COMMUNITY-BASED OUTREACH TREATMENT FOR ADDICTIONS AND CONCOMITANT DISORDERS: TIME FOR A CHANGE OF PARADIGM

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COMMUNITY-BASED OUTREACH TREATMENT FOR ADDICTIONS AND CONCOMITANT DISORDERS: TIME FOR A CHANGE OF PARADIGM

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EDITORIAL
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Editorial: Community-Based Outreach Treatment for Addictions and Concomitant Disorders: Time for a Change of Paradigm

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Editorial on the Research Topic

Community-Based Outreach Treatment for Addictions and Concomitant Disorders: Time for a Change of Paradigm

In addiction medicine, traditional outreach treatment mainly aims at risk reduction, for example, of overdose and infectious diseases. Besides, and complementary to, risk reduction treatments, other needs could be more adequately addressed, such as social rehabilitation and inclusion (1, 2). Over the last few decades, different models of community treatment for individuals with substance use disorders (SUD) and concomitant disorders have been developed (3, 4). Target populations often present complex disorders and face difficult social situations and frequently present high emergency and inpatient service use (5). This suggests that most outpatient programs are often unsuccessful at addressing the needs of this population.

Recently, newer models of community-based outreach treatment have been developed in psychiatry using recovery-oriented practices (6), in accordance with the United Nations Convention on the Rights of Persons with Disabilities (7). Central to recovery-oriented service delivery is the idea that, as well as offering evidence-based treatments, services have to adapt to people's needs, instead of people to service requirements (8). Among others, “housing first” and “supported employment” have been regarded as successful examples of the implementation of such a recovery model in mental health services (9, 10). Only few studies have examined specific community-based outreach treatment models for patients with addictions and concomitant disorders, especially with respect to recovery-oriented practices. Most of these studies either excluded or did not specifically assess the effect of these treatment models for individuals with SUD.

In light of these considerations, new models of addiction treatment are generally moving from prevention and risk reduction-based models to community treatment models which focus on inclusion and recovery (11). In order to further consolidate this paradigm change, the factors associated with the recovery process and with the stakeholders' possible views and barriers need to be studied as well. Therefore, the aim of this Research Topic is to present and discuss some examples of recovery-oriented models for individuals with addictions and concomitant disorders. The Research Topic includes eight articles which study new treatment models and service

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organization from different angles. They discuss service organization, different treatment models, and their possibilities for improvement, as well as how to facilitate access to care with the use of new technologies.

Existing community treatment programs, such as case management for individuals with SUD, are reviewed in the meta-analysis by Vanderplasschen et al. from a recovery-oriented perspective: previous findings of improved treatment retention for patients receiving case management are confirmed. However, further research is needed to assess the recovery potential of case management. The review by Wiktorowicz et al. of policies, service coordination, and access issues illustrates the remaining differences and challenges in the implementation of collaborative care models and local networks to foster service coordination for concurrent disorders. In order to understand which factors may be improved by community-based treatment, Gentil et al. investigated different profiles of homeless populations using clusters analysis. They found that SUD, mental health disorders, and high functional disability (complex disorders) had an important impact on quality of life, a fact which needs to be considered when designing community treatment programs for marginalized populations.

The study by Yang et al. has shown that, while programs need to be adapted to different populations, it is also important to improve the perceived social support and resilience in order to improve life satisfaction among individuals with SUD. When further exploring factors associated with recovery in community interventions, stakeholders' attitudes, and views also have to be examined. The detailed analysis of recovery attitudes and practices in an assertive community treatment team (ACT) by Khoury helps to understand which practices are associated with recovery. Especially the interactions based on collaborative egalitarian relationships between service providers and service users seem to be especially promising in the innovation of practice approaches in this field.

Another important goal of community-based outreach programs is to enable access for hard-to-reach populations and individuals who do not normally use addiction or mental health services. Such programs are reviewed by Edalati and Conrod, who examined modifiable risk factors which may lead to SUD and personality-targeted community interventions for adolescents aimed at reducing substance misuse. These interventions were found to facilitate access to care at school, as high-risk adolescents may not have the possibility to access other services. They contributed to reduce substance misuse and concomitant mental health problems. The study by Flores-Aranda et al. also describes an intervention for individuals not usually reached by traditional SUD programs. They presented an online intervention for men who have sex with men which aims to prevent substance use and sexual health related problems. Online tools have gained popularity in various fields of health prevention and treatment and could be helpful in facilitating access to care Monney et al. The literature review by Pennou et al. further highlights the treatment possibilities *via* mobile phone of core difficulties such as emotional regulation found in individuals with dual disorders.

The diversity of these contributions shows important promises in community-based outreach treatment for addictions. The topic highlights a major paradigm change in addiction treatment, moving away from a stepwise approach of harm reduction and relapse prevention followed by work on social inclusion. The new paradigm focuses on inclusion and recovery from the beginning and implements a more integrated approach with a range of interventions and goals which meet diverse needs aimed at enabling a sustained recovery management. Further research is needed on how to best translate recovery-oriented practices from theoretical aims to service organization and clinical practices and how to best include service users in this process.

AUTHOR CONTRIBUTIONS

LP wrote the first draft of the manuscript. YK and M-JF provided critical revision of the manuscript and important intellectual contributions. All authors read and approved the submitted version.

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Social Support and Resilience as Mediators Between Stress and Life Satisfaction Among People With Substance Use Disorder in China

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This study investigated the potential mediating roles of resilience and social support in the relationship between stress and life satisfaction. A total of 426 individuals, who have substance use disorder, from the Shifosi and Dalianshan rehabilitation facilities in China participated in the study. They were tested using the Perceived Stress Scale, Multidimensional Scale of Perceived Social Support, Connor–Davidson Resilience Scale, and Satisfaction with Life Scale. Results showed that the serial multiple mediation of social support and resilience in the relationship between stress and life satisfaction was significant. Furthermore, the findings corroborate the important roles of perceived social support and resilience in alleviating stress. Finally, we discussed ways to enhance the life satisfaction for individuals who have substance use disorder and analyzed the limitations of this study.

Keywords: stress, social support, resilience, life satisfaction, people with substance use disorder

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INTRODUCTION

Drug abuse is an important and widespread health problem (1). Statistics from the Niaz et al. (2) indicate that approximately 29.5 million adults worldwide use illegal drugs, which account for approximately 5.3% of the global population (3). In China, the use of drugs by 2.51 million people was registered by the end of 2016 (excluding retraining, deaths, and departures after 3 years of abstinence), with an annual increase of 6.8% (4). The prevalence of drug abuse and the increasing number of people with substance use disorder impeded China's social and economic development. The direct economic loss caused by drug abuse in China amounts to several hundred billion yuan annually. In addition, extreme social behaviors, such as robbery, theft, violence, and self-inflicted injuries, caused by drug abuse have seriously endangered the healthy development of the society. Research has emphasized that people who are dependent on drugs face more pressure than other groups (5, 6). They deal with stigma among family and friends, pressures in employment and life, social integration, physical and mental dependence, loss of self-identity, financial problems, and lack of institutional assistance (7–11). The negative reinforcement processing model of addiction shows that escaping from negative emotions caused by the negative external environment is the dominant motivation for maintaining addictive behaviors (12). Studies have found that stress plays an important role in drug abuse and its persistence (13, 14). Stress may be a common factor in promoting the memory of dorsolateral dependence, which can be used as a neural mechanism to increase drug use and its relapse after stressful life events (15). Stress forces people who use drugs to relapse after they return to society. Tartaglia et al. (16) performed a regression analysis to test the relationship between cannabis use and life satisfaction. They found that life satisfaction is negatively related to substance use. Drug dependents frequently feel depressed, anxious, and even suicidal (17, 18). Therefore, considerable attention must be accorded to the pressure and health problems experienced by people with substance use disorder.

Stress and Life Satisfaction

With the development of positive psychology, attention toward life satisfaction has increased in the academic literature (19–21). Life satisfaction refers to a subjective assessment of the quality of life and is considered an important component of subjective well-being (22). It is also an indicator of psychological states. Life satisfaction is a resource that includes autonomy, control beliefs, positive emotions, emotional regulation, problem-solving, adaptation, and balance throughout the life cycle (23). In contrast, perceived stress is a subjective evaluation of an aversive situation. Stress has been studied by measuring the physiological performance, the occurrence of major life events, and cognitive evaluation (24). Stress occurs when the demand for events exceeds the available resources (25). The relationship between stress and life satisfaction has been the subject of a considerable research (26–28). Numerous empirical studies have shown that stress is negatively related to life satisfaction (26, 29, 30). Stress exerts a negative effect on people over time, which results in dissatisfaction with life and other emotional reactions. The previous literature has shown that stress is associated with life satisfaction; however, the underlying mechanisms behind such a relationship remain unclear. Therefore, the present study aims to identify the potential intermediary mechanisms between stress and life satisfaction.

Stress, Social Support, Resilience, and Life Satisfaction

Social support is hypothesized as a mediator between stress and life satisfaction. Some studies have shown that individuals with extremely high stress levels rarely feel satisfied with themselves and are likely to have low social support (31, 32). These conditions are negatively related to their physical and psychological well-being (33). People with higher levels of social support have been proved to be less likely to use drugs and alcohol (34, 35). Social support is associated with better quality of life and acts as a significant indicator of the subjective well-being among people with substance abuse disorder (36). Wang et al. (37) found that the relationship between stress and life satisfaction can be mediated by support from family and friends, but not from a person's significant other. Stress is associated with life satisfaction by increasing the demand for social support. In other words, the level of social support can mediate the relationship between stress and life satisfaction.

Resilience is also hypothesized as a mediator between stress and life satisfaction. Stress has been found to be positively correlated with decreased resilience (38, 39). Long-term stress exposure undermines a person's successful adaptation to a threatening environment, which is not conducive to the development of resilience (27). Research has shown that resilience is an important psychological resource that can maintain or recover high well-being while confronting life's adversities (40–42). Resilient individuals can maintain physical and mental health by alleviating the negative consequences of difficult situations (43, 44). Resilience has been positively identified as an important source of life satisfaction. Shi et al. (45) found that resilience plays the role of a partial mediator in the relationship between stress and life satisfaction among Chinese medical students.

Considerable literature has addressed the relationship between stress and life satisfaction (46, 47). Moschion and Powdthave (48) in a longitudinal study of 1174 respondents found that a decrease in life satisfaction following the consumption of illegal/street drugs persists 6 months to a year after use. Laudet and White (49) have shown that higher life satisfaction and less stress are positively associated with high levels of social support among individuals with substance use disorder. Nikmanesh and Honakzeh (34) found that enhancing perceived social support and positive affection plays a significant role in increasing teenagers' resilience to drug abuse. Individuals with resilience were less likely to involve themselves in drug abuse (50), which is beneficial to life satisfaction (51). To our knowledge, however, no study has yet assessed whether the relationships among the three variables (i.e., stress, social support, and resilience) can simultaneously affect the life satisfaction of people with substance use disorder. The relationships among stress, social support, resilience, and life satisfaction of people with substance use disorder remain unexplored. Therefore, the potential mediating roles of social support and resilience in the relationship between stress and life satisfaction among people with substance use disorder may be critical to key decision makers when developing intervention strategies for the treatment process.

Accordingly, the present study aims to verify the mediating roles of social support and resilience in the synergic effect of the relationship between stress and life satisfaction. On the basis of the summary of the existing studies on the relationship among stress, life satisfaction (46), resilience (52), and social support (53), we hypothesized that social support and resilience act as mediators between stress and life satisfaction among people with substance use disorder in China.

In addition, the existing research results show that as a social resource, social support directly affects resilience (54). Given the significant influence of resilience on life satisfaction, stress is assumed to exert a considerable indirect effect on life satisfaction by mediating the effects of social support and resilience. In particular, individuals with low stress perception receive high social support. Their mental flexibility is also improved. Thus, their life satisfaction is higher than that of the individuals with high stress perception. Social support and resilience play significant intermediary roles in the relationship between stress and life satisfaction. The hypothesis model is shown in **Figure 1**.

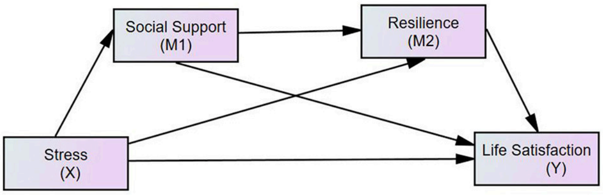

FIGURE 1 | The hypothesized model concerning the relationship between stress and life satisfaction: social support and resilience as mediators.

METHODS

Participants and Procedure

A total of 426 people with substance use disorder from China volunteered to participate in the study without compensation. Informed consent was obtained from all the participants prior to the initiation of the investigation. The participants were asked to independently complete the questionnaire in a conference room to ensure the confidentiality of their information. The questionnaire took approximately 30 min to complete.

The 426 participants, comprising 328 males and 95 females (excluding the missing ones), were from the Shifosi and Dalianshan rehabilitation facilities in China. Their age ranged from 19 to 51 years. For the education variable, the level of education degrees was considered as a reference criterion: 1 = elementary school and below, 2 = middle school, 3 = high school, and 4 = college and above. The distributions of the "1" and "3" variables were similar, i.e., each level accounted for nearly 20% of the participants. Meanwhile, variable "2" comprised the largest proportion ($P = 53.1\%$), whereas variable "4" had the smallest proportion ($P = 7\%$). Considering the marital status, 31.2% ($n = 133$) of the participants were single, 33.3% ($n = 142$) were married to a living spouse, 31.5% ($n = 134$) were divorced, and 2.3% ($n = 10$) were widowed. The drug abuse analysis indicated that 59.5% ($n = 280$) of the participants were addicted to meth, 26.3% ($n = 112$) to heroin, 2.1% ($n = 9$) to marijuana, 1.2% ($n = 5$) to cocaine, 0.9% ($n = 4$) to ecstasy, 0.7% ($n = 3$) to morphine, and 1.2% ($n = 5$) to other drugs. Furthermore, 56.4% of the respondents reported an annual income below 50,000 yuan, 20.4% between 50,000 to 10,000 yuan, and 19.7% <10,000 yuan.

Measures

Stress

The Perceived Stress Scale (PSS) was administered to assess stress. It consists of 14 items, which measure the degree of stress experienced by the respondents over the past 4 weeks. PSS-14 uses a five-point Likert scale response format (from 0 = never to 4 = very often) (25). The PSS-14 score is based on a summary of all 14 projects. The Chinese version of PSS-14 achieves good levels of reliability (0.808) and validity among the Chinese population (55).

Social Support

The Multidimensional Scale of Perceived Social Support (MSPSS) was administered to assess social support. In this scale, the participants respond to each question using a seven-point Likert scale (from 1 = very strongly disagree to 7 = very strongly agree). MSPSS focuses on three main subscales: family, friends, and significant other (56). The Chinese version of MSPSS achieves good levels of reliability and validity among the Chinese population (57, 58). The Cronbach's alpha of MSPSS in this study is 0.911, which indicates the high reliability of this scale.

Resilience

The Connor–Davidson Resilience Scale (CD-RISC) was administered to assess resilience. The CD-RISC comprises 25 items, which can be rated using a five-point scale (0 = not true at all, 1 = rarely true, 2 = sometimes true, 3 = often true, 4 = true nearly all the time); a high score reflects greater resilience (59). The Chinese version of CD-RISC achieves good validity and reliability among the Chinese population (60). The Cronbach's alpha of CD-RISC in this study is 0.908, which indicates the high reliability of this scale.

Life Satisfaction

The Satisfaction with Life Scale (SWLS) was administered to assess life satisfaction. SWLS consists of five statements. Participants will indicate their degree of agreement to these statements using a seven-point Likert scale. The five statements are listed below. (1) In most ways, my life is close to my ideal. (2) The conditions of my life are excellent. (3) I am satisfied with my life. (4) So far, I have achieved the important things I want in life. (5) If I could live my life over, I would change almost nothing. The seven-point scale is as follows: 1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = neither agree nor disagree, 5 = slightly agree, 6 = agree, and 7 = strongly agree. The SWLS score is derived by summarizing the rating of each participant for the five statements (61). The Chinese version of SWLS achieves good validity and reliability (57, 60, 62). The Cronbach's alpha of SWLS in this study is 0.844, which indicates the high reliability of this scale.

RESULTS

Preliminary Analyses

We used an initial correlational analysis to test the relationships among stress, social support, resilience, and life satisfaction. The descriptive statistics included mean and standard deviation (SD), which were tested using IBM SPSS Statistics version 22.

The descriptive statistics (mean, SD, and alpha), reliability estimates (Cronbach's alpha coefficients), and correlations of all the variables are presented in **Table 1**. The results show significant correlations among all the variables. Stress was negatively related to social support, resilience, and life satisfaction, whereas life satisfaction was positively related to social support and resilience. These bivariate correlations support the following mediation analyses.

Serial Multiple Mediation Model

A serial multiple mediation model was used to test the important roles of social support and resilience in mediating the relationship between stress and life satisfaction. Compared with

TABLE 1 | Means, standard deviations (SD), Alpha, reliabilities and intercorrelations among study variables.

Number	Measure	Mean	SD	Alpha	1	2	3	4
1	Stress	41.11	5.50	0.808	1			
2	Social Support	52.86	13.61	0.911	−0.222**	1		
3	Resilience	77.74	16.46	0.908	−0.389**	0.484**	1	
4	Life satisfaction	16.39	6.63	0.844	−0.100*	0.236**	0.261**	1

α, Cronbach's alpha.
***Correlation is significant at the 0.01level(2-tailed).*
**Correlation is significant at the 0.05level(2-tailed).*

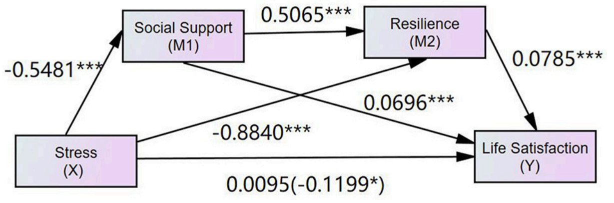

FIGURE 2 | The finalized structural model (*N* = 426) in the present study. Factor loading are standardized. Support, perceived social support; SS1-SS3, three parcels of social support; SS1, family support; SS2, friend support; SS3, specialist support; LS1-LS3, three parcels of life satisfaction; PSS1-PSS3, three parcels of stress; Re1-Re2, two parcels of resilience.

