

Mini Review

A Systematic Review of Treatment Modalities for Alcohol Use Disorder

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Submitted: 24 September 2014

Accepted: 04 December 2014

Published: 06 December 2014

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Abstract

Currently, there is an increasing recognition of the importance of treatment for alcohol use disorder, and how this condition has major impacts on a large percentage of the population. Given current economic conditions, the move from inpatient treatment to outpatient treatment, and several different recommended approaches, it is appropriate to review the range of treatment available for alcohol use disorder to determine if there can be a single recommended treatment approach.

Detoxification is the initial step toward recovery, and may be accompanied by brief interventions to effect changes in alcohol use through the harm reduction approach. For some individuals, this may be the final form of therapy while others will engage in therapy that increases in duration and intensity through a stepped care approach.

From this review it is clear that there are multiple possible treatment modalities for alcohol use disorders. These include programs focusing on elements of social control, behavioural economics, behavioural choice, social learning, and stress and coping mechanisms.

In addition, the length and duration of therapy varies; however, elements of motivational interviewing (MI), motivational enhancement therapy (MET), cognitive behavioural therapy (CBT), and mindfulness meditation (MM) are found in brief interventions during detoxification, harm reduction approaches, inpatient and residential care programs, and self-help programs. These therapies enable the individual to restructure their thought processes, perception of events, and enhance coping skills and self-efficacy. However, the research data for all of these proposed approaches is relatively limited, certainly in terms of frequent studies demonstrating significant improvements in abstinence at 12-months or longer.

Nonetheless, despite a large variety of options, the current research evidence is not strong enough to identify optimal treatment strategies for diverse populations. For example, when discussing alcohol dependence, it is unclear what components of a treatment pathway are necessary and sufficient to produce positive outcomes for specific populations. Long term prospective studies including sustained remission as an outcome for each approach are lacking, with most literature reporting outcomes within the first year post-treatment. In addition, studies on alcohol use disorders do not always incorporate a control or comparator groups. Variations in design and demonstrated difficulties in reproducing results across study sites further contribute to the challenge of developing treatment guidelines from available research.

INTRODUCTION

Alcohol use disorders are a major health concern that challenge affected individuals and society in general. Large numbers of individuals in the developed world exceed research generated ranges for low-risk alcohol consumption, and this is associated with an increased prevalence of chronic conditions such as liver disease and cancer, as well as acute outcomes

such as injuries and need for emergency medical assistance for alcohol toxicity [1,2]. In addition, higher-risk alcohol use leads to increased rates of social issues such as fetal alcohol spectrum disorder, motor-vehicle collisions, violence, and crime [2,3].

Many interventions have been created for alcohol use including inpatient, outpatient and residential treatments with a variety of theoretical bases [4-12]. Understanding the

theoretical approaches used in treatment allows for a discussion of the empirical management practices that may be a part of typical care pathway from initial detoxification to long-term relapse prevention. Inevitably, the undertaking of this review is to determine if current research is capable of recommending optimal approaches to treatment that assist in resolving alcohol use disorders.

METHODOLOGY OF REVIEW PROCESS

Multiple databases were searched for appropriate publications through the University of Alberta library. Databases include: MEDLINE, Social Sciences Citation Index, Science Citation Index, CINAHL Plus with Full Text, FRANCIS, Academic OneFile, SocINDEX with Full Text, Science Direct, and Dynamed. Additionally, a manual search of publications that had the words "Alcohol" or "Addictions" in the titles was carried out. Keywords searched for were outpatient, inpatient, substance use, day hospital, inpatient care, 12-step, treatment, remission, abstinence, alcohol use disorder, Alcoholics Anonymous, and recovery. In total, these searches yielded over 1 million results.

Study Selection

Research studies in the form of meta-analyses are included in this systematic review, specifically those published within the timeframe of 2000 to October 2014. In addition, inclusion criteria comprised of studies specifically focusing on adult alcohol use disorder and those studies with a control or comparator group.

Studies that were excluded were those involving substances other than alcohol; studies that were not meta-analyses; complex high needs populations (i.e. homeless, domestic abuse, pregnant, co morbid medical/mental health); studies involving college students; studies in youth 18 years of age and under. In addition, studies without a comparator group were also excluded.

