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REVIEW

A Review of Existing Treatments for Substance Abuse Among the Elderly and Recommendations for Future Directions

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Abstract

Background: With population aging, there is widespread recognition that the healthcare system must be prepared to serve the unique needs of substance using older adults (OA) in the decades ahead. As such, there is an increasingly urgent need to identify efficient and effective substance abuse treatments (SAT) for OA. Despite this need, there remains a surprising dearth of research on treatment for OA.

Aims of review: This review describes and evaluates studies on SAT applied to and specifically designed for OA over the last 30 years with an emphasis on methodologies used and the knowledge gained.

Methods: Using three research databases, 25 studies published in the last 30 years which investigated the impact of SAT on OA and met specific selection criteria were reviewed.

Results: A majority of the studies were methodologically limited in that they were pre-to-post or post-test only studies. Of the randomized controlled trials, many were limited by sample sizes of 15 individuals or less per group, making main effects difficult to detect. Thus, with caution, the literature suggests that among treatment seeking OA, treatment, whether age-specific or mixed-age, generally works yielding rates of abstinence comparable to general populations and younger cohorts. It also appears that with greater treatment exposure (higher dosage), regardless of level of care, OA do better. Finally, based on only two studies, age-specific treatment appears to potentiate treatment effects for OA. Like younger adults, OA appear to have a heterogeneous response to treatments, and preliminary evidence suggests a possibility of treatment matching for OA.

Conclusions: Expansion of research on SAT for OA is urgently needed for maximum effectiveness and efficiency of the healthcare system serving these individuals. Future research needs to include laboratory and community based randomized controlled trials with high internal validity of previously vetted evidenced-based practices, including Motivational Interviewing, cognitive behavioral therapy, and medications such as naltrexone, to determine the best fit for OA.

Keywords: older adults, alcohol, drugs, substance abuse treatment

Introduction

In 2011, the first of the Baby Boomers turned 65. Boomers make up 30% of the population in the United States.[1] The US Census Bureau estimates the number of older adults (OA) will increase from 40.3 million to 72.1 million between 2010 and 2030.[2] Lower birth rates[3] and longer life expectancies[1] contribute to ongoing growth of this population segment.

With population aging, there is widespread recognition that the healthcare system must prepare to serve the unique needs of OA in the decades ahead. Specifically, there is a call for expanded dissemination of knowledge about mental health services and substance abuse treatments (SAT).[2,4,5] As such, there is increasing need to identify effective and efficient SAT for OA.

Prevalence of substance use among OA

This generation of OA is distinct from generations past due to both their magnitude and their level of exposure to and attitudes towards drug and alcohol use.[6,7] As a result, unhealthy substance use and substance use disorders (SUD) are estimated to be increasingly prevalent. Despite increasing evidence of substantial cocaine, heroin, and prescription drug use,[7,8] alcohol remains the most commonly used mood altering substance among OA.[7]

The estimated prevalence of OA with alcohol use disorders (AUD) in the general population is approximately 4%, but may be as high as 22% among medical inpatients, those in outpatient geriatric psychiatric care, and those who present to emergency rooms.[9–11] At-risk drinking (defined as drinking more than seven drinks per week) and binge drinking (defined as drinking more than 5 drinks on any one occasion) prevalence rates for OA are estimated at around 10%.[10,12,13] While these rates of AUD and unhealthy drinking are lower than younger adults, they are likely impacted by underreporting of heavy drinking,[14] difficulties with differential diagnoses of AUDs in OA, and unidentified co-morbidity.[15]

Illicit drug use is more common among American OA than among the elderly in almost any other country in the world.[16] In 2007, 9.4% of adults ages 50–59 used an illicit or nonmedical drug in the past year,[17] which marks an increase in drug use driven by the Baby Boom generation.[18] OA ages 50 to 64 use more psychoactive drugs than individuals 65 and older.[19]

For example, 3.9% of adults 50 to 64 report past-year marijuana use compared to 0.7% of adults 65 and older. OA using cocaine, inhalants, hallucinogens, methamphetamine, and heroin in the past year are all estimated at less than 1%.[17,19] Among those that do use them, 11.7% meet criteria for past-year SUD.[17]

Misuse of prescription and over-the-counter drug use among OA is also prevalent. Data from the National Surveys on Drug Use and Health[20] revealed that 1.4% of adults 50 and older reported past-year non-medical use of prescription opioids, a rate higher than sedatives, tranquilizers, and stimulants. Actual prescription opioid use disorder among this same group was 0.13%, yet dependence was more common than abuse.[17]

SAT need among OA

Even if the proportion of OA needing treatment remains low, the actual numbers of individuals needing SAT will grow substantially[2,4,18,21]; however, research on service utilization demonstrates that the proportion of OA seeking SAT for the first time is also growing at a rate faster than that of younger adults.[8] It is due to both an estimated 39% increase in the actual number of OA and an estimated 44% increase in the rate of treatment need that prevalence of SUD among people over 50 is expected to increase from an average of 2.8 million from 2002 to 2006 to 5.7 million in 2020.[18]

Existing knowledge about SAT for OA

Despite widespread acknowledgement of the impending "silver tsunami"[2] of OA with SUD treatment needs, there remains a surprising dearth of research on treatment for OA. A variety of potential explanations for this exist, such as the myth that OA do not abuse drugs or alcohol, the myth that OA do not respond to treatments due to long addiction histories, and ageism.[22] The perception that OA do not abuse substances arises in part from the tendency of OA to avoid seeking treatment due to shame, stigma, or the perception that their substance use is not severe enough to merit treatment.[17,22] OA may also specifically avoid mixed-age treatment, the primary type of treatment available in the US,[23] due to feelings of isolation and shame.

Additionally, OA have been systematically excluded from landmark SAT studies, such as Project MATCH.[24]

While such exclusions are often necessary for research, it has prevented the field from gaining important information about how current evidenced based practices impact OA substance use. Instead, research on OA SAT outcomes has been limited to primarily real world contexts—mainly pilot programs and brief interventions in primary care settings.

Over the last three decades, there have been a number of reviews of treatment research for OA.[25–29] Each of these reviews had distinct goals—from a broad review to inform the public about available treatments[25,28,30] to reviews of particular techniques used with OA for a number of health behaviors including substance abuse.[26] This review adds to this literature by reviewing studies on SAT applied to and specifically designed for OA with an emphasis on the methodologies used and the knowledge gained. This is the first review to include studies published after 2000.

Method

Literature on SAT for OA was reviewed by searching three databases (PsycInfo, PubMed, and Social Science Citation Index) for peer-reviewed journal articles published over the last 30 years, using the keywords "older adult," "elderly," "treatment," "drugs," "drug use," "alcohol," "drinking," and "substance use." Studies were included in this review if: (1) at least one group examined in the study had a mean age of 55 or older; (2) the study involved participants undergoing a treatment for substance use; and (3) outcomes of treatment were reported and quantified in terms of substance use (eg, abstinence rates, quantity or frequency of use). All studies reporting treatment utilization rates only or with outcomes but did not connect the two in a direct way in the analyses[31] were excluded. In addition, one study was excluded due to a focus on a sample with comorbid, primary depression.[32] Utilizing these selection criteria, a total of 30 articles, representing 25 studies, were identified, retrieved, and are reviewed below.

The review that follows is organized by first dividing the 25 studies into three primary groups: (1) 10 studies examining mixed-age/non-age specific treatments applied to OA (Table 1); (2) 13 studies examining an age-specific treatment (Table 2)—treatment specifically for OA; and (3) 2 studies directly comparing these two kinds of treatment (Table 2). In this review, studies that applied an existing treatment to a homogenous group of OA were considered age-specific. It is thought that having OA among age-group peers will have a greater therapeutic effect[33] due to reduced shame and stigma. Within these three groups, studies are arranged by level of care. Level of care ranged substantially across studies—from brief advice to inpatient care. The vast majority of the studies focused on alcohol use. Only four studies examined substance use in general.

Within each level of care, studies are described in order of least methodological rigor to most. Tables show important study details, such as the sample size and demographic characteristics. In addition, the years in which data was collected are noted, marking the generational context of OA examined. Information gleaned from previous generations of OA may not apply to the upcoming generation of OA.[21]

Mixed-age treatments implemented with OA

Ten studies examined mixed-age treatments implemented with OA (Table 1). Levels of care in this group included brief intervention (BI), outpatient, and inpatient treatment. Four studies examined a veteran population, and one took place in a primary care setting. Four studies included randomization of participants, and five studies compared an OA cohort to a cohort of younger adults.

Brief intervention

BIs are distinguished here from brief advice (BA) in that BIs involve interaction with a health care provider described as more than simply providing information (eg, contracting or goal setting). Only one study utilized a non-age specific BI to intervene with OA. It examined the effectiveness of BIs for hazardous drinking adults of all ages in a primary care setting.[34,35] At-risk drinkers were recruited and randomized to one of three conditions: motivational enhancement (ME), BA, or standard care (SC). ME was adapted from Project MATCH[36] and consisted of an initial 45–60 minute session and two 15 minute booster sessions with a counselor.[35] Gordon and colleagues[35] performed a post-hoc comparison of the effectiveness of these conditions among elderly at-risk drinkers. As with their non-elderly counterparts, all three groups significantly decreased use of alcohol,

Table 1. Characteristics and findings of studies on non-age specific treatment.

