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#### Systematic Review of SMART Recovery:

Outcomes, Process Variables and Implications for Research

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#### ABSTRACT

Clinical guidelines recommend Self-Management and Recovery Training (SMART Recovery) and 12-step models of mutual aid as important sources of long term support for addiction recovery. Methodologically rigorous reviews of the efficacy and potential mechanisms of change are available for the predominant 12-step approach. A similarly rigorous exploration of SMART Recovery has yet to be undertaken. We aim to address this gap by providing a systematic overview of the evidence for SMART Recovery in adults with problematic alcohol, substance and/ or behavioral addiction, comprising a commentary on outcomes assessed, process variables, feasibility, current understanding of mental health outcomes and a critical evaluation of the methodology. We searched six electronic peerreviewed and four grey literature databases for English language SMART Recovery literature. Articles were classified, assessed against standardized criteria and checked by an independent assessor. Twelve studies (including three evaluations of effectiveness) were identified. Alcohol related outcomes were the primary focus. Standardised assessment of non-alcohol substance use was infrequent. Information about behavioral addiction was restricted to limited prevalence data. Functional outcomes were rarely reported. Feasibility was largely indexed by attendance. Economic analysis has not been undertaken. Little is known about the variables that may influence treatment outcome, but attendance represents a potential candidate. Assessment and reporting of mental health status was poor. Although positive effects were found, the modest sample and diversity of methods prevents us from making conclusive remarks about efficacy. Further research is needed to understand the clinical and public health utility of SMART as a viable recovery support option.

Keywords: Systematic review; SMART Recovery; Mutual Aid; Self-help groups; Addiction Protocol Registration: PROSPERO CRD42015025574

#### BACKGROUND

The burden of addiction is considerable, with a profound and detrimental impact on mortality (Whiteford et al., 2010), health, relationships, employment and quality of life (Black, Shaw, McCormick, & Allen, 2013; Laudet, 2011). Together, the harms from alcohol, substances and behavioral addictions such as gambling have been estimated to cost over \$28 billion per year (Australian Government Productivity Commission, 2010; Manning, Smith & Mazerolle, 2013). As the course of addiction is often chronic and characterised by multiple relapses (Sheedy & Whitter, 2009), accessible, long term support is important.

'Mutual aid' programmes represent one avenue for accessing such support. 'Mutual aid' refers to the social, emotional and informational support provided by, and to, group members undergoing recovery from addiction (Public Health England, 2015). Twelvestep models (e.g. Alcoholics Anonymous) are the largest and most researched source of addiction mutual aid. Within the 12-step model, addiction is conceptualised as a medical and spiritual disease and a key feature of the recovery process is relinquishing control to a userdefined higher power (Donovan, Ingalsbe, Benbow & Daley, 2013). For adults with moderate/ severe alcohol use disorder, evidence suggests that improvement following community 12-step participation is at least equivalent to that of professional interventions (Ferri, Amato, & Davoli, 2006; Humphreys et al., 2004; Kelly, Magill, & Stout, 2009), and in the longer term, active participation increases the likelihood of full sustained remission and recovery (Moos & Moos, 2006; Public Health England, 2015). However, individuals may fail to engage with 12-step groups, for a variety of reasons including a mismatch between personal beliefs and the 12-step philosophy (Horvath & Sokoloff, 2011). To enhance engagement, clinical guidelines advocate for tailored addiction support that accounts for individual needs and preferences (e.g. NICE, 2012; NICE, 2011). Choice over mutual aid

support options is therefore important and fortunately, alternatives are available (see Humphreys et al., 2004 for a review).

One such alternative is Self-Management and Recovery Training ("SMART Recovery"). SMART Recovery is one model recommended alongside 12-step by clinical guidelines for both addiction (NICE, 2012; NICE, 2011) and dual diagnosis (Mills et al., 2010). SMART Recovery is a not-for-profit organisation that provides mutual aid in group and on-line formats (Horvath & Yeterian, 2012). SMART Recovery focuses on selfempowerment and adopts key principles (e.g. self-efficacy) and therapeutic approaches (e.g. motivational interviewing and cognitive behavioural therapy) shown to be effective in promoting recovery from addiction (see Australian Psychological Society, 2010 for a recent review of the efficacy of these approaches). Unlike 12-step approaches that offer addiction specific support groups (e.g. alcoholics anonymous, narcotics anonymous, gamblers anonymous), SMART Recovery offers support for a range of addictive behaviours (Horvath & Yeterian, 2012).

#### OBJECTIVES AND IMPORTANCE OF THE CURRENT REVIEW

Relative to the methodologically rigorous systematic reviews of the efficacy (Ferri et al., 2006) and potential mechanisms of change (Kelly et al., 2009) of 12-step models, to date, reviews of SMART Recovery (e.g. Horvath & Yeterian, 2012) are narrative in nature and tend to focus on the origins, development and principles of SMART Recovery. A systematic approach to identifying, summarising and evaluating the quality of evidence for SMART Recovery has yet to be undertaken. Furthermore, since Horvath's 2012 narrative review, the evidence base has doubled - an additional four studies have been published including the first randomised controlled trial (RCT).

The current review is reported here following established guidelines for conducting systematic reviews (Moher, Liberati, Tetzlaff & Altman, 2009). We advance the current

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literature by using an established methodology (Higgins & Green, 2011) to provide a comprehensive, systematic overview and critical evaluation of both published and unpublished evidence for SMART Recovery and include recommendations for future research. We aim to explore whether, for adults with experience of substance and/ or behavioral addiction(s), SMART Recovery results in changes in the severity of addiction and its consequences and whether any observed changes are influenced by process variables (e.g. treatment engagement). To help guide our understanding of the applicability of these research findings to 'real world' settings, we will also describe the feasibility of the SMART Recovery approach, including a commentary on economic outcomes and service user satisfaction. To better inform research and clinical care, we will also describe the treatment contexts and clinical presentations of participants (e.g. addiction only vs. dual diagnosis). Given not only the high prevalence, but also considerable impact of comorbid mental health conditions on addiction recovery (Mills et al., 2010), the assessment and/ or change in mental health status reported within the research on SMART Recovery will also be discussed.

#### **METHODS**

The current systematic review is exempt from review by a Research Ethics Committee/ Institutional Review Board as no primary data collection was undertaken from study participants.

Criteria for Selecting Studies for this Review:

Methods were informed by Cochrane Guidelines for systematic reviews (Higgins & Green, 2011) and are extensively detailed in the review protocol (Beck et al., 2016). The population of interest was adults (aged  $\geq$  18) attending SMART Recovery with current or past problematic experience of at least one addictive behavior (substance and/ or behavioral). Study participants could be residing in community, rehabilitation, treatment and/or correctional settings. The intervention of interest (SMART Recovery), could be delivered in a

group format, of any intensity or frequency (including stand alone and/ or as an adjunct), by a lay or professional facilitator. SMART Recovery could be compared to inactive and/ or active conditions of any intensity, frequency and delivery method. Evaluations without a comparator group were also eligible. Studies had to provide data for SMART Recovery participants for at least one of the following: a) severity of addiction and its consequences, b) process variables (e.g. treatment engagement) or c) feasibility (see Beck et al., 2016 for definitions). We included the following designs: randomised controlled trials (cluster and parallel design); cross-over trials; case series or case controls; one-arm trials; non-randomised trials; crosssectional or cohort studies and case reports. Qualitative only designs were not included.