Based on our inclusion and exclusion criteria we found 3 meta-analyses to form the basis of our systematic review.

Alcohol Use Disorder Definition

Developing an appropriate treatment pathway in part depends upon defining the condition being treated; however, described features of alcohol use disorders vary between diagnostic systems. The following is a brief review of current and recent criteria, but it is important to note that the use of a different diagnostic system can influence research on outcomes. The similarities and differences are shown in Table 1.

The latest revision to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) released in 2014, collapses the categories of alcohol dependence and abuse into a single entity – previously separate in DSM-IV [13-15] (Table 1). The committee developing the DSM-5 combined all 11 facets of dysfunctional alcohol use to simplify diagnosis with focus on enhancing accuracy. In this new edition the individual must meet two or more criteria to be diagnosed with an alcohol use disorder and the severity of the substance use disorder is determined by the number of criteria that are met. The other major psychiatric diagnostic system in use worldwide is the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) [16]. This diagnostic tool shares most cluster criteria detailed in the DSM-IV-TR (Table 1).

Harmonizing the different diagnostic systems can result in a general description of an alcohol use disorder as a condition, characterized by the frequent and compulsive need to consume alcohol with associated maladaptive behaviour patterns and functional impairment that may affect employment, school, and interpersonal relationships.

In terms of remission, early remission is defined as having between 3 – 12 months without symptoms of alcohol use disorder (except craving), and sustained remission as having at least 12 months without meeting diagnostic criteria (except craving) [17-20]. Outcomes in research trials ideally should include both early and sustained remission; however, often studies are limited in their assessment of symptoms and/or their duration of follow-up.

Treatment Approaches for Alcohol Use Disorder

It has been suggested that treatment programs for alcohol use disorders are more successful if they incorporate primary social and psychosocial concepts that normally avert engagement in substance abuse [19,21,22]. Fundamental concepts promoting adaptive behaviour and resiliency, including social control, behavioural economics/behavioural choice, social learning, and stress and coping models, may best enable effective resolution of substance use disorders. It is therefore helpful to understand the similarities and differences between these theories before discussing treatments.

Social Control Theory

Social control theory views conventional societal rules as motivation for individuals to consistently demonstrate adaptive and prosocial behaviour [22-24]. Treatments for alcohol use, that incorporate elements of social control theory, often focus on developing a bond or support network for the individual [24,25]. This bond may allow for the development of strong motivation to play a supportive and cooperative role within society while abandoning past antisocial and deviant values such as substance use. A firm sense of monitoring and structure is required for social control to ensure that inevitable regressions are identified and modified efficiently and accurately [26]. Treatment programs that incorporate monitoring and structure may enable acquisition of conventional societal rules more rapidly than treatment programs that lack supervision.

Behavioural Economics/Behavioural Choice Theory

Behavioural economics or behavioural choice theory is based on the assertion that an individual's rational choice is grounded on seeking attractive rewards and outcomes from behaviour [27,28]. Under this model, a lack of engagement in protective and prosocial activities is a significant contributor to any form of deviance, including substance use disorders, and personal choice dictates relative value of behaviour [22,27]. When behavioural economics is applied to alcohol use disorders, involvement in spiritual or religious groups, sports, career, education or other goals provide the individual with the opportunity to choose to connect in prosocial activities while reducing the probability of exposure to substance use [29,30]. Further, the core reasons that individuals engage in alcohol misuse are thought to be lack of alternatives that provide comparable reward, limited exposure

to prosocial environments, personal preferences, and value appraisal [22,29].

Social Learning Theory

Social learning theory proposes that behaviour is the result of an interaction between the individual's environment, experiences, and past behaviour [31,32]. Treatment based on social learning theory focuses on environmental observation and imitation of behaviour as processes needing modification [31]. Alcohol use continues by means of behaviour that is socially influenced, and similarly, abstinence will occur if promoted through social means [33-35]. Alcohol use treatment programs targeting maladaptive thought patterns or cognitive scripts associated with usage may attempt to restructure the individual's attention, observation and subsequent imitation of deviant behaviour.