TABLE 2 | Bootstrapping indirect effects and 95% confidence intervals(CI) for the final mediational model.

Number	Model pathways	Point estimates β	95%CI	
			Lower	Upper
1	Total Indirect Effect	−0.1293	−0.1992	−0.0738
2	Stress→ SS→ Life satisfaction	−0.0382	−0.0854	−0.0076
3	Stress→ SS→ Re→ Life satisfaction	−0.0181	−0.0416	−0.0044
4	Stress→ Re→ Life satisfaction	−0.0576	−0.1064	−0.0163

N = 426, SS = Social Support, Re = Resilience.

the traditional mediation method, a serial multiple mediation model enables researchers to simultaneously analyse two or more mediators. Furthermore, it can provide effective values for each model path and account for other model paths. In accordance with the development of multiple mediation macros presented by Preacher and Hayes (63), we calculated the standard value of the direct and indirect coefficients in the relationship between stress and life satisfaction. All the path coefficients stand for regression weights in the relationship between independent and dependent variables.

As shown in **Figure 2**, the total effect ($\beta = -0.1199, p < 0.05$) from stress to life satisfaction was at a significant level (Step 1). Moreover, the direct paths from stress to social support ($\beta = -0.5481, p < 0.001$) and resilience ($\beta = -0.8840, p < 0.001$) were significant. Meanwhile, the paths from the first mediator (social support) to the second mediator (resilience) were also significant ($\beta = 0.5065$, $p < 0.001$) (Step 2). The paths from the mediators, namely, social support ($\beta = 0.0696$, $p < 0.001$) and resilience ($\beta = 0.0785$, $p < 0.001$), to life satisfaction were significant (Step 3). However, the direct path from stress to life satisfaction was insignificant ($\beta = 0.0095$, $p > 0.05$) (Step 4). Moreover, the mediating variables (social support and resilience) were observed to exert a mediating effect on the relationship between stress and life satisfaction.

The bootstrapping procedures in the SPSS PROCESS macro from the serial multiple mediation model 6 were used to test the significance of the indirect effects of stress on life satisfaction through the mediation of social support and resilience (64). Following the recommendations of Shrout and Bolger (65), we generated 10,000 samples from the original dataset ($N = 426$) via random sampling. If the 95% confidence interval (CI) of the outcome of the mediation effect did not contain zero, then the mediation effect would be significant at the 0.05 level. **Table 2** shows the indirect effects and their associated 95% CIs. As shown in the table, the total indirect effect (i.e., the difference between total effect and direct effect) of stress through social support and resilience on life satisfaction was significant ($\beta = -0.1293$, $p < 0.001$). The single mediation of social support, the multiple serial mediations of social support and resilience, and the single mediation of resilience in the relationship between stress and life satisfaction were all significant in the tested model.

DISCUSSION

In this study, we analyzed the mediating roles of social support and resilience in the relationship between stress and life satisfaction among individuals with substance use disorder in China. We hypothesized that stress is negatively related to life satisfaction, social support, and resilience. The correlational analyses indicated that our hypothesis is correct. Many previous studies have analyzed the relationships among stress, life satisfaction (66, 67), and resilience (38, 39). Furthermore, our correlational analyses showed that the relationship between stress and social support is negative. This result matches with those of the previous studies (68), which indicated that people who have substance disorder with low stress levels may maintain high social support.

Moreover, the mediating effects of social support and resilience on the relationship between stress and life satisfaction were significant among people with substance use disorder. Individuals with low stress levels can maintain higher social support than others, which enhances their resilience. All these advantages will enhance their life satisfaction levels. The results indicate that the life satisfaction of people with substance use disorder can be enhanced in many ways. Their stress level can be alleviated and their social support or resilience can be enhanced, thereby increasing their life satisfaction. Several previous studies have indicated that social support and resilience can decrease stress, and consequently, enhance life satisfaction. Hamama et al. (66) found that reducing the stress may enhance life satisfaction by increasing the social support from others. Shi et al. (45) found that resilience mediates the relationship between stress and life satisfaction.

From the final model of the present study, the path "stress → social support → resilience → life satisfaction" is significant. This path shows that individuals who have substance use disorder with low stress levels will receive more social support from others, which may increase their resilience, and consequently, their life satisfaction. Moreover, the research results indicate that social support and resilience are mediators between stress and life satisfaction. On the one hand, social support is a positive factor and predictor of increased life satisfaction; it can widen a person's social network, resist or relieve stress, and promote health (69, 70). Considerable research has identified the positive relationship between social support and life satisfaction (71). The results of the current study indicate that social support is a mediator between stress and life satisfaction. People who have substance use disorder with low stress levels may receive more social support, thereby increasing their life satisfaction. On the other hand, the mediating effect of resilience is consistent with the results of the previous studies (45). Research shows that chronic stress is positively related to reduced resilience, particularly in the face of loss (72). In addition, resilience is considered an important factor in the development of a person's life satisfaction (44, 73). On the basis of these results, inferring that resilience plays a mediating role in the relationship between stress and life satisfaction is reasonable. This study provides initial support for this hypothesis.

In summary, this study extended insights into the complex interactions among the stress, social support, resilience, and life satisfaction of Chinese individuals who have substance disorder. The important path from stress to social support to resilience to life satisfaction determines the internal mechanism between stress and life satisfaction. The results of the current study can provide valuable guidance in implementing psychological interventions to improve the life satisfaction of people with substance use disorder. Avoiding stress can be used as a preventive therapy to help such people to improve their life satisfaction. It can also be used as an active therapy to help them manipulate the impact of social support on their social relationships and mental resilience, thereby improving their life satisfaction.

However, the current study has several limitations. First, the data are completely dependent on face-to-face survey measures, which are prone to bias because the participants (i.e., people with substance use disorder) tend to provide responses with specific social needs. To reduce the impact of subjectivity, multiple assessment methods should be used for assessment. Second, the cross-sectional design of this study does not determine causality. In future studies, longitudinal and experimental methods can be used to analyze the relationships among stress, perceived social support, resilience, and life satisfaction. Third, the results of the current research are based on 2D measures of social support and resilience. In future studies, other facets of stress must be examined. Other possible mediating factors, such as loneliness, self-esteem, and happiness, must also be explored. Lastly, the sample in the current study was obtained from the population of individuals with substance use disorder. Thus, whether the current findings can be generalized to other population groups, such as the youth, males, females, and the elderly, requires further investigation.

ETHICS STATEMENT

This study was approved by the ethics committee of Nanjing Medical University, which fully considers safety and fairness principles. The research content will not pose any harm or danger to any group. The recruitment of the subjects will be entirely voluntary and informed consent will be obtained from the participants. The researchers exert maximum protection to guarantee the privacy of the subjects, the research contents, and the research results.

AUTHOR CONTRIBUTIONS

There are a total of four authors are involved in this paper. CY and MX contributed equally to this work. MX is responsible for this paper, literature review and discussion part. CY is responsible for the whole framework and data processing as well as part of this paper. MH is responsible for the parts in this paper, the method and the polishing of the essay. YL is responsible for guiding the writing of this article.

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REVIEW
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A Review of Personality-Targeted Interventions for Prevention of Substance Misuse and Related Harm in Community Samples of Adolescents

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Several school-based prevention programmes have been developed and used to prevent, delay, or reduce substance misuse, and related problems among community samples of adolescents. However, findings indicate that many of these interventions are associated with null, small, or mixed effects in reducing adolescent substance misuse, in particular for those mostly at risk of transitioning to substance use disorders. These findings highlight the need to shift the focus of substance use prevention efforts toward intervention strategies which directly target high-risk adolescents. The Preventure programme was designed to target four personality risk factors for substance misuse: hopelessness, anxiety sensitivity, impulsivity, and sensation seeking. This article reviews findings from the previous trials of personality-targeted interventions (i.e., Preventure programme) with adolescents and discuss the promises and benefits of these interventions for targeting community samples of high-risk adolescents at school level for reducing substance misuse and related mental health problems. Findings indicated that this programme has been successful in reducing the rates of alcohol and illicit drug use and substance-related harms by ∼50% in high-risk adolescents with the effects last for up to 3 years. These interventions were also associated with a 25% reduction in likelihood of transitioning to mental health problems, such as anxiety, depression, suicidal ideation, and conduct problems. The programme is particularly beneficial for youth with more significant risk profiles, such as youth reporting clinically significant levels of externalizing problems, and victimized adolescents. A key strength of the Preventure programme is that it is embedded in the community and provides substance use intervention at school level to the general samples of high-risk adolescents who might not otherwise have access to those programmes.

Keywords: school-based substance use prevention programme, community-based targeted prevention, cluster randomized trial, substance use outcomes, mental health, high-risk adolescents

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INTRODUCTION

Several school-based prevention programmes have been developed and used to prevent, delay, or reduce substance misuse and related problems among community samples of adolescents [e.g., (1–3)]. However, the majority of these interventions have not been evaluated using controlled randomized trials and do not meet the scientific standards against which many other medical interventions are compared (4, 5). A recent review of 46 systematic reviews on the effectiveness of interventions to prevent substance abuse among adolescents indicated that school-based prevention programmes were the most highly evaluated interventions for targeting adolescent substance abuse compared to other platforms including family/community-based interventions, digital platforms, policy interventions, multicomponent interventions, and incentives (6). Results from these reviews have indicated that many of these interventions are associated with null, small, or mixed effects with respect to reducing substance misuse among adolescents [e.g., (1–3, 7–9)]. There is also very limited evidence on medium or long-term impact of these interventions (7, 10), however, a small number of well-evaluated programmes do indeed indicated long-term benefits [e.g., (11)].

Among effective school-based prevention programmes, prevention programmes targeting never-smokers, and combined social competence and social influences curricula reduced smoking initiation (8). Smoke-Free Class Competition (SFC) decreased current smoking (12). School-based brief alcohol interventions (BAIs) were associated with reduced alcohol consumption (13). Combined social competence and social influence interventions were effective in preventing drugs and cannabis use (14, 15). Finally, programmes combining antidrug information with refusal skills, self-management skills, and social-skills training were linked to reduction in marijuana and alcohol use (16) [see (6)]. The majority of these intervention programmes are based on universal approaches which target all students, regardless of their level of risk for substance use and are based on delivering generic intervention components that are appropriate for general populations of adolescents [e.g., (17, 18)]. Therefore, adolescents who are most at risk of transitioning to substance use disorders, and those who have already started using substances may not benefit from these approaches (19). Some programmes were only successful when delivered individually and had no significant effect when delivered in groups (13) which requires many resources. Many programmes were effective when they incorporated components of multiple prevention models (8, 15, 16), included several intervention sessions (e.g., $\geq$ 15 sessions), or were facilitated by individuals other than teachers (15) which put a heavy burden on school systems. While programmes such as brief school-based interventions have been shown to reduce alcohol problem symptoms in young drinkers, they are limited in the extent to which they can address the full spectrum of drug-related behaviors and prevention aims (7). In addition, implementation fidelity is a significant challenge, with programs rarely being implemented in the way that they were originally designed and tested—due to limited resources and lack of mechanisms for promoting sustainability of prevention efforts [see Ennett et al. (20)]. One of the most widely studied school-based program was even shown to produce harmful effects when implemented through a program delivery system for which it was not initially intended (21). Despite these effects, substance use and misuse remain a highly prevalent problem and an escalating problem in certain high-risk communities and populations (22, 23).

The combination of limited efficacy or effectiveness of programmes and limited resources in the school settings to invest in prevention universally have stimulated research focusing on risk for early onset or more problematic substance use for the purpose of directing resources at those most in need of intervention, and to better understand and target risk trajectories to produce more impactful interventions (24).These findings suggest that shifting the focus of substance use prevention efforts toward more selective and targeted intervention strategies to target youth most at risk of transitioning to substance misuse and disorders might result in more impactful interventions, both from a cost-benefit perspective and potentially from an efficacy perspective. The distinction between selective and targeted programmes is of importance, where the former would simply direct existing interventions toward those most in need, and the latter would involve intervening upon the specific risk factor in a particular high-risk group [e.g., (25, 26)]. A combination of the selective and targeted approach is not always possible due to inability to target some known risk factors (e.g., gender), but when selective programs have been developed to directly target factors that render youth at greater risk for problematic use, such programmes have been shown to be highly beneficial for adolescents with higher risk profiles, both at individual (e.g., high-risk personality profiles) and contextual/environmental (e.g., poverty, trauma) levels (25–29).

One selective and targeted programme that has been widely tested in recent years is the "Preventure" programme, which targets personality risk factors through brief, selective interventions for groups of youth reporting higher levels of traits indicating risk. This personality-targeted approach to substance use prevention offers many advantages over more traditional universal prevention approaches by allowing schools and communities to direct their limited resources to those most in need, and by providing an integrated framework for addressing multiple prevention targets (e.g., substance use, mental health, victimization). A previous review article of personality-targeted interventions (27) included results from both adolescents and community and clinical adult samples and reported on delivery of the programme in any format, including full Preventure programme and personality-specific interventions (e.g., anxiety-sensitivity intervention for adults with high levels of anxiety sensitivity) and platform (e.g., delivered at school, delivered by telephone or email) (27). This article was focused on primary findings of each trial related to the substance use outcomes and does not include the secondary data analyses of these trials and outcomes related to mental health problems and other relevant outcomes (e.g., victimization). The present article reviews the findings from the five previous trials of personality-targeted interventions with community samples of at-risk adolescents delivered using school platform and discusses the promises of this approach for targeting early substance use and other mental health problems.

PREVENTURE PROGRAMME: A PERSONALITY-TARGETED APPROACH TO SUBSTANCE USE PREVENTION

The Preventure programme was designed to target four personality risk factors for substance misuse: hopelessness, anxiety sensitivity, impulsivity, and sensation seeking (27). Longitudinal cohorts have identified these personality factors as strong and reliable predictors of future risk for substance use and related problems (30–32). These traits appear to be related to distinct substance use trajectories, differentiated on the basis of substance use and co-morbidity patterns, age of onset, and motivations for use [for a review, see (24)]. Sensation seeking trait is associated with biological and subjective sensitivity to the incentive rewarding and enhancing effects of substances and directly linked to early onset experimentation with substances and binge drinking, whereas, impulsivity, reflected as poor inhibition and a tendency to behave without proper consideration of the consequences, seems indirectly related to substance use through conduct problems, and therefore is associated with a slightly later onset of use, but more severe and problematic substance use profile (24, 33). By contrast, internalizing traits like hopelessness (i.e., a tendency to negative and depressive thinking) and anxiety sensitivity (i.e., a fear of anxiety-related physical sensations) are associated with the tendency to report using substances to cope and regulate negative affect and indirectly related to substance use through depressive and anxiety symptoms (24, 33). These traits are also able to predict specific drug-use profiles suggesting different underlying motivational drivers of the substance use, a hypothesis which has been confirmed by studies on the relationship between these traits and self-report motives for substance use in the general population (34), and in high-risk communities (35, 36).

Preventure is a "selective" substance use prevention programme, that is, high-risk students are selected based on their score on personality questionnaire, Substance Use Risk Profile Scale [SURPS (37)]. Adolescents who score one standard deviation above the population mean (e.g., school's mean) on one of the SURPS subscales (i.e., high-risk individuals; ∼45% of the youth population) are invited to participate in brief group-based intervention sessions which target their dominant personality profile. Interventions are generally held during school hours and involve only two 90-min sessions, with 1 week separating sessions. Interventions are conducted using specific manuals for each personality profile that incorporate psycho-educational, motivational enhancement therapy (MET) and cognitive behavioral therapy (CBT) components and include real life "scenarios" shared by local youth with similar personality profiles [see (27)].

Personality-targeted interventions have been evaluated in eight randomized trials, including samples of adolescents and adults, in Canada, United Kingdom, Netherlands, and Australia, with additional trials in progress [for a review of primary findings of previous Preventure trials, see (27)]. **Table 1** summarizes the findings from five previous randomized trials of personality-targeted interventions with community samples of high-risk adolescents. Findings from five previous trials with adolescent samples have indicated that the school-based Preventure Programme is successful in reducing a range of substance use outcomes by ∼50% in high-risk adolescents with the effects lasting for up to 3 years [see (27)]. These interventions were also associated with a 25% reduced likelihood of transitioning to significant mental health problems, such as anxiety, depression, suicidal ideation, and conduct problems (38).

FACILITATING ACCESS TO CARE AND REDUCING THE BARRIERS OF DELIVERY FOR HIGH-RISK YOUTH: A COMMUNITY-BASED OUTREACH MODEL TO SUBSTANCE USE PREVENTION

A key strength of the school-based Preventure programme is that it is embedded in the community. It provides preventative interventions to community samples of high-risk adolescents who might not otherwise have access to mental health programmes due to limited community resources, need to involve third party payers for such services, and due to local health care policies which often require that youth present with clinical impairment in order to receive services, or through their parents health insurance plan. To address these barriers, the Preventure programme is largely delivered by school personnel, including teachers and school counselors, but is designed to be adapted to the context in which youth present: trials indicate that Preventure is similarly efficacious when delivered by trained clinicians or school teachers in terms of reducing problematic mental health, alcohol and drug-related outcomes (39).

Results of the previous trials indicated that by targeting personality risk factors instead of onset of mental health or substance use problems, the programme also has the advantage of involving youth who might be higher functioning or not yet experiencing problems, allowing schools to promote it as a skill-building workshop and making it much more attractive and less intimidating to youth and their parents. Trials demonstrated that when the programme is promoted in this way, 70–85% of youth will voluntarily participate in the programme [see consort flow diagrams of trials (39–41)]. Delivering personality-specific skills in group format with adolescents with similar personality profiles may also help increasing engagement and empathy among adolescents and school personnel.

Finally, by training educational professionals to identify and intervene early on psychological risk factors for mental health and addiction, the programme equips professionals with assessment tools, and cognitive-behavioral and motivational interviewing skills that they can then use in future interventions with student who might require more intensive or additional services. In fact, a new trial in progress [i.e., Inter-Venture, (see https://ichgcp.net/clinical-trials-registry/NCT03114007)] delivers the 2-session Preventure programme in schools and then follows youth annually to then proactively identify and have

TABLE 1 | Summary of five randomized trials of personality-targeted interventions (Preventure Programme) for substance misuse and related problems in community samples of high-risk adolescents.

