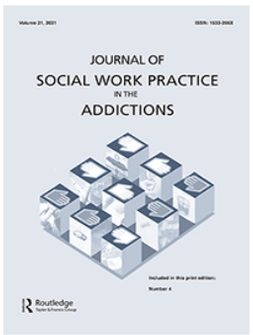

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The effectiveness of The Seven Challenges® Program for addressing substance misuse: a systematic review

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ABSTRACT

The Seven Challenges® (7C) is a program for adults and adolescents with substance use disorders and co-occurring problems. The aim of this systematic review was to examine the methodological characteristics and substantive findings of studies evaluating the effectiveness of 7C. We identified seven studies via searches of seven electronic databases. Our results suggest that 7C is associated with reduced substance use, decreased mental health-related problems, and reduced criminal behavior. However, further research is needed to determine whether 7C is superior to alternative interventions for substance misuse and to explore the efficacy of the 7C program among adult populations.

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Addiction; addiction treatment; mental health; Seven Challenges® Program; substance abuse; substance misuse; substance use disorders; systematic review

Substance misuse is a significant and growing public health crisis in the United States (U.S.). Approximately one in seven people in the U.S. is expected to develop a substance use disorder (SUD) in their lives (Kessler et al., 2005), and an estimated 7.4% of people aged 12 or older had a past-year SUD in 2018 (Substance Abuse and Mental Health Services Administration [SAMHSA], 2019). Since 2000, the rate of drug overdose deaths in the U.S. has increased by 137% (Rudd et al., 2016), and recent estimates indicate that 67,367 people died as a result of a drug overdose in the U.S. in 2018 alone (Hedegaard et al., 2020). A clear and urgent need exists for accessible and effective substance use treatment services in the U.S.

A well-established body of research has demonstrated that substance misuse is associated with significant short- and long-term consequences for individuals, families, communities, and society as a whole. For example, substance misuse is associated with an increased risk of problems related to physical and mental health, legal involvement, social and interpersonal functioning, work and school performance, financial issues, and premature death (Feinstein et al., 2012; Kelly & Daley, 2013; United Nations Office on Drugs and Crime [UNODC], 2020; Whyte et al., 2018). Moreover, recent reports estimate that tobacco, alcohol, and illicit drug use account for approximately 740 USD billion in costs related to crime, lost work productivity, and health care (National Institute on Drug Abuse [NIDA], 2020, April 6). These far-reaching individual and systemic effects of substance misuse in the U.S. underline the potential benefits of community- and federal-level investments in the development of substance use interventions.

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Although individuals who misuse substances can achieve remission without formal treatment (Kelly et al., 2017), research has found that many require such services to address their substance misuse (Eddie et al., 2019). Outcomes for individuals in substance use treatment are generally favorable, and prior studies have found that participation in treatment is generally associated with corresponding decreases in substance misuse (Dutra et al., 2008; Prendergast et al., 2002). However, despite significant advances in the development and testing of empirically supported substance use treatments, research suggests that these services remain underutilized. In 2018, an estimated 21.2 million people aged 12 or older needed substance use treatment, yet only 11.3% of this population received treatment services at a specialized facility (SAMHSA, 2019). Moreover, one study found that less than half of substance use treatment programs in the U.S. deliver evidence-based interventions (Padwa & Kaplan, 2018), indicating that the field has insufficiently implemented relevant research findings.

The broad range of adverse consequences associated with substance misuse underscores the need for more evidence-based services that address both substance misuse and co-occurring problems such as comorbid mental health disorders, criminal justice involvement, and relationship issues. Research has found that clients enrolling in substance use treatment have a significant number of concurrent service needs across multiple life domains. In fact, approximately half of individuals with a mental health disorder will also experience a SUD, and vice versa (Kelly & Daley, 2013; Ross & Peselow, 2012). Moreover, studies have consistently demonstrated that when unaddressed, issues associated with substance misuse can diminish the efficacy of treatment and interfere with treatment completion (Cao et al., 2011). For instance, one study found that individuals with comorbid mental health and substance use disorders experienced unique challenges to treatment due to a higher prevalence of complex needs, poorer treatment adherence, and an elevated risk of premature drop out (Coco et al., 2019).

The current critical consensus is that effective treatments must address multiple domains of functioning in order to best meet the needs of individuals who misuse substances (NIDA, 2020, May 29). However, in order to increase the availability of programs that address substance use and its co-occurring problems, more research is needed to build the evidence base of these comprehensive substance use interventions.