Stress and Coping Theory

Stress and coping theory suggests that harmful use of substances is the result of feelings of estrangement and distress stemming from work, school, family and friends [22,36]. Individuals who have low self-confidence or do not have appropriate coping skills when dealing with problematic situations are more likely to resort to substance use as an escape from undesirable feelings [22,37,38]. Adversity, such as various forms of abuse and other trauma may lead to self-medicating through substance abuse, particularly alcohol use [40-42]. Treatment approaches that target an individual's coping mechanisms provide alternatives to current reactions to life [21,22,36]. This is typically done through drawing attention to situations that are high risk and reshaping responses in order to build self-efficacy and self-confidence [22,36,42].

EMPIRICALLY SUPPORTED TREATMENT MODALITIES

There are a number of treatments for alcohol use that incorporate aspects of these theoretical concepts. Some of these modalities are empirically supported and can occur along the longitudinal course of treatment.

Detoxification and pharmacological treatments

The initial step toward abstinence from alcohol use often begins with detoxification and involves pharmacological approaches [43-46]. Detoxification is the removal of harmful toxins such as alcohol, opioids, or other substances from the body in order to establish a baseline of temporary abstinence [43,45].

Naltrexone, acamprosate, and disulfiram are among the most widely used medications for prevention of relapse of alcohol use, as well as being used along with benzodiazepines for initial treatment during detoxification [46-52]. Naltrexone is an opiate antagonist that may be used in the long-term treatment of alcohol dependence. It is thought to reduce alcohol consumption by decreasing cravings and blocking associated feelings of euphoria [47,53-55]. Acamprosate reduces the severity of the symptoms of withdrawal that often accompany alcohol dependence [47,51,54]. Disulfiram impedes the metabolic processes that break down alcohol in the body. As such, an aversive reaction occurs when alcohol is consumed [54]. Disulfiram is used in cases of chronic alcohol consumption and in situations in which avoiding alcohol

may be challenging, such as special occasions [54], and shows promise of treating individuals with concomitant psychiatric conditions [56].

A meta-analysis of 64 randomized, placebo-controlled clinical studies on naltrexone and acamprosate, conducted over a span of 39 years (1970-2009), found both medications to be efficacious in the treatment of alcohol use disorder; however, each medication targeted different alcohol-related outcomes [57]. Using Hedge's *g* value, the effect size of naltrexone was compared with acamprosate on four alcohol-related outcomes: abstinence, heavy drinking, craving, and heavy drinking + craving. Results on abstinence indicate that acamprosate had a larger effect size (0.359), and more positive impact, than naltrexone (0.116); however, naltrexone had a larger effect size (0.189) on reduction of heavy drinking in comparison to acamprosate (0.072). Similar effects sizes are reported for craving outcomes: 0.144 and 0.034 for naltrexone and acamprosate, respectively. In addition, combining the two alcohol-related outcomes, heavy drinking + craving, naltrexone demonstrated a more positive impact than acamprosate (0.180 and 0.041, respectively). In essence, neither medication can be used to treat the full spectrum of alcohol-related outcomes, but evidence from this meta-analysis promotes the use of naltrexone to moderate heavy drinking and craving, while acamprosate is better suited to moderate abstinence. This study has a few limitations: most trials on naltrexone took place in the United States, while most trials on acamprosate took place in Europe and demographic factors may have produced biases in the literature. In addition, all individuals were receiving some form of psychotherapy, meaning trials did not have a pure no-treatment control group. This, too, may have produced results that could have affected overall outcome measures.

Brief alcohol interventions

Brief alcohol interventions (BAI) are intended to encourage harm reduction in individuals who are engaging in high risk alcohol consumption [58,59]. Traditional therapy and counselling is a long-term process; however, BAI are short "one-on-one" sessions that focus on reduction of alcohol consumption rather than abstinence as the primary goal [58]. This short duration, combined with a more acceptable approach to continued drinking, provides at-risk individuals with knowledge and tools to change their consumption [59,60] (Figure 1). BAI is an opportunity to motivate clients to move along the path from contemplating change to developing an action plan by educating them on the harms associated with consumption of alcohol, including personal and social hazards [59,60] (Figure 2). Stepped-care interventions for alcohol use often begins with brief interventions, and these increase gradually in both duration and intensity depending on the progress of the individual [61].