Trial	Sample	Substance use outcomes	Mental health outcomes	Other related outcomes
1. Canadian preventure trial (4 months) (45)	HR secondary students (drinkers) IG: $n = 166$ CG: $n = 131$	Reduction in: Drinking rates (4 months) Drinking quantity (4 months) Binge drinking (4 months) Drinking problems (4 months)		
2. United Kingdom preventure trial (2 years) (40, 46–48)	HR secondary students IG: $n = 190$ CG: $n = 157$	Reduction in: Drinking rates (6 months) Binge drinking (6 months) Drinking problems (2 years) Uptake of illicit substance misuse (2 years) Drugs use rates (2 years) Drug use frequency (2 years) Cannabis use (2 years) Cocaine use (2 years)	Reduction in: Panic attack (6 months) Truancy (i.e., school avoidance) (6 months) Depression (6 months) Shoplifting (6 months)	
3. Dutch preventure trial (12 months) (44, 64)	HR secondary students (drinkers) IG: $n = 343$ CG: $n = 356$	Reduction in: Binge drinking (12 months) Growth of binge drinking (12 months)		Reduction in alcohol use outcomes in HR adolescents in lower education schools (e.g., vocational training)
4. United Kingdom adventure trial (2 years) (29, 39, 49, 51, 57, 59, 60, 64)	HR secondary students IG: $n = 558$ CG: $n = 437$	Reduction in: Drinking rates (2 years) Drinking quantity (2 years) Drinking frequency (2 years) Binge drinking (2 years) Growth of binge drinking (2 years) Drinking problems (2 years) Cannabis use (2 years)	Reduction in: Depressive symptoms (2 years) Anxiety symptoms (2 years) Conduct symptoms (2 years) Peer victimization (2 years) Bullying perpetration (2 years)	Reduction in alcohol use outcomes in HR adolescents with pre-existing depression and anxiety symptoms, and those in different SES (2 years) Additional reduction in those with pre-existing ADHD and conduct problems and those victimized by peers (6 months & 2 years) Reduction in drinking rates and growth of binge drinking in LR students (i.e., herd effect)
5. Australian CAP trial (3 years) (41)	HR secondary students IG: $n = 202$ CG: $n = 291$	Reduction in: Drinking rates (3 years) Binge drinking (3 years) Drinking problems (3 years)		

Note. HR: High-risk; IG: intervention group; CG: control group; SES: Socioeconomic Status; LR: Low-risk; ADHD; attention-deficit/hyperactivity disorder; CAP: Climate and Preventure.

a dialogue with high-risk youth about their persistent emotional and behavioral concerns or difficulties. These youth can then be rapidly identified and assisted (either by revisiting Preventure program in an individualized and extended version with the trained school counselor), or by being assisted in finding services or solutions to address their needs without having to wait for symptoms to escalate into crisis. This trial will evaluate whether integrating school-based prevention with community-based youth services is an effective method of reaching youth with mental health needs and preventing mental health problems at the population level.

The Preventure programme and its intervention materials are designed with consideration of cultural values, developmental needs, and attitudes of the targeted youth to make it more effective and relevant to adolescents receiving interventions in each personality group. O'Leary-Barrett et al. (40) have shown that youth-reported positive group experiences, learning, and skill development were predictive of positive behavioral changes in alcohol use and mental health symptoms after receiving the Preventure programme (42). Youth perspectives on the intervention independently accounted for up to 12–25% of the variance in changes in alcohol consumption and mental health symptoms over 12 months (42). These findings highlight the positive youth experiences of the programme as a significant indicator of its efficacy.

Adolescents may not be willing to share information regarding their substance use for fear of negative consequences and schools are often ambivalent about sharing drug-related information in the school context. Within the Preventure approach, substance use is not directly assessed or discussed. Participants are primarily selected based on their personality profiles. They learn about the target personality profile and associated risky coping behaviors, such as interpersonal dependence, aggression, avoidance, and substance misuse, using psycho-educational strategies. Thus, substance use is only discussed as one of the risky coping behaviors within a personality-focused learning context. Finally, the Preventure programme is very brief (only 2 sessions) and cost effective to implement. Because it does not interfere with the school curriculum, might prove to be easier to sustain compared to many universal approaches for youth substance use prevention [e.g., (43)].

EFFECTS ON SUBSTANCE USE OUTCOMES

Preventure targets personality traits that have been shown to associate with risk for early initiation of substance use and development of substance use disorders (24, 33). Thus, it can be helpful in the context of both prevention and early intervention for youth who have already started using substances. Previous trials which included substance use onset as an additional eligibility criterion have indicated that interventions were effective in reducing substance use and related problems in such groups of adolescents [e.g., (44, 45)].

Findings from all five previous Preventure trials with adolescents have reported a significant reduction with regard to a number of alcohol outcomes including drinking rates, drinking quantity, binge drinking, and problem drinking symptoms [up to 4 months; Canadian Preventure Trial; (45)], drinking rates and binge drinking (up to 6 months) and problem drinking symptoms (up to 2 years; United Kingdom (UK) Preventure Trial; (46–48), drinking rates, drinking quantity and frequency, rates and growth of binge drinking, and problem drinking symptoms [up to 2 years; Adventure Trial; (39, 49)], binge drinking and development of binge drinking [up to 12 months; Dutch Preventurec Trial; (44)], and drinking rates, binge drinking and alcohol-related harms [up to 3 years; Australian Climate and Preventure (CAP) Study; (41)]. Results from the U.K. Adventure and the Australian CAP trial also indicated a positive indirect effect of this intervention on the drinking rates and growth of binge drinking during the 24-month follow-up in the broader low-risk population of students (55% of age-matched school children) who were not selected for the intervention but were simply in the schools in which the Preventure programme was delivered to the high-risk students (i.e., "herd immunity") (49).

Results from the UK Preventure trial also indicated that receiving interventions was associated with preventing uptake of illicit substance misuse and decreasing number of drugs used and drug use frequency in at-risk youth over a 2-year period (48). Importantly, the intervention increased the likelihood that high-risk adolescents survive as non-cannabis users by 30%, as non-cocaine users by 80%, and non-users of other illicit drugs by 50% over the 2-year follow-up period compared to high-risk youth in control group (48). Receiving interventions in the UK Adventure trial was also associated with significant reduction in rates of cannabis use at the 6-month follow-up and reductions in frequency of cannabis use at 12- and 18-month follow-up (50). With respect to specific personality profile, adolescents with high scores in sensation seeking were shown to be at higher risk for cannabis use and particularly benefited from the interventions with regard to delaying or reducing binge drinking (47) and delaying the onset of cannabis use (50). Youth in anxiety sensitivity group specifically benefited from the intervention in terms of showing fewer coping motives for drinking alcohol (46). Altogether, results across studies indicate a consistent moderate effect of Preventure on most substance use outcomes (27).

EFFECTS ON MENTAL HEALTH PROBLEMS AND OTHER RELEVANT OUTCOMES

There is a high comorbidity between substance misuse and a range of concurrent psychiatric disorders in adolescents (51). Specific personality traits have been identified as common underlying risk factors that explain the co-occurrence between substance misuse and psychiatric symptoms and disorders [e.g., (31)]. Preventure includes key components from CBT for major psychiatric disorders relevant to each type of the personality traits. This can be helpful in reducing psychiatric symptoms and improve mental health of adolescents receiving intervention (38). For example, CBT strategies for depression (52), are applied in the hopelessness intervention, CBT for panic disorder in the case of anxiety sensitivity (53, 54), and CBT for attention-deficit/hyperactivity disorder (ADHD) in the case of impulsivity (55) are integrated in the interventions and manuals used for each specific personality profile.

Secondary data analyses from previous trials have indicated that adolescents who received the Preventure programme improved on psychological problems including internalizing and externalizing outcomes. Results from the two-year follow-up trial with 1,024 adolescents (i.e., Adventure trial) indicated that receiving Preventure programme was associated with reduction in experiencing severe depression (26% reduction), anxiety (21% reduction), and conduct symptoms (21% reduction) over 2-year follow-up in the full sample (56). In addition, interventions significantly reduced the odds of severe depressive symptoms and conduct problems (56). An earlier trial similarly showed that interventions were associated with 18.2% reduction in self-report panic attacks and 15.3% in truancy (i.e., school avoidance) in anxiety sensitivity groups, reduction in depression scores in hopeless groups, and 8.5% reduction in shoplifting in the entire sample of 13–16 years old adolescents ($N = 423$, UK Preventure trial), with a stronger effect on this outcome for the impulsivity group (18% reduction in shoplifting) (40). Findings from the Australian CAP trial report very similar and longer-term benefits on mental health outcomes and suggest that these effects are specific to school-based interventions that target personality risk (57).

In addition to the positive effects on psychological outcomes, there is no indication that intervention effects are limited to the least problematic students at schools: adolescents with pre-existing mental health symptoms including depression, anxiety, ADHD, and conduct problem symptoms equally benefit (or receive more benefit) from Preventure with regard to their alcohol use outcomes. Secondary data analysis from the Adventure cluster-randomized trial ($n = 3021$) indicated that high-risk adolescents with depression and anxiety symptoms equally benefited from the interventions with regard to reduction in their alcohol use and related problems. Adolescents who reported higher symptoms of externalizing problems (ADHD and conduct problems) at baseline indicated more reduction in alcohol consumption at earlier follow-up periods (6 months post-intervention) and more reduction in their alcohol-related problems over the 24-month period compared to those with lower levels of these problems (58).

The programme has also been associated with some improvements in the rates of peer victimization and bullying perpetrations in schools receiving the interventions. Results from a study using the data from Adventure trial indicated that interventions were associated with reduction in peer victimization in the entire sample (Conrod et al., under review). In addition, there was a significant decrease in bullying perpetration among high-risk students in the intervention group, particularly among impulsive adolescents (Conrod et al., under review). This effect is particularly important given the high rates of co-occurrence between peer victimization and substance use during adolescence and the role of personality in susceptibility to victimization and perpetration of bullying (59, 60). These findings suggest that Preventure programme can provide an opportunity to deliver effective interventions for targeting adolescent substance use while also providing solutions for broader emotional and behavioral wellbeing in schools.

EFFECTS ON SPECIFIC GROUPS OF ADOLESCENTS

Most school-based intervention programmes have been evaluated at the community-level impact, whereas, the effect of contextual risk factors is also an important consideration in the evaluation of these programmes. Since contextual risk factors, such as socioeconomic status and peer victimization, increase the risk of early alcohol and substance misuse among adolescents [e.g., (60, 61)], it is probable that they also influence the effectiveness of substance use prevention programmes. Two recent studies involving secondary analyses of Preventure trials reported that the programme is particularly effective for youth with more significant risk profiles (29, 62).

A trial of Preventure in the Netherlands examined the effects of this programme on alcohol outcomes in 699 adolescents aged 13–15 years with different education levels within the Dutch school system (62). This study found that receiving Preventure reduced binge drinking, binge drinking frequency, alcohol use and alcohol use frequency in lower educated young adolescents (e.g., vocational training), but not in the higher education group (e.g., pre-university education) (62). Another study sought to investigate the potential moderating effects of socioeconomic status and peer victimization on the effectiveness of the Preventure programme in reducing adolescent alcohol use over a 2-year period using the data from Adventure cluster-randomized trial ($N = 3021$). Findings indicated that Preventure programme was equally beneficial for high-risk adolescents in different socioeconomic status and those exposed to peer victimization in terms of their alcohol outcomes and related problems (29). Receiving interventions was additionally beneficial for adolescents reporting peer victimization regarding their alcohol-related harm compared to non-victimized youth (29). Given previous findings linking peer victimization to risk for alcohol misuse and the tendency to report risky coping motives (e.g., to cope with negative emotions and to conform) (63), implementing the school-based Preventure programme provides an opportunity to deliver effective substance use interventions for victimized adolescents, who are at risk of long-term mental health concerns and substance misuse (64).

While Preventure is primarily designed to target the risk of substance use and related problems within the general populations of high-risk adolescents, it can be modified and adapted for use with youth populations with more complex or more specific needs. We recently launched a pilot project with high-risk adolescents in child welfare services to adapt Preventure for youth with experiences of trauma and maltreatment. In a recent manuscript, we reviewed *the available interventions for reducing substance use problems in adolescents involved in the child welfare system* and discussed the promises of personality-targeted interventions for reducing substance use problems in these populations (28). This review suggested that the Preventure programme is potentially a valuable targeted intervention for reducing high risk for substance use and mental health problems in adolescents involved in child welfare services, and for filling the gap in service delivery for these vulnerable populations (28).

LIMITATIONS AND FUTURE DIRECTIONS

Preventure programme has been evaluated in five trials with high-risk youth using school platform in different countries (40, 41, 44, 45, 49). Findings from these trials indicated a fairly robust effect on reduction of alcohol use outcomes. However, research on the efficacy of this approach on other types of substances is still limited and needs further investigations. For example, although results from previous trials have showed a significant reduction in likelihood of uptake and use of illicit substance misuse (48, 50), none of the previous trials reported any outcome related to smoking behavior or prescription drug use. Recent and ongoing trials of Preventure seek to address this gap. Two ongoing trials (Co-Venture and Inter-Venture) assess smoking behaviors. In addition, a new project, Canadian Underage Substance use Prevention (CUSP) trial (Conrod et al., 2018–2022), involving a total of 12,150 students in secondary schools across Canada, will investigate the effectiveness of the Preventure programme when delivered through a train-the-trainers model on illicit substance use in high-risk adolescents with prescription drug misuse as a novel secondary outcome. In addition to investigating different types of substances, personality-targeted interventions have yet to be tested in populations with higher proportion of high-risk adolescents, such as adolescents with histories of trauma or those reporting concurrent mental health problems. Our new project to adapt Preventure for youth with experiences of trauma and maltreatment in child welfare services, and the Inter-venture trial, which seeks to proactively identify and assist youth who are at higher risk of transition to significant psychiatric symptoms, are designed to address this gap. The impact of interventions on youth with special education needs or those with mental disabilities still needs an investigation. Moreover, there is a need to examine the effect of these interventions on other related problematic behaviors, such as risky driving and sexual behaviors, eating behaviors and risk for psychotic disorders. Finally, some studies, such as the CAP trial, have evaluated that programme against an evidence-based universal programme and showed equivalent effects on drinking behavior and slightly superior effects on higher risk outcomes, such as drinking problems (65). While this constitutes one form of control comparison, staunch methodologists might require additional research comparing the outcomes of the personality-targeted approach with a placebo control intervention delivered to high risk youth. While this might add to the quality of the evidence of this intervention approach, iatrogenic effects of psychosocial interventions with high risk youth have been reported in the literature [e.g., (66, 67)]. Therefore, any future attempt at placebo-controlled intervention designs should be very carefully considered.

CONCLUSIONS

Findings from this article point to the importance of interventions which target modifiable risk factors associated with higher risk of initiation and development of substance use disorders, such as personality factors. Preventure programme is an evidence-based programme which has shown to be effective in reducing the risk for underage alcohol and illicit drug use, substance use related harms, and risk of transitioning to significant mental health problems in adolescence, with results last for up to 3 years. Additional efforts should be made to make school-based targeted interventions more accessible for high-risk youth in communities with insufficient resources to improve substance use and mental health outcomes.

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HE and PC designed the concept of the Mini Review. HE wrote the first draft. PC edited for intellectual content.

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Profiles of Quality of Life in a Homeless Population

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Quality of life (QOL) is a key indicator in mental health planning, program evaluation, and evaluation of patient outcomes. Yet few studies have focused on QOL in homeless populations. More specifically, research has yet to identify profiles of homeless individuals based on their QOL using cluster analysis. This study developed a typology of QOL for a sample of 455 homeless individuals recruited from 27 community and public organizations in Quebec (Canada). The typology was developed based on QOL scores, as well as sociodemographic, clinical, and service use variables. Study participants had to be at least 18 years old, with current or previous experience of homelessness. A questionnaire including socio-demographics, residential history, service utilization, and health-related variables was administered. Four clusters were identified using a two-step cluster analysis. QOL was highest in the cluster consisting of older women with low functional disability, and relatively few episodes of homelessness. The second cluster with high QOL scores included individuals living in temporary housing with relatively few mental health or substance use disorders (SUDs). The third cluster with low QOL included middle-aged women living in temporary housing, with criminal records, personality disorders, and SUDs. QOL was also lower in the fourth cluster composed of individuals with multiple homeless episodes and complex health problems as well as high overall service use. Findings reinforced the importance of disseminating specific programs adapted to the diverse profiles of homeless individuals, with a view toward increasing their QOL.

Keywords: quality of life, homeless, cluster analysis, mental health disorders, substance use disorders, type of accommodation, health care service use variables

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INTRODUCTION

Quality of life (QOL) is one of the most important indicators in mental health planning, program evaluation, and assessment of patient outcomes (1). QOL is a heterogeneous concept that encompasses many areas of objective and subjective well-being (2). Objective QOL includes aspects of the physical environment and social functioning (2), whereas subjective QOL (SQOL) relates more to individual preferences, opinions, and life satisfaction (3). Research on QOL has been conducted with patients affected by mental health disorders (MHDs) (4–7); while studies on QOL and homelessness have focused on veterans (8–10), newly housed individuals who were previously homeless (11, 12), or homeless individuals with MHDs or substance use disorders (SUDs) (13, 14). However, few studies have focused on QOL in homeless populations.

QOL in homelessness may be linked to multiple variables including sociodemographic characteristics, clinical, and health care service use variables. Some studies have reported higher QOL among older homeless women (12, 13, 15); whereas having a criminal record has been found to negatively affect QOL (16). Compared with individuals who have experienced multiple episodes of homelessness, those experiencing a first homeless episode had higher QOL (12). Fewer days of homelessness were also associated with higher QOL (17). Individuals living in permanent supported housing such as Housing First (HF) programs, which integrate financial subsidies, case management, and a harm reduction philosophy tailored to individual needs, had higher levels of QOL compared with control groups consisting of emergency shelter users, or those residing in temporary housing or various forms of independent housing viewed as inadequate (18–20). In terms of clinical variables, homeless individuals with common MHDs (e.g., depression), serious MHDs (e.g., psychosis), SUDs, and personality disorders reported low QOL scores (13, 17, 21), similar to results for homeless individuals with high functional disabilities (22). While suicidal behaviors associated with MHDs and SUDs (23–25), and physical illnesses were also found to be prevalent in homeless populations (e.g., diabetes, cardiovascular disease) (26, 27), research has yet to investigate possible associations between these conditions and QOL. Regarding service use, one study found that being enrolled in outpatient services produced improved QOL scores in a homeless sample (28), while another identified improved QOL after enrolment in medical, employment or public support programs (17, 19). While homeless individuals with MHDs, SUDs or physical illnesses have tended to be high emergency room (ER) users, defined as four or more ER visits in a single year (29, 30) no study has identified associations between high ER use and QOL.