The Seven Challenges Program

The Seven Challenges® (7C) Program is one promising treatment program for adolescents and adults who misuse substances. First developed in 1991, 7C is a comprehensive cognitive-behavioral program that addresses substance misuse and co-occurring problems such as mental health issues, criminal justice involvement, and relationship issues. The program integrates several theoretical approaches – including client-centered therapy (Rogers, 1951), transactional analysis (Berne et al., 1996) and the stage of change model (Prochaska & DiClemente, 1983) – in order to increase an individual's motivation for treatment and help them make informed decisions about changing their substance-related behaviors.

The 7C program can be conducted in group or individual sessions and relies on an individualized, non-judgmental approach that is sensitive to the stage of change and developmental challenges of participating individuals. A central focus of the program is

to allow clients to identify their own concerns and support them in making informed decisions about the behaviors they wish to change. To this end, 7C incorporates cognitive-behavioral strategies and teaches coping skills that can assist clients in managing problems that co-occur with substance use. A comprehensive overview of 7C is provided in its program manual (Schwebel, 2010, 2015, 2017)

Currently, 7C is used across the U.S. in a variety of treatment settings, including residential, intensive outpatient, school, and home-based settings (The Seven Challenges, n.d.). Since its inception, a number of individual studies have examined the efficacy of 7C. However, although these studies have individually contributed to the program's empirical base, disentangling and comparing their results can be difficult and time-consuming, particularly for practitioners seeking to improve their understanding of evidence-based practices. Consolidating these findings would strengthen 7C's empirical base and provide a research synthesis that could be more effectively utilized by researchers, practitioners, and policy-makers. To address this need, the present review's primary research aim was to evaluate the methodological characteristics and substantive findings of studies evaluating the effectiveness of 7C for decreasing substance misuse. Our secondary aim was to synthesize the results of studies evaluating the effectiveness of 7C for improving additional co-occurring problems for which data were available.

Methods

Eligibility criteria

We developed this review using the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA; Moher et al., 2009). Prior to the search, we submitted a review protocol to PROSPERO, an international prospective register for review protocols (registration number CRD42019140251).

To guide our inclusion and exclusion of studies, we developed four a priori eligibility criteria: studies had to be (a) published in English; (b) original studies examining the effectiveness of 7C; (c) targeted to populations with substance misuse; and (d) published after 1991, when 7C was created. We excluded book reviews, books, book chapters, published abstracts, systematic/literature reviews, treatment guidelines, and treatment manuals. Studies were also excluded if they reported only qualitative results, did not assess outcomes related to substance use, or did not specifically evaluate 7C. No restrictions were placed on the age of participants.

Search strategy

We identified relevant literature through computerized searches of seven electronic databases and repositories: PubMed, PsychINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, Sociological Abstracts, Social Service Abstracts, and the Cochrane Database of Systematic Reviews. All searches were conducted in May of 2019. To identify gray literature not identified in our initial search, we contacted the Seven Challenges, LLC to identify additional published and unpublished studies of 7C and also conducted backwards reference searching by examining the reference lists of all eligible studies for relevant work. Search terms were developed in consultation with a social sciences

research librarian and included the following keywords: *substance abuse* OR *substance use* OR *substance misuse* OR *drug abuse* OR *addiction* OR *addict* OR *SUD* OR *substance use disorder* OR *alcohol* OR *drug* OR *smoking* OR *tobacco* AND *Seven Challenges* or *7 Challenges.*

Study selection

Two authors independently reviewed the titles and abstracts of articles identified through the database search. Both authors subsequently reviewed the full text of articles that met the eligibility criteria and developed an abstraction form to systematically extract data from the studies selected for inclusion. This form was pilot tested with two randomly selected articles and refined accordingly. The data extraction form captured information related to the study title, author(s), location, research aim(s), design, data analysis method, sample size and demographics, inclusion/exclusion criteria, whether the sample had co-occurring psychological or conditional problems, intervention duration, intervention frequency, interventionist characteristics, fidelity assessment measures, control condition, follow-up period, assessment measures, and treatment outcomes. Both authors independently abstracted data from the articles selected for inclusion. All discrepancies throughout the search and abstraction process were resolved through mutual discussion, and all data were managed using Covidence software (n.d.)

