reported abstinence or drinking no more than 3 drinks per day. Having undergone CBT was positively associated with abstinence and compliance with therapy increased the likelihood of abstinence. OA who received comprehensive and integrated outpatient treatment that combined psychosocial management for AUD with dependence had better outcomes at 6 months on a range of AU outcome measures compared with middle-aged patients ($p < 0.001$). One study (Andersen et al. 2019) sought to evaluate the addition of the Community Reinforcement Approach (CRA-S) to Motivational Enhancement Therapy (MET) in the treatment of OA with AUD. Both MET and MET + CRA-S resulted in reductions in AU in terms of the number of days of drinking, the number of days of binge drinking, and the amount of alcohol consumed per week. The results of the study showed that community reinforcement for OA did not alter the improvement in AU outcomes, as the chances of success in MET vs. MET + CRA-S conditions did not differ. Both treatment options also showed small improvements in patients' quality of life.

Summary of Conclusions

The research reported in this review was part of a comprehensive synthesis of the evidence on AU among OA internationally to further knowledge of this phenomenon. A peak in the frequency of studies (45.4% ($n = 30$)) was observed between 2015 and 2020, indicative of the recent and growing interest in this issue. Indeed, unlike adolescents or young adults, there are very few studies and a lack of evidence and empirical data in the literature specific to AU in OA. Subsequently, a large number of scientists have shown an interest in the risk factors and consequences of AU in OA.

Analysis of the studies suggests that biopsychosocial factors have a strong influence on AU among OA despite the contrasting results. As the authors point out, these results show that certain variables determining AU can be the subject of appropriate psychological and psychiatric support in OA. Mood, anxiety, or personality disorders appear to have a significant influence and to increase the likelihood of UAU in OA (Blazer & Wu, 2011; Forlani et al. 2014; B. H. Han et al. 2017; Lin et al. 2014; Muñoz et al. 2018; Vaughan et al.

2014). The relationship between mental health diagnoses on AU has been confirmed, thus requiring special attention in clinical practice with OA. They constitute a heterogeneous group and report drinking for a variety of reasons. They may drink alcohol for medicinal purposes, for a self-perceived meaningless life and to relieve anxiety, loneliness or depression (Immonen et al. 2011a). The risks associated with AU are not minimal among OA. Clinicians need to be aware of these comorbidities during the care of a mental disorder. Studies have shown that end-of-life variables associated with social resources, social support, social learning, stress and coping strategy, and social control theories predicted UAU in OA. One of the most consistent predictors was the approval of AU by members of the social network(Moos, Brennan, et al. 2010a). These findings reflect long-term, two-way influencing processes in which OA's social resources and UAU may amplify, attenuate or reverse each other (Moos, Schutte, et al. 2010a, b, c). Similarly, the use of avoidance coping strategies to manage stressors would seem to be the main variable predicting a decrease in AU over time (Brennan et al. 2010). Our results show that religious practice and being surrounded by people who disapprove of AU are protective factors in favor of abstinence (Martinez et al. 2014; Platt et al. 2010). Our interpretation of the results is that OA consume alcohol in social situations and that social integration also predicts continued AU habits. Social activity seems to be more strongly associated with more frequent AU than social contact (Agahi et al. 2019; Brennan et al. 2010; Hoeck & Van Hal, 2013; Martinez et al. 2014; Platt et al. 2010). Stressful life events, victimization, discrimination, and perceived stress also appear to be associated with AUD in OA (Sacco et al. 2014). Conversely, perceived stress among older women is associated with a lower likelihood of UAU (Bryan et al. 2017). Identity stigmatization was not significantly associated with AU in OA(Bryan et al. 2017; Sacco et al. 2014). We also found that aging representations of self-perception and emotions may foster UAU in OA(Villiers-Tuthill et al. 2016). Similarly, greater satisfaction with life appears to be a variable determining low AU among OA (Li et al. 2017, 2019). Negative perceptions of well-being appear to be associated with UAU in OA, particularly among women in southern Europe (Fuentes et al. 2017). However, we have previously pointed out that the results are very mixed, and several studies have not shown a significant relationship between AU in OA and biopsychosocial factors (Canham et al. 2016; Choi & DiNitto, 2011b; Cousins et al. 2014; Hoeck & Van Hal, 2013; Ilomäki et al. 2013; Iparraguirre, 2015; Martinez et al. 2014; Parikh et al. 2015; Sacco et al. 2014, 2016).