#### Search Methods for Identification of Studies

Figure 1 summarises the procedure used to identify studies, including databases searched, search terms used, exclusion criteria and study classification. The full MEDLINE search strategy is provided in Online Supplementary File 1. Abstract, title, key words and subject headings specific to each database were searched. Subject headings were exploded. No limits were placed on publication year. Publications had to be available in English. Reference lists of identified publications were hand searched to identify any additional publications. All publications were organised in reference manager Endnote. The searches were performed in May-June 2015 and re-run in April 2016. Articles were identified and classified according to the following steps:

#### Step 1: Identification and Screening

The primary author performed the searches and reviewed the titles and/or abstracts of the identified 989 publications and used the inclusion criteria to exclude clearly ineligible articles. If eligibility was unclear, the full text article was accessed.

Step 2: Eligibility and Classification

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The full text versions of 118 publications were manually reviewed. Eighty-one publications were excluded. The remaining 37 were classified as 'evaluation', 'review', 'discussion' or 'other' according to published definitions (see Beck et al., 2016).

#### Step 3: Cross Checking.

The 118 publications from step two were cross-checked by having a research assistant (EF) blinded to the results of the initial classification, reclassify the publications. The articles excluded in step one were not cross-checked because they were not relevant to the review. The 12 studies independently classified by AKB and EF as 'evaluation' were retained for further examination.

#### Data Collection and Analysis

Data extraction was performed by AKB and checked by EF. Extraction forms were piloted on several papers and modified as needed before use. When multiple reports of the same study were identified (Brooks & Penn, 2003; Penn & Brooks, 2000) data from each report was extracted separately and then combined across multiple data collection forms. Criteria for data extraction (detailed in the protocol, Beck et al., 2016) were adapted from the Downs and Black Scale (Downs & Black, 1998) and the Cochrane Handbook for Systematic Reviews (Higgins & Green, 2011).

#### Assessment of Methodological Quality and Risk of Bias

Assessment of quality and bias was undertaken independently by AKB and EF. Downs and Black Scale

All non-randomised studies were evaluated using this 27-item checklist (which is recommended by the Cochrane Guidelines for assessing the quality of non-randomised trials; Higgins & Green, 2011). Consistent with previous concerns about the two items regarding blinding of subjects and therapists (e.g. Baker, Hiles, Thornton, Hides & Lubman, 2012) these items were not used. Scoring of item 27 (power) was unclear so the

following convention was used: 0=no power calculation reported; 1=power analysis reported, but insufficient power achieved and 2=power analysis reported and sufficient power achieved. Item ratings were summed for a total maximum score of 27, with higher scores reflecting greater methodological quality. Raters achieved 80.5% consistency in their initial independent ratings. Discrepancies were then resolved following discussion and consensus ratings obtained for all items.

#### PEDro Scale

The one RCT identified was also assessed against the 11 item Physiotherapy Evidence Database (PEDro) scale (Centre for Evidence Based Physiotherapy, 2009) - a widely implemented and validated tool for assessing the quality of randomised trials. Again, the two items regarding blinding were deemed inappropriate (e.g. Baker et al., 2012) and not scored. The remaining items were assigned a yes (1 point) or no (0 points) rating (Centre for Evidence Based Physiotherapy, 2009), generating a quality score from 0 to 8 points. Raters achieved 100% consistency in their independent ratings.

#### Cochrane Collaboration's Risk of Bias Tool

Risk of bias (within and across all studies) was assessed using the Collaboration's Risk of Bias tool (Higgins & Green, 2011). This tool provides an overall risk of bias ('high', 'low' or 'unclear') based on the following methodological characteristics: sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting and 'other' potential sources of bias. Raters achieved 89.2% consistency in their independent ratings. Discrepancies were resolved by discussion, and consensus ratings across all items obtained.

#### RESULTS

#### **Description of Studies**

Twelve studies were identified (8 published in peer reviewed journals, 4 unpublished

dissertations). The studies were predominantly cross-sectional (8 of 12). The effectiveness of SMART Recovery has been explored in one RCT (Hester, Lenberg, Campbell & Delaney, 2013), one pre-post design (described across two publications; Brooks & Penn, 2003; Penn & Brooks, 2000) and one quasi-experimental pseudo-prospective study (Blatch, O'Sullivan, Delaney & Rathbone, 2016). Concurrent mental illness and substance use disorder was the focus of only one study (described across two papers, Brooks & Penn, 2003; Penn & Brooks, 2000).

The SMART Recovery intervention and comparison condition was often poorly described. Intervention content and delivery methods were only clearly detailed for SMART Recovery informed or adapted interventions (Blatch et al., 2016; Brooks & Penn, 2003; Penn & Brooks, 2000; Hester et al., 2013). For community based SMART Recovery groups (and comparison conditions), assessment and/or reporting of SMART Recovery tools, strategies, content, delivery methods, facilitator experience and training was scarce. Thus, adherence to SMART Recovery guidelines was unclear. Assessment and reporting of concurrent treatment (including pharmacological and psychological) for addiction and/ or mental health was also lacking.

#### **Outcomes** Assessed

#### Severity of Addiction and its Consequences

The severity of addiction and its consequences tended to be assessed in terms of quantity, frequency and/ or duration of use. Other indices (e.g. number of hospitalisations and recidivism) were assessed in three studies (Blatch et al., 2016; Brooks & Penn, 2003/Penn & Brooks, 2000; Milin, 2007) and quality of life in only one study (Brooks & Penn, 2003/ Penn & Brooks, 2000). Despite high comorbidity between mental health conditions and substance misuse, standardised assessment of mental health status occurred in only three studies (Brooks & Penn, 2003/Penn & Brooks, 2000; Hester et al., 2013; Kelly,

Deane & Baker, 2015).

Alcohol related outcomes were the primary focus of the literature. However, only three studies utilised standardised assessment of alcohol use (Brooks & Penn, 2003; Hester et al., 2013; Milin, 2007). The remainder relied on subjective accounts, including self-reported duration of 'abstinence', 'sobriety' (Atkins & Hawdon, 2007; Guarnotta, 2015; Trumble, 2015) and 'problems' (Kelly et al., 2015; O'Sullivan et al., 2015). Only three studies explicitly reported on non-alcohol substance use (Brooks & Penn, 2003; Kelly et al., 2015; Milin, 2007). Within these, the focus was on illicit drugs, to the relative neglect of other common forms of substance use like smoking (reported only by Kelly et al., 2015) and misuse of prescription medication (reported only by Milin, 2007). Brooks and colleagues were the only authors to utilise a standardised clinical interview to assess non-alcohol substance use (Brooks & Penn, 2003). Theirs was also the only study to employ physiological verification of alcohol and/or substance use (urine analysis; Brooks & Penn, 2003/Penn & Brooks, 2000). The severity and impact of behavioral addictions has yet to be assessed, but two studies did provide limited prevalence data (Kelly et al., 2015; O'Sullivan et al., 2015).

#### **Process Variables**

Treatment engagement was the most common process variable assessed (10 of the 12), but only three studies explored its relationship to treatment outcome (Blatch et al., 2016; Brooks & Penn, 2003/ Penn & Brooks, 2000; Hester et al., 2013). Other process variables assessed included elements of the therapeutic process (e.g. readiness to change, group cohesion), locus of control, spirituality/ religiosity, self-efficacy, resilience, coping and social support, but few studies (Atkins & Hawdon, 2007; Bogdonoff, 2003; Guarnotta, 2015; Milin, 2007) explored the relationship between these and treatment outcome. *Feasibility* 

Feasibility tended to be indexed by attendance, including the number of sessions (Hester et al., 2013), duration of involvement (Brooks & Penn, 2003/ Penn & Brooks, 2000; Kelly et al., 2015; Li et al., 2000; Milin et al., 2007; O Sullivan et al., 2015) and proportion of participants accessing different types of mutual aid (Blatch et al., 2016). No studies assessed economic outcomes. Two studies (Milin, 2007; O'Sullivan et al., 2015) did report some qualitative data regarding satisfaction (Table 3).