Quality assessment

Two authors assessed the methodological quality of each study selected for inclusion using a quality assessment tool for quantitative studies from the Effective Public Health Practice Project (EPHPP; Thomas et al., 2004). The EPHPP tool is a standardized instrument that was developed to evaluate the methodological quality of primary studies. It has demonstrated evidence of validity and reliability and is designed for use across a range of study designs. The instrument consists of eight quality domains, each rated as *strong, moderate*, or *weak*. Scores from individual domains are then consolidated to form an overall assessment score. Studies with no weak ratings are rated as strong, those with one weak rating are rated as moderate, and those with two or more weak ratings are rated as weak.

Results

As shown in Figure 1, our initial search of databases and repositories yielded 90 records. Removal of duplicates reduced this sample to 38 potentially relevant records. Thirty studies were excluded during the title and abstract screening, as they were determined to be clearly irrelevant to the systematic review, leaving eight studies for full-text review. Two of these studies were excluded due to not evaluating 7C and not providing substantive outcome data. One additional unpublished article was identified for inclusion in the systematic review by contacting the Seven Challenges, LLC. This process yielded seven studies for inclusion in the present review.

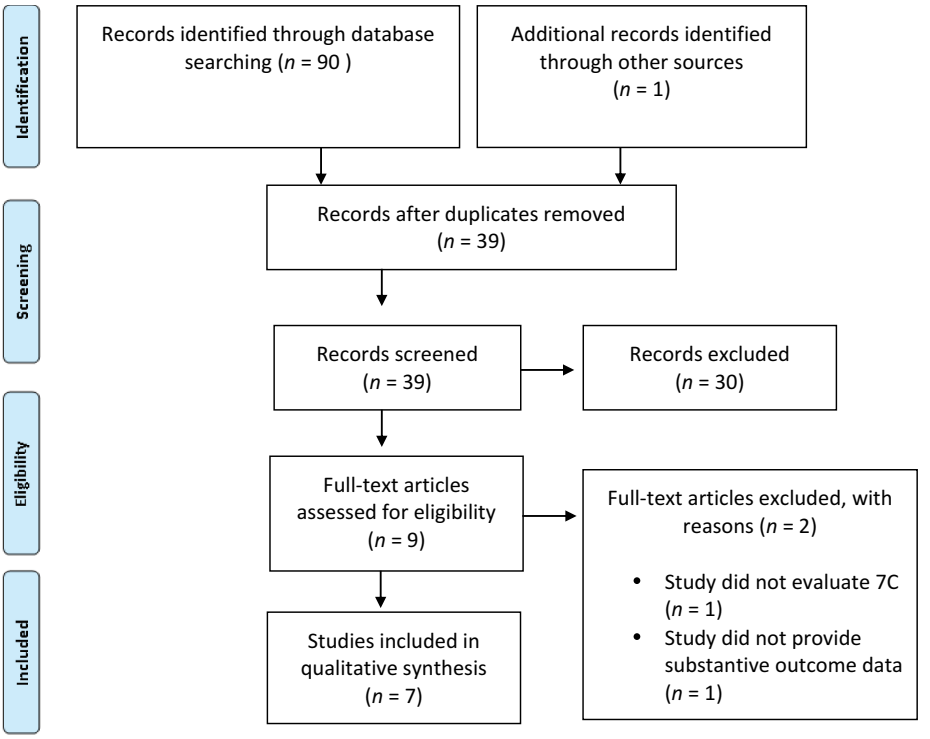

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart of study identification and selection.

Study characteristics

Table 1 presents the study characteristics and major findings of the seven articles evaluating 7C. Of the seven studies evaluated in this sample, one used a randomized control trial (RCT) design (Smith et al., 2006), two used quasi-experimental designs (Korchmaros, 2018b; Lindeman, 2009), and four used observational designs (Applied Survey Research, 2010; Korchmaros, 2018a; Korchmaros & Stevens, 2014; Stevens et al., 2007). Five of the studies in this review were published, peer-reviewed articles, and two were unpublished gray literature: a dissertation (Lindeman, 2009), and a research survey (Applied Survey Research, 2010). Study sample sizes ranged from 36 (Stevens et al., 2007) to 392 (Korchmaros, 2018a), with a combined sample size of $N = 962$. Sample mean ages ranged from 15.4 (Korchmaros & Stevens, 2014) to 32.9 years (Korchmaros, 2018b). All seven studies reported higher numbers of males than females in their samples. Across studies, the majority of participants were White.

Methodological quality

Table 2 displays the methodological appraisal of the reviewed studies as assessed with the EPHPP. Four studies were rated as moderate quality, and three were rated as weak quality. The strongest quality domain was 'Data Collection Methods,' with the majority (57.1%) of

Table 1. Summary of studies evaluating the seven challenges® treatment program.