To detect UAU among OA, several scales and screening tools exist although some are adaptations of instruments initially created for young adults. Self-questionnaires, hetero-questionnaires, and self-report measures of AU are not binding for OA (Kuerbis et al. 2014). In this review, AUDIT (Aalto et al. 2011; Babor et al. 2001; Bush et al. 1998), CAGE (Mayfield et al. 1974), MAST-G(Blow et al. 1992, 1998), DPI (Finney et al. 1991), and CARET (Barnes et al. 2010) are the self-assessment scales commonly used in the majority of studies to identify AUD in OA. DSM-III-TR, DSM-IV, and DSM 5 (American Psychiatric Association, 1990, 1998, 2013) diagnostic criteria have been used in some studies to make a diagnosis of alcohol abuse and dependence. The validity of these diagnostic criteria has been shown in several studies (Denis et al. 2015; Fazzino et al. 2014; Hasin et al. 2012; Peer et al. 2013). Almost all the studies reviewed (78.8% $n=52$) collected self-reported data to assess average AU, to estimate frequency, or to quantify AU through direct questions supported or not by visual aids.

Concerning treatment options, the studies in this review showed that following and complying with CBT is associated with and increases the likelihood of abstinence (Wieben et al. 2018). Community reinforcement does not appear to change anything in the improvement in OA's AU (Andersen et al. 2019). Our outcomes showed that interventions involving

personalized feedback, educational materials, counseling and medical follow-up could be very effective (Kuerbis et al. 2015; Moore et al. 2011; Schonfeld et al. 2010). However, the results regarding the effects of the interventions were mixed (Duru et al. 2015; Ettner et al. 2014; Vrdoljak et al. 2014; Watson et al. 2013). Nonetheless, it should be noted that individual brief interventions that had positive effects included: an "intensive" brief intervention; a brief postal intervention with personalized feedback; group and family therapies; advice to reduce AU; motivational interviewing; therapeutic education; posters; brochures; telephone calls and web-based assessments (B. H. Han et al. 2018; Kuerbis et al. 2017; Lin et al. 2010a, b; Lin et al. 2010a, b; Zanjani et al. 2018). We find similar results in four studies demonstrating that interventions can reduce AU among OA and provide support to maintain and improve their health, while minimizing risk behaviors (Armstrong-Moore et al. 2018; Caputo et al. 2012; Dedert et al. 2015; Kelly et al. 2016, 2018b).