#### Methodological Quality and Risk of Bias in Included Studies

The one identified RCT (Hester et al., 2013) received 6 from a possible 8 points using the PEDro Scale and 22 from a maximum 27 points using the Downs & Black Scale. The methodological quality of non-randomised trials varied considerably (see Table 2), with Downs and Black ratings ranging from 8-19.

The level of risk of bias is presented separately for each study in Figure 2 and as a combined assessment of ratings in Figure 3. Online Supplementary File 2 contains justification for each risk assessment. Hester et al. (2013) was the only study to report both appropriate sequence generation and allocation concealment, thereby, the only study assessed as having a low risk of selection bias. Masking of participants and providers in trials of psychological interventions is generally not possible, and therefore there was a high risk of bias in this domain. However Hester et al. (2013), Brooks et al. (2000, 2003) and Blatch et al. (2016) used objective outcome assessment and/ or collateral information, and were therefore deemed to be at low risk of performance bias. Risk of detection bias was assessed as low in only one paper (Hester et al., 2013) and three provided insufficient information to make a determination (Blatch et al., 2016; Brooks & Penn, 2003/ Penn & Brooks, 2000). Four papers adequately addressed attrition and missing data and were deemed low risk of attrition bias (Bogdonoff, 2003; Brooks & Penn, 2003/ Penn & Brooks, 2000, Hester et al., 2013), while the remaining eight provided insufficient information. Risk

of reporting bias was deemed low in ten studies, as all planned outcomes were reported (or an explanation provided) and post-hoc analyses were clearly specified.

#### SMART Recovery Participant Characteristics

A total of 7655 participants were recruited to the included evaluations (1177 SMART Recovery, 6478 comparison conditions). Baseline demographic and clinical characteristics of SMART Recovery participants are presented in Table 1. Mean age ranged from 34.2 to 51. The gender distribution (% males) ranged from 39% to 71%. The majority of participants were Caucasian. Between 25% and 82% attained at least college/ graduate degree level certification. Employment (full or part time) ranged from 30.7% to 63%. The proportion of individuals who were single or divorced ranged from 23% to 63.9%. The dual diagnosis population had fewer years of education (M=11.6 years education), were less likely to be employed (full or part time; 20.4%) and more likely to be single or divorced (80%). From the data available, mental health problems and impairment were common.

Average years of alcohol use ranged from 10 to 19.25 years. The majority of participants reported prior treatment and/or multiple quit attempts. The two studies that used the AUDIT at baseline both reported scores >20 (Hester et al., 2013; Milin, 2007), consistent with hazardous alcohol use and likely dependence. Amphetamines (7.3%) and marijuana (3.3%), were variously identified as the most common self-reported primary non-alcohol substance of abuse. Self-reported multi-drug use was as high as 70%. In one study, 24.4% of participants endorsed behavioral addiction (sex, pornography, food, spending) alone, or in combination with drugs and/ or alcohol (O'Sullivan et al., 2015). In another, food (10.5%), gambling (9.7%) and shopping (6.5%) emerged as the top three non-substance problematic behaviours (Kelly et al., 2015).

#### Effects of Interventions

A summary of key findings for the four types of comparisons identified (community SMART Recovery groups versus an online intervention, alone or in combination; SMART Recovery informed interventions versus active and/ or control comparison conditions; community SMART Recovery groups versus other forms of mutual aid and community SMART Recovery groups without a comparison condition) are presented in Table 2 and discussed in turn below.

### Summary of Evidence Comparing SMART Recovery to a SMART Recovery Informed Online Intervention (Alone or In Combination)

Hester and colleagues (2013) conducted the sole identified RCT and compared SMART Recovery to a SMART Recovery informed web application ('Overcoming Addictions'; OA), alone or in combination. At three month follow-up, SMART Recovery participants with a history of problematic alcohol use demonstrated significant improvement in all outcome measures (percent days abstinent, standard drinks per drinking day and alcohol related problems; Hester et al., 2013). The level of improvement did not significantly differ between treatment conditions (Hester et al., 2013). Although mental health symptoms were recorded at baseline (Mean BSI=19.35, SD=12.5), change across time was not assessed.

In the SMART Recovery Only condition, the number of meetings attended was identified as a significant predictor of improvement in all three primary outcomes (Hester et al., 2013). For the OA+SMART Recovery group the total amount of support (including SMART Recovery/ other meetings and counsellor visits) emerged as the strongest predictor of alcohol related change. Sixty eight participants allocated to the SMART Recovery Only group (70%) completed 3 month follow-up assessment. 58 (85%) of these 68 had attended at least two SMART Recovery meetings, defined by the authors as the threshold for being considered 'treated' (Hester et al., 2013). Of note, the authors had to abandon their original plan to randomise to an 'OA Only' condition as potential participants were unwilling to be

allocated to a treatment condition that would prevent them from attending SMART Recovery meetings.

#### Summary of Evidence for Interventions Informed by SMART Recovery

Two evaluations of face-to-face interventions informed by SMART Recovery were identified. Firstly, Brooks and colleagues (2000, 2003) used a pre-post design to compare an intensive, outpatient/partial hospitalisation adaptation of SMART Recovery for dual diagnosis to a similarly adapted 12-step programme for adults with serious Axis I mental illness and concurrent substance dependence. In this dual diagnosis population, there was an overall reduction in alcohol and substance use across time for both conditions (Brooks & Penn, 2003; Penn & Brooks, 2000). Improvement in ASI-alcohol (but not ASI-Drug) was superior for 12step relative to SMART Recovery participants (Brooks & Penn, 2003). However, interpretation is complicated since 12-step baseline ASI-Alcohol scores were also significantly higher. Urine analysis indicated that 12-step participants were less likely than SMART Recovery participants to use marijuana at 2-month follow-up (no other substances or follow-up intervals reached significance; Brooks & Penn, 2003). Both groups also demonstrated improvement across several indices of functioning (financial well-being and life satisfaction; ASI psychiatric, employment and legal composite scores; psychiatric hospitalisation), with between group differences on employment and number of psychiatric hospitalisations, both in favour of SMART Recovery (Brooks & Penn, 2003/ Penn & Brooks, 2000). Observed changes in substance use, but not functional outcomes were predicted by attendance (Brooks & Penn, 2003). Overall, (i.e. irrespective of treatment condition), greater attendance was associated with less marijuana use, but slightly more alcohol use. This latter finding may have been due to floor effects since participants who attended more also had less baseline alcohol use. Between group differences emerged in the duration of attendance, with

SMART Recovery participants attending significantly fewer days and weeks of treatment relative to 12-step participants (Brooks & Penn, 2003).

Blatch and colleagues (2016) used a quasi-experimental design to compare 'Getting SMART', a SMART Recovery informed intervention for offenders (alone, or in combination with SMART Recovery) to a propensity matched control group. For custodial offenders, all indices of recidivism were consistently lower for 'Getting SMART' participants relative to controls (Blatch et al., 2016; see Table 2). Observed reductions in reconviction (for 'any' and 'violent' crimes) were even more pronounced for participants who attended both Getting SMART and SMART Recovery. Conversely, the improvements seen following participation in SMART Recovery only did not significantly differ from that of controls. Completion of 10-11 sessions (Getting SMART and/or SMART Recovery) was required to detect a significant therapeutic effect (defined as 25% increase in days to first reconviction; Blatch et al., 2016) and over a third of participants met this threshold (See Table 2). Neither baseline nor change in either mental health status or alcohol/ drug use outcomes were reported.