Author, Year	Study Design	Participants	Facility Type	Assessment and Time Points	Findings
Applied Survey Research, 2010	Observational	126 high school students; 27% 9th grade; 15% 10th grade; 44% 11th grade; 15% 12th grade 64% male, 34% female, 2% other 61% Caucasian; 20% Latino; 1% African American; 1% Native American; 13% Multi-racial; 5% Other	Not reported	Ad-hoc survey Pretreatment, 1 year	Among students who reported substance use, use in the past 30 days use deceased for marijuana (n = 41, 98% to 76%); alcohol (n = 42, 76% to 71%); tobacco (n = 40, 70% to 68%); binge drinking (n = 40, 55% to 48%); and ecstasy (n = 41, 20% to 15%). Past 30-day use increased for LSD or other psychedelics (n = 41, 24% to 32%); prescription medications taken to get high (n = 41, 17% to 22%); cocaine (n = 41, 7% to 10%); inhalants (n = 41, 10% to 7%); cough/cold medicine (N = 41, 5% to 7%); methamphetamine or amphetamines (n = 41, 2% to 5%); heroin (n = 41, 2% to 5%); and diet pills (n = 41, 2% to 5%).
Korchmaros, 2018a	Observational	392 adolescents enrolled in 7 substance abuse treatment programs as part of drug court; mean age: 15.8; 71% male; 29% female; 27% Hispanic; 54% racial minority status	6 juvenile drug court programs and 1 intensive outpatient program	GAIN (Dennis et al., 2003) Pretreatment, 6 months	Past 90-day use decreased for the total number of days of substance use (32 vs. 15.08, F [1,375] = 45.8, $p < .0001$, $\eta_p^2 = .11$), days drunk or high (22.3 vs. 10.3, F[1, 368] = 21.4, $p < .001$, $\eta_p^2 = .06$), and days of THC use (22.5 vs. 10.1, F [1,379] = 37.3, $p < .001$, $\eta_p^2 = .09$). No significant changes were found for past-90 day use of: alcohol; crack, smoke rock, or freebase; inhalants or huffed substances; heroin; pain killers or other opiates; acid, LSD, or hallucinogens; antianxiety or tranquilizers; speed, uppers; any form of methamphetamine; downers or sedatives. Significant improvements were found for SFS Scale scores (F[1,385] = 25.4, $p < .001$, $\eta_p^2 = .06$), and SPS scores (F[1,381] = 4, $p < .05$, $\eta_p^2 = .01$)

(*Continued*)

Table 1. (Continued).

Author, Year	Study Design	Participants	Facility Type	Assessment and Time Points	Findings
Korchmaros, 2018b	Quasi -experimental	71 adults enrolled in treatment as a condition of a drug treatment court; mean age = 32.9; 65% male, 35% female; 14% Hispanic; 16% racial minority status	Outpatient substance use treatment agency	GAIN (Dennis et al., 2003) Pretreatment, 6 months	As a whole, 7C and CBT participants experiences overall reductions in past 90-day substance use (F (1, 69) = 17.9, $p < .001$, $\eta_p^2 = .21$), days drunk or high most of the day ($F(1, 69) = 9.11$, $p = .004$, $\eta_p^2 = .12$), alcohol use ($F(1, 69) = 16.6$, $p < .001$, $\eta_p^2 = .19$), THC use ($F(1, 69) = 11.3$, $p = .001$, $\eta_p^2 = .14$), methamphetamine use ($F(1, 69) = 12.3$, $p = .001$, $\eta_p^2 = .15$), scores on the SFS (F(1, 69) = 20.2, $p < .001$, $\eta_p^2 = .23$), and increases in days of abstinence ($F(1, 69) = 6.9$, $p = .01$, $\eta_p^2 = .09$). Participants receiving 7C reported significantly lower use of alcohol (F[1, 69] = 8.2, $p = .006$, $\eta_p^2 = .11$) and days drunk or high most of the day (F (1, 69) = 7, $p = .0$, $\eta_p^2 = .09$) compared to the CBT group. 7C participants received lower overall scores on the SFS ($F(1, 69) = 7.2$, $p = .009$, $\eta_p^2 = .09$) and the SPS ($F(1, 69) = 6.7$, $p = .012$, $\eta_p^2 = .09$) than CBT participants
Korchmaros & Stevens, 2014	Observational	89 adolescents enrolled in a substance abuse treatment program; mean age = 15.4; 81% male, 19% female White 50.6%; Hispanic 30.3%; Native American 2.2%; Mixed 9%; Unknown 7.9%	3 month intensive outpatient adolescent treatment program	GAIN (Dennis et al., 2003) Pretreatment, 3 months	Past 90-day days without THC use decreased (33.35 vs. 14.66, $t(88) = 5.67$, $p < .001$), and days of other drug use in the past 90 days decreased (7.94 vs. 2.78, t (88) = 2.23, $p = .03$). No changes were found for high risk drinking. Past 90-day days of abstinence increased (50.19 vs. 68.69, t (88) = −5.39, $p < .001$),