To understand the impact of BAI on alcohol use disorders, we examined a meta-analysis of 34 studies comparing BAI to a control group (non-treatment seeking), and 20 studies comparing BAI to extended treatment [62]. These studies incorporated brief interventions with no more than 4 sessions; however the criteria for extended treatment was not provided. When comparing BAI to no treatment, a small to medium effect size (aggregate: 0.14 - 0.67) was noted toward the positive impact of BAI on alcohol-related outcomes (number of drinks, days abstinent, problems as

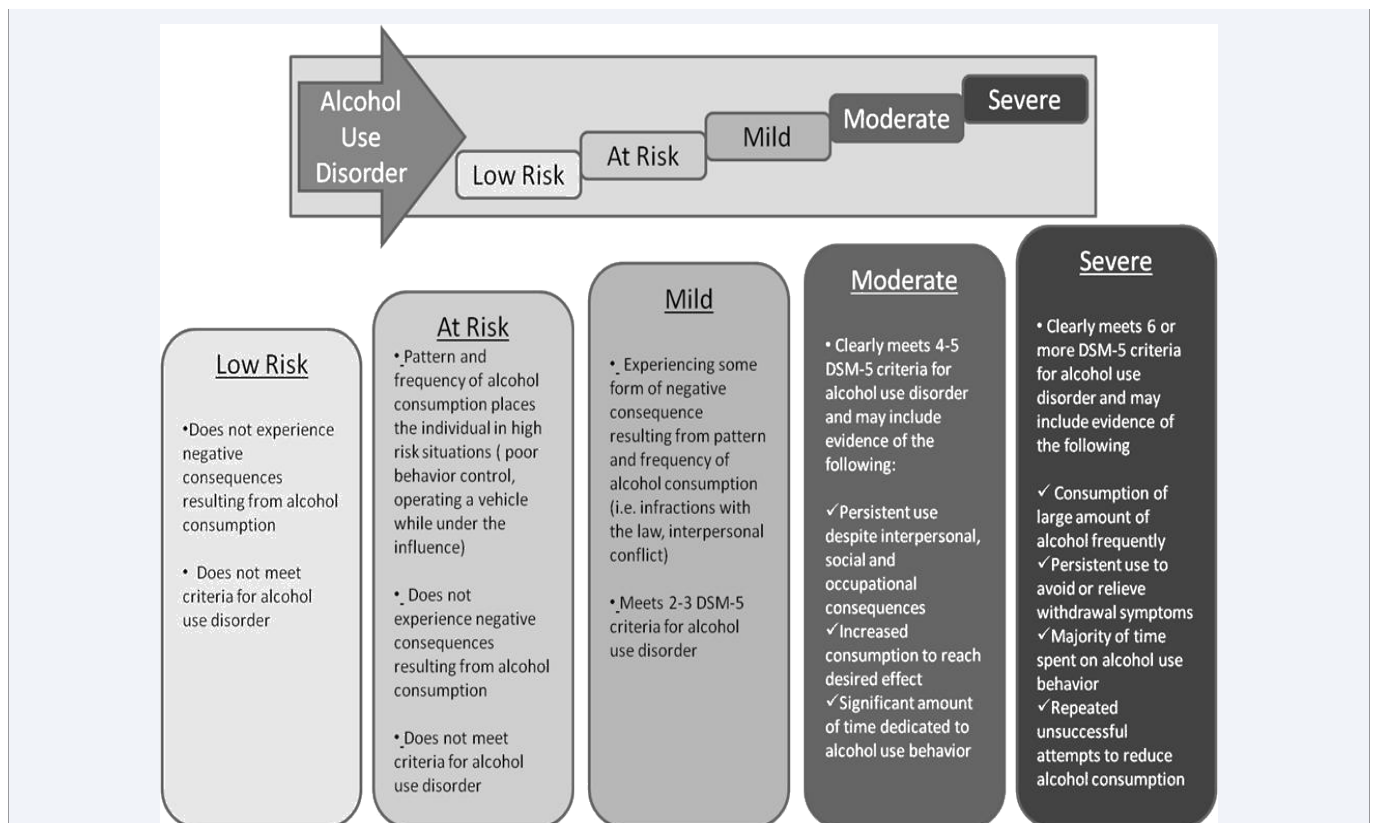


Figure 1 DSM-5 Criteria for Alcohol Use Disorder Continuum of Severity. This figure depicts the criteria for alcohol use disorder on a continuum based on the severity of symptoms. The number of symptoms present indicates the level of alcohol use disorder.