Study	Years data collected	Sample[a]	Mode of treatment[b]
Weins, Menustik, Miller and Schmitz[45]	1978–1979	N = 87 adults w/AD Age: 65+, male M = 69, SD = 3.2 female m = 68, SD = 2.2 % female: 32 % Cauc: 99 % AfAm: 0 % Asian: 1	IP; chemical aversive counter-conditioning to alcohol plus other therapy; booster S 2–3 weeks post discharge, then over following year M days in tx: ~19 over the year (14 days IP)
Janik and Dunham[37]	1977–1979	N = 2,600 Age: 21–60+, M = NR, SD = NR 3 groups: 21–39, 40–59, 60+ (Ns of each: NR) % female: NR % Cauc: NR % AfAm: NR	OP; Quantified as hours of OP tx; provided by 550 programs nationwide
Carstensen, Rychtarik and Prue[44]	1979–1981	N = 16 V IP tx completers Age: 65–70 M = NR, SD = NR % female: 0 % Cauc: NR % AfAm: NR	IP; 28-day rehabilitation program. Used "social learning model"; "behaviorally oriented" (p. 308)
Rice, Longabaugh, Beattie and Noel[38]	1984–1986	N = 229 Age: 18–50+ M = NR, SD = NR 3 groups: YA: 18–29, n = 53; MA: 30–49, n = 134; OA: 50+, n = 42 % female: 31 % Cauc: NR % AfAm: NR	OP; 20 weekly S. All groups included 2 intro S, 2 booster S. 3 txs: CBT—16 S; Relationship enhancement (RE)—6 CBT S, 8 partner S, 2 didactic S; vocational (VE)—6 CBT S, 4 partner S, 4 vocational S
Lemke and Moos[47,48]	NR, but prior to 1997 when results first reported	N = 1,296 V Matched age groups (n = 432 in each): YA: 21–39; MA: 40–54 OA: 55–77 M = NR, SD = NR % female: 0 % Cauc: 71 % AfAm: NR	IP; 12 mixed-age alcohol tx programs at VAs nationally; 4 12-step oriented; 4 CBT oriented; and 4 eclectically oriented
Lemke and Moos[48]	NR, but prior to 1997 when results first reported	N = 570 V Age: 22–55+ M = NR, SD = NR Matched age groups (n = 190 in each): YA: 22–39; MA: 40–54; OA: 55+ % female: 0 % Cauc: 73 % AfAm: NR	IP; 63 community residential facilities (CRFs) contracted with VA
Oslin, Liberto, O'Brien, Krois and Norbeck[41]	NR	N = 44 V w/AD Age: 50–70 M = 58, SD = 6.8 % female: 0 % Cauc: 36 % AfAm: 64	OP; 50 mg of NTX/day vs. placebo. Total possible 12 weeks in tx. M weeks in tx: 10; simultaneously attended group therapy

Outcomes of interest	Method	Findings
Study success = total abstinence, not even 1 drink, 1 year post tx	Post-test only. Self report, staff observation, collateral reports, and patient charts; Time point: 1 2 groups studied over 2 years for study replication	78 patients completed initial treatment. 34 completed 6+ reinforcement S. 65.4% patients were totally abstinent for 12+ mo.
Quantity-frequency index; impairment index (eg, difficulty sleeping, missing meals); patient's assessment of severity of alcohol problems; counselor's assessment of severity of alcohol problems	Post-test only. CTYA, discriminant analysis using administrative data with a follow up survey. Time points: 2 Time span: 180 days post intake	Only age related finding: middle-aged group was more severe on counselor assessment of alcohol problems and impairment
% abstinent for at least 6 mo. prior to interview; early vs. late onset rates of abstinence; participant characteristics that distinguish abstinence vs. non-abstinence.	Post-test only. Telephone interviews 2–4 years post-discharge. Collateral interviews. Time points: 1	Descriptive results only. 50% abstinent; 38% drinking problematically; 13% reduced drinking since entering program. Late onset did slightly better than early onset. No demographics distinguished abstinent vs. non-abstinent groups
% days abstinent; % days of heavy drinking	RCT. Post-hoc CTYA. Randomly assigned to tx. Telephone interviews each mo.; in person interview every 6 mo. Time points: 6? Time span: 6? mo.	Only OA demonstrated condition differences. For OA, CBT was significantly better over VE (for both outcomes). No difference between CBT and RE
Daily alcohol intake; positive expectancies; situational confidence and coping. Scores from each of these were aggregated into "discharge status", with higher scores = better outcomes. Maximum alcohol use (heaviest day); drinking problems, BSI; continuing care; motivation; cognitive functioning; social support	CTYA—matched group design. Evaluation project of VA programs. Time points: 4 Time span: 5 years post tx entry. First report at discharge	No group differences on outcomes. OA received less practical help while in tx. Main predictors of higher discharge status: Marital status, cognitive functioning, motivation for treatment (OA lower than other groups), specialized services, social support. 1 year follow up: OA—Lowest problems among 3 groups; Lower distress than MA group; 59% received OP; 51% attended self help; 30% received psych care (lowest among 3 groups). 5 year follow up: OA had lowest problems and distress among groups
Typical alcohol use; maximum alcohol use (heaviest drinking day); AD; alcohol problems; BSI; health status; tx services; continuing care services	CTYA—matched group design. Evaluation of VA programs. Follow up by mail and/or telephone interviews. Time points: 3 Time span: 4 years	No age group differences in outcomes, treatment services, or formal and informal continuing care. Greater engagement, length of stay, and supportive relationships predicted less drinking, fewer drinking problems and psychological distress. Continuing care also predicted positive outcomes
Relapse = return to clinically significant drinking (5+ drinks per occasion; drinking 5+ days per week; coming to tx with positive BAC)	RCT. Time points: 5 Time span: 12 weeks	17 did not complete study—due to relapse/ drop out; noncompliance; transportation or work problems. 68.2% achieved abstinence. No significant group differences on abstinence or relapse rates. In context of alcohol exposure, NTX group half as likely to relapse

(*Continued*)

Table 1. (*Continued*)

Study	Years data collected	Sample[a]	Mode of treatment[b]
Oslin, Pettinati and Volpicelli[42]	NR	N = 183 adults w/AD Age: 21–75, M = NR, SD = NR; YA: 21–54, n = 143; OA: 55+, n = 40 % female: 27 % Cauc: 74 % AfAm: NR	OP, 100 mg daily NTX and BRENDA (weekly counseling, 20–30 minutes w/NP); 7 day placebo lead in; 2 thirds randomized to NTX
Gordon, Conigliaro, Maisto, McNeil, Kraemer and Kelley[35]	1995–1997	N = 45 at-risk drinkers in PC; Age: 65+, M = ~73, SD = NR % female: 13 % Cauc: 69 % AfAm: 29	BI; 3 conditions: Motivational enhancement (ME, feedback, consequences, goal-setting; 1 S, 45–60 min, 2 15 min boosters, n = 18); brief advice (BA, 1 15 min S, n = 15); standard care (SC, n = 12)
Satre, Mertens, Arean and Weisner[39,40]	1994–1996 (years admitted to program); Follow up through 2001	N = 1,204 HMO participants Age: 18–81, M = NR, SD = NR; YA: 18–39, n = 736; MA: 40–54, n = 379; OA: 55+, n = 89 % female: 36, 30, 24 % Cauc: 73, 74, 93 % AfAm: 12, 15, 2	OP; Day hospital or "traditional" OP program. Day hospital was 4x more intense in first 4 weeks, then more similar after. 8 week tx total, then 1 of year aftercare

and trends were found for ME and BA decreasing alcohol consumption to a greater extent than SC. Sample sizes likely affected the ability to detect significant differences between the intervention groups (IGs) (ME, n = 18; BA, n = 12; and SC, n = 12). It is important to note that of the 180 elderly individuals identified as hazardous drinkers, only 25% agreed to participate.

Outpatient treatment

Five studies examined the impact of mixed-age outpatient treatment on OA substance use—four contained some kind of random assignment, and four compared an OA group to a younger cohort. The first study in this group did not use random assignment. It utilized administrative data on 2,500 participants in 550 SAT programs nationwide.[37] Participants were categorized into three age groups—21 to 39, 40 to 59, and 60 and older—and compared. Participants completed an intake form at baseline and completed a follow-up questionnaire 180 days post-intake. Treatment was described as hours of outpatient

treatment received. Primary outcome measures were both the participants' and the counselors' ratings of alcohol problems, impairment (eg, sleeping difficulties, missing meals), and quantity and frequency of alcohol use. Follow-up outcomes revealed that the middle-aged group had the highest ratings of alcohol problems (as rated by the counselor) and impairment of the three groups. There were no differences between the youngest and oldest groups. Within group results were not reported.