(*Continued*)

Table 1. (Continued).

Author, Year	Study Design	Participants	Facility Type	Assessment and Time Points	Findings
Smith et al., 2006	Quasi-experimental	98 adolescents referred to outpatient treatment; mean age = 15.8. 71% male, 29% female; 24% minority	Outpatient treatment agency	GAIN (Dennis et al., 2003) Baseline, 3, 6, 9, 12 months	For 7C participants, the odds of substance use at month 3 and month 6 were reduced by 93% and 95%, and the odds of continued substance-related problems at month 3 and month 6 were reduced by 52% and 69%. Significant differences were not found between 7C participants and participants receiving SOFT
Stevens et al., 2007	Observational	36 adolescents participating in.an intensive outpatient substance abuse treatment setting; mean age = 15.4 l 75% male, 25% female; 53% Caucasian; 31% Latino/Hispanic; 17% Biracial	2 month intensive outpatient adolescent substance abuse treatment program	GAIN (Dennis et al., 2003) Baseline, 3 months, 6 months	From baseline to 3 months, scores on the SPS (6.0 vs. 4.6, $p = .04$) and SFS Scale (.22 vs. .14, $p = .001$) significantly decreased. From baseline to 6 months, the SPS significantly decreased (5.97 vs. 3.42, $p = .004$) and the SFS marginally decreased (0.22 vs. 0.15, $p = .055$)
Lindeman, 2009	Quasi-experimental	150 male adolescents	Adolescent residential substance abuse treatment facility	POSIT (Rahdert, 2007) and the CRAFFT (Knight et al., 2003) Baseline, 6 weeks	No difference was found in CRAFFT scores between 7C and a standard CBT group. Participants receiving 7C had significantly lower scores on the POSIT ($F = 41.7$, $p < .000$) at posttreatment than did CBT participants.

Note: LSD = Lysergic acid diethylamide; GAIN = Global Appraisal of Individual Needs Scale; THC = Tetrahydrocannabinol; SFS = Substance Use Frequency Scale; SPS = Substance Use Problem Scale; 7C = Seven Challenges; CBT = cognitive behavioral therapy; CRAFFT = Car, Relax, Alone, Forget, Friends, Trouble Scale; POSIT = Problem Oriented Screening Instrument for Teenagers; OR = odds ratio; SOFT = Strengths Oriented Family Therapy

Table 2. Summary of study quality of as assessed by the quality assessment tool for quantitative studies.

Author, Year	Selection Bias	Design	Confounders	Blinding	Data Collection Methods	Withdrawals and Dropouts	Overall Score
Applied Survey Research, 2010	Moderate	Moderate	N/A	Weak	Weak	Weak	Weak
Korchmaros, 2018a	Moderate	Moderate	N/A	Weak	Strong	Moderate	Moderate
Korchmaros, 2018b	Moderate	Moderate	N/A	Weak	Weak	Moderate	Weak
Korchmaros & Stevens, 2014	Moderate	Moderate	N/A	Moderate	Strong	Weak	Moderate
Lindeman, 2009	Moderate	Moderate	Strong	Weak	Strong	Strong	Moderate
Smith et al., 2006	Moderate	Strong	Strong	Weak	Strong	Moderate	Moderate
Stevens et al., 2007	Moderate	Moderate	N/A	Weak	Weak	Moderate	Weak

Note: Quality indicators are based on the EPHPP. Overall Scores: STRONG = no WEAK ratings; MODERATE = one WEAK rating; WEAK = two or more WEAK ratings
N/A = Not reported

studies receiving a strong rating in this domain (Korchmaros, 2018a; Korchmaros & Stevens, 2014; Lindeman, 2009; Smith et al., 2006). Overall, the weakest domain was 'Blinding': 85.7% of studies were rated as weak in this domain.