a result of drinking, dependence symptoms). At 3 month follow-up and beyond, BAI continued to increase in effect size, however, not for individuals with severe alcohol use disorders. In contrast, comparing BAI with extended treatment, no significant effect size was noted shortly after treatment; however at the 3 – 6 month follow-up, extended treatment demonstrated a higher effect size (0.42) for reduced consumption of alcohol, indicating a positive impact outweighing BAIs. For the other alcohol-related outcomes, the effect size (0.06) between BAI and extended treatment are relatively homogeneous. Although insightful, this meta-analysis is difficult to generalize because populations sampled may not be diverse or representative and the components of each BAI and extended treatment trial are highly heterogeneous. In addition, focusing on optimal duration (time/number of sessions) of BAI in future meta-analyses will benefit this area of research greatly.

Harm reduction and low-threshold interventions

The harm reduction, or controlled drinking approach, is an extension of some forms of brief alcohol interventions although, for some, this approach may be the final form of therapy. The unique component of this approach is the tolerance for continued involvement in undesirable behaviours, such as alcohol use [63]. Proponents of harm reduction believe human habits exist on a continuum and the shift from severe and harmful habits to neutral and positive habits occurs gradually, varying based on individual goals and preferences [64-65].

While harm reduction as a principle allows for decreased negative consequences and provides an alternative to abstinence-based programming, solid evidence of effectiveness is lacking [58,66,67]. Our search for meta-analyses on this topic yielded 19 studies for harm reduction and 431 for controlled drinking. Only one meta-analysis attempted to specifically examine the effects of controlled drinking (termed managed alcohol in this study) on alcohol-related outcomes, such as dependence symptoms, or problems as a result of alcohol consumption (i.e. legal, family, employment, interpersonal relations); however, out of the 22 eligible studies, 21 did not provide a comparison with managed alcohol programmes, 1 included participants under the age of 18, and one did not evaluate managed alcohol modalities [68]. Randomized controlled trials or controlled trials evaluating the effect sizes of managed/controlled drinking compared to no-treatment, and traditional abstinence programs are needed, but where ethically possible. Meta-analyses and systematic reviews on this topic will allow for accurate data synthesis, and possibly the ability to provide a recommendation based on effect sizes reported.

OUTPATIENT TREATMENT

Outpatient treatment services for substance use disorders are very similar to inpatient and residential programs; however, the central difference between the two is the structure and environment in which programming is implemented [69]. Unlike residential care, outpatient programs allow the individual to

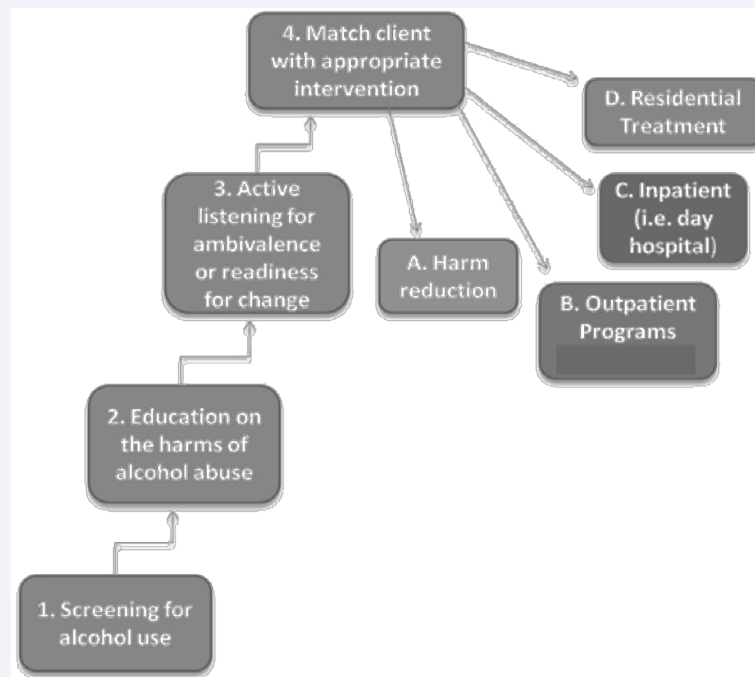


Figure 2 Screening for alcohol use.

engage in daily treatment for substance abuse while maintaining responsibilities to family, employment and education. The flexibility to attend outpatient sessions offers relative anonymity and may be an attractive feature.