Rice and colleagues[38] performed a post-hoc age group (young, middle-aged, and OA) comparison of 229 participants randomly assigned to one of three outpatient treatments. The treatments were cognitive behavior therapy (CBT), relationship enhancement therapy (RE), or vocational enhancement therapy (VE). Each treatment consisted of up to 20 sessions over 18 weeks. All conditions included two introductory sessions and two booster sessions, one of which was provided a year post-treatment. CBT contained 16 sessions. RE contained six sessions of CBT, eight partner sessions, and two didactic sessions.

Outcomes of interest	Method	Findings
TLFB; Drinkers inventory of consequences; ASI; SF-36; primary outcome = relapse to clinically significant drinking ≥5 in a single day	RCT. Post hoc CYTA. Focused on first 3 mo. of tx (out of 9). Time points: 2 Time span: 3 mo.	OA significantly greater adherence to medication and tx attendance than YA. 42.5% were abstinent during trial, 42.5% relapsed (NS compared to YA). Potentially greater medication effect for OA, trend only
TLFB; no. days abstinent; no. total drinks per month; no. drinks per drinking day; no. of drinking days	RCT. Post hoc CTYA. Randomized at individual level to 1 of 3 conditions. Time points: 6 Time span: 12 mos.	All conditions had significant decrease in drinking over time. No significant differences between conditions or age groups. Trend effect of ME and BA over SC
ASI score. Abstinence (in last 30 days). SCL-66 subscale (psychiatric distress); Readmission	Partial randomization to 2 types of tx. Post hoc CTYA. Telephone and in-person interviews. Time points: 3 Time span: 5 years 77+ % follow up rate through year 5 in all age groups	6 mo.: OAs had longer LOS; Tx services: Abstinence rates equivalent across age groups. Predictors of abstinence were not age related: married, no dependence, lower hostility, abstinence goal, longer LOS 5 years: predictors of abstinence were only "age related" as in fewer YA had: female gender, longer LOS, friends not supportive of drug/alcohol use

Abbreviations: [a]Sample—M, mean; SD, standard deviation; Cauc, Caucasian; AfAm, African American; NR, not reported; V, veterans; PC, primary care; AD, alcohol dependence; YA, young adults; MA, middle-ages adults; OA, older adults; [b]Mode of Treatment—BA, brief advice; BI, brief intervention; OP, outpatient treatment; IP, inpatient treatment; M, mean; S, session(s); tx, treatment; VA, Veterans Affairs; CBT, cognitive behavioral therapy; NTX, naltrexone; [c]TLFB, Timeline follow back; BSI, Brief Symptom Inventory; ASI, Addiction Severity Index; BAC, blood alcohol concentration; no., number; [d]CTYA, comparison to young adults; RCT, randomized controlled trial, randomized comparison trial; mo., month(s); [e]LOS, length of stay; tx, treatment; S, session(s); no., number; mo., month(s).

VE contained six sessions of CBT, four partner sessions, and four vocational sessions. In-person follow-up interviews took place every six months post-randomization; however, it was unclear on which of multiple time points the authors reported. At follow-up, only OA demonstrated significant condition differences. OA assigned to CBT had significantly higher rates of percent days abstinent and lower percent heavy drinking days than those in VE. No significant differences between those in CBT and RE emerged. The numbers of individuals receiving each treatment within each age group were not reported. It is therefore unclear whether sample size may have impeded the ability to detect additional condition differences. Authors surmised that differences between VE and CBT were due to VE's insensitivity to life stage for OA.

Another study examined the impact of two types of outpatient SAT ("day hospital" or a "traditional" outpatient) on 1,204 HMO participants.[39,40] A subgroup of the study participants was randomly assigned, while some participants requested a preferred treatment. Treatment lasted about eight weeks, followed by one year of aftercare. For analytic purposes, three age groups were compared: 18 to 39, 40 to 54, and 55 and older.[39] Results reported were on the follow-up at six months[39] and five years post-treatment.[40] At baseline, OA demonstrated higher levels of alcohol dependence, lower levels of drug dependence, lower psychiatric symptoms, and greater medical problems as compared to the younger cohort.[39] Within the first six months, both older and middle-aged groups had longer lengths of stay than the youngest cohort, though only the middle-aged group had significantly greater abstinence than the youngest cohort. Five year follow-up data revealed that OA were significantly more likely to report abstinence from alcohol and drugs over the past year than younger adults but not middle-aged adults, and they were significantly less likely than the two younger age groups to have been a 12-step group member. There were no differences between the group who was randomized to treatment and those who were not. All three age groups demonstrated a reduction in alcohol problems and drinking. Importantly, age was not an independent predictor

Table 2. Characteristics and findings of studies on age-specific treatment.

Study	Years data collected	Sample[a]	Mode of treatment[b]
Dupree, Broskowski and Schonfeld[66]	NR [Estimated late 70s/early 80s]	N = 24 late onset PD; Age: 55+, M = 64, SD = NR % female: 39 % Cauc: NR % AfAm: NR	OP; Pilot day tx program; Focus: behaviorally oriented, enhancing social support networks, group therapy
Kofoed, Tolson, Atkinson, Toth and Turner[75]	1981–1982	N = 57 V; Controls: (n = 24)—Age: 54–66, M = 59, SD = 3.7, % female: 0; Experimental group: (n = 33)— Age: 55–76, M = 60, SD = 2.9 % female: 12; % Cauc: NR % AfAm: NR	OP; 50% first participated in mixed age IP; Only the OP was adapted
Kashner, Rodell, Ogden, Guggenheim and Karson[76]	1987–1989	N = 166 V; Age: 45–70+, M = ~59, SD = NR % female: 0 % Cauc: 90 % AfAm: NR	OP; Discharged from IP, randomly assigned to OAR or traditional program. Both programs were 1 year OP aftercare. Group and individual therapy
Fleming, Manwell, Barry, Adams and Stauffacher[56]	1993–1995	N = 158 PDs from 24 PC clinics Age: 65+ M = NR, SD = NR % female: 34 % Cauc: NR % AfAm: NR	BI; Intervention group (IG) = 2, 10–15 min with physician; advice, education, contracting for reduced drinking. Controls (C): general health booklet
Blow, Walton, Chermack and Mudd Brower[72]	1993–1995	N = 90 patients with AUD Age: 55–91, M = 71, SD = 6.8 % female: 41 % Cauc: 89 % AfAm: 8 % Latino: 3	IP and OP; case management services; identifying community resources
Oslin, Thompson, Kallan and Ten Have, et al[64]	1995–1998	N = 2,637 V admitted to IP VA units; screened + for anxiety, depression, and/or at-risk drinking Age: 60+ M = 70, SD = 6.6 % female: 4 % Cauc: ~71 % AfAm: NR	CC; UPBEAT vs. usual care (UC); onsite training and supervision, but no certification of care coordinators; UC = referrals only

Characteristics of age Specific tx[b]	Outcomes of interest[c]	Method[d]	Findings
4 modules: (1) Analysis of behavior (12 S); (2) Self management in high risk situations (45 S); (3) Education (9 S); (4) Problem solving (13 S)	Program success = abstinence or limited alcohol use; based on self report	Pre-to-post test. Gerontology Alcohol Project (GAP). Drop outs not followed. Time points: 7 Time span: 12 mo. post-discharge	At 12 mo., 74% of program graduates had program success. More females than males drank at home and sought professional help
Flexible protocol emphasized socialization and support, slower pace and less confrontation	Retention (no. of mo. in tx, no. of visits, attendance rate), completed 1 year of tx (yes/no); no. of: irregular discharges, known relapses, relapses successfully treated, drinking at discharge	Quasi experimental study with an experimental group (E) and historical controls (C). All data from clinical charts. Time points: 2 Time span: 1 year	E: more mos. in tx, more tx visits, higher rates of completion, fewer irregular discharges than C. E had equal no. of relapses, but greater number of relapses treated successfully than C. Controlled for onset and severity of problem
Older Alcoholic Rehabilitation (OAR). Goals—building peer relationships, self-esteem. Used reminiscence therapy. Focus: past successes rather not future consequences. Peer lead training and less physical therapy. Non-age-specific program emphasized confrontation	Self and collateral reported abstinence in prior 6 mo	RCT. Time points: 3 Time span: 12 mo. post-discharge 82.5% follow up rate	OARS patients were 2.9 times at 6 mos. and 2.1 times at 12 mos. more likely to report abstinence than those in the traditional program. As age increased in either program, greater response. In OAR, patients had a greater response at older ages than in the traditional programs
NR. Presumed feedback adjusted for OA	7 day alcohol use; binge drinking in last 30 days; frequency of excessive drinking in past 7 days;	RCT. Project GOAL. 30 min in-person interviews in PC clinics. Time points: 4 Time span: 12 mo. 92.4% follow up rate	At 12 mo. IG had significantly: fewer drinks in last 7 days (9.92 vs. 16.27); fewer binge episodes in last 30 days (1.83 vs. 5.36); smaller proportion binge drinking in last 30 days (30.8% vs. 49.3%); smaller proportion of excessive drinkers in last 7 days (15.4 vs. 34.3%) than C
Adapted for physical and cognitive functioning. Less confrontation, CBT, interpersonal and supportive aspects. Emphasis on therapeutic alliance; grief, bereavement, loss, loneliness, boredom, isolation, developmental issues (integrity vs. despair); slower pace	BSI, Diagnostic Interview Schedule, TLFB	Pre-to-post test. Categorized at follow up: Abstainers (55.9%), Non binge drinkers (13.3%), binge drinkers (26.5%), and non-completers (9.4%). Time points: 2 Time span: 6 mo. 75.6% follow up rate	All groups showed improvements in perception of general health and were less limited by pain. Binge drinkers in greater distress than other groups
Unified Psychogeriatric Biopsychosocial Evaluation and Treatment (UPBEAT): clinical assessment, treatment engagement, help in adhering to tx plan; case management/ care coordination. Specifically for elderly veterans	For at-risk drinkers (n = 1,709): Alcohol Use Disorders Identification Test scores (AUDIT). Mental health related disability: Mental Component Summary (MCS) score on SF-36	RCT. Randomized to UPBEAT or UC after hospitalization. Time points: 4 Time span: 12 mo. 40.1% follow up	Low participation. Outcomes did not differ by condition. AUDIT scores lowered over time for both conditions