Within our study, it is plausible to distinguish several limitations. First, the conclusions of the literature review diverge because of the different assessment methods used, the interacting environmental factors, the heterogeneity of the study populations, and the potentially different AU patterns. Limitations of the outcomes in our review include the fact that self-reported AU is likely to be underestimated to some extent in all studies. The measurement instruments and scales used in the different study protocols were mostly self-report tools that may have led participants to report "fair" or "pleasant" responses. This phenomenon is social desirability bias in reporting AU that may impact screening for AUD and bias the level of accuracy of responses when collecting data in OA (Davis et al. 2010; Kypri et al. 2016). This may be exacerbated if OA feel stigmatized by AU in any way. Indeed, OA are likely to underreport or not accurately report their actual AU, particularly among heavy drinkers and women. However, scientific research suggests that self-reports should be considered as accurate, reliable and valid as other measures (Del Boca & Darkes, 2003; Kirchner et al. 2007; Sayers et al. 2004). In addition, 95.5% of the studies used screening tools for AU that were not specific to OA, which may represent a sensitivity bias in the UAU prevalence outcomes. Similarly, the different cross-sectional designs of some studies prevent us from making causal assertions about certain outcomes. Also, because of our non-inclusion criteria, some issues in our studies could not be addressed, such as the relationship between AU and medical comorbidities. Another limitation is that not investigating the impact of where OA live does not allow us to know whether or not living in a rural or urban setting is a risk or protective factor for AU and whether or not treatment options may or may not differ based on this distinction. Despite the multiracial nature of the countries included in our systematic review of the literature, a limitation of our results is the lack of information regarding race and possible associated differences in AU or UAU. Indeed, results focusing on race would raise possible social inequalities in health in terms of the impact of AU on biopsychosocial factors and treatment care. The aim was to provide an overview of treatment options reported in studies published over the past decade. The studies included in our review are primarily focused on early interventions, with an included population that appears to have a high literacy rate, thus being able to understand the posters and literature and participate in types of interventions such as CBT. Thus, one limitation of the outcomes on treatment options is that some of the brief interventions mentioned are only appropriate for OA with some level of education. In addition, no studies stipulate what is in place for the segment of the older adult population that cannot benefit from these types of interventions such as the homeless, those who do not have access to or knowledge of the use of certain technologies (e.g., telephone, computer,). In addition, little information on primary prevention or health promotion for OA was found in the literature to prevent the development of UAU. Interventions in primary care are limited by the fact that strategies, such as outreach to hard-to-serve isolated older adult populations, are not defined.

In addition, OA may be more vulnerable to alcohol-related problems and may be seen more frequently in hospital emergency departments, shelters, or detoxification centers. Given the inequalities in terms of capacity, there is thus a need for a broader range of interventions and resource allocation to be developed for the different segments of the older adult population.

Conclusion

Beliefs that OA do not consume alcohol or do not consume it in a problematic manner have been dismissed. Excessive AU continues to increase significantly among OA, particularly women. These trends in AU present unique risks and challenges. Knowledge about AU in OA and the problems that contribute to the onset or maintenance of addiction in later years will need to be continually updated as we discover what motivates this generation of adults to drink. Unlike adolescents and younger adults, due to psychophysiological degeneration, OA are at risk and more vulnerable to UAU and complications often manifesting themselves in a specific forms that can be confused with geriatric syndromes. Thus, future research is needed to advance and develop specific screening tools for OA to distinguish the symptoms of AU from those of the aging process. Further longitudinal studies are also needed to examine the threshold, frequency and patterns of AU and the impact on the health of OA. Increased attention is required in public health initiatives. Effective treatment options do exist, but generally remain limited, as few health programs or services offer interventions tailored to OA. Denial of AUD in OA is not a solution. The health system will be called upon to invest in the well-being of OA by culturally acclimatizing services so that they are not prevented from being cared for because of their age. Future research should focus on the development of interventions that build on the knowledge, beliefs, social representations, and attitudes of caregivers in order to raise awareness and improve their role in primary health care for OA. Emphasis should be placed on process-oriented and multidimensional scientific studies. Psychological processes-mediating biopsychosocial factors would allow the development of effective preventive interventions to be conducted in order to improve the quality of life of OA and reduce health inequalities.

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Author Contribution OM-M and VI contributed to the design of this study. FS supervised the conduct of the systematic review, data collection, analysis, interpretation, and preparation of the manuscript. OM-M was responsible for the literature search, data selection, and extraction process. VI and BJ also contributed to the data selection process, respectively. NF and BJ reviewed a subset of abstracts and provided advanced expertise on data collection, analysis, interpretation, and important intellectual content. OM-M, FS, BJ, and NF contributed to the data analysis, critical appraisal, writing the manuscript, and reviewed drafts and revisions of the manuscript. All authors contributed to and have approved the final manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Declarations

Ethics Statement Ethical approval for this study was not required.

Conflict of Interest The authors declare no competing interests.

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