Cluster analysis is a useful method for establishing typologies (31), and may be used to investigate QOL among individuals experiencing homelessness. General profiles have been developed using cluster analysis among homeless individuals with both common and serious MHDs (32–34), co-occurring MHDs/SUDs (35), or physical illnesses (36), as well as among patients with serious MHDs using psychiatric services (33) and those using shelters over a multiple-year period (37–41). However, no known study has used cluster analysis to identify profiles of homeless individuals based on their QOL. Moreover, few cluster analyses in homelessness have taken into account the possible effects of sociodemographic characteristics such as criminal record, episodes of homelessness, and different types of accommodation on QOL. As well, clinical variables such as suicidal ideation or functional disability, and overall service use have hardly been considered in typologies of homelessness. The availability of a QOL typology based on sociodemographic, clinical, and service use variables for homeless populations would provide critical information and a deeper understanding that could inform the development of housing policies and services that capture the unique characteristics and needs of each group. Accordingly, the objective of this study was to build a typology based on QOL, sociodemographic and clinical variables, and service use for a sample of 455 homeless individuals in Quebec who were living in different types of accommodation.

MATERIALS AND METHODS

Study Setting and Data Collection

The study was conducted in the two major urban areas of Quebec: Montreal and Quebec City. Montreal had the largest homeless population ($N = 3{,}016$), as well as 2,017 available beds (71% of the provincial total) in emergency shelters and transitional housing, while Quebec City had 262 beds (15%) (42). Recruitment was conducted in 27 public organizations, mainly community organizations (22 from Montreal and five from Quebec City). Twenty of these organizations offered housing resources; five with emergency shelters (29 beds per organization, on average); 12 with temporary housing resources (average 20 beds per organization), and three with permanent supported housing (total: 173 beds). The seven organizations without a housing component provided other essential services including food banks, day centers, leisure activities; employment or housing services, and financial or material support.

Eligibility requirements for participation in the study included current or previous experience of homelessness and age requirements (18 or older). No interested participant was excluded from the study, if eligible; but interviews sometimes had to be delayed for participants who were intoxicated or otherwise indisposed at recruitment time. Posters were displayed in common areas of the selected organizations. The project coordinator also recruited participants directly while present in sites where homeless people congregate, such as nearby cafés. Finally, researchers held information meetings with housing staff and enlisted their help with recruitment. There were four housing conditions: emergency shelters (overnight accommodation), temporary housing (3–12 month residency), and permanent housing (1 year to indefinite stay), either with financial and case manager support (Housing First), or without this support. Homeless individuals invited to participate in the study included 46 users of emergency shelters, 243 residents in temporary housing, 156 residents in permanent housing with support, and 52 permanent housing residents without support, for a total of 497 invited study participants.

Data were collected between January and September 2017 by trained interviewers. Interviews were conducted in the selected organizations, at participant apartments, or in quiet corners of local cafés or fast foods restaurants. Interviews usually took place on the same day, or day following initial contact, and averaged 90 min in duration. All study participants signed a consent form before undergoing an interview, and were told that their responses would remain confidential. The research ethics board of the Douglas Mental Health University Institute approved the multisite study protocol.

Variables and Instruments

The questionnaire included socio-demographic information, as well as questions on residential history, service utilization, and clinical variables. The dependent variable, QOL, was measured using the Satisfaction with Life Domains Scale (SLDS), a frequently used instrument for QOL assessments in various fields. The SLDS was published initially by Baker and Intagliata in 1982 (43), and a French translation developed and validated (Cronbach Alpha = 0.92) by Caron (44). The SLDS assesses 20 domains of life satisfaction. As well, five stylized faces were used to represent a range of emotional states, from the saddest face (score = 1), to the happiest face (score = 5). Study participants were directed to select the face that corresponded to their current emotional state (43).

Table 1 presents all variables included in the study and the instruments used. Variables were based on the literature, and included socio-demographics: age, sex, criminal record, homelessness episodes, and type of accommodation; clinical variables: MHDs, SUDs, number of physical illnesses, suicidal ideation, and functional disability; and service use variables: has a family physician and frequency of the following services: community services (e.g., soup kitchen, day center, employment support program, support group, women's center); public services (local community service center; addiction rehabilitation center, hospital or other); and emergency room (ER).

Analyses

After cleaning the database for missing values and outliers, univariate analyses comprised of frequency distributions for categorical variables, and mean values with standard deviations for continuous variables were carried out, followed by Cluster verification analyses. Missing values (<5%) were randomly distributed and treated using the Expectation Maximization method. Clustering of participants was computed with the SPSS Statistics 24.0 package Two Step Cluster Analysis. QOL was the variable of interest. The choice of variables was based on their relevance to the homeless population according to the literature. Variables were organized as continuous or categorical variables. Categorical variables were entered in the program first, followed by continuous variables. The Log-likelihood method was used to determine inter-subject distance. Participant clusters were identified using Schwartz Bayesian criteria, with the final number of clusters set at four, according to their overall contributions to inter-Cluster homogeneity. An analysis of variance was also performed to test whether differences among profiles were statistically significant on QOL scores, followed by *post hoc* tests using the Bonferroni correction. Comparison analyses were run to assess statistical differences between clusters for each variable, using the Chi-square test for categorical variables, and ANOVA t-test for continuous variables.

RESULTS

The final sample consisted of 455 participants, of the 497 invited, for an overall response rate of 92%. Response rates for the four housing groups were: 94% (n = 229/243) for temporary housing; 90% (n = 140/156) for permanent housing with support; 79% (n = 41/52) for permanent housing without support; and 98% (n = 45/46) for homeless individuals using emergency shelters. Sample characteristics are presented in **Table 2**. Regarding sociodemographic variables, 60% of the sample were men, and 52% were 50 years of age, or older. Almost half had experienced a single homeless episode (46%), and 50% resided in temporary housing. In terms of clinical variables, 67% of participants reported personality disorders, 42% common MHDs (e.g., depression, anxiety), 39% SUDs, and 26% serious MHDs (e.g., schizophrenia, bipolar disorders). The mean for functional disability was 21, or moderate, on a 60-point scale. Concerning source of healthcare, 42% had a family physician. Participants had used community services an average of 72.5 times in the previous 12 months, public services 6.2 times, and the ER 1.9 times. Finally, the global mean score for QOL was 70.3/100.

Table 3 presents the four clusters identified in the sample based on QOL. Cluster 1 was composed of 128 participants (28% of total sample) with a mean overall score for QOL of 75.8 (SD = 10.7), ranking first of the four clusters. Cluster 2 consisted of 120 individuals (26% of total sample), had the lowest overall mean QOL score (mean = 66.0; SD = 11.0). Cluster 3 included 142 individuals (31% of sample) ranked second on QOL (mean = 70.4, SD = 3.1). Finally, Cluster 4 presented 65 participants (14% of total sample), ranked third on QOL (mean = 67.1; SD = 11.4). Analysis of variance comparing QOL scores among the four clusters revealed significant differences: $F_{(3,454)} = 26.54$, $p < 0.000$. *Post hoc* tests using the Bonferroni correction revealed higher mean scores on QOL for Cluster 1 than for the other three Clusters ($p < 0.000$). Cluster 2 had lower scores than Cluster 3 ($p < 0.001$). Finally, the comparison between the mean scores for QOL for other Clusters (2 vs. 4, and 3 vs. 4) were non-significant (**Tables 3**, **4**).

Tests confirming the cluster analysis indicated that socio-demographic variables (age, sex, criminal record, homeless episodes, type of accommodation), clinical variables (suicidal ideation, number of physical illnesses, and functional disability), and frequency of services use (public services) differed significantly across clusters (**Table 3**). Cluster 1 included predominantly women 50 years old and over, who had experienced one episode of homelessness. Cluster 1 also had the lowest proportion of individuals with criminal records and the lowest functional disability scores. As compared with those in Clusters 3 and 4, more Cluster 1 participants resided in permanent housing with support; they reported a greater number of physical illnesses, but more often had a family physician. Compared with Clusters 2 and 3, Cluster 1 participants also made less use of public services. Finally, compared with Cluster 2, Cluster 1 participants reported lower ER use. Cluster 1 was labeled: "*Mainly older women with one homeless episode, low functional disability and high QOL*"

Cluster 2 had the highest proportions of individuals with MHDs (both common and serious MDs) and suicidal ideation, as well as higher functional disability scores than individuals in the other three clusters. As opposed to both Clusters 1 and 4, Cluster 2 had a higher proportion of individuals with two episodes of homeless, and more with five homeless episodes and over. Compared to Clusters 3 and 4, Cluster 2 also had a higher proportion of individuals with a family physician, and more residing in permanent housing with support. Finally, compared with Cluster 1, Cluster 2 individuals used public services with greater

TABLE 1 | Variables and instruments.

Variables	Instruments and references	Description	Number of items	Scoring/Range	Psychometric properties
VARIABLE OF INTEREST					
Quality of life (QOL)	Satisfaction with Life Domains Scale (43, 44)	Note 1	20	Five-point Likert-scale; Range: 0–100	Cronbach's alpha=.0.92
SOCIODEMOGRAPHIC VARIABLES					
Age	Canadian Community Health Survey (CCHS) (45)	Note 2		Numerical	
Sex	CCHS (45)	Note 3		1 = male; 2 = female	
Criminal record	CCHS (45)	Note 4		Yes/No	
Homeless episodes	CCHS (45)	Note 5		Numerical	
Types of accommodation	CCHS (45)	Note 6		Emergency shelter Temporary housing Permanent housing with or without support	
CLINICAL VARIABLES					
Mental health disorders (MHDs)	M.I.N.I International Neuropsychiatric interview 6.0 (46)	Note 7	120	Yes/No	Kappa Cohen = 0.50–0.84
Personality disorders	Standardized Assessment of Personality Abbreviated Scale (47)	Note 8	8	Two point Likert-Scale	Cronbach's alpha = 0.68
Substance use disorders (SUDs)	Drug Abuse Screening Test-20 (48)	Note 9	20	Yes/No	Cronbach's alpha = 0.74
	Alcohol Use Disorders Identification Test (49)		10	2 or multiple choice questions	Cronbach's alpha = 0.88
Number of physical illnesses	CCHS (45)	Note 10		Yes/No	
Functional disability	WHO Disability Assessment Schedule 2.0 (50)	Note 11	12	Five-point Likert-scale 0 to 60 (where 0 = no disability; 60 = full disability)	Cronbach's alpha = 0.93–0.94
Suicidal ideation	CCHS (45)	Note 12		Yes/No	
SERVICE USE VARIABLES					
Frequency of service use	Service use Questionnaire: adapted from CCHS (51)	Note 13		Numerical	
Has a family physician	CCHS (45)	Note 14		Yes/No	

Descriptive notes:

Note 1. Subjective quality of life consists of five domains: (l) daily life and social relations; (2) housing, neighborhood; (3) personal relationships; (4) spare-time activities; (5) autonomy.

Note 2. Age was calculated from date of birth, as confirmed by participants.

Note 3. Sex as declared by participants.

Note 4. Criminal record as declared by participants.

Note 5. Homeless episodes as declared by participants.

Note 6.Housing type as declared by participants.

Note 7. M.I.N.I. is a short structured diagnostic interview, developed jointly by psychiatrists and clinicians in the United States and Europe, for DSM-IV and ICD-10 psychiatric disorders.

Note 8. The Standardized Assessment of Personality Abbreviated Scale was developed from the semi-structured interview Standardized Assessment of Personality.

Note 9. The Drug Abuse Screening Test-20 (DAST-20) is a screening tool. It is a 28-item self-report scale. Rating: 1–20; higher, greater drug use disorders.

The Alcohol Use Disorders Identification Test (AUDIT) Rating: 0–50; higher, greater level of substance use disorders.

Note 10. Number of physical illnesses as declared by participants.

Note 11. Short version: 12 items. It is used for all diseases, including mental, neurological, and addictive disorders. Scores assigned to each of the items—"none" (0), "mild" (1) "moderate" (2), "severe" (3), and "extreme" (4). 6 Domains of Functioning, include: cognition, mobility, self-care, getting along, life activities, and participation; Higher, less functional disability.

Note 12. Suicidal ideation as declared by participants.

Note 13. Frequency of service use as declared by participants.

Note 14. Has a family physician as declared by participants.

frequency. Cluster 2 was labeled: "*Individuals with higher functional disability, complex mental health problems and lowest QOL.*"

Cluster 3 mainly consisted of individuals residing in temporary housing who had the lowest proportion of SUDs, MHDs (both common and serious MDs), personality disorders, and suicidal ideation among the 4 clusters. As compared with Clusters 1, Cluster 3 had a higher proportion of individuals with a criminal record and with two homeless episodes. Individuals from Cluster 3 were also less affected by physical illnesses. Fewer had a family physician compared with individuals in Clusters 1 and 2. Cluster 3 was labeled: "*Individuals living mainly in temporary housing with fewest SUDs and MHDs and moderate QOL.*"

TABLE 2 | Participant characteristics.

		Min	Max	*n* (%)	Mean ± SD
Quality of Life (QOL)		33.00	100.00		70.29 ± 10.00
SOCIODEMOGRAPHIC VARIABLES					
Age categories	18–39 years			28 (6.2%)	
	40–49 years			194 (42.6%)	
	50 and over			233 (51.2%)	
Sex	Women			181 (39.8%)	
	Men			274 (60.2%)	
Criminal record				101 (22.2%)	
Homeless episodes	1 episode			210 (46.2%)	
	2 episodes			79 (17.4%)	
	3–4 episodes			93 (20.4%)	
	5 episodes and over			73 (16%)	
Types of accommodation	Emergency shelter			45 (9.9%)	
	Temporary housing			229 (50.3%)	
	Permanent housing with support			140 (30.8%)	
	Permanent housing without support			41 (9.0%)	
CLINICAL VARIABLES					
Diagnoses	Common MHDs			190 (41.8%)	
	Serious MHDs			119 (26.2%)	
	Personality disorders			303 (66.6%)	
	SUDs			177 (38.9%)	
Number of physical illnesses		0.00	8.00		1.83 ± 1.63
Functional disability		11.00	49.00		20.55 ± 6.60
Suicidal ideation				101 (22.2%)	
SERVICE USE VARIABLES					
Source of health care:	Has a family physician			193 (42%)	
Frequency of service utilization	Public services	0.00	156.00		6.15 ± 13.87
	Community services	0.00	628.00		72.50 ± 115.43
	Emergency room	0.00	100.00		1.89 ± 6.84

Finally, Cluster 4 had a higher proportion of women between 40 and 49 years of age, who had experienced one homeless episode. More had a criminal record, resided in temporary housing, and had personality disorders and SUDs as compared with individuals in the other three clusters. Cluster 4 was labeled: "*Mainly middle aged women living in temporary housing, with criminal records, personality disorders, SUDs, and low QOL.*"

DISCUSSION

This study developed a typology for a sample of homeless individuals on the basis of QOL in relation to sociodemographic, clinical, and service use characteristics. Four clusters were identified, each with distinct features. Mean QOL scores varied from 66.0 to 75.8 ($M = 70.3$), which was lower than QOL scores for the general population in a Quebec epidemiological area, at 78 (52).

Our results showed marked differences among the four clusters in terms of sex, age, presence or absence of a criminal record, episodes of homelessness, and residence in temporary vs. permanent housing, number of physical illnesses, MHDs, or SUDs, as well as sources of health care and frequency of public service use in the previous year.

Cluster 1 differed from other clusters in terms of mean QOL, but also on sociodemographic and clinical characteristics. Cluster 1 mainly included older women who had experienced one episode of homelessness; they had the lowest scores on disability and criminal record as well the highest QOL. These results seem to confirm that high QOL among homeless individuals was associated with older age and female gender, as identified in previous research (53). Moreover, this cluster with the higher QOL also included those less affected by functional disability, which suggests that functional disability negatively influenced QOL (22).

Cluster 1 showed very marked differences from Cluster 2, which had the lowest QOL in relation to socio-demographics (sex, age, criminal record number of homeless episodes), and clinical variables (both common and serious MHDs, personality disorders, suicidal ideation, and functional disability) and on the frequency of public service use. Cluster 2 mainly consisted of individuals with a high prevalence of MHDs (common, serious, personality disorders), and functional disability. MHDs have been associated with lower QOL (14, 17). Previous studies

TABLE 3 | Cluster analysis and comparison between clusters.