(*Continued*)

Table 2. (*Contined*)

Study	Years data collected	Sample[a]	Mode of treatment[b]
Schonfeld, Dupree, Dickson-Fuhrmann, Royer, McDermott, Rosansky, Taylor and Jarvik[66]	1996–1999	N = 110 V Age: 53–82, M = 65, SD = 5.5 % female: 2 % Cauc: 51 % AfAm: 42 % Latino: 6 % Asian: 2	OP; Weekly support groups for V 60+, CBT (16 S), psycho-education (6 S). Groups were 75 min. Completers went to 13 out of 16 S.
Slaymaker Owen[70]	2000	N = 67 Age: 55–88 M = 66, SD = 7.2 % female: 50 % Cauc: 99 % AfAm: NR	IP; Residential treatment. Group and individual S; lectures, homework assignments; self-help groups; 12-step with CBT and MI
Oslin, Sayers, Ross, Kane, Ten Have, Conigliaro and Cornelius	2000–2002	N = 97 V in PC and specialty care. Presence of depression, suicidality, and/or at-risk drinking Age: 18+, M = 62, SD = 10.5 % female: 4 % Cauc: 50 % AfAm: NR	BI; Usual care (UC) vs. telephone disease management (TDM); TDM = 7 calls, occurred weeks 1–24 post intake. Booklet mailed post-call. 45 min. calls. UC = referral to specialty care
Oslin, Slaymaker, Blow, Owen and Colleran[71]	2000–2002	N = 1,358 Age: 50+, M = NR, SD = NR (2 groups, middle-aged and elderly—not defined) % female: 44 % Cauc: 98 % AfAm: 0	IP; 2 rehabilitation facilities for AD; One mixed-age, one age-specific; most services were similar re: group and individual therapy
Oslin and Grantham et al[58]	2000–2002	N = 560 at-risk drinkers Age: 65+ M = 72, SD = 5.3 % female: 8 % Cauc: 70 % AfAm: NR	BT; Integrated Care (IC) vs. Enhanced Specialty Referral (ESR). IC = provided onsite, services within PC, M visits = 3; ESR = referral offsite, M visits = 1.9
Zanjani et al[61]	2000–2001	N = 258 at-risk drinkers. Problematic (n = 111) vs. non-problem-atic (n = 147) Age: 65+, M = 72, SD = 4.7 % female: 0 % Cauc: 66 % AfAm: NR	BT; IC vs. ESR. See Oslin, Grantham et al, 2006 above

Characteristics of age Specific tx[b]	Outcomes of interest[c]	Method[d]	Findings
Age specific support groups. CBT program—adapted from GAP (Dupree et al, 1984)—CBT and self management (SM) therapy. Included the SAPE (a structured interview that helps to facilitate CBT modules	Self reported abstinence. Used clinical measures and information from the charts for descriptors	Post-test only. Geriatric Evaluation Team: Substance Misuse/ Abuse Recognition and Treatment (GET SMART). Administrative and clinical records, telephone interviews at follow up Time points: 2 Time span: 6 mo. post-tx	44.5% completed the program. Of those, 55% remained abstinent, 26.5% primarily abstinent with some slips. Of the 55% non-completers—16% remained abstinent, 31.1% returned to full time use. Completers significantly more likely to remain abstinent, and non-completers likely to return to full use
Special unit for older adults. Physical accommodations (for vision, hearing, mild cognitive disabilities). Special group topics: grief, loss, life transitions, leisure, recreation	ASI subscale scores. SF-12 for health. Mental component summary (MCS)	Pre-to-post test. Consecutive admissions to IP unit. 33% refused to participate. Time points: 3 Time span: 12 mo. 64% and 58% follow up at 6, 12 mo.	77% completed the program. 71% and 60% were continuously abstinent at 6 and 12 mo. ASI psychiatric scores showed significant change at 6 mo. which remained at 12 mo. Significant improvement in MCS at 6 and 12 mo.
Used BI described in Barry, Oslin, and Blow, 2001. MI based BI for alcohol	At risk drinking = 14+ per week and greater than 3 binge episodes in 3 mo.	RCT. Randomly assigned physician to condition. Time points: 2 Time span: 4 mo. post intake 76.3% follow up rate	Only 31 were at-risk drinkers. Those in TDM had more than twice the rate of response than UC for either depression or at risk drinking. No significant differences in drinking outcomes by condition. Among at-risk drinkers: TDM (n = 16), UC (n = 15)
Age specific facility included handicapped access, slowed program pace, and groups with special topics (eg, life transitions, senior support)	Post-discharge tx engagement; clinical outcomes (abstinence, overall progress; quality of life)	Post hoc analysis. CYTA. Admin-istrative data. Telephone interviews at follow up. Time points: 2 Time span: 1 mo. post-discharge. 64.5% follow up rate	Elderly were less likely to engage in after care, contact a sponsor, or report improved quality of life. As likely to be abstinent as younger group
BI (IC) adapted from Barry, Oslin, Blow, 2001	Average number of weekly drinks; no. of binge episodes in the last 3 mo.	Multisite RCT. PRISM-E study. Time points: 2 Time span: 6 mos.	Only 9% had recommended 3 visits of IC. 21% reduced their drinking to safe levels. Both groups demonstrated lower levels of average weekly drinking and binge drinking. No group differences
BI (IC) adapted from Barry, Oslin, Blow, 2001	At-risk drinking defined as beyond safe levels (eg, more than 7 drinks/week); Problem drinkers = those w/a score of 3+ on the SMAST-G	Multisite RCT. PRISM-E study. 3 sites-Chicago, Madison, and Philadelphia VA centers; Time points: 4 Time span: 12 mo.	Both groups showed reduction in drinks/week. Only PDs showed reduction in binge drinking. Condition by PD interaction on drinking over time—IC led to fewer binges

(*Continued*)

Table 2. (*Contined*)

Study	Years data collected	Sample[a]	Mode of treatment[b]
Lee et al[60]	2001–2005	N = 153 drinkers; Normal drinkers (n = 119); at-risk drinkers (n = 34) Age: 65+, M = 75, SD = 8 % female: 61 % Cauc: 40 % AfAm: 45	BT; IC vs. ESR; Site specific differences (respectively): individual vs. group; harm reduction vs. abstinence; IC = 3 sessions of MI; ESR = 12 step oriented, 8 weeks, for individuals 55+
Fink, Elliot, Tsai and Beck[49]	2000–2003	N = 665 PC patients, 1+ drink in last 3 mo. Ages: 65+, M = 77, SD = 6.2 % female: 53 % Cauc: 88 % AfAm: 1 % Latino: 4 % Asian: 7	BA; Written feedback. 2 interventions: Combined report (both MD and patient receive report); Patient report only; Physicians not trained to intervene
Moore and Blow et al[63] Lin and Karno et al[62]	2004–2007	N = 631 PC patients from 3 sites; Age: 55+ M = 69, SD = 6.8 % female: 29 % Cauc: 87 % AfAm: NR % Latino: 9	BI; 2 conditions: Control (C): general health booklet; Intervention (I): feedback, advice from physician, 3 health educator calls (1 40 min S, w/2 20 min S); MI based
Schonfeld, King-Kallimanis, Duchene, Etheridge, Herrera and Barry Lynn[50]	2004–2007	N = 3,497 Age: NR M = 75, SD = 9.2 % female: 70 % Cauc: 76 % AfAm: 17 % Latino: 16	BI/BT; BI = 1–5 S, often delivered in home, w/health promotion workbook. BT = 16 S of relapse prevention
Outlaw, Marquart, Roy, Luellen, Moran, Willis and Doub[69]	2005–2007	N = 199 Age: 50–89 M = 59, SD = 7.4 % female: 33 % Cauc: 54 % AfAm: 34	OP; Weekly groups. Supplemented by individual therapy, case management services, and medication management