#### Summary of Evidence for SMART Recovery Relative to Other forms of Mutual Aid

Five cross sectional studies compared SMART Recovery to other forms of mutual aid, most commonly AA. Only Atkins (2007) and Milin (2007) included some index of mental health status, with Atkins reporting on prior psychiatric hospitalisation and Milin assessing self-reported diagnosis (see Table 2 for data on SMART Recovery participants). Atkins (2007), Bogdonoff (2003) and Trumble (2015) all report an equivalent duration of sobriety for SMART Recovery and AA participants. Conversely, Guarnotta (2015) found that the duration of abstinence for AA participants was approximately double that of SMART Recovery participants, but the statistical significance of this effect was not assessed. With the exception of 'years of abuse' (which did not significantly differ) Milin (2007) described a more severe addiction profile for AA relative to SMART Recovery participants (including greater substance related problems, impaired functioning and poorer quality of life). However, corrections were not made for multiple comparisons.

Milin (2007) also found that 'readiness to change' was greater for SMART Recovery relative to AA participants, but contrary to expectations, it did not predict alcohol related problems. Bogdonoff (2003) found that relative to their AA counterparts, SMART Recovery participants' demonstrated greater future orientation, greater approach coping skills, less conflict and higher social support. However, contrary to prediction, none of these variables predicted abstinence. Conversely, Guarnotta (2015) found significant, moderate, positive correlations between abstinence and self-efficacy for both SMART Recovery and AA participants. Atkins (2007) identified additional predictors of sobriety, including participation and number of close friends in recovery.

When Milin (2007) asked SMART Recovery participants about what they 'liked' about their mutual aid group, qualitative findings revealed that both general group processes (support, non-judgement), and key features of the SMART Recovery approach (empowerment, tools/resources and scientific/theoretical approach) featured in the top five themes extracted (Table 3). When SMART Recovery participants were asked about what they disliked about prior approaches, responses again pertained to general group processes (e.g. poor boundaries), but this time also referred to prior experience with 12-step approaches (e.g. higher power/religion; perception of powerlessness; Table 3).

#### Summary of Evidence for SMART Recovery Without a Comparison Condition

Two studies without a comparison condition were identified. Kelly and colleagues (2015) explored potential mechanisms of change in SMART Recovery by assessing the extent to which quality of group facilitation, group cohesion and homework contributed to self-rated use of cognitive behavioural skills. Group cohesion emerged as a significant predictor of cognitive restructuring, while homework was identified as a significant predictor of behavioral activation (Kelly et al., 2015). Although quality of group facilitation was not

identified as a significant predictor of either cognitive restructuring or behavioral activation, a positive relationship was detected with group cohesion (Kelly et al., 2015). O'Sullivan and colleagues (2015) sought to explore the recovery goals of SMART Recovery members and facilitators; to describe the educational and training backgrounds of SMART Recovery facilitators; and to describe SMART Recovery members and their motivations for attending. When SMART Recovery members were asked to describe their reasons for switching from another mutual aid approach, their responses closely mirrored those described by Milin (2007; See Table 3). The majority of participants reported that they attended SMART Recovery relative to other forms of mutual aid due to alignment with key features of the SMART Recovery approach (e.g. CBT; 51.6%) or prior difficulties with 12-step approaches (e.g. higher power/religion; perception of powerlessness; 26.8%; Table 3).

#### DISCUSSION

This review was designed to provide a comprehensive overview and critical analysis of the current state of evidence for SMART Recovery in adults with substance and/or behavioral addictions. We sought to comment on a) whether participation in SMART Recovery results in changes in the severity of addiction and its consequences, b) what factors might influence any changes observed, c) the feasibility of this approach, and d) future research directions. Further, given the prevalence of comorbid mental health conditions and their impact on addiction recovery (Mills et al., 2010) we also sought to comment on the assessment, reporting and/or change in mental health status within the included studies.

A modest body of research, comprising12 studies was identified. Although predominantly cross-sectional, three evaluations of effectiveness were identified (Blatch et al., 2016; Brooks & Penn, 2003/ Penn & Brooks, 2000; Hester et al., 2013). Participants with alcohol addictions were the primary focus of existing research. The relationship between SMART Recovery and the severity and impact of behavioral addictions has yet to be assessed. Functional outcomes were rarely reported. Feasibility was largely indexed by attendance and economic analysis has not been undertaken. Little is known about variables that may influence treatment outcome, although attendance (Blatch et al., 2016; Brooks & Penn, 2003/ Penn & Brooks, 2000; Hester et al., 2013) represents a potential candidate.

Despite high rates of comorbidity between mental health and substance use disorders within the community (Mills et al., 2010), assessment and reporting of mental health status is limited. Only three studies (Brooks & Penn, 2003/Penn & Brooks, 2000; Hester et al., 2013; Kelly et al., 2015) utilised standardised instruments to establish a baseline diagnosis or severity and only one reported on change in mental health outcomes (psychiatric hospitalisation; Brooks & Penn, 2003/Penn & Brooks, 2000). Within the literature identified, mental health condition(s), distressing symptoms and past suicide attempts appear common amongst SMART Recovery participants. Given that co-morbid mental health conditions have the potential to complicate the course and severity of addiction and vice versa (Mills et al., 2010) improved assessment and reporting of mental health outcomes represents an important priority for future research.

The modest sample of papers and diversity of methods prevents us from making conclusive remarks about the efficacy of SMART Recovery, but positive effects were found in dual diagnosis (Brooks & Penn, 2003/ Penn & Brooks, 2000) and correctional settings (Blatch et al., 2016). Evidence from the sole identified RCT also supported the benefits of SMART Recovery for reducing the severity and consequences of problematic alcohol use (Hester et al., 2013). Importantly, this RCT was independently evaluated by two assessors to be of high quality and at low risk of bias, thereby increasing our confidence in these findings. However, an important limitation of these studies is the limited (Hester et al., 2013) or absent (Blatch et al., 2016; Brooks & Penn, 2003/ Penn & Brooks, 2000) assessment and reporting of concurrent treatment (pharmacological and psychological) for addiction and/or mental health. Accordingly, the relative contribution of mutual aid and formalised treatment (alone or in combination) to the performance of SMART Recovery remains unclear and represents an important question for future research.

The comparative influence of SMART Recovery on addiction outcomes relative to other forms of mutual aid and/or evidence-based treatments (alone or as an adjunct) has yet to be systematically evaluated. This is not without methodological challenges. SMART Recovery groups are freely accessible in the community, therefore, it may be impractical and possibly unethical (McCrady & Miller, 1993) to randomise some participants to this resource while prohibiting others. Indeed, the one RCT had to abandon their original research design, as participants were unwilling to be randomised to condition where they would be unable to continue face-to-face SMART Recovery meetings. Preference based trials, evaluation of professionally delivered SMART Recovery groups or embedding research methods within new community groups as they are established may help bridge this gap between methodological rigour and real-world relevance.

The literature also suggests that the 'sobriety' of SMART Recovery participants is at least equivalent to that of alternative forms of mutual aid (Atkins & Hawdon, 2007; Bogdonoff, 2003; Trumble, 2015), with some evidence to suggest that the severity and consequences of alcohol addiction is less for SMART Recovery relative to AA participants (Milin, 2007). Conversely, the duration of abstinence has been identified as longer for AA relative to SMART Recovery participants (Guarnotta, 2015). Clinical guidelines advocate tailoring addiction support to the goals of the individual (Mills et al., 2010; NICE, 2012; NICE, 2011), so while abstinence may be encouraged, moderated use and/or harm reduction approaches might also be employed. Moreover, in the case of poly-substance use, some but not all substances may be identified as an important focus of treatment. Accordingly, such

global ratings of 'abstinence' and 'sobriety' are unlikely to be adequate indicators of clinically meaningful change.