		Cluster 1			Cluster 2			Cluster 3			Cluster 4			Combined			Total sample
Quality of life (mean, SD)		75.84 ± 10.68 ^{2,3,4}			65.99 ± 10.99 ^{1,3}			70.38 ± 3.12^{1,2}			67.12 ± 11.4^{1}			70.29 ± 10			<0.00001
		n	% in row	% in column	n	% in row	% in column	n	% in row	% in column	n	% in row	% in column	n	% in row	% in column	
		128	28.10%		120	26.40%		142	31.20%		65	14.30%		455	100.00%		
SOCIODEMOGRAPHIC VARIABLES																	
Age categories	18–39 years	1	3.60%	0.78%	4	14.30%	3.33%	21	75.00%^{1,3,4}	14.79%	2	7.10%	3.08%	28	100.00%	6.15%	<0.00001
	40–49 years	13	6.70%	10.16%	63	32.50%^{1,4}	52.50%	64	33.00%	45.07%	54	27.80%^{1}	83.08%	194	100.00%	42.64%	
	50 years and over	114	48.90%^{2,3,4}	89.06%	53	22.70%	44.17%	57	24.50%	40.14%	9	3.90%	13.85%	233	100.00%	51.21%	
Sex	Men	18	9.90%	14.06%	72	39.80%^{1,4}	60.00%	89	49.20%^{4}	62.68%	2	1.10%	3.08%	181	100.00%	39.78%	<0.00001
	Women	110	40.10%^{2,3,4}	85.94%	48	17.50%	40.00%	53	19.30%	37.32%	63	23.00%^{1,2}	96.92%	274	100.00%	60.22%	
Criminal record		9	8.90%^{2,3,4}	7.03%	23	22.80%^{1,4}	19.17%	36	35.60%^{1,4}	25.35%	33	32.70%^{1,2,3}	50.77%	101	100.00%	22.20%	<0.00001
Homeless episodes	1 episode	84	40.00%^{2,3,4}	65.63%	36	17.10%	30.00%	61	29.00%	42.96%	29	13.80%	44.62%	210	100.00%	46.15%	<0.00001
	2 episodes	17	21.50%	13.28%	28	35.40%^{1,4}	23.33%	30	38.00%^{1,4}	21.13%	4	5.10%	6.15%	79	100.00%	17.36%	
	3–4 episodes	14	15.10%	10.94%	28	30.10%	23.33%	24	25.80%	16.90%	27	29.00%^{1,4}	41.54%	93	100.00%	20.44%	
	5 episodes and over	13	17.80%	10.16%	28	38.40%	23.33%	27	37.00%	19.01%	5	6.80%	7.69%	73	100.00%	16.04%	
Type of accommodation	Emergency shelter	16	35.60%	12.50%	7	15.60%	5.83%	12	26.70%	8.45%	10	22.20%	15.38%	45	100.00%	9.89%	<0.00001
	Temporary housing	41	17.90%	32.03%	49	21.40%	40.83%	88	38.40%^{1,2,4}	61.97%	51	22.30%^{1,2,3}	78.46%	229	100.00%	50.33%	
	Permanent Housing with support	61	43.60%^{3,4}	47.66%	51	36.40%^{3,4}	42.50%	25	17.90%	17.61%	3	2.10%	4.62%	140	100.00%	30.77%	
	Permanent Housing without support	10	24.40%	7.81%	13	31.70%	10.83%	17	41.50%	11.97%	1	2.40%	1.54%	41	100.00%	9.01%	
CLINICAL VARIABLES																	
Diagnoses	Common MHDs	35	18.40%^{2,3,4}	27.34%	114	60.00%^{1,3,4}	95.00%	6	3.20%^{1,2,4}	4.23%	35	18.40%^{1,2,3}	53.85%	190	100.00%	41.76%	<0.00001
	Serious MHDs	28	23.50%^{2,3}	21.88%	84	70.60%^{1,3,4}	70.00%	0	0.00%^{1,2,4}	0.00%	7	5.90%^{1,2,3}	10.77%	119	100.00%	26.15%	
	Personality disorders	94	31.00%^{2,3,4}	73.44%	112	37.00%^{1,3,4}	93.33%	32	10.60%^{1,2,4}	22.54%	65	21.50%^{1,2,3}	100.00%	303	100.00%	66.59%	
	SUDs	53	29.90%^{3,4}	41.41%	62	35.00%^{3,4}	51.67%	6	3.40%^{1,2,4}	4.23%	56	31.60%^{1,2,3}	86.15%	177	100.00%	38.90%	
Suicidal ideation		14	13.90%^{2,3,4}	10.94%	57	56.40%^{1,3}	47.50%	3	3.00%^{1,2,4}	2.11%	27	26.70%^{1,3}	41.54%	101	100.00%	22.20%	<0.00001
Number of physical illnesses (Mean, SD)		2.22^{3}	±1.62		2.23^{3}	±1.99		1.24^{1,2}	±1.18		1.68^{2}	±1.38		1.83	±1.63		<0.00001
Functional disability (Mean, SD)		17.71^{2,3,4}	±5.3		25.27^{1,3,4}	±8.15		19.21^{1,2}	±3.37		20.37^{1,2}	±6.53		20.55	±6.6		<0.00001
SERVICE USE VARIABLES																	
Source of health care: Has a family physician Frequency of service utilization (Mean, SD)		79	40.90%^{3,4}	61.72%	82	42.50%^{3,4}	61.72%	13	6.70%^{1,2,4}	9.15%	19	9.80%^{1,2,3}	29.23%	193	100.00%	42.42%	<0.00001
Public services		2.48^{2,3}	±4.28		8.2^{1}	±12.39		6.7^{1,2}	±15.84		8.4	±21.19		6.15	±13.87		0.003
Community services		79.43	±125.1		74.36	±120.32		67.39	±112.65		66.58	±91.57		72.5	±115.43		0.816
Emergency room		0.88^{2}	±1.53		2.07^{1}	±3.64		2.81	±11.54		1.51	±2.16		1.89	±6.84		0.131

*χ^2 Comparisons are done for each row reporting percentages for categorical variables and ANOVA t-test for continuous variables. Superscript indicates significant differences at $p < 0.05$ (look **Table 4**).*

Cluster 1: "Mainly older women with one homeless episode, low functional disability and high QOL."

Cluster 2: "Individuals with high functional disability, complex mental health problems and lowest QOL."

Cluster 3: "Individuals living mainly in temporary housing with fewest SUDs and MHDs and moderate QOL."

Cluster 4: "Mainly middle aged women living in temporary housing, with criminal records, personality disorders, SUDs, and low QOL."

TABLE 4 | Comparison tests between classes and variables.

		Total sample	Class 1 vs. 2	Class 1 vs. 3	Class 1 vs. 4	Class 2 vs. 3	Class 2 vs. 4	Class 3 vs. 4
Quality of life		<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***	0.987***	0.150***
Age categories		<0.0001*	<0.0001*	<0.0001*	<0.0001*	0.007*	<0.0001*	<0.0001*
Sex		<0.0001*	<0.0001*	<0.0001*	0.022**	0.657*	<0.0001**	<0.0001**
Criminal record		<0.0001*	0.004*	<0.0001*	<0.0001*	0.232*	<0.0001*	<0.0001*
Homeless episodes		<0.0001*	<0.0001*	0.003*	<0.0001*	0.170*	<0.0001*	<0.0001*
Housing		<0.0001*	0.153*	<0.0001*	<0.0001*	<0.0001*	<0.0001*	0.002*
Mental health disorders (MHDs)	Common MHDs	<0.0001*	<0.0001*	<0.0001*	<0.0001*	<0.0001*	<0.0001*	<0.0001*
	Serious MHDs	<0.0001*	<0.0001*	<0.0001**	0.058*	<0.0001**	<0.0001*	<0.0001**
	Personality disorders	<0.0001*	<0.0001*	<0.0001*	<0.0001*	<0.0001*	0.052**	<0.0001**
	SUDs	<0.0001*	0.105*	<0.0001*	<0.0001*	<0.0001*	<0.0001*	<0.0001*
Suicidal ideation		<0.0001*	<0.0001*	0.004**	<0.0001*	<0.0001**	0.437*	<0.0001**
Number of physical illnesses		<0.0001***	1.000***	<0.0001***	0.095***	<0.0001***	0.206***	0.164***
Functional disability		<0.0001***	<0.0001***	0.038***	0.031***	<0.0001***	<0.0001***	0.698***
Has a family physician		<0.0001*	0.275*	<0.0001*	<0.0001*	<0.0001*	<0.0001*	<0.0001*
Frequency of utilization	Public services	0.003***	<0.0001***	0.015***	0.162***	0.948***	1.000***	0.993***
	Community services	0.816***	1.000***	0.957***	0.961***	0.997***	0.997***	1.000***
	Emergency room	0.131***	0.007***	0.268***	0.217***	0.978***	0.722***	0.732***

**Pearson test; **Fisher test; ***ANOVA t-test.*

also found that the presence of MHDs was associated with increased access to public health services; including primary care (54).The presence of multiple MHDs among homeless individuals also increases the risk of suicide (24). As well, functional disability, higher in Cluster 2, is a frequent result of both medical and psychiatric conditions, creating barriers to employment, and perpetuating the cycle of homelessness (55). A US study estimated that 37% of homeless individuals have a functional disability as compared with 25% of individuals living in poverty, and 15% of the general population (56). The fact that Cluster 2 individuals resided mainly in permanent supported housing, as in Cluster 1, seemed to indicate that QOL was not automatically associated with type of accommodation in homelessness. Similarly, QOL was not automatically associated with a regular source of health care, as the two clusters with higher (Cluster 1) vs. lower (Cluster 2) QOL reported similar proportions of individuals with a family physician.

Cluster 3 was second in terms of QOL, with moderate scores. Cluster 3 was mainly composed of individuals with few MHDs and SUDs who residing in temporary housing. The higher QOL than reported in Cluster 3 may have been due to the very low numbers of MHDs, SUDs, physical illnesses and suicidal ideation in this cluster. Individuals with MHDs or SUDs tend to report low QOL scores (13, 17, 21, 22). The low prevalence of MHDs and SUDs may also explain the low use of healthcare resources, such as family physicians and public services, in this cluster.

QOL scores for Clusters 3 and 4 showed no significant differences. These Clusters were similar in terms of the number of physical illnesses, levels of functional disability, and frequency of service utilization. However, major differences emerged on other variables between Clusters 3 and 4, the later consisting mainly of women greatly affected by personality disorders, SUDs, common and serious MHDs and suicidal ideation. The prevalence of common MHDs, and personality disorders was higher in women than men (57). Among women, MHDs, SUDs as well as violence are main causes of homeless (58). A systematic review of the literature on homeless women veterans also revealed that women were more likely to be affected by MHDs than men (59), and were more often involved in the justice system, in addition to having relatively higher rates of MHDs and SUDs (57).

Clusters 2 and 4 accounted for the lowest QOL scores, with no significant differences between them. These clusters were similarly and strongly characterized by high rates of personality disorders, SUDs, common MHDs, suicidal ideation, and high functional disability among their respective constituents. MHDs and SUDs have been identified in association with poor QOL, with a correspondingly high negative impact on family relationships and on employment status (17, 60, 61). Individuals in the two clusters also had similarly high rates of public services use, which suggests that frequency of service use was more related to clinical variables than socio-demographic variables or type of housing.

Finally, compared with Cluster 1, Cluster 4 consisted almost exclusively of middle aged women living in temporary housing, who had low QOL scores. As well, all Cluster 4 participants had a disproportionately high prevalence of personality disorders and

SUDs, which is interesting as individuals with dual diagnoses are known to be high service users (62). Cluster 4 also had a disproportionate number of individuals with SUDs and criminal records. These results were similar to results of other studies underlining that SUDs increased vulnerability among homeless women, making them more prone to participate in drug-related crimes (63, 64).

STRENGTHS AND LIMITATIONS

This first study to profile QOL in a homeless sample included individuals living in different types of accommodation (emergency shelter, temporary housing, and permanent housing with and without support). In addition, the participation rate (92%) in this study was very high; only 42 of the 497 participants invited to the study refused to participate. Moreover, this study provided highly relevant insights into different aspects of homelessness and their associations with QOL, identifying sociodemographic, clinical, and service use characteristics affecting QOL in homelessness.

This study had also limitations that should be noted. The main limitation concerned the modest number of variables that could be introduced into the cluster analysis. Second, due to the convenience sampling, our results may not be generalizable. Third, our results emanating from data collected in Quebec may not be generalizable to other jurisdictions. Fourth, the study used cross-sectional and self-reported data. A longitudinal study could have better highlighted the causal relationships between QOL and the selected independent variables. Fifth, some housing groups, such as emergency shelters, were less represented than others in this study. Finally, while the sample was more evenly distributed in terms of sex, there were relatively fewer young people than those in older age categories.

CONCLUSION

The use of cluster analysis provides insight into the differences among homeless individuals in terms of QOL, taking into account sociodemographic, clinical, and service use variables. A better understanding of QOL in different homeless groups may help inform policy and service planning, while better responding to the need for client-focused healthcare that is sensitive to group differences. Our results suggest that older age may have a positive influence on QOL in women, while clinical characteristics, such as MHDs, SUDs, and high functional disability scores may influence QOL negatively, as the two clusters where individuals were more affected by complex mental health problems revealed the lowest QOL scores. Moreover, type of accommodation, having a family physician, and frequency of service utilization seemed not to have a direct impact on QOL. Temporary and permanent housing may both positively influence QOL but only among individuals without complex health problems.

Our findings reinforce the importance of disseminating specific programs adapted to the diverse profiles within homeless populations, with a view toward increasing their QOL. For Cluster 1, use of a family physician may be sufficient to meet the needs of that fairly functional clientele; whereas in Cluster 3, strategies such as the deployment of outreach workers may be needed to encourage service use. Programs that promote social integration may influence QOL in Cluster 4, as this group included a high proportion of women with criminal records and SUDs. Finally, assertive community treatment should be considered as an effective strategy for Cluster 2 individuals affected by both multiple MHDs and high functional disability.

AUTHOR CONTRIBUTIONS

LG, GG, and M-JF: study design and analyses, interpretation of data, and preparation of manuscript. J-MB: data analysis. HD: revision of manuscript.

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Models of Concurrent Disorder Service: Policy, Coordination, and Access to Care

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Background: Societal capacity to address the service needs of persons with concurrent mental health and substance-use disorders has historically been challenging given a traditionally siloed approach to mental health and substance-use care. As different approaches to care for persons with concurrent disorders emerge, a limited understanding of current models prevails. The goal of this paper is to explore these challenges along with promising models of coordinated care across Canadian provinces.

Materials and methods: A scoping review of policies, service coordination and access issues was undertaken involving a review of the formal and gray literature from 2000 to 2018. The scoping review was triangulated by an analysis of provincial auditor general reports.

Results: Models of concurrent disorders service were found to have evolved unevenly. Challenges related to the implementation of models of collaborative care and local networks that foster service coordination and policy accountability were found to inhibit integrated care.

Conclusion: Emergent models of coordinated care were found to include collaborative care, regional networks with centralized access to care, clinical information-sharing, cross-training, improved scope of care to include psychologists and alignment of physician incentives with patient needs to better support patient care.

Keywords: concurrent disorders, mental health and substance use, substance use disorders, mental health and addictions, substance misuse, substance use, mental health policy

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INTRODUCTION

Co-occurring mental health and substance-use disorders disable one-third to one-half of treatment populations with an estimated international prevalence of 1–3% (1, 2). A large proportion of individuals with concurrent disorders report high levels of unmet need and low levels of satisfaction with care (3). As many as 35–50% of those with concurrent disorders do not access formal care. Concurrent disorders offer unique challenges for healthcare providers, as substance use may affect adherence to treatment or compromise efficacy of prescribed medications (4). Concurrent disorders are associated with higher levels of service use when compared with either substance-use or mental illness alone. Individuals with concurrent disorders are three to four times more likely to be hospitalized than those with only mental illness, and are 10–20 times more likely to be admitted to inpatient care than those with substance-use disorders alone (5). Individuals with concurrent disorders have a greater tendency to miss medical appointments, experience relapse, and be readmitted to hospital than individuals with only mental illness (6, 7). They are also more likely to experience higher rates of morbidity, mortality, unemployment, poverty, homelessness, social isolation (2, 8, 9) and involvement with the criminal justice system (10) than those singly diagnosed (2) leading to immense health, social and economic costs (8, 9, 11).

The Canadian population affected by concurrent disorders (1.7%) accounts for a large proportion of those using mental health and substance use (MHSU) services (12). Concurrent disorders are common within substance-use subpopulations (8). As post-traumatic stress disorder and use of opioids rise, so has the prevalence of concurrent disorders (13) and with it the imperative to develop effective models of care. Over the years, consensus on models of integrated MHSU care has been slow to evolve. Integrated treatment can be differentiated from sequential and parallel treatment, with integrated approaches largely preferred. Sequential treatment has been criticized for ignoring the interconnected nature of concurrent disorders, and parallel approaches can lead to contradictory or incompatible treatment and inferior outcomes (14, 15). Given the challenges associated with developing integrated treatment approaches, the objective of our study was to identify similarities and differences in emergent models of concurrent disorders service across Canadian provinces through a scoping review. Based on our findings, we aim to shed light on current service models, clarify the barriers that prevent the needs of affected individuals from being met and the changes needed at provincial and national levels to address the holistic needs of persons with concurrent disorders.

METHODS

Search Strategy and Selection Criteria

We systematically reviewed the published literature available from 2000 to 2018 to identify relevant studies on concurrent disorders service policy, coordination and access to care to conduct a scoping review. Literature searches were carried out in the following electronic databases: MEDLINE, EMBASE, PsycINFO, Global Health, The Cochrane Library (Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Methodology Register), Health Technology Assessment Database, and Web of Science (Science and Social Science Citation Index). Search terms included substance use/misuse/abuse, drug addiction, addiction therapy, substance use/misuse/abuse therapy, mental health services supports/treatment, concurrent disorders/mental health/substance use, substance use policy, concurrent disorder policy, concurrent disorder financing/funding, access to services, comorbidity. The search terms were used in combination with the Boolean operators AND, OR, and *(asterisk). We screened all the publications for eligibility based on relevance by reviewing the title and abstract. We included qualitative and quantitative studies focused on Canada as well as gray literature, commentary, proposals and editorials in the Canadian context. The language of publication was limited to English for reasonable analysis purposes. Studies in which participants were elderly people over 75 years of age were excluded. The PRISMA-P criteria for reporting a scoping review protocol was followed (16). In addition, provincial Auditor General Reports that monitor and evaluate MHSU care from 2012 to 2018 were analyzed to triangulate the scoping review findings.

Data Abstraction

Data were recorded based on participant characteristics (e.g., whether participants had concurrent disorders), addressed access to concurrent disorder service support/treatment programs, coordination of MHSU care and policy. Study quality was assessed using a checklist and included assessment of control group and randomization (for intervention studies), objectivity of outcome measures, validity, adequate methods of analysis (for qualitative studies), and description of the demographic.