Outpatient care does not have the same structure as residential programs, which remove the individual from their environment and consequently reduce potential triggers that promote substance use [69-71]. Personal responsibility, self-efficacy and self-confidence are personality factors that may be required to continue toward successful recovery despite remaining in one's environment.

Beyond structural and environmental features, psychosocial components for outpatient and residential care modalities are relatively similar [72]. In both approaches, individuals participate in self-help support groups such as Alcoholics Anonymous (AA) and individual counselling with elements of cognitive behaviour therapy, motivational interviewing and enhancement, mindfulness meditation, contingency management and community reinforcement strategies [73,74]. Peer support and counselling are integral components aiding recovery from substance use in both residential and outpatient programs allowing individuals to learn prosocial and adaptive life skills promoting sustained sobriety.

The flexibility and anonymity of outpatient care services may be an appealing alternative to residential treatment; however, some studies find outpatient services to be ineffective for individuals with more severe forms of alcohol use disorder involving higher rate of craving [75]; while in other studies, individuals with severe alcohol use disorder demonstrate successful outcomes [76]. Personal factors such as motivation to change, social stability and concomitant psychiatric conditions

appear to influence differing outcomes noted in these studies [75-77].

INPATIENT AND RESIDENTIAL TREATMENT

Inpatient care involves detoxification for individuals who are dependent on substances, such as alcohol, and have been unsuccessful at practicing abstinence and achieving sobriety through outpatient services [44,70]. Inpatient care has the added benefit of removing the client from their environment, which avoids unnecessary triggers and subsequent relapse while incorporating psychosocial treatments to help regulate alcohol consumption [70,71]. Inpatient modalities often view substance use disorders through a medical lens and may provide pharmacological methods paired with brief interventions and are usually used in conjunction with general or psychiatric hospital admissions [72].

Residential treatment programs, like inpatient services, remove individuals with substance use disorders from their environment but for a longer duration ranging between 21 days to one year. Positive outcomes of residential treatment include: increased rate and duration of abstinence; lower unemployment rates; reduced use of medical services for emergencies; and reduced interactions with law enforcement [70].

In a recent review we have examined outcomes (Hamza and Silverstone, personal communication), comparing outpatient treatment to that of inpatient/residential treatment. We did not find any significant differences in outcomes for most groups, with the only consistent factor for successful outcomes being the length of time individuals remained in a program: in general the longer the time the better the outcome. This generalized statement about treatment duration should be viewed with caution. Studies on alcohol use disorder do not follow a standardized format and

the heterogeneity of methodology, including outcome measures of interest, challenges accurate synthesis of available data. Meta-analyses and systematic reviews focusing on alcohol-related outcomes, such as abstinence or dependence symptoms, for inpatient and outpatient care settings are needed (and based on severity of alcohol use disorder) in order to evaluate the appropriateness of treatments based on client characteristics.

Psychosocial modalities

Cognitive behaviour therapy: Cognitive behaviour therapy (CBT) views maladaptive behaviour patterns as the result of inaccurate and distorted patterns of thought [53,78]. Social learning is the theoretical basis for CBT in which the individual has learned alcohol using behaviour and has developed positive cognitions associated with use [22].

One meta-analysis evaluating the effects of CBT on alcohol and illicit drugs was found; however many of the studies incorporated a higher proportion of cocaine and opiate users than individuals with alcohol use disorder. Studies investigating the influence of CBT on alcohol-related outcomes will benefit from comparing an experimental group (CBT) with a no-treatment control group.

Motivational interviewing and enhancement therapy: Motivational interviewing (MI) allows the client and therapist to establish a working alliance through positive regard; empathy and support in order to examine the client's feelings of uncertainty toward changing their behaviour, including substance use [79,80] (see Figure 3).