Consistent with the broader literature (e.g. Reardon, Cukrowicz, Reeves & Joiner, 2002) attendance was identified as a significant predictor of change (e.g. Hester et al., 2013). Further research is needed to clarify not only whether an 'optimal' threshold of attendance exists, but to identify the factors involved in engaging participants and encouraging attendance. Interestingly, despite largely comparable addiction related outcomes, current findings suggest that the duration of attendance may be shorter for SMART Recovery relative to 12-step participants (Brooks & Penn, 2003/ Penn & Brooks, 2000; Li, Feifer & Strohm, 2000; Milin, 2007). Although clearly in need of further investigation, this may be testimony to the feasibility of the SMART Recovery approach. That is, SMART Recovery may represent a more time efficient method for promoting clinically meaningful change. However, further research on the relationship between attendance and the change process within and across different mutual aid groups is needed before firm conclusions can be drawn.

It is important to acknowledge the methodological limitations of this review. Firstly, this review covers a small number of heterogenous studies. Drawing comparisons between studies was complicated by differences in outcome assessment, intervention and comparator groups. Additionally, the studies varied in methodological quality. Only one received a high quality rating (Hester et al., 2013) and was also the only study deemed to be at low risk of bias. We also restricted our literature search to English language publications, so the cross-cultural generalisability of our findings is restricted.

#### Authors' Conclusions:

#### Implications for Practice

Given the positive effects of SMART Recovery and SMART Recovery informed interventions, to enhance client centred, collaborative care that is tailored to the needs and preferences of the individuals, clinicians need to be aware of the range of mutual aid support options available, including SMART Recovery and discuss these options with their clients.

#### Implications for Research

To increase understanding of the role of SMART Recovery in facilitating recovery from addiction and to consolidate our confidence in the effectiveness of this approach, future research may benefit from improved assessment and reporting of (i) mental health status (e.g. diagnosis, treatment history, symptoms and functioning); (ii) concurrent treatment (pharmacological and psychological) for mental health and addiction; (iii) use and consequences of non-alcohol substance use, including greater attention to smoking and prescription opiate misuse; (iv) personal and social functioning (e.g. quality of life); (v) severity and consequences of behavioral addictions and (vi) economic outcomes.

We also offer the following suggestions to improve the quality of future research. Firstly, greater utilisation of validated data collection methods, including interviewer administered (e.g. Time Line Follow Back), service user rated scales (e.g. AUDIT) and biological indices (e.g. saliva) is an important priority. Secondly, there is a need for greater attention to the relationship between 'active ingredients' (e.g. self-management skills), attendance and the change process within and across different mutual aid groups. Thirdly, where possible, future research would benefit from greater attention to the use and reporting of random sequence generation, allocation concealment, attrition, missing data and power. Finally, preference based trials, evaluation of professionally delivered SMART Recovery groups and/ or embedding research methods within new community groups may help to clarify the relative impact of SMART Recovery on addiction outcomes compared to other forms of mutual aid and/ or evidence based treatments.

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#### FIGURE CAPTIONS

*Figure 1*. Flow chart of study selection process

*Figure 2.* Risk of bias summary: Review authors' judgements about each risk of bias item for each included study

*Figure 3*. Risk of bias graph: Review authors' judgements about each risk of bias item presented as percentages across all included studies



	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and researchers (performance bias) - All Outcomes	Blinding of outcome assessment (detection bias) - All outcomes	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
	+	+	+	+	+	+	+
)	•	?	Ŧ	?	+	+	+
)	?	?	+	?	?	?	?
	•	+	+	?	+	+	+
	-		-	-	?	+	+
)7)	+				?	+	+
5)	-		•		?		•
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	•		•	•	?	+	+
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	-	•	-	-	+	+	+
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Hester et al (2013) Brooks & Penn (2003) Penn & Brooks (2000) Blatch et al. (2016) Li et al. (2000) Atkins & Hawdon (2007) O'Sullivan et al. (2015) Kelly et al. (2015) Guarnotta (2014) Milin (2007) Trumble (2015) Bogdonoff (2002)

Risk of bias:



Demogra	pnic a	na Clinic	al Char	racteristics	OJ SMART	<u>kecovery Pa</u>	rticipants				
		Age	Gender	Ethnicity	Education/		Marital			Addiction	
	Ν	M (SD)	(% Male)	(% Caucasian)	Degree	Employment	Status	Mental Health	Alcohol	Substance Behavi	oral
		Ε	stablishe	ed Communit	ty SMART G	Froups versus <b>S</b>	SMART Info	ormed Online Interver	ntion (Alone or In Combin	ation)	
Hester et al (2013)	86	43.4 (10.6)	39%	88.4%	M=15.93 (SD=2.5) years	Not reported	Not reported	Brief Symptom Inventory: M=19.35(SD=12.5)	Hazardous Alcohol use (see baseline measures reported in Table 2)	Substance Dependence Excluded	Not assessed
SMART Informed Interventions versus Active and/ or Control Comparison Conditions											
Blatch et al (2016)	2882ª	Not reported	68%	27% ATSI	Not reported	Not reported	Not reported	Not assessed	Not assessed	Not assessed	Not assessed
Brooks & Penn (2003)	58	34.2(8.4)	67.2%	72.4%	M=11.6 (SD=2.4) years	20.4% (Full Time or Part Time in the past 3 yrs)	80% single or divorced	44.8% mood disorder 20.7% thought disorder 15.5% personality disorder Mean number of times of psychiatric hospitalisation=8.2 (SD=10.5	ASI: M=0.2825 Years of use: M=10.5(SD=9.6) Longest duration of abstinence= 6.5months <sup>b</sup> Mean number of times of alcohol treatment=3.4(SD=6)	Substance Dependence: 8.8% polysubstance 14% cocaine 10.5% amphetamines 8.8% Marijuana Mean Years of use: Polysubstance: 9.1(SD=8.4) Marijuana: 8.6(SD=8.6) Cocaine: 4.4(SD=5.7) Mean number of times of substance use treatment=3.2(SD=5.5)	Not assessed
				Establish	ed Commun	ity Groups: SI	MART Reco	very versus Other For	ms of Mutual Aid		
Atkins & Hawdon (2007)	321ª	47 (no SD)	58.1% <sup>b</sup>	90.3%	Not reported	Mean income \$55000	43.4% single or divorced	21.4% reported prior psychiatric hospitalisation	Years of use >10 (78.8%) Past hospitalisation (35%) Past outpatient treatment (48.7%)	>70% Polysubstance Use	Not assessed
Bogdonoff (2002; Unpublished Dissertation)	53	36 (no S.D.)	24.5%	32.4%	5.9% bachelors/ graduate	12.9% (Full Time or Part Time)	23% Single, divorced, separated	Not reported	Past treatment (60.4%)	No independent assessment of substance use	Not assessed