Characteristics of age Specific tx[b]	Outcomes of interest[c]	Method[d]	Findings
BI (IC) adapted from Barry, Oslin, Blow, 2001	At-risk alcohol use in this analysis: 14 drinks/week for men, 12 for women and 4 binge episodes (4+ drinks) within 3 mo.	Multisite RCT. PRISM-E Study. Single site analysis. Time points: 3 Time span: 6 mo.	Among at-risk drinkers, only 20 out of 34 received tx—92.9% in IC; 35% in ESR. No. of days between screening and engagement for IC was half that of ESR. No. of drinks in past week and no. of binge episodes were significantly different between groups—IC reduced more than ESR. No change in SMAST-G scores
Personalized information provided specific to older adults	Maintenance of nonhazardous drinking (no known risks). Reduction in hazardous drinking (risk for problems); Reduction in harmful drinking (presence of problems)	RCT. 3 PC sites randomized to 1 of 2 interventions or to usual care (UC). Measured via Computerized Alcohol-related Problems Survey (CARPS) Time points : 2 Time span: 12 mo.	Both interventions were associated with greater odds of lowered-risk of drinking than UC. Combined report was no more effective than patient report alone. Only combined report had greater odds of predicting decrease in drinks/week than UC at follow up
Booklet specific to aging and alcohol in intervention condition	Comorbidity Alcohol Risk Evaluation Tool (CARET); Drinks/week; daily use of alcohol; no. of risks; Being an at-risk drinker; risk scores; no. of days drinking; heavy drinking; no. of drinks in last 7 days	RCT. Healthy Living as You Age (HLAYA) study. Time points: 3 Time span: 12 mo.	I: 19.7% did not receive calls; 30% completed 1–2; 50.3% completed all 3. Completing all 3 calls increased odds of being no longer at-risk at 3 mo. follow up compared to no calls. All drinking outcomes improved over time. At 12 mo.: I had lowest number of drinks in last 7 days. I did not reduce at-risk drinking compared to C
BI adapted from TIPs 26 and 34. Workbook on quality of life, healthy habits, education, reducing consequences of substance use; used MI techniques. BT = taken from GAP, CBT/SM treatment for older adults. Utilized tx honed in Schonfeld et al, 2000, and published in CSAT, 2005; 18 S w/CBT orientation	Short Michigan Alcohol Screening Test-Geriatric Version (SMAST-G); Self-report yes/no questions re: using/ abusing prescription and over-the-counter (OTC) medications and illicit drugs. Any alcohol; 5+ drinks; drug use; depression; anxiety; trouble concentrating or understanding as a result of drug or alcohol; stressfulness, emotional problems or reduced activities as a result of drug or alcohol use. Physical health, mental health, and social functioning	Pre-to-post test. Evaluation of pilot program modeled after SBIRT. Discharged individuals could be rescreened. Time points: 2 Time span: 30 days post-discharge Pre-to-post test. Completers vs. non-completers. Completers attended 75% of modules. Time points: 2 Time span: 6 mo. post-baseline	Alcohol (n = 339): SMAST-G scores differed significantly between intake and discharge— from 80% to 18.9%. At discharge: Prescription meds (n = 187): 32.1% improved. Illicit drugs (n = 12): 75% improved. OTC (n = 24): 95.8% improved 42% completed the program. Completers: Over time, (a) more likely to reduce nonmedical prescription drug use; (b) greater reduction in trouble understanding, concentrating, or remembering; (c) more likely to report less stress, emotional problems and reduced daily activities. Main effects of time on all drinking outcomes. No main effect group differences on other outcomes

Abbreviations: [a]M, mean; SD, standard deviation; Cauc, Caucasian; AfAm, African American; NR, not reported; V, veterans; PC, primary care; AD, alcohol dependence; YA, young adults; MA, middle-ages adults; OA, older adults; PD, problem drinkers; AUD, alcohol use disorders; SA, substance abuse. [b]BA, brief advice; BI, brief intervention; OP, outpatient treatment; IP, inpatient treatment; M, mean; S, session(s); tx, treatment; VA, Veterans Affairs; CBT, cognitive behavioral therapy; NTX, naltrexone; MI, Motivational Interviewing; [c]TLFB, Timeline follow back; BSI, Brief Symptom Inventory; ASI, Addiction Severity Index; BAC, blood alcohol concentration; no., number; [d]CTYA, comparison to young adults; RCT, randomized controlled trial, randomized comparison trial; mo., month(s); [e]LOS, length of stay; tx, treatment; S, session(s); no., number; mo., month(s); ASI, Addiction Severity Index.

of abstinence at five years when covariates (gender, treatment retention, and having friends supportive of reduced use) were entered into the model.[40]

Two studies were randomized controlled trials (RCT) examining the impact of naltrexone (NTX) versus placebo on OA.[41,42] In one study, 44 male veterans 50 and older were randomly assigned to 50 mg per day of NTX or placebo and followed for 12 weeks.[41] Each participant also received weekly group therapy and case management. Seventeen of the participants did not complete treatment. There were no significant differences between conditions on abstinence or relapse rates. Among those individuals exposed to alcohol, those on NTX were significantly less likely to relapse than those on placebo. A high drop-out rate and small group sample sizes likely prevented detection of additional differences.

In a larger study, 183 participants were randomly assigned to one of three conditions and treated for 9 months.[42] This analysis reported on the first three months of treatment, during which two-thirds of the subjects were randomized to 100 mg per day of NTX and one-third to placebo. All participants participated in BRENDA, a medication management intervention with qualities similar to age-specific treatments, such as a non-confrontational style.[43] In a post-hoc analysis, participants were divided into two age groups—21 to 54 year olds (n = 143) and those 55 and older (n = 40).[42] At baseline, OA had longer drinking careers and greater physical disability but fewer consequences and less mental health distress than the younger cohort. OA demonstrated greater rates of treatment engagement and medication adherence than the younger adults. There were no significant differences between age groups on abstinence or relapse rates; however, significant interaction effects demonstrated that OA were more likely to be abstinent and less likely to relapse due to greater therapy and medication adherence. Trend effects also emerged, possibly indicating greater medication effects for OA than for younger adults. Again, small cell sizes may have impeded the ability to detect main effects.

Inpatient treatment

Four studies examined OA responses to mixed-age inpatient treatment. The first was a cross-sectional examination of outcomes for 16 OA two to four years post-discharge from a 28-day treatment program described as behaviorally oriented.[44] In-person interviews with the former program participants and collaterals were conducted. Descriptive results revealed 50% were abstinent in the six months prior to the follow-up interview, and 38% were drinking problematically. Late onset alcohol abusers appeared to do descriptively better than early onset alcohol abusers. There was no report of whether additional treatment was sought in between the inpatient treatment and the follow-up interview, making it difficult to determine whether the results were attributable to the described treatment.

Another study examined abstinence rates among 87 alcohol dependent OA one year after participating in inpatient, chemical-aversive counterconditioning.[45] Older alcoholics admitted to the program were largely married, not depressed, reported some medical problems, and reported late onset alcohol problems. Treatment consisted of two weeks of inpatient treatment and then two to four booster sessions throughout the following year. Data was retrieved from patient charts, self-report, staff observation, and collateral reports. Follow-up data on outcomes were collected one-year post admission. In addition, two separate groups were studied in consecutive years in an effort to replicate findings. Results revealed an average 65.4% of participants across the two groups were abstinent at one-year follow-up.

Two studies examined outcomes of residential treatment by comparing OA veterans to two younger cohorts using matched sample designs. In the first study, the outcomes of 190 older male veterans with AUD treated in 63 community-based residential facilities were compared with the outcomes of two younger-aged cohorts (each of which also had 190 participants) at one and four years post-treatment entry.[46] As found in other studies, OA experienced fewer problems at intake and lower psychological distress even with equivalent levels of alcohol dependence. All groups had equivalent treatment participation and treatment outcomes. Predictors of the best outcomes across groups and time points were longer lengths of stay, more counseling, more involvement in supportive relationships with other residents, and aftercare post-discharge. Notably, results are generalizable to only OA veterans.

In a similarly designed yet distinct study, outcomes for 12 mixed-age alcohol treatment programs

in the Veterans Affairs (VA) medical system[47,48] were explored. The programs were theoretically oriented in thirds to CBT, 12-step, and an eclectic approach. Three groups (younger, middle-aged, and OA) of 432 individuals each—matched on demographics, medical status, and psychiatric status—were recruited from across the 12 programs. At discharge, all age groups responded equivalently to treatment.[47] At one year and five year follow-up assessments, OA had significantly better outcomes than the younger cohorts—demonstrating lower drinking rates, drinking problems, and psychological distress[48]—a difference present even though OA obtained an equivalent level of outpatient SAT and self-help and significantly less psychiatric care than the younger cohorts during follow-up. Factors predicting positive outcomes independent of age were use of continuing care services, self-help groups, and coping strategies. No age group-by-program type differences were explored. Again, results are generalizable to only OA veterans.

Summary

OA samples presenting to mixed-age treatments were largely heterogeneous (eg, demographics; some with higher rates of alcohol dependence than the younger cohort, others with lower rates; early vs. late onset), but there were some commonalities. Generally, OA had fewer alcohol problems, less psychiatric distress, and lower rates of drug use or dependence than the younger cohorts.[37,39,45–47] Despite heterogeneity of samples (eg, veterans vs. HMO members), results consistently demonstrated that OA responded equivalently to younger cohorts to mixed-aged treatments, regardless of level of care, as evidenced by few differences in outcomes compared to their younger counterparts. Even minimal interventions, such as BA from a physician, appear to positively impact OA drinking. It is important to note that conclusions can be generalized to only OA who sought services from a mixed-age treatment program.