Incorporating feedback in the form of counselling; recognition of personal responsibility; providing advice and options for change; and promotion of self-efficacy are core components of the assessment process that is not usually involved in MI [53,79]. The inclusion of an assessment component to MI, otherwise known as "drinker's check-up," in combination with principles of motivational interviewing, creates the counselling approach known as motivational enhancement therapy (MET) [79-81]. Motivational enhancement therapy (MET) encourages alcohol users to move toward harm reduction or abstinence [53].

Our search for meta-analyses on MI or MET yielded 1 result, however this study encompassed all addictions and was not specific to alcohol alone. Future studies implementing a control group and disseminating critical factors or components of MI/MET encouraging positive alcohol-related outcomes would be beneficial.

Twelve Step Facilitation - Alcoholics Anonymous: Many self-help approaches to substance use disorders are modeled after Alcoholics Anonymous (AA) in the format of twelve-step facilitation (TSF) [22,53]. TSF views substance use disorders as a disease rather than a condition that can be reduced and eliminated through modification [82]. These approaches emphasize avoidance of alcohol use through meeting attendance, requesting assistance, finding a senior member to be a mentor through the process, engaging in social groups, and focusing of physical health [82]. AA and other TSF programs provide

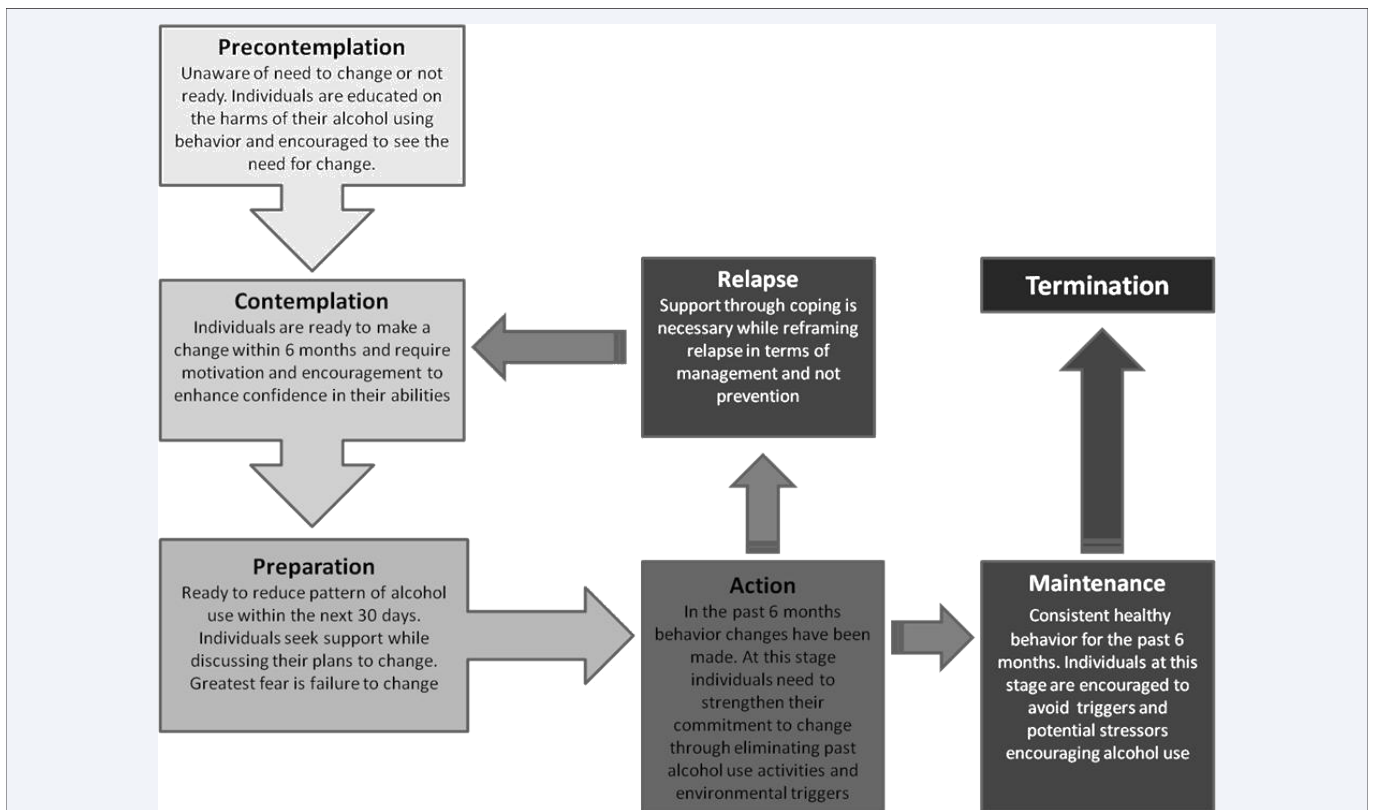


Figure 3 This figure is of Prochaska's stages of change model which can be related to the process of changing alcohol misuse behaviors during treatment for alcohol use disorder. Brief interventions have been found to be an effective initial step in treatment, encouraging individuals to move from the Precontemplation stage into the contemplation stage of change.

peer support for those with substance use disorders through a cooperative fellowship, while encouraging healing through identification with the inner addict and submitting oneself to a "higher power" [22,53,83]. The only requirement to participate in AA is the desire to be sober and learn positive life skills from the bonds established through the AA fellowship [84]. Further, AA caters to diverse populations, implements simple language to ensure relative ease in understanding program content and offers free membership to everyone [82,84]. The formation of strong bonds with similar peers, sponsorship, and attendance at regular meetings are engaged in at a personal pace and are key aspects of TSF [82,83,85]. Some research studies have suggested that TSF treatment is comparable to MET and CBT in promoting abstinence [22,85].