RESULTS

The screening and selection process for the scoping review are shown in **Figure 1**. Initially, the search identified 940 possibly relevant papers. Approximately 34 additional records were identified by scanning the references of the 940 included studies. In total, 557 papers were excluded due to repetition, which left 417 articles to screen. Once the title and abstract of each paper was scanned, 190 papers were omitted due to irrelevance in terms of the inclusion criteria. Of the remaining 227 papers, 190 were discounted due to either region (e.g., United States), demographic (e.g., patients with dementia), irrelevant topic (e.g., comparing treatments), unavailable full text, dissertation or book. The remaining 37 studies met inclusion criteria and were included in the final review: 19 qualitative (17–35), 9 quantitative (36–44), and 9 mixed methods articles (45–53) (**Table 1**). Reoccurring themes included access to care (strategies to improve access, community level of care and families, homelessness); integration and coordination of care (scope of practice for psychiatrists/physicians, access to and coordination with psychotherapy); and gaps in care. Lastly, in studies focused on policy, sub-themes of accountability, monitoring, and funding for initiatives and programs that address concurrent disorders emerged. The scoping review results were triangulated with an analysis of 13 auditor general reports that evaluated and monitored provincial MHSU programs and were incorporated in the policy section on accountability and monitoring.

Access to Care

Considerable emphasis was placed on improving access to MHSU services across the provinces. Rush and Saini (46) identified five dimensions of access to care: approachability; acceptability; availability and accommodation; affordability; and appropriateness. The potential barriers to healthcare access are compounded by the social determinants (e.g., education, race, sex, ethnicity, and income). Patients further noted such barriers as stigma, low income, language differences, lack of integration between mental health and health services, shortage of mental health professionals, regional disparities, and cross-cultural diversity (46). Issues related to MHSU care were found to go well-beyond enabling service access when the most basic needs went unmet for vulnerable segments of the population.

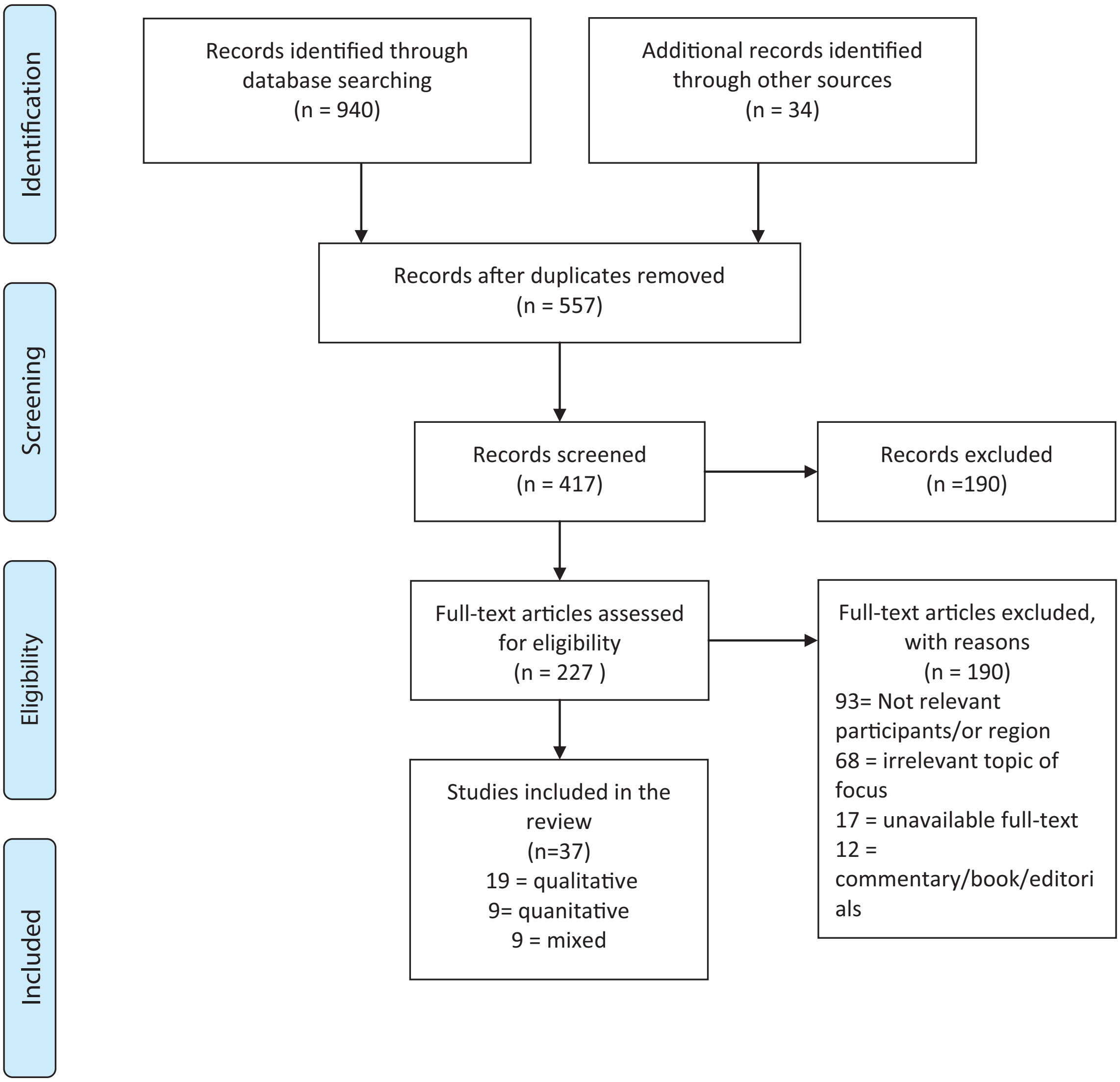

FIGURE 1 | Search, screening, selection, and inclusion process diagram (16).

Strengthening mental health care within primary care and integrating care between providers are key issues (27). Integrated service models provide a single-entry point to access a variety of services by coordinating medical care with allied community healthcare and social services. Although integrated service models are endorsed for improving access, efficiency, and quality of care, various barriers exist due to lack of coordination. In Canada, 60% of general practitioners are in private physician-run clinics, and a minority (8.3%) work within public governance models such as community health centers (54). From a collaborative perspective, 23% work in solo practice, 51% in group practices, and 24% in multidisciplinary team practices (27, 54).

Strategies to Improve Access

Although the notion of coordinated and integrated care is emphasized in the literature, the important shift is in the implementation of programs. Rush and Saini (46) highlight recent centralized programs available. Government policy reports such as *Open Minds, Healthy Minds, Ontario's Comprehensive Mental Health and Addiction Strategy* (2011) emphasize the difficulty for individuals to navigate and access services because of the "silo" approach in the healthcare system (55). *Ontario's Action Plan for Health Care* (2012) stressed that "patient centered integration is the right thing to do for patients, and for our healthcare system" (56). In Quebec, Fleury et al. (57) evaluated implementation strategies in the Quebec mental health reform that sought to improve accessibility, quality and continuity of care by "developing primary care and optimizing integrated service networks". The authors recommend mental health reform focus on the development of network integration strategies and not solely on service implementation. The improvement of networks requires the implementation of more formalized integration strategies to better incorporate the continuum of care for clients with mental health disorders.

Vallerand and McLennan (33) surveyed child mental health agencies across Canada about the strategies they use to manage service demands. Collaborating with other providers and agencies was the most common approach that aligned with the Mental Health Commission of Canada recommendation for collaborative care or shared service model with the potential to improve access to services. Centralizing the intake process and using a triage system to prioritize care were found to reduce wait times for mental health services.

Community Level of Care

A comparative study found that unmet service needs in Canada were greater among individuals over age 65, those with low levels of education and rural residence (47). Fleury et al. (57) discuss the transition of individuals from mental health institutions to the community in a longitudinal study of 204 individuals with severe mental disorders (SMD), who faced isolation as they were integrated back into the community. They hypothesized a correlation between isolation and lower perceived adequacy of help received which consequently affects familial and community relationships (53). In order to better foster community integration for individuals with SMDs, supported employment, education, community treatment, and intensive case management were recommended.

Attitudes about mental health services and demographic variables predict service utilization. Individuals in socio-economically deprived communities have higher levels of depressive symptoms (37). Prevalence of mental health issues are also higher among individuals exposed to violence, crime, or imprisonment. Fleury et al. (37) assessed variables associated with health service use by individuals diagnosed with mental health disorders in Montreal. Individuals who used MHSU services had a worse perception of their mental health and lower life satisfaction compared to those who did not use mental health services (37). Predictors of service use were classified as: predisposing, enabling, and needs-related factors. Predisposing factors greatly hinder service use where females and those with higher education are more likely to seek health services in comparison to their community counterparts. The Canadian Health Act (1984) incents provinces to publicly fund services provided in hospitals and by physicians; availability of community-based services thus varies significantly with psychological services predominantly unavailable unless provided by a physician, to which access is limited. In comparison, community-based care is covered for individuals eligible for public health insurance under Medicare and Medicaid in the United States (47). International comparisons may further inform the implementation of health systems as they relate to access and utilization.

Youth and Families

An estimated 4.4% of Canadians aged 15 and older have a substance-use disorder, with alcohol dependence most prevalent at 3.2% (19). As integrated care is complex and little is known about what it entails for youth, designing, and implementing programs for youth lends further complexity. Settipani et al. (30) found an absence of comprehensive reviews of integrated care for youth MHSU in community settings. Their scoping review protocol proposes to better conceptualize integrated care for youth (populations, setting, service providers, interventions, infrastructure, coordination methods) and to identify constructs measured and evaluated. Although community-based integrated care hubs for youth with MHSU issues have emerged internationally, their key components require greater clarification. The Mental Health Commission of Canada released the *Evergreen: Child and Youth Framework for Canada* report (58), in which the use of "best available evidence" to inform treatments was a core value in the reform of Canada's publicly funded children's mental health care system.

Hunsley et al. (25) surveyed Canadian psychologists who care for children and youth in order to profile the services offered. Health services are provided in a wide range of publicly funded agencies and independent practices to patients from ethnically and socioeconomically diverse communities. Patients who received psychological services were found to be treated for the same problem by numerous sources, making coordination of their services an important issue. The majority of psychological practitioners (68%) reported providing more than one half of their services in a public practice context (e.g., health care facility, school board), while one third provided more than one half of their services in an independent practice context (25). Considerable evidence stresses the mental health problems of children and adolescents can foster lifelong behaviors. Hunsley et al. (25) recommend psychologists examine and possibly alter the relative balance of child- and adult-oriented training options to ensure availability of well-trained psychologists to deliver child and youth services (25).

Séguin et al. (18) identified the personal and social circumstances of suicides in New Brunswick to address the service needs of individuals and their families and improve suicide prevention by using direct proxy-based interviews, medical chart reviews and telephone contact with informants. Of the 109 suicide deaths identified, 42% of individuals had concurrent mood and substance use disorders with long-term destructive repercussions on individuals, family members and their social circles (18).

The Ontario Youth Wellness Hubs (YWHO) are being piloted to improve service standards and models of care for youth aged 12–25. The goals include increased access to timely, integrated mental health and addictions services for adolescents and transition-aged youth. Elements of the model include evidence-based services matched to individual need, co-located MHSU and primary care, improved holistic care, system functioning and mental well-ness outcomes (59). Funding of $3 million divided across multiple sites for 3 years supported the transition to offering integrated and co-located MHSU services. ACCESS Open Minds is a similar model being piloted across several provinces supported by the Canadian Institutes of Health Research and the Graham Boeckh Foundation (60).

TABLE 1 | Summary of scoping review studies.

Reference #	Study aim	Methods	Sample size	Year	Key findings
McMain and Ellery (17)	Reviews the psychometrics of instruments for screening and diagnosis of personality disorders (PDs), which may be useful in addiction treatment settings.	Diagnostic assessment involving screening for personality pathology for people seeking treatment for addiction problems	N/A	2008	The prevalence of PDs among people with a SUD is high, and the clinical presentation of these patients is often more complex than that of their non-PD counterpart.
Séguin et al. (18)	Investigates all suicide cases in New Brunswick from April 1, 2002, to May 31, 2003 (14 months), to determine 6-month and lifetime prevalence rates of psychopathology in the deceased.	Direct proxy-based interviews and medical chart reviews, together with telephone contacts with informants.	$N = 102$	2006	At time of death, 65% of the suicide victims had a mood disorder, 59% had a SUD, and 42% had a concurrent mood and substance use disorder. The lifetime prevalence of SUDs among these suicide victims was 66%. Finally, 52% of the suicide victims presented with a personality disorder; one-half of these were of the cluster B type.
Fleury et al. (19)	Aims to identify integration strategies implemented in Quebec substance-use disorder networks and to assess their strengths and limitations.	A total of 105 stakeholders representing two regions and four local substance-use disorder networks participated in focus groups or individual interviews.	65 clinicians and 40 managers	2016	Six types of service integration strategies were implemented to varying degrees in substance-use disorder networks. They are: (1) coordination activities-governance, (2) primary-care consolidation models, (3) information and monitoring management tools, (4) service coordination strategies, (5) clinical evaluation tools and (6) training activities
Hunsley (20)	Reviews on cost issues associated with psychological interventions, including cost effectiveness and cost offset.	A review of the current fiscal situation in Canada as it relates to health care costs in general and psychological services more specifically.	N/A	2003	Psychological treatments (i) can be cost-effective forms of treatment and (ii) have the potential to reduce health care costs, as successfully treated patients typically reduce their use of healthcare services
Selick and Wiktorowicz (21)	Investigates the state of service integration in Ontario and identifies models for integrated treatment, factors that support or hinder implementation efforts.	Key informant interviews. Interview transcripts were analyzed to identify emerging themes.	N/A	2016	Five domains were identified: organizational barriers, system barriers, historical barriers, barriers related to stigma and discrimination, and knowledge barriers.
Wiktorowicz et al. (22)	Modes of governance were compared in 10 local mental health networks in rural/urban and regionalized/ non-regionalized contexts to clarify the governance processes that foster inter-organizational collaboration and the conditions that support them.	Case studies of 10 local mental health networks were developed using qualitative methods of document review, semi-structured interviews and focus groups that incorporated provincial policy, network and organizational levels of analysis.	$N = 10$ networks; 96 key informants (managers, clinicians)	2010	Mental health networks adopted either a *corporate structure*, *mutual adjustment* or an *alliance* governance model. Mediation by a regional authority was an important lever to foster formal inter-organizational coordination.
Brousselle et al. (23)	Identified key factors in integrating services for patients with co-occurring disorders.	A process evaluation with the aim of identifying factors that enhance or impede service integration.	N/A	2010	The study identified various levers and characteristics that affect the development of an integrated approach. Also formulated six propositions to identify what matters when integrating services for persons with mental health and substance use disorders.
Kêdoté et al. (24)	Described the characteristics of service utilization among patients with co- occurring disorders in a large urban area.	A sample of those identified with a SUD and psychoses from administrative and clinical databases were followed (12 months) to track their medical service use. A descriptive analysis of the data and a two-step cluster analysis were undertaken.	$N = 5,467$	2008	The analyses revealed relatively high utilization of emergency services, outpatient clinics, private practices, and hospitalization among patients with co- occurring disorders of severe mental illness and substance use.

(Continued)

TABLE 1 | Continued

References #	Study aim	Methods	Sample size	Year	Key findings
Hunsley et al. (25)	To understand the complexity of the context in which psychological services are provided to young people.	Canadian psychological practitioners who offer services to children and youth were surveyed using real-time sampling to obtain a profile of services offered to a specific child or adolescent client.	$N = 137$	2014	In the majority of cases, psychological services involved not only the target client, but also parents or school personnel. Almost one third of clients had been prescribed psychotropic medication, and one quarter of practitioners indicated that their clients received services from another health care practitioner for the same problem.
Talbot et al. (26)	A survey among Anglophone and Francophone physicians in New Brunswick to determine practice and referral opinions to access specialized treatment services for adults with anxiety and depression.	The CPTADS is a 25-item self-report questionnaire to assesses demographics, practice characteristics, treatment approach to anxiety and depression, referral patterns, barriers to evidence-based practice, satisfaction with wait time and effectiveness of available treatment	$N = 152$	2014	The current findings suggest that many patients treated in primary care will not make it beyond their family physician's office and therefore will not access specialized therapy.
Fleury et al. (27)	Examines patient profiles in primary mental healthcare, determinants of service utilization, and primary mental healthcare reforms with a spotlight on best practices. Considers the most effective strategies for enhancing care collaboration and integration.	Conducted a major literature review, including both epidemiological and organizational research initiatives. General practitioner data from Quebec presented were sourced from two studies.	N/A	2012	Found that general practitioners welcomed opportunities to manage patients with common mental disorder; however, they also faced a number of obstacles, including: healthcare system fragmentation; lack of communication, resources, and clinical tools; the prevalence of solo practice; and unsuitable modes of payment.
Goldner et al. (28)	To obtain improved quality information regarding psychiatrist waiting times by use of a novel methodological approach in which accessibility and wait times are determined by a real-time patient referral procedure.	A semi structured call procedure was used to collect information about the psychiatrists' availability for receipt of referrals, identify factors that affect psychiatrist accessibility, and determine the availability of cognitive-behavioral therapy.	$N = 297$	2011	Among the 230 psychiatrists reached successfully and contacted, 160 (70%) indicated that they were unable to accept the referral.
McKee (29)	This review outlines the main best-practice guidelines for working with people with concurrent disorders and describes some of the barriers and facilitators to integration.	An example of successful integrated treatment is presented, with suggestions for how psychologists can play a key role in this important work.	N/A	2017	The change leader needs to be embedded within the program and remain long after initial integration to provide ongoing clinical supervision and model the novel, unified treatment philosophy.
Settipani et al. (30)	Identifies: (1) populations, settings, service providers, interventions, infrastructure and care coordination methods used in integrated care for youth with mental health and/or addiction needs; and (2) constructs measured and evaluated (e.g., outcomes, engagement) in youth integrated care.	Scoping review; a formal data extraction method was employed, enabling synthesis of results in quantitative and qualitative formats.	Seven electronic databases and gray literature sources were searched from 2001 to 2016	2017	The current focus of implementation efforts for youth integrated care in terms of the populations, settings, service providers, interventions, infrastructure and care coordination methods are outlined.
Durbin et al. (31)	Identifies funding arrangements and legislation/regulation related to scope of practice as important system wide factors that influence delivery of IC (Integrated care).	An environmental scan of scholarly literature using Ovid Medline, Embase and Social Work Abstracts and Google Scholar.	N/A	2016	Regarding the impact of funding, identified studies addressed patient selection, inclusion of non-physician providers (NPPs), and reimbursement for collaboration. Regarding regulatory/legal issues, identified studies addressed scope of practice for NPPs related to medication prescription and counseling, and the role of the physician.