Among these studies, there is little data that contributes to understanding which treatments work best for OA or which might be the crucial mechanisms of change for OA. Existing treatments such as chemical aversive counterconditioning to alcohol,[45] CBT, and relationship enhancement therapy[38] demonstrate positive outcomes for OA; however without true control groups (CG), it is difficult to conclude what is caused by treatment or research participation and/or the passage of time. Interestingly, it appears that regardless of modality, more treatment (eg, greater lengths of stay or treatment adherence) yields better outcomes for OA.[39,40,42,46]

Results from many of the above described studies should be interpreted with caution. Small sample sizes[35,38,41] and limited methodological rigor, such as post-test only studies,[44,45] prevented detection of possible group differences or generalization of results to a wider OA population. In addition, while trending results potentially point to a greater response to treatment by OA in general, these trends are likely not due to older age per se but commonly shared attributes of OA, such as supportive social networks or greater treatment adherence. While several studies utilized randomization, it did not always occur at the individual level (the most rigorous level), and many analyses performed within the context of RCTs were post-hoc in nature. Without considering age in the randomization process, condition assignments may have been imbalanced within age groups thus skewing findings.

Age-specific treatment

Thirteen studies (Table 2) examined the impact of age-specific treatment on substance using OA. Level of care ranged from BA to inpatient care. Five studies examined the effects of treatment on a veteran population; four took place in primary care settings.

Brief advice

One study examined the impact of BA on OA drinking and drinking problems. Fink and colleagues[49] implemented a RCT examining the effect of written personalized feedback on 665 OA with non-hazardous, hazardous, and harmful drinking habits. In this study, three primary care sites were randomized to one of three conditions: patient report (given to patient only), combined report (report given to physician and patient), or usual care (UC, no report given). Physicians were not trained on how to intervene or discuss reports with patients. At baseline, 21% were harmful drinkers, and 26% were hazardous drinkers. At the 12-month follow-up, participants in both IGs had higher odds of reducing their hazardous and harmful drinking than UC. Only the combined group had higher odds of reducing the number of drinks per week. This study's major limitation is that

randomization occurred at the level of primary care site rather than the individual.

Brief interventions

Five large studies on BIs were implemented to reduce OA problematic drinking or increase access to SAT. Four of the studies recruited participants from a primary care setting. One exclusively recruited a veteran sample.

Schonfeld and colleagues[50] implemented an extensive BI—a three-year state-funded evaluation project of a pilot program modeled after SBIRT[51] and designed to address underutilization of SAT among OA. Participants were recruited from the community—at health fairs, senior housing sites, and retirement communities—and screened for alcohol, illicit drug, and medication misuse in addition to depression and suicide. Counselors screened 3,497 OA for substance use/misuse, and if positive, counselors performed the initial intervention in the home (or other convenient location) of the participant. For those requiring intervention, counselors provided the BI by completing a health promotion workbook within one to five sessions and utilizing techniques of Motivational Interviewing (MI).[52] If the BI was determined inadequate, counselors were given discretion to also implement a brief treatment (BT) of 16 sessions of CBT. Referrals to other treatment for serious substance abuse were made at any time. Individuals who received a BI or BT were followed 30 days post-discharge. Among those who screened positive for alcohol use (n = 339), there were significant reductions in the proportions of individuals (from 80% to 18.9%) experiencing alcohol problems and symptoms of alcohol dependence as measured by the Short Michigan Alcohol Screen Test—Geriatric Version (SMART-G)[53] at follow-up. In addition, 32% reported reduced prescription medication misuse (n = 187, 67.9% reported no improvement); 95.8% improved on use of over-the-counter medications (n = 24); and 75% improved on illicit drug use (n = 12). Unfortunately, no data on the number of individuals who received only the BI versus those who received the BI and the BT was reported. There was also no CG. Given the pre-to-post test design and the considerable variation in length and type of the intervention, conclusions about its effectiveness are limited. While it appears promising, it is unclear if results were due to the intervention or to the considerable, often in-home, contact with program staff.

Oslin and colleagues[54] tested the efficacy of a telephone disease management (TDM) program for depression and/or at-risk drinking. Older veterans (n = 97) attending VA Medical Center-based primary care settings or subspecialty care clinics (eg, cardiology) who screened positive for at-risk drinking, depression, or suicidality were recruited. Clinicians providing the interventions were randomly assigned to TDM or UC. TDM consisted of around seven contacts with a behavioral health specialist and was an adaptation of a BI designed for OA.[55] UC consisted of referral to specialty care. For at-risk drinkers (n = 31), participants in both conditions demonstrated a reduction in quantity of drinking and binge episodes at the four-month follow-up interview.[54] A descriptive difference emerged between conditions such that 48.3% of those in TDM as opposed to 20% in UC achieved a response. Lack of significant group differences was likely due to small sample sizes.

Fleming and colleagues[56] implemented a RCT to examine the effectiveness of BA and contracting with a physician in reducing problem drinking among 158 OA. Participants were recruited from 24 primary care clinics. Individuals were eligible if they were drinking beyond the National Institute for Alcohol Abuse and Alcoholism (NIAAA) recommended guidelines for OA (more than seven standard drinks per week).[22] Participants were randomized to one of two conditions: (1) a CG consisting of a general health booklet, or (2) an IG consisting of a personalized feedback booklet on the participant's drinking and a scheduled primary care visit that included a contract with their physician to reduce drinking. Results revealed that at the 12-month follow-up, the IG had significantly fewer drinks in the previous 7 days, fewer binge episodes, and less excessive drinking compared to the CG. Interestingly, those in the IG maintained a mean number of drinks beyond the NIAAA safe guidelines at follow-up.

The Primary Care Research in Substance Abuse and Mental Health for the Elderly (PRISM-E) study[57–59] was a multisite, RCT comparing integrated care (IC) to enhanced specialty referral (ESR) for OA at-risk drinkers. Participants were recruited from 10 study sites across the nation. IC was provided on site in primary care clinics and included a BI comprised of

reviewing a workbook using motivational techniques over the course of three, 30 minute sessions. ESR involved referring participants to off-site specialty care. An analysis of one particular site[60] included a slightly different description of IC, highlighting it as a harm reduction approach that consisted of MI. ESR in this case was specified as an abstinence-based 12-step program. The larger study reported greater treatment engagement for those in IC, especially for those with more severe problems.[59] In addition, there was an overall reduction in mean drinks per week and binge drinking but no condition differences.[58] Among individuals assigned to IC within the single site analysis providing a harm reduction approach, a greater proportion received treatment and had fewer drinks and binge episodes as compared to those assigned to ESR.[60] Finally, another separate analysis of this study's data[61] compared at-risk drinking OA with problem drinking OA (PDOA, defined as scoring ≥ 3 on the SMAST-G) across multiple sites. Results demonstrated both at-risk drinkers and PDOA significantly decreased both number of drinks and binge episodes across 12 months, regardless of condition assignment; however, PDOA had higher engagement rates in IC. Engagement was a key predictor of more pronounced reduction in weekly consumption and binge episodes for PDOA.

The Healthy Living as You Age (HLAYA) study was a RCT of 631 at-risk drinkers aged 55 and older identified and recruited from patients scheduled for a visit in the next week at one of three primary care clinics.[62,63] Participants were randomized to one of two conditions, an IG or CG. Participants in the CG received a general health information booklet. Participants in the IG were given personalized feedback and a drinking diary to keep track of drinking, and their primary care physician was given the same report. The physician gave oral and written advice about drinking to the participant, and a health educator called the participant at 2, 4, and 8 weeks after the PC visit. Participants were followed up with at three and 12 months via telephone interviews. Individuals in both groups reduced drinking over time. At three months, the IG had significantly fewer at-risk drinkers, lower risk scores, reported drinking fewer drinks, and less heavy drinking compared to the CG.[63] At 12 months, only number of drinks remained significantly different, and 54% and 60% of the intervention and CGs respectively remained at-risk drinkers. Completing all three health educator calls significantly increased odds of not being an at-risk drinker.[62]

Care coordination
A comprehensive interdisciplinary care coordination (CC) program was created for medically hospitalized elderly veterans with previously unidentified depression, anxiety, or who were at-risk drinkers.[64] Participants who agreed to participate were randomly assigned to CC or usual care (UC) and followed for 24 months. UC consisted of referrals by hospital staff as needed. The primary outcome for at-risk drinkers (n = 1,709) was the Alcohol Use Disorder Identification Test (AUDIT).[65] While both groups demonstrated a reduction in AUDIT scores over the two-year follow-up period, there were no significant condition differences.[64] Authors cite low program participation and follow-up (40.1%) as a possible explanation for lack of findings.