However, there are many criticisms of TSF approaches. For example, it has been suggested that admitting the disease of alcohol use disorder may degrade one's already low level of self-confidence and self-esteem [62,82]. Further, identification with the disease may discourage individuals to seek assistance in achieving sobriety. Another criticism of TSF is the definitive meaning of spirituality within this program. A commonly cited example is that AA places fundamental importance on submitting to a higher power, which one may assume is God [53,83]. In some cases, assumptions related to the core idea of relinquishing power to a higher power produces a barrier for health care workers when recommending treatment programs for clients [82,83]. It appears reluctance to refer non-Christian individuals to TSF programs is related to the incompatibility with core features of this treatment modality [83]. When discussing the elements of TSF treatment, some researchers include religiosity in their description [22]. This is further complicated as AA literature claims to promote a broad idea of spirituality, yet incorporates specific religious practices, such as the Lord's Prayer or Serenity Prayer at the end of sessions [83]. As such, some categorize AA as a quasi-religion, and therefore not consistently applicable to diverse populations. Another criticism of the need to submit to a higher power is that in doing so one becomes powerless. For many individuals with substance use disorders, relinquishing power may be associated with trauma experienced in the past, creating additional feelings of victimization and helplessness.

A current meta-analysis evaluating the outcomes of randomized and nonrandomized involvement in AA is warranted in order to gauge the impact of this self-help modality.

CONCLUSION

There exists an abundance of literature regarding treatment modalities for alcohol use disorders.

It is difficult to apply results from individual studies to develop optimal treatment strategies for diverse populations. For example, when discussing alcohol use disorders, it is unclear what components of a treatment pathway are necessary and sufficient to produce positive outcomes for specific populations. Long term prospective studies including sustained remission as an outcome for each approach are lacking, with most literature reporting outcomes within the first year post-treatment. In addition, studies on alcohol use disorders do not always incorporate a control or comparator group. Further, many studies

implement self-reporting measures decreasing the validity and reliability of data collected while increasing the potential for social desirability bias. Variations in design and demonstrated difficulties in reproducing results across study sites contribute to the challenge of developing treatment guidelines from available research. Future studies may benefit from the creation of a standardized methodology for evaluating treatments for alcohol use disorder which will enable accurate and systematic comparison of variables impacting outcome.

Given the prevalence of alcohol use in the general population, clarification of effective care pathways in the treatment of alcohol use disorders remain necessary, and have the potential to positively impact both individuals and society. Unfortunately, current research limitations are such that it is not possible to determine the most effective forms of treatment.

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Cite this article

Hamza DM, Silverstone PH (2014) A Systematic Review of Treatment Modalities for Alcohol Use Disorder. *J Subst Abuse Alcohol* 2(3): 1023.