# Table 1.Demographic and Clinical Characteristics of SMART Recovery Participants

Guarnotta (2014; Unpublished Dissertation)	58	42.1 (13.4)	45.1%	87.7%	51.7% college/ graduate	Not reported	63.9% Single or divorced	Not reported	Mean Number of Days Abstinent=322.4 (SD=323.79)	No independent assessment of substance use	Not assessed
Li et al (2000)	33	45.79 (11.8)	67%	Not reported	82% college/ graduate	Not reported	Not reported	Not reported	Not assessed	Not assessed	Not assessed
Milin (2007; Unpublished Dissertation)	60	44 (no SD)	56.7kell %	97%	30.2% college	64.6% (Full Time or Part Time)	52.6% Single or divorced	Self-Reported Diagnosis: Major depression (40%); Severe anxiety/ panic (26.7%); ADHD (8.3%); Bipolar (11.7%); SZ (0%); OCD (5%); Other (1.7%)	History of problematic alcohol use (see Table 2) Mean number of months abstinent=7.13 (SD=10.93) Past Treatment: Inpatient (25%) Residential (15%) Individual (46.7%) Outpatient (25%)	Drug of Choice: Cocaine (1.7%) Prescription Meds (1.7%) Current Abuse: Marijuana (3.3%) and Prescription Medication (6.7%) only Ever Abuse: Marijuana (56.7%) Cocaine (46.7%) Heroin (8.3%) Methamphetamine (25%) Hallucinogens (33.3%) Prescription Meds (31.7%)	Not assessed
Trumble (2015; Unpublished Dissertation)	70	51.62 (11.74)	64%	95%	41% bachelors	48%: Income= \$35,000 to \$100,000	Not reported	Not reported	Mean number of days abstinent=1417.6 (SD=1985.28)	No independent assessment of substance use	Not assessed
					SM	IART Recovery	Without a	<b>Comparison Condition</b>	n		
Kelly et al (2015)	124	40.65 (11.38)	56.5%	6. <u>5% ATSI</u>	Not reported	30.7% Full Time or Part Time	Not reported	Self-Reported Diagnosis 46.7% depression; 29% anxiety; 5.6% bipolar; 4.8 % PTSD; 3.2% SZ or psychotic disorder; 6.5% other 29% reported a prior suicide attempt Mean K10: 21.74(SD=4.91)	85.6% used alcohol within the preceding 12 months Mean years of problems (alcohol or substance)=18.11 (SD=10.97)	Primary substance of abuse: Amphetamine (7.3%) Heroin (5.6%) Tobacco (4.8%) Marijuana (3.2%) Use $\leq 12$ months: Tobacco (63%) Marijuana (44%) Heroin (32.3%) Amphetamines (27.4%) Analgesics (22.6%);	Food (10.5%) Gambling (9.7%) Shopping (6.5%) Pornography (4.8%) Sex (3.2%)

								47% in high or very high range (>22) 66.4% reported prior treatment 46.8% reported		Cocaine (12.1%); Ecstacy (11.3%)	
								management			
O'Sullivan et al. (2015)	81	48 (13.1)	66.7%	90.1% white	66.6% graduate/ bachelors	63% employed	34.6% single	51% endorsed 'psychiatric disability'	Mean years of abuse: 15.62(SD=11.5) Sobriety attempt: 1st (26.6%); 2-5 (50.6%); 6-10 (11.4%) Mean years of individual counselling 5.14(SD=7.39)	Drugs (14.8%) + Alcohol (9.9%) + Behavioural (2.4%) + Both (7.4%)	7.3% + Alcohol (7.3%) + Drugs (2.4%) + Both (7.4%)

Note. ADHD = Attention Deficit Hyperactivity Disorder; ATSI = Aboriginal or Torres Strait Islander; M = Mean; PTSD = Post traumatic Stress Disorder; SD = Standard Deviation; SZ = Schizophrenia. <sup>a</sup>Data only available across all treatment conditions (SMART Only not available); <sup>b</sup>Full sample gender distribution (41.2% male) skewed by Women For Sobriety (women only group) – revised gender distribution removing WFS participants reported

# Table 2Summary of Methodology and Key Findings from Evaluations of SMART Recovery

Study Quality Pating	Aim	Country Design	K	Key Findings	
Risk of Bias	Target Population	Treatment/ Comparison Groups	Severity of Addiction and its Consequences	Process Variables	Feasibility
	Established Commun	ity SMART Groups v	ersus SMART Informed Online Intervention	(Alone or In Combination)	
Hester et al (2013). Downs & Black 22 (max=27) PeDRO: 6 (max=8) Overall Risk of Bias: Low	To evaluate the effectiveness of a web application informed by SMART Recovery "Overcoming Addictions" (OA) and SMART Recovery in a sample of problem drinkers new to SMART Recovery Participants had ≤4 weeks attendance at SMART and hazardous alcohol use as indexed by ≥8 on AUDIT and alcohol consumption outside recommended guidelines	USA RCT OA (n=19) vs SMART (n=86) vs. OA+SMART (n=83)	Significant improvement in all conditions at 3- month follow-up (no between group differences): Percent days abstinent (PDA): Significant Main Effect (44% vs 72%) F1,149=160.93, p<.001 Group differences F<1.0 Standard drinks per drinking day (DDD): Significant Main Effect (8.0% vs 4.6%) $F_{1,149}$ =61.73, p<.001 Group differences F<1.0 Inventory of Drug and Alcohol Use Consequences (InDUC): Significant Main Effect (40.8% vs 19.5%) $F_{1,149}$ =122.28, p<.001 Group differences F<1.0 Change in mental health status not assessed	Number of days of face-to-face meetings, online meetings and/ or 'any support' were identified as significant predictors of change in alcohol use (the relationships that emerged varied according to treatment condition and outcome measure). OA: Number of days of online SMART meetings identified as a significant predictor of PDA (p=0.25). SMART: Number of days of face to face meetings identified as a significant predictor of all three outcome measures (PDA: r=.358, p=.003; DDD: r=250, p=.039; InDUC: r=244, p=.045) and change in these from baseline (PDA: r=.274, p=.024; DDD: r=.478, p<.001; and InDUC: r=.403, p=.001) OA+SMART: Number of days of 'any support' identified as a significant predictor of PDA (r=.306, p=.012) and improvement in InDUC (r=.305, p=.012)	OA: Logged onto the program on average 7.2 times (SD=6.4) SMART: 71% attended at least two online meetings. Days of face to face meetings (M=3.31); days of online meetings (M=5.90); days of 'any support' (M=14.85) OA+SR: 85% attended at least two face-to-face meetings Days of face to face meetings: (M=1.82); days of online meetings (M=4.42); days of 'any support' (M=12.8)

	SMART Informed Interventions versus Active and/ or Control Comparison Conditions						
Blatch et al (2016) Downs & Black: 16 (max=27) Overall Risk of Bias: High	To determine reconviction outcomes for male and female offenders who participated in Getting SMART (a 12 session adaptation of SMART for custodial offenders) and/ or SMART Recovery relative to a propensity score-matched control group who did not participate in either programme Participants were offenders who served custodial sentences in New South Wales between 2007 and 2011	AUS Quasi-experimental, pseudo-prospective study design Getting SMART (n=2343) vs Getting SMART+SMART (n=306) Vs SMART (n=233) Vs Control (n=2882)	Relative to controls: Time to "any" reconviction: Getting SMART: ~8% reduction (HR=0.918*; CI=0.848-0.995). Neither reduction in SMART (~13%) nor Getting SMART+SMART (~8%) reached significance Time to "violent" reconviction: Getting SMART:~13% longer (HR=0.867*; CI=0.763-0.985) Neither change in SMART (~16% longer) nor Getting SMART+SMART (~25% longer) reached significance Reconviction rate (any): Getting SMART: ~19% reduction (HR=0.808**; CI=0.747-0.875) Getting SMART + SMART: ~22% reduction (HR=0.784*; CI=0.647-0.950) SMART did not reach significance Reconviction rate (violent): Getting SMART:~30% lower (HR=0.704**; CI=0.621-0.799) Getting SMART+SMART: ~42% lower (HR=0.578**; CI=0.407-0.821) SMART did not reach significance Mental Health Status not reported	Attendance at 10-11 sessions (of either programme, alone or in combination) was associated with a significant therapeutic effect (25% reduction in reconviction rate; HR=0.764*; CI=0.612-0.953). Brief exposure (1-6 sessions) mirrored the control group	81% attended Getting Smart Only 8% attended SMART Only 11% attended Getting SMART+SMART 37% attended >12 sessions 19% attended between 9 and 11 sessions		
Brooks & Penn (2003) Downs & Black: 14 (max=27)	To compare the effectiveness of a SMART and 12-step Informed intervention for dual diagnosis in an intensive outpatient/ partial hospitalisation setting Participants had severe Mental Illness (Schizophrenia, Bipolar	USA Multivariate multiple baseline comparison (Alternate allocation) SMART Informed (n=58) VS.	Improvement over time for both groups on: Addiction Severity Index (Alcohol, Substance, Employment, Legal and Psychiatric Subscales); Urine Analysis: marijuana and 'other' (cocaine, heroin, amphetamines and barbiturate use);	Attendance was identified as a significant predictor of marijuana use (better attendance, less likely to use at 2 months; odds ratio=.05) Greater attendance increased the slope indicating that alcohol use (ASI) decreased <i>less</i> with greater	SMAR1 participants attended significantly fewer days than 12-step: M=81(SD=18.3) vs. M=94(SD=21.6)		