Outpatient treatment
Three studies investigated age-specific outpatient treatment, utilizing successive generations of one therapy protocol. The Gerontology Alcohol Project (GAP)[66] was a pilot day treatment program with late onset alcohol abusers 55 and older. Treatment was a combination of CBT, self management, and education and was implemented via group therapy over approximately 74, 45-minute sessions. A pre-to-post test evaluation of the program revealed that among the 48 individuals admitted, 24 graduated the program. Only program graduates were followed 12 months post-discharge. At follow-up, 74% had achieved and maintained their self-selected goal of abstinence or controlled drinking.

Schonfeld and colleagues[67] evaluated an outpatient SAT for OA veterans called the Geriatric Evaluation Team: Substance Misuse/Abuse Recognition and Treatment (GET SMART). It consisted of a weekly support group for individuals 60 and older, an adapted form of the GAP program described above—focused on CBT and self management (referred to jointly as CB)—and six sessions of psychoeducation. Of 110 participants, 44.5% completed at least 13 of the 16 CB groups. Among non-completers, data was collected every six months on a semi-informal basis by clinical staff, and 77% were successfully contacted.

Data on completers was gathered from administrative and clinical records. Completers were significantly more likely to be abstinent at six month follow-up than non-completers. Among completers, one returned to full time use, as compared to 19 of the non-completers (n = 47). Neither the amount of treatment received among non-completers nor their reasons for drop out were reported making group differences difficult to interpret.

Utilizing an adapted form of the CB protocol used in GET SMART,[68] Outlaw and colleagues[69] tested the impact of 18 sessions of group therapy, supplemented by individual therapy, case management, and medication management, on 199 adults with SUD ages 50 and above.[69] Participants were assessed at baseline and six months post-intake. Program completers, those who attended at least 75% of sessions, were compared with non-completers. Forty-two percent of participants completed the program. Completers were more likely than the non-completers to be male, African American, and unemployed. There was a main effect of time on all drinking outcomes—with no significant group differences. Completers were more likely to reduce nonmedical prescription drug use and to report reduction in trouble understanding or concentrating due to drug or alcohol use over time. Completers were also more likely to report improved cognitive functioning, mental health, vitality, and less bodily pain.

Inpatient treatment

Two studies examined the effectiveness of inpatient treatment on OA alcoholics. The first study performed a pre-to-post test of an inpatient SAT on 67 alcohol dependent OA.[70] Residential treatment consisted of individual and group therapy and community activities. Adaptations for OA included handicapped access, slower program pace, and modifications for vision, hearing, and mild cognitive problems. The theoretical approach was a combination of CBT, motivational enhancement, and 12-step. Special OA groups included topics such as grief, loss, continuing care, leisure, recreation, and life stage transitions. Length of stay ranged from four to 42 days with a mean of 26. Participants were followed at six and 12 months. Seventy-one percent and 60% of participants were continuously abstinent at six and 12 months respectively. Lack of a CG was the single major limitation of this study.

Utilizing administrative data, Oslin and colleagues[71] implemented a post-hoc pre-to-post test on 1,358 patients 50 and older admitted to two Hazelden-based rehabilitation programs. Utilizing an underlying 12-step philosophy, one was specifically designed for OA, and the other was a mixed-age program. Outcome data was collected on 64.5% of study participants via a telephone interview one month post-discharge. Age-specific components included accommodations for physical limitations, "a slower paced program",[71] and groups that were homogeneous with respect to age and topical—including subjects such as life transitions. For the analysis, participants were separated into two groups: middle-aged and elderly adults; however, these groups were not further defined. Overall, OA across both rehabilitation programs demonstrated fewer mental health problems and less severe alcohol use than the middle-aged group. Middle-aged and elderly adults had equivalent lengths of stay (an average of 25 days) and treatment completion rates. Middle aged participants were more likely to attend aftercare, contact a sponsor, and report an improved quality of life compared to the elderly participants. Middle-aged and elderly participants also demonstrated equivalent outcomes in terms of abstinence post-discharge, with proportions around 85%. Outcomes comparing the two treatment types were not reported.

Both inpatient and outpatient treatment

One study implemented a pre-to-post-test an elderly-specific SAT program with both inpatient and outpatient components.[72] Treatment was non-confrontational, covered age specific topics (eg, loss, isolation, and physical health problems), utilized a slower pace of treatment, and strongly emphasized therapeutic alliance. Case management services were also provided. Participants (N = 90) were interviewed at baseline and six months later. Forty-nine percent of participants reported that it was the first time receiving treatment and most completed treatment. While all participants reduced drinking over time, investigators categorized participants into four groups depending on their six-month status: abstainers (55.9%), non-binge drinkers (13.3%), binge drinkers (26.5%), and non-completers (9.4%). Of these groups, binge drinkers were in the greatest psychological distress at follow-up.

Summary

Almost all of treatments demonstrated positive outcomes for OA—even with minimal intervention—both at end of treatment and follow-up. Treatment intensity varied from minimal (BA) to specialized inpatient treatment. Due to emphasis on harm reduction, the outcome of interest among BIs and BA tends to be the proportion of OA drinking at nonhazardous levels. While many BIs demonstrated significant differences between conditions on outcomes, a significant proportion (often over half) within all the BI studies remained at-risk drinkers[56,61,63] (drinking beyond recommended guidelines[22] for health and safety). In some cases, symptoms of problematic drinking or dependence persisted at the same rate even when quantity and frequency were reduced.[60] Among the more intensive treatments, abstinence rate was the common marker of success. Among the general population, the estimated success rate of SAT a year post-discharge is 30%–50%.[73] When reported, age-specific treatments yielded abstinence rates of 55%[67] and above at one year follow-up. Like mixed-age treatments, preliminary evidence suggests that the more treatment OA receive, the more likely they will yield positive outcomes.[63,67,69]

Age-specific treatments themselves were comprised mostly of tailoring information provided to OA to their age group (eg, education about unique medical vulnerabilities to alcohol, medication combinations). Tailoring has also proven effective and important among OA within smoking cessation.[74] Within more intensive treatments, both physical and psychological accommodations were made for OA. Physical or practical accommodations included handicapped access to programs or a slower pace of treatment. Psychologically based accommodations included group therapy with topics salient to their life stage, including coping with depression, loneliness, loss, grief, and life transitions.

Methodologically, these treatments were categorized into two groups—RCTs and pre-to-post tests. RCTs made up the more recent research, contained primarily BIs, and targeted groups of OA who were non-traditional treatment seekers. All of the RCTs were effectiveness trials (testing interventions in a real world context). As with most effectiveness trials, these studies had limited internal validity (eg, few or no tests of protocol fidelity, no reported tests of interventionist competence and/or training), and the interventions themselves were variable or not always clearly defined. For example, in the PRISM-E study, each site could adapt the specific on-site intervention and choose the various specialty programs to which they referred.[57,59] On-site programs varied in the goals they encouraged for OA (moderation vs. abstinence), and specialty programs also varied in treatment philosophy (eg, CBT, 12-step).

Pre-to-post tests were implemented mostly with treatments at higher levels of care, with a few exceptions. These studies targeted primarily traditional treatment seekers—OA willing to enter treatment regardless of whether it was a specialized program for OA. There were only three studies with comparison groups—two compared completers vs. non-completers[67,69] and one compared the sample to a younger cohort.[71] Differential follow-up rates in these studies interfere with reliably comparing the groups.

Studies comparing mixed-age and age-specific treatments

Only two studies directly compared mixed-age and age-specific treatments, and both utilized samples from a veteran population.[75,76] The first study was a quasi-experimental study in which 33 participants in an age-specific outpatient treatment program were compared with 24 historical controls who had participated in the same treatment prior to the age-specific adjustments.[75] Adjustments included an emphasis on socialization and support, a slower pace of treatment and a less confrontational style than the mixed-aged program. Outpatient treatment was defined as once–a–week groups. Participants were followed during the one year of treatment. Results demonstrated significant differences between the two program types on outcomes, such that participants in the age-specific program were more likely to stay in and complete treatment and have fewer irregular discharges. In addition, while there were equivalent rates of relapse, age-specific participants were more likely to have successfully treated relapses.

A randomized comparison trial explored the differential effectiveness of age-specific versus mixed-age inpatient and outpatient treatments on 166 veterans.[76] Participants were randomly assigned to either the Older Alcoholic Rehabilitation (OAR) program or a traditional SAT program that emphasized confrontation.

OAR utilized a special inpatient unit and emphasized peer support, promotion of self esteem, and time-limited goal setting.[76] The philosophical approach of OAR was to be respectful of patients' ages, by calling them "sir" and to tolerate being called "girl" if it was not meant to be disrespectful.[76,] Reminiscence therapy was used to help participants emphasize past successes. Inpatient and outpatient groups were offered to both conditions with many overlapping topics. While actual abstinence rates were not reported, participants in the OAR program were 2.9 times and 2.1 times more likely at six and 12 months respectively to report abstinence than their traditional program counterparts. Abstinence rate also increased significantly as participant age increased. There were additional program-by-age effects, such that as participants' ages increased, those in the OAR program were increasingly more likely to report abstinence than those in the traditional program cohort. Finally, results demonstrated that OAR was more "productive" than traditional treatment, an index similar to cost-effectiveness.