Intervention characteristics

Setting, delivery dosage, and interventionist

The 7C program was delivered to adolescents via a variety of study settings, including outpatient treatment programs (Korchmaros & Stevens, 2014; Smith et al., 2006; Stevens et al., 2007), drug court programs (Korchmaros, 2018a), a residential substance abuse treatment facility (Lindeman, 2009), and a high school (Applied Survey Research, 2010). A single study was identified that evaluated 7C delivery to adults in a drug court setting (Korchmaros, 2018b). All three studies that reported the frequency of program delivery indicated that participants attended weekly group and/or individual sessions (Korchmaros et al., 2018; Lindeman, 2009; Smith et al., 2006). Among the studies that reported the professional backgrounds of the intervention facilitators, one reported that 7C was delivered by master's-level therapists (Smith et al., 2006) and three reported delivery by counselors (Korchmaros, 2018b; Korchmaros & Stevens, 2014).

Intervention outcomes

Substance use

All seven studies evaluated in this systematic review reported that 7C was associated with improved substance use outcomes. Four studies reported general reductions in the number of days of substance use reported by adult and adolescents in a drug court program (Korchmaros, 2018a, 2018b), high school students (Applied Survey Research, 2010) and adolescents in outpatient treatment settings (Korchmaros & Stevens, 2014). Additionally, four studies reported reductions in participants' frequency of overall substance use. These studies evaluated adolescent (Korchmaros, 2018a) and adult (Korchmaros, 2018b) drug court participants as well as adolescents receiving services in outpatient treatment programs (Smith et al., 2006; Stevens et al., 2007). Among the six studies that included a general measure of substance use-related problems as an outcome variable, all six reported decreases in this area. These studies evaluated adult and adolescent drug court participants

(Korchmaros, 2018a, 2018b), adolescents in outpatient treatment programs (Korchmaros & Stevens, 2014; Smith et al., 2006; Stevens et al., 2007), and adolescents in a residential treatment setting (Lindeman, 2009).

Four of the studies in this sample evaluated posttreatment changes in the use of specific substances. These studies evaluated adolescents and adults in drug court (Korchmaros, 2018a, 2018b), high school students (Applied Survey Research, 2010) and adolescents in an outpatient treatment program (Korchmaros & Stevens, 2014). Although these studies did not evaluate all the same substances, all four found that 7C participation was associated with reduced Tetrahydrocannabinol use. Further, two studies found that adults in drug court (Korchmaros, 2018b) and adolescents in high school (Applied Survey Research, 2010) reported reduced alcohol use at posttreatment.

One study found that high school students who received 7C experienced *increases* in the use of the following substances at posttreatment: Lysergic acid diethylamide or other psychedelics; prescription medications; inhalants; cough or cold medicine; methamphetamine or amphetamines; heroin; and diet pills (Applied Survey Research, 2010). However, this study only reported the percentage of students using each substance at pre- and posttreatment. Consequently, it is unknown whether these changes were statistically significant. Notably, no other study evaluated in this review reported increases in posttreatment substance use.

Three studies directly compared 7C with other substance use treatment modalities. Two studies evaluated adolescents (Lindeman, 2009; Smith et al., 2006), and one examined adults (Korchmaros, 2018b). The first of these two studies evaluating adolescents (Lindeman, 2009) compared 7C to cognitive behavioral therapy as part of a residential treatment program. Although both groups experienced reductions in measures of substance use, no significant inter-group differences were observed at posttreatment with regards to changes in substance use (Lindeman, 2009). The second study (Smith et al., 2006) compared the efficacy of 7C and Strengths Oriented Family Therapy (SOFT), a family therapy model for substance use treatment, in an outpatient treatment setting. Its authors found that participants in each program demonstrated significant reductions in substance use frequency and related problems; however, neither condition was found to be superior to the other at reducing the frequency or severity of substance use-related problems at either the 3-month or the 6-month follow-up assessment (Smith et al., 2006). In contrast with these findings, a single study evaluating adults in drug court (Korchmaros, 2018b) found that 7C was associated with larger reductions in the recency and frequency of substance use over time when compared to a standard cognitive behavioral substance use treatment.