Overall Risk of Bias: High Penn & Brooks (2000) Downs & Black: 8 (max=27) Overall Risk of Bias: High	Disorder, Schizoaffective Disorder, Major Depression) and Concurrent Substance Use disorder (as indexed by Diagnostic Interview and Collateral Information)	12-step Informed (n=54)	Lehman Quality of Life (Financial and Life Satisfaction Subscales); Number of Psychiatric Hospitalisations Significant between group differences only emerged on Addiction Severity Index: Alcohol (in favour of 12-step; Intercept coefficient -0.0076; SE=.0033, t=-2.28, p<.05) 2 month Urine Analysis: Marijuana (in favour of 12-step; odds ratio = 0.05) Addiction Severity Index: Employment (in favour of SMART; coefficient = -0.0076, SE=.0033, t = -2.28*) Psychiatric Hospitalisation (in favour of SMART): Significant time x treatment interaction F(2,78.6)=4.239, p<.024; M = 0 vs 5.52 (SD=13.7)	attendance (Time linear slope: Attendance Coefficient=.0001, SE=.0001, t=2.51*)	t(48)=2.26; p<.028* SMART participants attended significantly fewer weeks than 12-step M=26(SD=3.2) vs. 28(SD=4.7) t(48)2.46; p<.018*
	Establi	shed Community Grou	ups: SMART Recovery versus Other Forms of	of Mutual Aid	
Atkins & Hawdon (2007) Downs & Black: 16 (max=27) Overall Risk of Bias: High	To explore the relationship between participants' personal religious/spiritual beliefs, the religious/spiritual beliefs of their mutual aid group and level of participation In participants who identified as being "In Recovery" and were able to identify a "primary recovery group"	USA Cross sectional (National Survey) SMART (n=321) vs 12-step (n=161) vs Women for Sobriety (WFS; n=236) vs Secular Organisations for Sobriety (SOS; n=104)	Mutual aid group was not predictive of 'number of days clean and sober' (Wald X <sup>2</sup> =1.11, p=.267)	Significant predictors of sobriety identified were Age: ( $\beta$ =.272); Coefficient=.054*** SE=.009 Number of close friends in recovery: ( $\beta$ =.240); Coefficient = .418***SE=.093 Participation (as indexed by a study specific instrument): ( $\beta$ =.177); Coefficient = .045*** SE=.013 Religiosity and belief in a higher power did not emerge as significant predictors of sobriety	Mutual Aid Group = significant predictor of participation SMART: ( $\beta$ =193) Coefficient=-3.02 SE=1.09 WFS: ( $\beta$ =211) Coefficient = -3.63* SE=1.04 SOS: ( $\beta$ =191) Coefficient = -4.73* SE=1.71 Authors concluded that relative to 12- step all other groups

					were less likely to
					participate
Bogdonoff (2002; Unpublished Dissertation) Downs & Black: 17 (max=27) Overall Risk of Bias: High	To explore the predictive relationship between recovery and resilience (including self-efficacy, coping skills and internal locus of control- constructs embedded within resilience) and to compare these characteristics in SMART Recovery and 12-step groups to see if either type of group was more effective in supporting abstinence during the early period of the first 90 days of recovery Participants had a history of alcohol and substance abuse and/ or dependence and were in the "early stage of recovery" (< 30 self-reported days abstinent)	USA Cross sectional Prospective Quasi-experimental SMART (+/- short or long term residential rehabilitation; n=53) Vs 12-step (+/- short or long term residential rehabilitation; n=86)	At 90-day follow-up 'Sobriety' did not significantly differ between 12-step (39.5%) and SMART (39.6%) groups (as indexed by dichotomous self report assessment (yes/no) o abstinence over the preceding 90 days)	Neither mutual aid group, nor any of the following factors were identified to be significant f predictors of abstinence: Resilience and optimism (Adult resiliency belief system), self- efficacy regarding drinking ( Drug Taking Confidence Questionnaire), locus of control (drinking related internal-external locus of control), coping ( oping response inventory) and social support resources (Family/ Social Composite score on the addiction severity index) Of potential relevance to the differing underlying philosophies (i.e. the role of relinquishing to a higher power in 12-step) SMART Recovery participants demonstrated greater 'approach' coping skills (including logical analysis, seeking guidance and problem solving) F(1,132)=7.11, p=.009	Did not report on feasibility
Guarnotta (2015; Unpublished Dissertation)	To explore the relationship between abstinence and self- efficacy for individuals in SMART Recovery and how this compared to the relationship	USA Cross sectional Quasi-experimental SMART (n=58) vs	Self-reported duration of abstinence for AA (M=677.2, SD=1576.4; Range=30 to 4589) was approximately double that of SMART (M=322.4, SD=323.79; Range=30 to 1012), but significance not reported	Self efficacy (as indexed by the General Self Efficacy Scale) did not significantly differ between AA (M=30.58, SD=6.3) and SMART (M=30.28, SD=5.9), p=.79.	Did not report on feasibility
Downs & Black: 17 (max=27) Overall Risk of Bias:	between self-efficacy and abstinence for individuals attending AA Participants demonstrated a history of problematic alcohol use	AA (n=64)		Self Efficacy was identified as a significant predictor of abstinence for AA (r=.345, p<.01) and SMART (r=.378, p<.01) participants, explaining	

High	(as indexed by Michigan Alcohol Screening Test), were abstinent from alcohol or illicit substances for a maximum of 30 days and reported a "strong commitment" to attend mutual aid			approximately 10.4% of the variance in abstinence time (R <sup>2</sup> =.104)	
Li et al (2000) Downs & Black 14 (max=27) Overall Risk of Bias: High	To investigate whether AA's Higher Power concept encourages externally dependent behaviour by testing whether AA and SMART members are equal on measures of locus of control Participants were "In Recovery" (at least 8 weeks mutual aid attendance)	USA Cross sectional (Survey) SMART (n=33) vs AA (n=48)	This study only explored process measures	Significantly higher percentage of AA (96%) than SMART (48%) participants reported belief in a higher power (X <sup>2</sup> =24.42, df=1, p<.0001) AA participants demonstrated a more external locus of control (DRIE: M=5, SD=3.23, Range=0- 13) than SMART participants (M=2.09, SD=2.66, Range=0-13), p=.00003 The relationship between process variables and outcome measures was not explored	Self-reported duration of involvement (months) was significantly longer for AA (M=66.48, SD=76.24; Range=3-252) relative to SMART (M=18.76, SD=15.54; Range=2-48) t=3.58, p=.0006
Milin (2007; Unpublished Dissertation) Downs & Black: 17 (max=27) Overall Risk of Bias: High	To examine the relationship between consequences of alcohol abuse and motivation to change drinking behaviour and to explore similarities and differences between members of AA and SMART Participants were currently attending mutual aid	USA Cross sectional Between Subjects Correlational SMART (n=60) vs AA (n=56)	Outcomes for SMART were consistently superior relative to AA including Less hazardous use of alcohol as indexed by the AUDIT (M=22.5, SD=6.64 vs M=26.57, SD=7.31; p=.002); Lower severity and less functional impact of addiction as indexed by The Addiction Severity Index (ASI) ASI-Alcohol (M=.48, SD=.28 vs M=.64, SD=.19; p=.001) ASI-Drug (M=.05, SD=.09 vs M=.27, SD=.23, p<.001) ASI-Psychiatric (M=.29, SD=.21 vs M=.42, SD=.25; p=.003) ASI-Employment (M=.39, SD=.24	Levels of pre-contemplation were significantly greater in AA (M=- 5.59, SD= $3.95$ ) relative to SMART (M=- $7.42$ , SD= $3.42$ ), p<.01 Similarly, levels of contemplation were significantly higher in SMART (M= $5.77$ , SD= $2.68$ ) relative to AA (M= $3.98$ , SD= $4.48$ ), p<.05 However, readiness to change was not identified as a significant predictor of alcohol related problems (All models failed to reach significance)	Duration of involvement was significantly longer for AA (4.95, SD=1.63) relative to SMART (3.55, SD=1.8) participants, where 1=< 30days, 2=30days to 3 months; 3=3-6 months; 4=6 months to 1 year; 5=1 to 2 years; 6=2 years or more