Summary

While limited to two studies, findings suggest that age-specific treatments may work better with OA than mixed-age treatments. This is important given that OA generally have equivalent outcomes to younger cohorts in the mixed-age treatment studies. If treatments were adjusted for OA, they may be more efficient and improve outcomes. In these studies, the distinct age-specific components were an emphasis on building relationships and support, less confrontation, and an older-adult-only environment. While these studies did not examine specific attributes of or mechanisms within each of the treatment types, results point to potential mechanisms of action for what makes these treatments more effective for OA. Interestingly, since these two studies were published, research has shown that less confrontation is predictive of positive treatment outcomes across populations.[52]

Discussion

Several conclusions can begin to be drawn, with caution, from the findings of the above-described studies. First, OA presenting to SAT (ie, treatment seekers) are heterogeneous, with generally lower severity of alcohol problems than younger cohorts, even at

similar rates of alcohol dependence. Among treatment seeking OA, treatment, whether age-specific or mixed-age, generally works, yielding rates of abstinence comparable to general populations and younger cohorts. It also appears that with greater treatment exposure (higher dosage), regardless of level of care, OA a higher success rate. Finally, it is possible age-specific treatment may potentiate treatment effects for OA, potentially due to greater treatment engagement or retention.

Among non-treatment seekers, treatment was overwhelmingly provided via brief interventions in primary care settings as a part of randomized effectiveness trials. Among these studies, results were mixed, providing unclear directions for future practice and research. Overall, providing information and advice to OA about the potential hazards of heavy drinking appears to have benefit. Interestingly, there were no significant group differences between evidenced based practices (eg, motivational interviewing or similar techniques) and other more minimal interventions (eg, brief advice or information),[35,63] particularly through long-term follow-up. This may be due to internal validity or sample size issues. Those studies that found significant differences were often post-hoc analyses in which subgroups of the primary study sample were used.[60,61] This points to the possibility of a heterogeneous response to treatment and the potential for more efficient treatment matching.

The most commonly studied treatment for OA: outpatient treatment

Outpatient treatment (the subject of 11 studies) was the most common type of treatment investigated. Interestingly, few of the studies contributed knowledge about which treatments are most effective for OA and why. Mixed-age treatments were rarely described in detail, and no data regarding patient satisfaction or attributes of treatment that encouraged OA retention was provided. This absence of data proscribes an understanding of what might encourage or discourage OA mixed-age outpatient treatment involvement.

Of the age-specific outpatient treatments, none appear to have evolved beyond a pilot phase, despite the fact that the studies span three decades and utilize treatments adapted from their predecessors.[66,67,69] One can reasonably conclude that these treatments evolved over time in a community-based practice

setting; however, empirical evidence recounting this evolution is absent. This is particularly unfortunate given that two of the three studies found that these skills-based treatments yielded long-term rates of abstinence of 55%–74%. In addition, none of these studies compared the IG to a CG. Therefore outcomes should be interpreted with caution, as they are yielded primarily from studies utilizing a pre-to-post test or post-test only design. Lack of a comparison group prevents knowing whether these changes are the result of the treatment or the experience of participating in research.

Of all the outpatient treatment studies, there was only one randomized comparison trial that reported differential effects of outpatient psychotherapy for OA.[38] This study also provided evidence that skills-based treatment may be more effective than vocationally focused treatment among OA. Unfortunately, actual rates of abstinence or other outcomes were not reported, preventing further clinical interpretation and a point of comparison to other studies.

Other factors limiting synthesis of knowledge for OA

Methodological limitations of existing research prevent concrete conclusions to be drawn about OA response to SAT in several ways, as reviewed above. Two additional factors are important to note caused by both the unique attributes of this vulnerable population and historical context. First, among both treatment seeking and non-treatment seeking OA substance users, refusal rates to participate in research were high, greatly limiting the generalizability of the findings and our knowledge about all OA who may be in need of treatment. Recruitment was a major challenge for many of the above-described studies, which may explain the small sample sizes as well as the predominance of research occurring in real world contexts, in either treatment or non-treatment settings.

Second, only two[63,69] of the above-described studies included any participants who are Baby Boomers. While this was expected, it is important to use caution when applying knowledge gained studying previous generations to the current elderly and aging population. Cultural and historical contexts have impacted the Baby Boom generation in ways unique from any other generation, particularly in regards to substance use,[6,7] thus treatments for them may be differentially effective.

The role of age-specific treatment

Age-specific treatments aimed to enhance the treatment experience, its effectiveness for OA, and to encourage previously treatment-wary OA to seek help. Age-specific treatment was intended to address the distinct attributes of OA substance users, matching treatment with their unique needs. Many age-specific treatments made physical changes to the both the facility where the program was housed and the materials used in treatment. These accounted for physical and cognitive functioning deficits or limitations.

In addition to these practical accommodations, treatments addressed the life stage concerns, stressors, and vulnerabilities related to late life, such as addressing loneliness, grief, and loss. Some studies described above as well as others, collected data on the reasons for alcohol use among OA, justifying the choices in treatment topics. Loneliness and grief were among the reported reasons for use,[44,66,67,72] though the proportion of OA reporting these reasons was smaller than for other reasons in some studies. Social pressure, as a part of holidays or family occasions or "to be social," ranked among one of the most common reasons for substance use.[30,72] Notably, naturalistic, epidemiology studies of predictors of late life drinking problems also repeatedly show that social support for or against drinking greatly influences OA drinking.[78–80] Epidemiology studies also have found that OA who rely on avoidance coping are more likely to have late life drinking problems. These studies point to potential explanations as to why skills-based treatments may be particularly effective with OA.

Moving forward: the next generation of SAT for OA

Evidence from existing research on SAT for OA suggests that interventions work, yet there is no research to explain conclusively which works best or why. While treatments previously vetted with general population samples, such as MI, have been utilized with OA in community practice or adapted for effectiveness trials,[26,35,63] there are no laboratory or community-based RCTs of treatments with OA that have high internal validity in regards to treatment standardization and fidelity. While it may initially seem more practical to skip directly to effectiveness trials, particularly given the urgency of impending treatment

need, time and resources are being spent on studies that have yet to provide clear directions for honing existing treatments to improve efficiency or to create better treatment algorithms for OA.

The next generation of research studies on treatments for OA substance abusers must be multipronged. First, research with OA must include laboratory studies of existing evidence-supported treatments, such as motivational interviewing and cognitive behavioral therapy, with standardized treatments and high protocol fidelity. It is possible that these treatments do not work for OA with the same efficacy or in the same ways. For example, the aging process itself may differentially impact theorized mediators of change targeted by MI, such as motivation and self-efficacy to reduce drinking.[81,82] For some OA, a foreshortened sense of future may inhibit motivation to quit or essentially eliminate ambivalence about continuing to use substances. In addition, self-efficacy to reduce substance use may decline with age,[83,84] due to perhaps several unsuccessful attempts at recovery in the past or the perception that a limited ability to change is an unavoidable component of aging.[85]

Second, the next generation of research on SAT needs to expand knowledge about the impact of naltrexone and the efficacy of other potential medications. Current practice wisdom among gerontologists is to avoid using disulfiram (a.k.a. Antabuse), one of the most prescribed medications for treatment of alcohol use disorders, with OA due to their particular medical vulnerabilities. As such, there are currently fewer treatment options for OA interested in a medication treatment option. Related to this, future research on OA SAT should include exploration of combined treatments, such as use of naltrexone and skills-based treatment. While there may be some evidence to suggest that using medications in a combined treatment with psychotherapy may not enhance outcomes beyond psychotherapy alone among OA[77] and other populations,[86,87] combined treatment research contributes to knowledge about treatment decision making and potential algorithms for treatments for non-responding OA substance users.

Third, there has been a decade-old call among experts on OA substance users for mobile health interventions to be developed for and studied within an OA context.[88] Mobile health interventions could increase access to the health care system for OA who might otherwise avoid treatment due to stigma or isolation. Inexpensive and a potential powerful prevention tool, mobile health interventions are likely to be increasingly feasible as a more technologically savvy generation ages and the proportion of OA with smartphones grows.[89] Mobile health interventions are already being developed for and applied to OA across health behaviors, including substance use, but are still in nascent stages and as yet unpublished.[90]

Fourth, investigations must include identification of the mechanisms of action of treatments and change for OA. It is no longer sufficient to know whether a treatment/intervention works, we must also understand the how and why. In short, there are virtually unlimited options for the next generation of research on SAT for OA given that so little is known. From the research described above, guideposts indicating the most promising next steps for research potentially exist. Researchers can elect almost any arena to study and contribute important knowledge to the field and a healthcare system relying on the most current evidence at hand. The major challenges ahead are to implement quality research with few resources in relatively little time.

Author Contributions

This was an invited review. Conceived and designed the review: AK. Analysed the data: AK. Wrote the first draft of the manuscript: AK. Contributed to writing of manuscript: AK, PS. Agree with manuscript results and conclusions: AK, PS. Jointly developed the structure and arguments for the paper: AK, PS. Made critical revisions and approved final version: AK, PS. All authors reviewed and approved of the final manuscript.

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