Mental health

Three studies evaluated the effectiveness of 7C on multiple mental health outcomes in addition to substance use outcomes among adolescent populations (Korchmaros, 2018a; Korchmaros & Stevens, 2014; Stevens et al., 2007). The first study (Korchmaros, 2018a) evaluated mental health outcomes among clients enrolled in adolescent substance use treatment programs providing 7C as part of drug court. The author found that participants demonstrated significant posttreatment improvements in several measures of mental health, including internal mental distress, somatic symptoms, depressive symptom, traumatic stress, anxiety, and fear. The second study (Korchmaros & Stevens, 2014) investigated mental health outcomes among adolescent participants in an intensive outpatient

adolescent substance abuse treatment program that used 7C. The authors found that participants reported lower levels of internal mental distress at posttreatment than at pretreatment (Korchmaros & Stevens, 2014). In a third study of adolescents participating in an outpatient treatment program providing 7C, Stevens et al. (2007) found that participants demonstrated significant reductions in general mental distress, depressive symptoms, and anxiety at both 3-month and 6-month follow-up assessments.

Additional outcomes

Two studies evaluating adolescents (Korchmaros, 2018a) and adults (Korchmaros, 2018b) in drug court investigated changes in co-occurring problems beyond mental health or general substance use-related problems. Both studies found that the Seven Challenges was associated with improvements in a range of outcomes, which are described below.

In the first study (Korchmaros, 2018a), adolescents receiving 7C in drug court demonstrated reductions in the number of property, drug, violent, or interpersonal crimes committed; however, general illegal activity reported by participants did not significantly change between pre- and post-intake. This study also found that 7C had a positive impact on self-help activities at 6 months post-intake, although this effect was small (Korchmaros, 2018a).

The second study (Korchmaros, 2018b) found that adult drug court participants receiving 7C reported committing fewer crimes and engaging in fewer activities that could get them into trouble at 3 months post-intake compared to a control group of participants who received a cognitive behavioral intervention. By contrast, this control group reported statistically significant increases in crime and engagement in activities that could get them into trouble. This study also found that participants receiving 7C experienced increased vocational engagement at 3 months post-intake (Korchmaros, 2018b). However, this improvement was not significantly larger than the improvement reported by participants receiving a cognitive behavioral intervention (Korchmaros, 2018b). Moreover, even though 15.2% of the adult participants receiving 7C in this study reported experiencing homelessness at intake, significant reductions in homelessness were not observed at posttreatment.

Discussion

This systematic review examined seven studies published in the U.S. between 2006 and 2018 that evaluated 7C. Our review found that 7C is being applied across a range of diverse settings and populations, which enabled us to synthesize findings from a varied body of treatment literature.

All seven studies in the present review found improvements in substance use-related outcomes. Six studies found that participation in 7C was associated with reductions in the frequency of substance use among adolescents receiving services in a range of treatment settings, including outpatient programs (Korchmaros & Stevens, 2014; Smith et al., 2006; Stevens et al., 2007), a drug court program (Korchmaros, 2018a), a residential facility (Lindeman, 2009), and a high school (Applied Survey Research, 2010). Further, five of these studies found that adolescent and 7C participants demonstrated significant reductions in substance use-related problems at posttreatment (Korchmaros, 2018a; Lindeman, 2009; Smith et al., 2006; Stevens et al., 2007). These findings were consistent with the only

identified study that examined 7C among an adult sample, which found that drug court participants who received 7C reported reduced substance use frequency and related problems at posttreatment (Korchmaros, 2018b).

Among the three studies in this review that directly compared 7C to alternative treatments (Korchmaros, 2018b; Lindeman, 2009; Smith et al., 2006), results were equivocal. Although all three studies reported that individuals receiving 7C experienced reductions in substance use, only the study evaluating adults in a drug court setting (Korchmaros, 2018b) found that the 7C was more effective than a standard cognitive behavioral program at reducing substance use frequency and related problems. In contrast, two other studies that examined adolescent populations in a residential (Lindeman, 2009) and outpatient treatment program (Smith et al., 2009) did not find significant differences in outcomes between participants receiving 7C and those who received alternative interventions.

Collectively, the above studies suggest that 7C is associated with reductions in general measures of the substance use frequency and related problems across a range of populations and settings. Among the studies evaluating changes in rates of specific substance use, our results also suggest that 7C may be associated with reduced use of THC and alcohol use among adolescents and adults. Although out review also identified one study that reported that high school students who received 7C demonstrated increases in the use of certain substances, it is unknown whether these changes were statistically significant.