			vs M=.57, SD=.33, p=.001) ASI-Family/Social Problems (M=.29, SD=.23 vs M=.49, SD=.25 p=.001) ASI-Legal (M=.06, SD=.21 vs. M=.24, SD=.37 p=.002) Fewer alcohol related problems: DrINC-R-Total (M=55.27, SD=23.43 vs M=88.48, SD=25.34 p<.001 DrINC-Lifetime M=31.88, SD=7.62 vs M=37.11, SD=7.39 p<.001		
Trumble (2015; Unpublished Dissertation) Downs & Black: 19 (max=27) Overall Risk of Bias: High	The purpose of the study was to replicate the results from Li et al's 2000 study, (that AA will be more externally controlled and SMART more internally oriented) and to explore the relationship to faith in a higher power Participants were currently attending mutual aid	USA Cross sectional Quasi-experimental SMART (n=70) vs AA (n=36)	The duration of sobriety did not significantly differ between groups (p=.09) AA: M=2506.17days (6.87 years) vs SMART: M=1417.60 days (3.88 years)	Both groups demonstrated internal locus of control (as indexed by low scores on the Drinking Related Internal-External Locus of Control Scale) SMART was more internal ( M=2.08 SD=2.47) relative to AA (M=4.67, SD=4.01), p=.001 The relationship between locus of control treatment outcome was not assessed	Did not report on feasibility
		SMART Re	ecovery Without a Comparison Condition		
Kelly et al (2015) Downs & Black: 13 (max=27) Overall Risk of Bias: High	To provide a description of participants, including potential clinical complexities; to examine thow frequently participants used cognitive and behavioural skills outside of meetings; to examine the variables that may predict participants' self-reported use of cognitive and behavioral skills Participants were currently attending SMART Meetings	AUS Cross sectional (Survey) SMART Alone (n=124)	Duration of Alcohol/ substance use problems was 18.11 years (SD=10.97)	Group cohesion = significant predictor (17% of variance) of cognitive restructuring ( $\beta$ =0.23). F(3,113)=8.42, p<.001 Homework = significant predictor (21% of variance) of behavioral activation ( $\beta$ =0.26). F(3,113)=10.99, p<.001 Significant positive correlation between quality of facilitation and group cohesion (r=.38) Relationship to treatment outcome was not assessed	The majority of participants attended weekly (72.8%) Duration of attendance: M=8.78 months, SD=14.11; Range=1 week-96 months

8.16 (SD=1.24)

OSullivan et al.	To describe members of the	USA	Duration of problematic addiction was	The relationship between process	Frequency of
(2015)	SMART Recovery Community,	Cross sectional	M=15.62, SD=11.5; Range=3 months to 40	variables and treatment outcome	attendance: M=4.69
	their motivations for membership;	(two sample	years	was not explored	meetings per month
Downs & Black:	describe SMART facilitators and	exploratory			(SD = 2.64)
10 (max=27)	their educational and training	descriptive survey;			Duration of
	backgrounds; rank order of	n=81)			attendance:
Overall Risk of	members' and facilitators'				M=1.58, SD=1.81
Bias:	recovery goals				Range: 3 months to
High	Participants had $\geq 3$ months				10 years
	attendance at SMART Meetings				On a nine point
					scale (higher scores
					= greater
					confidence) mean
					confidence in
					SMARTs ability to
					meet recovery goals

*Note.* AA = Alcoholics anonymous ASI = Addiction Severity Index; AUDIT = Alcohol Use Disorders Identification Test; CI = Confidence Interval; DDD = Standard drinks per drinking day; DRIE = Drinking Related Internal-External Locus of Control Scale; HR = Hazard Ratio; InDUC = Inventory of Drug and Alcohol Use Consequences; M = Mean; OA = Overcoming addictions; PDA = Percent days abstinent; SD = Standard Deviation

\*p <.05; \*\* p < .01 \*\*\* p < .001

### Table 3.Summary of Oualitative Findings

Study	Treatment Cor	ndition						
Milin (2007)	What do you like about your curr	ent primary self-help group <sup>a</sup> ?						
	12-Step (n=56)	SMART Recovery (n=60)						
	Supportive environment (e.g. helping others, people trying to do the right thing; n=29)	Internal locus of control (e.g. self-directed, self-empowered; n=22)						
	Fellowship (n=12)	Supportive environment (e.g. giving and getting help; positive						
	12-steps give a sense of direction/ purpose (e.g. plan of action, structure; n=10)	reinforcement; n=20)						
	People have common problem (e.g. shared experiences, relate with other alcoholics,	Many tools/ resources for relapse prevention (n=17)						
	sober people; n=7)	Scientific nature, theoretical (e.g. CBT, REBT; n=14)						
	Availability of groups (e.g. always there, somewhere to go and not drink; n=4)	Non-judgemental (e.g. absence of guilt, slip is not catastrophic; n=7)						
	What did you dislike about self-help groups you attended in the past <sup>a</sup>							
	Prior 12-Step:	Prior 12-Step						
	Negative attributes of group members (e.g. complaining/ whining; cussing/ vulgarity;	Higher power, religious (n=21)						
	closed off; dishonesty; n=8)	Powerlessness (n=19)						
I 1	Disparity among different types of 12-step groups (e.g. NA too rigid about alcohol;	Dogmatic, authoritative, rigid (e.g. have to do it one way, problem for life,						
	lack of sponsorship in MA; could not identify with CA/ NA; too much mixing of NA	moderation not an option; n=18)						
	and AA; n=6)	Labeling (e.g. 'alcoholic', 'disease'; n=11)						
	Repetitious (e.g. no new information, retell same stories; n=5)	People with poor boundaries (intimidating/ domineering people, ask me for						
	Lack of seriousness (e.g. some not serious about sobriety; n=5)	money, unwanted advances from men, disrespectful, not trustworthy/						
	Frequent relapses (n=3)	dishonesty; n=10)						
	<u>Prior SMART</u>	<u>Prior SMART</u>						
	Lack of sponsorship (n not reported)	I don't like counselling/ advice (n=1)						
		Abstinence is not required (n=1)						
		Same stories repeated (n=1)						
		Easy to be facetious on-line (n=1)						
O'Sullivan	Reasons for switching from another mut	ual aid approach to SMART Recovery <sup>b</sup>						
et al. (2015)		Alignment with SMART philosophy, principles and format (e.g. CBT 51.6%)						
		Difficulties with surrendering to religious affiliations such as a higher power/						
		adoption of a powerlessness identity (26.6%)						
		Still attending both types of mutual aid (18.8%)						
		Outlier responses (3%)						

*Note.* CA = Cocaine Anonymous; CBT = Cognitive Behavioral Therapy; MA = Marijuana Anonymous; NA = Narcotics Anonymous; REBT = Rational Emotive Behavioral Therapy; <sup>a</sup>top five themes from the 13 identified reported here; <sup>b</sup>79% had switched from another approach (primarily 12-step), qualitative findings are derived from thematic analysis