(Continued)

TABLE 1 | Continued

References #	Study aim	Methods	Sample size	Year	Key findings
Kates et al. (32)	A position paper which acknowledges that effective collaboration can involve providers from any discipline.	Focuses mainly on activities of family physicians and psychiatrists	N/A	2011	Recommends steps to enable MH&A services and primary care providers to work together to better meet the needs of populations that have difficulty gaining access to care they require, patient- centered style of practice, and influence the evolution of health care delivery in Canada.
Vallerand and McLennan (33)	Describes strategies of child mental health agencies to manage service demands; (2) determines whether strategies used are related to meeting Canadian Psychiatric Association (CPA) benchmarks and wait times; and, (3) determines whether strategies used are related to agency characteristics.	An online questionnaire distributed to agencies providing child mental health services in Canada. The survey inquired about agency characteristics, wait times, ability to meet benchmarks and a series of strategies which may impact wait times	$N = 379$	2013	One hundred thirteen agencies returned adequately completed surveys (29.8%). Collaborating with other agencies/providers and referring families to self-help resources were the most commonly endorsed strategies
Kozloff et al. (34)	Examines care and aftercare following first ED visit for psychotic disorder among youth.	A retrospective cohort study of first ED presentations for psychotic disorder among youth 16 to 24 years in Ontario, Canada.	$N = 2,875$	2018	Forty percent of youth discharged to the community from their first ED presentation for psychotic disorder received no outpatient mental health care within 30 days.
Nolin et al. (35)	In the absence of national standards, examines the current state of EIS (Early intervention services) for psychosis in Canada in relation to expert recommendations.	A detailed online benchmark survey was developed and administered to 11 Canadian academic EIS programs covering administrative, clinical, education, and research domains.	N/A	2016	Most surveyed programs offer similar services, in line with published expert recommendations. However, differences were observed in admission and discharge criteria, services for patients at ultra high risk (UHR) for psychosis, patient to clinician ratios, accessibility of services, and presence of specific inpatient units.
Latimer et al. (36)	Estimates average annual costs of homelessness by cost category, that homeless people with mental illness engender from the perspective of society.	990 participants were followed in 5 cities from 2009 to 2011 for up to 2 years. Questionnaires ascertained service use, income; city- specific unit costs were estimated.	$N = 937$ with useable data	2017	Net costs ranged from $C15,530 to $C341,535. Distribution of costs across categories varied significantly across cities. Lower functioning and a history of psychiatric hospital stays were the most important predictors of higher costs.
Fleury et al. (37)	Sought to identify factors associated with health service use by individuals with mental disorders in a Canadian catchment area.	Data was collected randomly from June to December 2009 by specially trained interviewers. A comprehensive set of variables was studied using Andersen's behavioral health service model. Univariate, bivariate, and multivariate analyses were carried out.	$N = 406$	2012	Emotional problems and a history of violence victimization were strongly associated with service use. Participants who were middle-aged or deemed their mental health to be poor were also more likely to seek mental healthcare. Individuals living in neighborhoods where rental accommodations were the norm used significantly fewer health services than those residing in neighborhoods where homeownership was preponderant; males were less likely to use services than females.
Kurdyak et al. (38)	To study the relationships among psychiatrist supply, practice patterns, and access to psychiatrists in Ontario Local Health Integration Networks.	Practice patterns of full-time psychiatrists and post discharge care to patients who were hospitalized for psychiatric care were analyzed, according to LHIN psychiatrist supply in 2009.	N = 1379	2014	As the supply of psychiatrists increased, out- patient panel size for full-time psychiatrists decreased, with Toronto psychiatrists having 58% smaller outpatient panels and seeing 57% fewer new outpatients relative to LHINs with the lowest psychiatrist supply.

(Continued)

TABLE 1 | Continued

References #	Study aim	Methods	Sample size	Year	Key findings
Vasiliadis et al. (39)	Aimed to provide prevalence rates of health care service use for MH reasons by province and according to service type and to examine determinants of MH service use in Canada and across provinces.	Prevalence rate of past-year health service use for MH reasons, and potential determinants were assessed cross-sectionally, using Statistics Canada Canadian Community Health Survey: Mental Health and Well-Being data.	$N = 36,984$ respondents	2005	Need remains the strongest predictor of use, especially when a mental disorder is present. Barriers to access, such as income, were not identified in all provinces.
Torchalla et al. (40)	Examined the evidence of psychotherapeutic integrated treatment (IT) programs for individuals with concurrent substance use disorders and trauma histories.	Electronic searches of Cochrane Central Register of Controlled Trials, MEDLINE, Web of knowledge, PubMed, PsycINFO, CINAHL, PILOTS, and EMBASE identified 17 IT trials (9 controlled trials).	N/A	2012	Both narrative review and meta-analysis indicate that IT effectively reduces trauma symptoms and substance abuse from pretreatment to longest follow-up.
Denomme et al. (41)	Assessed the efficacy of a treatment program at reducing stress, increasing perceived social support from family and friends, and increasing general, dyadic, and self-rated family functioning within these concerned family members	A sample of family members of individuals with concurrent disorders was recruited, of which 97 participated in the treatment program and 28 were used as the comparison group.	$N = 125$	2017	A perceived personal benefits questionnaire demonstrated that participants had a better understanding of concurrent disorders, adopted stronger coping methods, participated in more leisure activities, and improved their relationship with the individual with a concurrent disorder.
Henderson et al. (42)	A protocol designed to test the benefits of an Integrated Collaborative Care Team (ICCT) model for youth with MHA challenges.	Youth presenting for hospital-based, outpatient psychiatric service will be randomized to ICCT or usual hospital-based treatment, using a pragmatic RCT.	$N = 500$	2017	First RCT of an ICCT program internationally. If equivalent clinical outcomes can be achieved with less expensive services, savings to the healthcare system may result.
Fleury et al. (43)	Identified variables associated with perceived unmet need for information, medication, and counseling, and overall perceived unmet needs related to mental health in a Montreal catchment area.	Needs were measured with the Perceived Need for Care Questionnaire and a comprehensive set of independent variables based on Andersen's behavioral model.	Of 2,334 persons interviewed 571 (24%) expressed a need	2015	Need factors were more strongly associated with unmet need for medication, predisposing factors with unmet needs for information and medication, and health service use with unmet information and counseling needs. People whose overall needs went unmet tended to be younger, to have an addiction, and to have consulted fewer professionals.
Durbin et al. (44)	Examined factors associated with unmet need for care from primary care physicians or from psychiatrists among clients enrolled in mental health court support programs in Toronto.	Cross-sectional study; sample included adults admitted to these programs during 2009 ($N = 994$). Predictors included client predisposing, clinical, and enabling variables.	$N = 994$	2014	Twelve percent had unmet need for care from primary care physicians and 34% from psychiatrists. Both measures of unmet need were associated with having an unknown diagnosis, having no income source or receiving welfare, homelessness, and not having a case manager.
Bartram and Lurie (45)	Explores how the gap in mental health funding occurred in Canada and provides a detailed analysis of the size of the gap itself.	Overview of provincial/territorial contributions, accountability mechanisms, outcome measures, the insurance/financing model, and how tightly eligible expenses are tied to specific initiatives, population groups, or levels of evidence.	N/A	2017	A public insurance-based funding model for psychotherapy and medication services are advised, but may not garner enough support given concerns with maintaining control over expenditures. However, the basket of mental health services is being examined by the Commissaire a la sante au bien etre in Quebec.

(Continued)

TABLE 1 | Continued

References #	Study aim	Methods	Sample size	Year	Key findings
Rush and Saini (46)	Assesses and describes coordinated and centralized access for mental health and addictions in Ontario. Includes an assessment of what is being implemented, as well as what is being, or has been, planned and considered.	Relevant peer reviewed journal articles, reports and government documents published in English were searched from 1990 to 2015 using the search terms: "centralized access," "centralized services," "integrated care," "coordinated care" etc. in Ontario	N/A	2016	Approaches to coordinated or centralized access have grown rapidly across the province. Many have appeared recently, and more are being developed. There is no published description of the different coordinated or centralized access approaches across Ontario. There also is no summary of research that can help improve and evaluate current approaches.
Vasiliadis et al. (47)	Compared the prevalence of depression and the determinants of mental health service use in Canada and the United States.	Data from preliminary analyses of the 2003 Joint Canada/US Survey of Health, which measured Canadian and American resident ratings of health and health care services. Included multivariate analysis of depression.	$N = 3{,}505$ Canadians; $N = 5{,}183$ Americans	2007	There was no difference in the prevalence of depression and mental health service use between Canadians and Americans with health insurance. Among those with depression, however, disparities in treatment seeking were found to be associated with lacking health insurance coverage in the US.
Cheung et al. (48)	Sought to understand correlation between ED use, hospital admission, and substance dependence among homeless persons with concurrent mental illness in a 'Housing First' (HF) intervention trial.	Two randomized controlled trials addressing homeless individuals with mental disorders who have "high" or "moderate" levels of need.	$N = 497$	2015	Substance dependence was not independently associated with ED use or hospital admission among homeless adults with mental disorders participating in an HF trial.
Roberge et al. (49)	(a) to examine access to psychotherapy for anxiety disorders in a sample of primary care patients; and (b) to examine individual factors associated with access to psychotherapy.	Data was drawn from the "Dialogue" project, a large primary care study conducted in 67 primary care clinics.	$N = 740$	2014	Nearly half of the respondents with anxiety disorders had received a form of psychotherapy or counseling in the past 12 months, and 20% of respondents reported at least 12 sessions with the same health care professional
Bradley and Drapeau (50)	Documents the attitudes of psychologists and psychotherapists licensed to practice in Quebec toward access to psychotherapy and government-funded psychotherapy programs.	Participants completed an online questionnaire; results indicated that 77% of the sample strongly agreed that accessibility to psychotherapy should be increased.	$N = 1{,}275$	2014	There was stronger agreement that clinicians working within a government-funded psychotherapy program should be paid on a session-to- session basis as opposed to receiving a yearly salary; to be able to set their own fee; and to have freedom to choose the appropriate psychotherapeutic approach (e.g., cognitive behavioral therapy [CBT], emotion-focused therapy [EFT]) and appropriate treatment materials (e.g., psychoeducational handouts).
Fleury et al. (51)	Evaluates the implementation and impact of a pilot project aimed at establishing an integrated service network for adults with severe mental disorders in an urban area in Quebec.	A case study method using formative assessment of a project designed to provide, through support for decision-making, ongoing information and results with regard to the project's ability to solve problems as they arise.	N/A	2008	This study shows that Integrated Service Networks play a role in transforming the health care system based on its existing structures and resources, allowing for a gradual transformation of the organization of services.
Dewa et al. (52)	Examines the changes in continuity of care (COC) likely to be affected by new system investments and the contributing factors.	A mixed method approach was used: decision-makers participated in two qualitative interviews; a 3-year cross-sectional quantitative data collection approach was used with clients and case managers.	$N = 67$	2010	A main finding was that new system investments can improve COC in terms of increased care access. However, it is not clear how other COC dimensions will be affected

(Continued)

TABLE 1 | Continued

References #	Study aim	Methods	Sample size	Year	Key findings
Fleury et al. (53)	Assessed predictors and changes in adequacy of help received (AHR), as perceived by 204 individuals with severe mental disorders (SMDs) transferred from a mental health institution to the community following a key healthcare reform.	Assessed changes in perceived AHR among 204 persons with SMDs at three points in time: before the mental healthcare reform (T0), and at 2 years (T1) and 5 years (T2) after implementation of the reform.	$N = 352$	2016	The results confirm that patient transfers from the institution to the community as mandated in the Quebec Mental Health Action Plan produced positive short- term effects. Indeed, after 2-year follow-up (T1), adjusted perceived AHR remained stable.

Concurrent Early Psychosis and Substance Use Care

Despite an expansion of Early Psychosis Intervention (EPI) programs for youth in Ontario, a retrospective cohort study by Kozloff et al. (34) found 40% of youth with psychosis discharged to the community from their first emergency department (ED) visit received no outpatient mental healthcare within 30 days and over one in 10 received no care by 1 year. As EPI Programs in Canada receive a significant proportion of their referrals from EDs, better care coordination between EDs and EPI Programs was advised. Nolin et al.'s (35) survey of EPI programs in Canada found they all accepted patients with a concurrent substance use disorder. Nine of the 11 EPI programs offer services that address substance-induced psychosis (35). The same proportion use a case management model of care in which one clinician (occupational therapist, social worker, nurse) combines service delivery with coordination in which access to related services is brokered (35).

Homelessness

An estimated 35,000 people are homeless on any given night and 235,000 experience homelessness over a year in Canada (36). A significant proportion of homeless individuals suffer from substance dependence and concurrent mental illness (48). A longitudinal study on the vulnerably housed and homeless found more than half (52%) report a past diagnosis of a mental health problem (61). Latimer et al. (36) determined the annual costs of homelessness from a societal perspective, and individual characteristics associated with higher costs. A Housing First support program (At Home/Chez Soi) trial offered people access to permanent housing with long term support or usual treatment for those with mental health disorders (in Vancouver, Winnipeg, Toronto, Montreal, and Moncton) from 2009 to 2011. Given restrictions in sharing administrative data between province, Canadian Institute of Health Information data was used to estimate the costs of physician services, hospital stays, outpatient, and emergency department visits. The costs for people who were homeless longer tend to be higher (36).

Fleury et al. (37) found the ratio of renters to homeowners was a predictor of service utilization, that led them to advise that neighborhoods with a high proportion of rental accommodations be targeted as a public health priority to improve mental health and service use, as the needs of individuals facing homelessness tend to be neglected. McMain (17) argues that key indicators of severity be assessed including criminal justice system involvement, lack of productive activity, sexually risky behaviors, high healthcare use, early onset of substance use, polydrug dependence and low self-efficacy to resist psychoactive substance. Among users of homeless shelters in Toronto, lifetime diagnosis of mental illness or substance use was found to be as high as 67% and 68%, respectively (48).

The goals of Housing First services include reduction of unnecessary hospitalization and ED visits (48). Although numerous studies observed a positive outcome with Housing First for individuals with concurrent disorders, others found no difference in healthcare use between program participant and control groups (48). A study that examined whether substance dependence predicted healthcare use among participants in Housing First trials found the average number of ED visits was 4.2 per person, per year (48). Several studies link Housing First to increased residential stability and reduced health service use, particularly for those with the most serious illnesses, while others found no significant correlation. Cheung et al. (48) hypothesize this may be due to sample differences in terms of higher burden of medical and psychiatric comorbidities, severity of substance use and healthcare systems across jurisdictions that varied in terms of service coordination (40).

Integration and Coordination of Care

Coordination and integration are closely related concepts. Coordinated care involves "actively managing all elements of the continuum of health and care services required by individuals and communities in order to achieve a seamless care pathway for the individual or client group" (46). Integration alternatively aligns collaboration between diverse providers through organizational, administrative, service delivery, clinical and funding approaches to support continuity of care by linking patient care across professional, organizational and system boundaries to improve efficiency (62). Integration can thus be considered as both a *process* that systematically arranges patient care across professionals and organizations; and integrated care as an *outcome* of the patient experience. Of four types of integration (organizational, functional, service, and clinical), *organizational* integration brings several organizations together through mergers or coordinated provider networks. *Functional* integration involves integrating administrative functions through for example shared electronic patient records. *Service* integration connects different clinical services at an organizational level through multidisciplinary teams for example. *Clinical* integration fosters a single, coherent care process by using shared guidelines (62).

Issues concerning integration were addressed by the report *Respect, Recovery, Resilience: Recommendations for Ontario's Mental Health and Addiction Strategy* (2010) that emphasized better coordination across the health system would help reduce avoidable ED visits and long waits for mental health and addiction services (63). Health Canada's report *Best Practices for Concurrent Mental Health and Substance Use Disorders* advised knowledge dissemination of best practices related to approaches for integration of concurrent disorders services (64). Although coordinated and centralized models of care exist throughout Ontario, they remain underdeveloped and precarious (46). ConnexOntario is an example of a centralized program that facilitates access to treatment and support services with varying levels of collaboration with regionally-accessed services (46).

Governance of Coordinated Care

Wiktorowicz et al. (22) compared models of governance that support coordination in 10 mental health networks across Canada. Networks were defined as a set of organizations and the relations among them that serve as channels through which communication, referrals, and resources flow (22). Networks develop efficient programs of care by coordinating primary, secondary, tertiary and community health and social services to simplify access for patients (22). Networks were categorized into one of three models of inter-organizational coordination: *mutual adjustment* based on voluntary exchanges (e.g., client referrals) between organizations without a formal mechanism of coordination (22); a *corporate* structure in which a regional authority integrates management of care (e.g., through oversight of psychiatric hospitals and community mental health centers), while in an *alliance* autonomous organizations form a coalition (22). Coordination was not well-supported when four aspects were considered: (1) Budget and planning decisions made at different jurisdictional levels (provincial vs. local level); the divided authority meant that organizations that reported to the Ministry were not held accountable when their services were not aligned with agencies in their network; (2) Hospitals had few incentives to align their care with community services, leading to delays in care for patients returning to the community who were more likely to "fall through the cracks" and be re-hospitalized; (3) Insufficient resources to develop information systems and electronic platforms that foster coordination; (4) Developing trust and cooperation among a large number of organizations in a metropolitan context could pose a challenge and require a regional strategy (22). Rush and Saini (46) suggest the lack of provincial description of available services and published syntheses of relevant research limits the evolution and evaluation of coordinated models of care.

Implementation of integrated MHSU service networks was found to rely on key strategies. Fleury et al.'s research based on Quebec's mental health reform (2005–2015) found that regional networks with strong governance and diversified resources supported better coordination of care and patient outcomes (51). Simplifying formal procedures such as the sharing of clinical records and referrals within and between organizations was found to promote collaboration and continuity of care between primary and specialized mental health services (57). Shared- or cross-training also supported service integration (19, 57) through knowledge translation on concurrent MHSU intervention methods (65). Facilitating knowledge sharing and collaboration between frontline and primary care providers was found to reduce harm and avoidable death, especially in the midst of a rising opioid epidemic. Knowledge sharing was also associated with enhanced perceived work role performance (66) and promoted shared vision and practice for integrated care among providers, reducing discrepancies in care (57).