Results from our review also suggest that 7C may have salutary effects on adolescent mental health (Korchmaros, 2018a; Korchmaros & Stevens, 2014; Stevens et al., 2007), and may be associated with reduced rates of criminal justice involvement among adolescents and adults in drug court settings (Korchmaros, 2018a, 2018b). Given the diverse and complex needs of clients presenting to substance use treatment with co-occurring problems, these results provide early and promising support for the use of 7C within agencies providing services to individuals experiencing challenges in multiple life domains.

To date, the 7C program has been implemented at more than 300 agencies in numerous treatment settings across the U.S., and at several sites in Canada and Germany (Korchmaros, 2018a). Nevertheless, despite the widespread implementation of 7C, our search identified only seven studies examining its effectiveness on substance use outcomes. Additional studies are therefore needed (a) to build the evidence base of the program in order to more fully understand mechanisms and moderators of 7C on substance use outcomes and (b) to examine commonly impacted domains of life that are affected by substance use. To this end, we offer several recommendations for future research.

Given the variation in sample populations, settings, and the types of specific substances assessed across studies, studies evaluating 7C should examine both general measures of substance use as well as measures evaluating the use of specific substances in order to affirm and expand the findings identified in the present review. The small number and equivocal findings of studies in our sample that directly compared 7C to alternative interventions also indicate the need for studies that use randomized controlled designs that directly compare 7C to other modalities of substance use treatment. Finally, additional studies are needed that examine 7C's efficacy among adult populations, as our search identified only one study that evaluated an adult sample (Korchmaros, 2018b).

Limitations

The present systematic review has several important limitations to consider when interpreting the findings. The aim of this review was to identify and collate all empirical evidence on the efficacy of 7C for improving substance misuse outcomes. To consolidate this literature, we did not limit our search to a specific population or treatment setting. Although this broad aim enabled us to evaluate a comprehensive body of evidence, our search yielded a small number of studies evaluating a range of treatment settings and age groups. This represents a significant limitation, as particular client populations (e.g., adolescents in drug court) are sometimes represented in our review by a single study. Consequently, our findings should be interpreted as providing preliminary rather than conclusive support for the efficacy of 7C. Nevertheless, given that 7C is specifically designed to accommodate a broad spectrum of client populations, such findings are important to synthesize in order to highlight areas in need of further research and provide a comprehensive overview of a widely implemented therapy.

Publication bias, which occurs when studies reporting statistically significant results are selectively published over non-significant findings, may have impacted the results of the present review (Dalton et al., 2016). Evidence suggests that non-significant results are less likely to be published than results that are statistically significant, making studies reporting non-significant findings more difficult to identify and include in systematic reviews of the literature. The exclusion of such studies can bias the findings of systematic reviews evaluating interventions, as it increases the likelihood that an intervention's effects will be overestimated (Dalton et al., 2016). To minimize the impact of publication bias in this review, we engaged several methods recommended by PRISMA to increase the transparency of our search process and bolster our ability to identify unpublished literature (Moher et al., 2009). First, we proactively registered our review with PROSPERO. Second, we created a flow-chart diagram of our search results. Third, we contacted the Seven Challenges, LLC to identify additional published and unpublished studies of 7C. Fourth, we manually examined the references of all articles eligible for inclusion to identify any articles that were not captured in the initial search (Moher et al., 2009). Despite these efforts, it is possible that relevant unpublished literature was not identified. Moreover, our exclusion of non-English language studies may also have created a language bias reflected in the results of this review.

Methodological limitations among the studies in this review may have also limited the validity and generalizability of our findings. The primary methodological limitations of evaluated studies were small sample sizes, lack of control groups, lack of representation of individuals of minority racial or ethnicity status, and short follow-up periods. Further, most of the studies in this review did not specify whether participants and outcome assessors were masked to the intervention or exposure status of participants. This detail is important for interpreting these studies' findings, as a lack of masking has a demonstrable association with inflated estimates of intervention effects (Pildal, 2007). Consequently, to provide high-quality data on 7C efficacy, future studies of 7C should use RCT designs, larger sample sizes, and longer follow-up periods in which both participants and assessors are masked to intervention conditions.

Conclusions

Our review found early support for the clinical utility of 7C in managing substance use and related problems across a broad range of client populations. These findings offer preliminary evidence of the potential value of using 7C in agencies that provide services to adolescents and adults. However, more research is needed to determine whether 7C represents a significant improvement over other more commonly utilized methods of treatment (e.g., standard cognitive-behavioral programs), learn more about its impact on additional treatment outcomes, such as mental health and criminal justice involvement, and replicate the findings of the studies identified in this review.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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