Henderson et al. (42) demonstrated the positive outcomes of Integrated Collaborative Care Teams (ICCT) for youth programs in three Toronto neighborhoods. ICCTs include co-located MHSU care providers (e.g., youth workers, social worker, psychiatrist, nurse practitioner); trained peer support workers; access to a primary care provider and a care navigator responsible for coordinating care among the various specialists (42).

Competing Concepts for Concurrent Disorder Care

A shift is needed in how MHSU treatment is conceptualized, organized, and funded (21). System integration will enhance system efficiency and effectiveness, minimize program and administrative duplication, and reduce the likelihood of clients being misdirected, misdiagnosed or lost in the system (21). Some however, argue that full integration is unnecessary and enhanced co-operation, co-ordination and communication between agencies as an alternative (21). In a series of research interviews, an advocacy organization stated, "You can't have expertise in everything in one place; I actually think that we fail when we do that" (21). Integrated care should be more widely provided as individuals with concurrent disorders often experience a spectrum of health and socioeconomic issues including housing instability and justice system involvement. Selick and Wiktorowicz (21) conclude there are two worlds in addictions: professional staff and peer workers. And there are three worlds in mental health: psychiatry, which is focused on medication; community services, which are more psychosocially oriented; and the self-help consumer movement. In order to achieve integrated care, all of these fundamental components must align.

Torchalla et al. (40) examined the evidence on psychotherapeutic integrated treatment (IT) programs for individuals with concurrent disorders and trauma histories. Through their systemic review of 17 trials of integrated treatment programs, the majority reported that they effectively reduced PTSD and substance use disorder (SUD) symptoms over time (40). Similarly, Brousselle et al. (23) identified key factors required in integrated services and treatments for patients with concurrent disorders. Their study suggests integrated care be more flexible, to adapt the process of integration to a client's particular context. Vasiliadis et al.'s (39) analysis of self-reported MHSU service use found that of those with suicidal ideation and drug dependency, only 44.1 and 37.3% sought services. Of those for whom alcohol or illicit drug dependency interfered with daily life, only 26 and 27%, respectively sought care (39). Brousselle et al. (23) conclude that patient characteristics will ultimately drive the reorganization of the patient care experience.

Supports for Integrated Care

In Quebec, Fleury et al. (51) evaluated a pilot project to establish an integrated service network for adults with severe mental disorders in an urban area. The study was designed to offer support for decision-making, and solve problems as they arise. In focusing on the network of services provided and the organizations that make up the networks, the inter-organizational relationships fostered aided in improving quality of care. The first stage of implementation consolidated the range of resources available within the network. The integration strategies advanced by the authors validated the ability to transform the healthcare system based on its existing structures and resources while allowing for gradual change within the services.

McKee's (29) research sought to drive the reform of the mental healthcare system further and bridge the gap to treatment. The study suggested the implementation of change leaders as the system branches into integrated care. Change leaders need to be embedded within the program and remain long after initial integration to provide ongoing clinical supervision and model the novel, unified treatment philosophy (29). By including post treatment integration plans, programs are more likely sustainable and encompass the holistic needs of individuals with concurrent disorders.

Scope of Practice

Important sub-themes for integration and coordination were scope of practice and gaps in care. As primary care practices (PCPs) prescribe between 60 and 80% of psychotropic medications they play an important role in integrated care, where the same team treats physical and mental health problems and can achieve improved depression outcomes. Receiving services from PCPs can be less stigmatizing, more coordinated and more accessible than mental health specialist services. Ontario employees who received integrated care had fewer short-term disability days and returned to work faster. Integrated care was associated with shorter referral delays, reduced time in treatment, fewer appointments and lower treatment costs and addressed both mental health and substance use needs, which is important given the high rates of concurrent disorders (67). As the management of substance use involves screening, assessment and intervention, whose role it is to administer the screening tool, the quality of the tool and time involved are issues. While treatment should follow assessment, identifying relevant services and making referrals can be time consuming. PCPs may have difficulty recruiting addiction specialists and physicians with prescribing licenses to administer methadone for example (67).

Medical school and continuing education on substance use is considered inadequate, inconsistently applied and a low priority. Physicians cite a lack of confidence in their ability to offer these services. As the optimal management of many addictions (e.g., opioid dependence) involves a combination of pharmacological strategies and psychotherapeutic interventions that can increase the time needed for communication, physician practices may be deterred from offering them.

Although physicians engaged in integrated care express concerns about liability insurance issues, the Canadian Medical Protective Association (CMPA) that provides liability protection argues that while fear of increased medico-legal liability is cited as a barrier to health professionals working collaboratively, there is no need for extensive changes to the medical liability system (31). They emphasize the importance of both physicians and non-physician providers working collaboratively to attain professional liability protection and/or insurance coverage. The CMPA stresses this issue should not impede integrated care (Physicians acquire liability protection through the CMPA; non-physicians are covered through professional liability plans purchased through the Family Health Team in Ontario for example). The benefits of greater satisfaction with the quality of care delivered and improved patient outcomes are important incentives for physicians to engage in integrated care (31).

Kurdyak et al. (38) assessed the relationship among psychiatrist supply, practice patterns and access to psychiatrists in Ontario Local Health Integration Networks (LHINs). As the supply of psychiatrists increased, outpatient panel size decreased for full-time psychiatrists (38). In Toronto, psychiatrists had 58% smaller outpatient and inpatient panels and saw 57% fewer new patients relative to LHINs with the lowest psychiatrist supply (38). Concerningly, 10% of full-time psychiatrists in Toronto saw fewer than 40 unique patients and 40% saw fewer than 100 unique patients annually (38). In LHINs with lower supply the proportions were around 4 and 10% respectively (38).

Collaborative Care

Although models of collaborative care vary, they enable MHSU and primary care providers to work together more effectively to improve care. A position paper by Kates et al. (32) identifies common components of collaborative care to include use of a case manager to coordinate care, access to psychiatric consultation, evidence-based treatment guidelines, skill enhancement for primary care providers and access to psychological therapies. The benefits include better clinical outcomes, more efficient use of resources and improved access to care (32).

Assertive Community Treatment (ACT) offers an alternative model in which an inter-disciplinary team of 10–12 practitioners accept shared responsibility to offer care to a caseload of 60–100 patients. Instead of coordinating services across agencies, the team delivers services directly in community settings to facilitate in crisis support, treatment and rehabilitation. Treatment populations are generally among the most seriously ill, including those with concurrent disorders and those who have been committed to community treatment (68). As ACT programs are expensive, access to them is limited that can lead to gaps in care.

Gaps in Care

The historical separation of substance-use from mental health services has limited health professionals' scope of practice for concurrent disorders and produced gaps in care. Psychological services available to children are limited (25). The Mental Health Commission of Canada (MHCC) found effective MHSU care requires collaboration among service providers, service users and their families (69). While over half of patients are referred by a psychologist to another professional or agency; the services are not necessarily coordinated and collaborative (69).

The National Psychiatry Waiting List Survey indicated the average wait-time for "urgent referrals" made by family physicians to psychiatrists was 2-weeks, while the wait-time for "elective referrals" was 7-weeks (70). The ICCT approach for youth reduces wait-times and produces more youth- and family-friendly services to complement existing services (42). Denomme and Benhanoh (41) found that family member-oriented treatment programs led to increased participant knowledge of substance-use and concurrent disorders and resulted in better coping capabilities among families.

Referral to Psychotherapy

In Quebec, Roberge et al. (49) examined access to psychotherapy for anxiety disorders in a sample of primary care patients who met DSM-IV criteria for panic-, generalized anxiety- or social anxiety disorders. They found 40% reported seeing a psychologist in the past year and more than a third reported being referred to a psychologist by a primary care physician, which is not included in publicly insured healthcare (49). There are twice as many psychologists per capita in Quebec compared to other provinces. Lack of resources and poor collaboration between family physicians and psychologists limits access to evidence based psychological treatment. Bradley and Drapeau (50) found that 77% of psychologists and psychotherapists ($N = 1{,}275$) practicing in Quebec advocated for greater accessibility to publicly funded psychotherapy (50). Additional concerns among the sample involved expanding the scope of referrals, instilling greater supervision and including employment assistance with psychotherapy treatment (50).

In New Brunswick, Talbot et al. (26) surveyed family physicians ($n = 152$) on their treatment and referral practice for adults with significant anxiety or depressive symptoms. Low referral rates were found; 61% of physicians treat over 50% of anxiety or depressive patient symptoms in their practice (26). These findings suggest that many patients do not access psychotherapy. Addressing the attitudes of family physicians and stressing the necessity of integrated care and collaboration of various health professionals would help close the gap of unmet mental health needs.

Policy

Integration and coordination of care is multifaceted as it involves translating policy into programs that encompass numerous stakeholders and agencies. MHSU care thus entails multilevel governance involving coordination of provincial, regional and sub-regional health and social services (22). Provincial Ministries of Health are responsible for mental health policy including aligning policies with the Ministries of Social Services, Justice etc., whereas regional health authorities oversee program operation including the development of regional and sub-regional service integration networks and liaising with primary care and other physician practices. Changes in provincial and regional governance affect the organization of and incentives that support service coordination. Within Canada's highly decentralized federal system, healthcare may be the most politically contested policy arena, resulting in intensely political policy negotiations between federal, provincial, and territorial governments as well as physician associations (45).

Accountability and Monitoring

In the absence of targeted federal transfers and effective accountability mechanisms, history reveals little hope for provincial and territorial governments to expand MHSU care on their own (45). A review of Auditor General reports across provinces from 2000 to 2018 reinforced the thematic challenges that emerged in the scoping review concerning access to care, service coordination and policy that prevent concurrent MHSU service needs from being addressed. The Auditor General of British Columbia found few specialized services for concurrent MHSU disorders and the situation is worse for rural and hard-to-reach populations (71). For instance, Northern Health which provides healthcare to rural and remote communities in BC with a high proportion of Aboriginal people has the highest rates of concurrent disorders (71). Low income neighborhoods in Quebec and BC were found to have a higher prevalence of unmet MHSU needs (43, 71). Although psychotherapy is an effective intervention for concurrent disorders (72), access is limited. Unlike Australia and the United Kingdom where psychological services are publicly accessible, most services in Canada are accessible to individuals with employer-based health insurance plans which has inadvertently instilled a two-tiered system of care (73, 74).

Policies Concerning Access to Care

Youth and adult access to concurrent disorders care was found to be limited. Until recently, Nova Scotia lacked a wait-time standard for child and adolescent mental health and substance-use services (75). Even where waitlist standards are mandated, it is not uncommon for youth and adults seeking inpatient mental healthcare or detox services to be turned away (76, 77). The service access issue is compounded by the fact that over one-third of individuals with concurrent needs miss appointments or treatments (77). Although stable housing can improve health outcomes for people with concurrent disorders (78, 79), many provinces lack information on the demand for supportive housing nor the units available to those in need (71, 80, 81).

Although physicians are usually the first point of contact for people with concurrent disorders, their care is not well-integrated with community-based healthcare services (81). Resultantly, transitions between specialty, acute, and community-based care are not well-managed making the system difficult for patients with complex MHSU needs to navigate (81–83). While community-based services (i.e., counseling, drug therapy and social housing) can be more effective and cost-efficient than hospital-based care (84), they are at capacity with long wait lists (71, 75, 80, 81). And although 10% of psychiatric hospital patients in Ontario were found to no longer require specialty care, a lack of supportive housing prevented their discharge (76).

Improving public access to psychological therapies can reduce bottlenecks in care by enabling psychiatrists to spend less time administering psychotherapy and more time seeing patients. Findings on psychiatrist supply and practice patterns in Ontario indicate that increasing psychiatric supply and duration of psychotherapy do not necessarily improve access to psychiatric services (38). Lack of coordination and access to services increases vulnerability to homelessness, hospital readmission and incarceration. Gaps between hospital and community-based care also leads to higher rates of hospital readmission (83, 85), referred to as the *revolving-door* syndrome. There is also a strong link between psychiatric deinstitutionalization and the overrepresentation of populations with MHSU needs in the criminal justice system, referred to as *trans-institutionalization*. Inmates in correctional facilities have a disproportionately high occurrence of MHSU issues and those with MHSU issues are more likely to be reconvicted (86, 87). Given a lack of clarity on which entity is responsible for providing concurrent MHSU services in provincial correctional institutions, gaps in accountability were found (86).

Policy Progress

Accountability and monitoring of policy progress in coordinating access to care reflects a further disconnect. Since the deinstitutionalization of psychiatric hospitals (beginning in the 1960s), jurisdictions shifted away from institutions and decentralized mental healthcare (71). In the past two decades, provinces reformed their MHSU systems to improve access and continuity of care through integrated service networks and shared care teams (57, 72, 75, 88). Interdisciplinary care models can take many forms (i.e., ACT teams, Intensive Case Management teams, Family Health Teams) and are usually provided through regional health authorities and contracted services providers (71, 88). While interdisciplinary care teams can reduce healthcare costs, the current fee-for-service funding model limits participation of physicians and other primary healthcare providers (81).

The Ontario *Patients First Act* (2016) and amendments to the *Local Health System Integration Act* (2006) equipped LHINs to better integrate healthcare systems by expanding the scope of a "health-service provider" under a LHIN to include Family Health Teams (88). Although LHINs now have a greater role in managing primary care, accountability for primary-care physicians remains under Ministry responsibility (88). An audit of mental health services in Alberta in 2015 found a disconnect between MHSU community providers and family physician practices; "half of all primary care networks had no mental health providers and seven had less than one full-time equivalent" (81). The divide between MHSU healthcare providers complicates sharing of patient information; providers do not share information even where there are no legal barriers (81).

Monitoring Policy Implementation

Provinces were also found to lack a governance mechanism to monitor the progress of policy implementation (75). Despite implementing strategies to improve access to MHSU care, many provinces do not have an effective process for monitoring provider performance, payment nor the ability to manage the capacity and demand for service (71, 75, 77, 81, 88). Bartram and Lurie (45) suggest expanding the mandate of the Mental Health Commission of Canada to include a monitoring function, or entrusting monitoring to provincial and territorial auditor generals as per the recommendation of the MHCC report *Out of the Shadows at Last*. Provincial auditor generals have attributed service gaps in the delivery of MHSU care to historical funding patterns that ignore assessed needs (71, 81, 88, 89). Service gaps result in people receiving different levels of care despite similar needs that widened MHSU inequities (80).

Funding

While the Canada Health Act (1984) could have addressed the growing need for broader health insurance by making coverage for non-physician health and mental healthcare providers such as nurses and psychologists a condition of federal funding transfers, instead it only addressed the issue of extra billing. The MHCC (69) recognized the importance of investing in mental health and social spending to strengthen the capacity of the MHSU system as part of the Mental Health Strategy for Canada. The current share of health spending on mental health in Canada at 7% (90), pales in comparison to other high income countries that spend up to 18% on mental health, with the United Kingdom spending 13% (91). For example, Ontario made new investments of $16.45 per capita in mental health compared to investments of $62.22 per capita in the U.K. and $98.13 in Australia between 2004 and 2011 (92). During this same time, Ontario invested $220 million in community mental health services and $18.5 billion in health care (92). Ontario invested an additional $180 million in community mental health services and $3.8 billion in health care from 2011 to 2016 (93).

The Canadian Institute for Health Information (2015) estimates that public funding from government transfers would need to increase to $3.1 billion per year, with an incremental base funding increase of $310 million each year, to close the MHSU gap and increase the share of mental health spending from seven to nine percent, with additional investments in social spending as the National Mental Health Strategy advised (69, 94). The MHCC (95) commissioned report *Making the Case for Investing in Mental Health* anticipated that such investments would reduce MHSU expenditures by over $179 billion and reduce employer expenditures due to productivity loss by $76.1 billion. Without increased investment, the MHCC (95) predicts that the cumulative cost of MHSU issues to the economy will exceed $2.5 trillion by 2041.

With $5 billion in new federal funding to improve access to mental health services set to roll out over the next 10 years through the 2017 Health Accord, the window of opportunity could begin to close the long-standing gap in mental health funding. Bartram's analysis of potential accountability mechanisms advises tying targeted federal funds to specific initiatives, population groups or levels of evidence (45, 94).

DISCUSSION AND CONCLUSION

An analysis of the literature on emergent models of service across Canada revealed that individuals with concurrent disorders present with complex needs that are often difficult to treat (96). A major challenge in addressing concurrent disorders has been integrating services between MHSU providers and community agencies. The independent development of mental health and substance-use services made accessing appropriate care more difficult and led to greater mental healthcare need among individuals with concurrent disorders (4). Considerable research on improving system and service level integration has emerged in recent years. While collaborative care models can simultaneously address multiple needs (i.e., concurrent disorders), our findings highlight the barriers to access care that remain.

Two general approaches to achieve service-level integration were identified: co-located MHSU services or collaborative care models across MHSU service providers (72). Successful healthcare reform for concurrent MHSU disorders requires greater attention to develop and operationalize integrated care models and service networks. While the models of integrated MHSU care envisioned would improve coordination among providers and access to services, structural barriers inhibit implementation. Despite several pilot projects and frontline operational practices that support integrated MHSU care, governments and legislatures have yet to accept responsibility for healthcare restructuring (81). The Auditor General of Alberta (81) identifies three elements that must be incorporated into healthcare frameworks to achieve integrated care; (1) structuring the healthcare system to include clear responsibility of roles, internal frameworks for funding and accountability for results; (2) integration of physicians through financial incentives or alternative pay models; and (3) clinical information systems to ensure appropriate sharing of patient information. These elements are critical to facilitate partnerships for collaborative care and address service gaps in concurrent MHSU care.

Lessons can be drawn from the barriers to concurrent MHSU care found and evidence concerning successful implementation strategies for integrated care models and the service networks on which they rely. The findings suggest formal network decision-making supports, implementation strategies and accountability mechanisms that monitor progress in implementing system reform would improve access to care. Despite limited progress made to integrate mental health with substance-use care, issues of policy accountability for system-level integration inhibit the delivery of coordinated care. Greater attention to operationalize and implement integrated service networks to address unmet MHSU needs and related harms requires changes to the funding and structure of provincial MHSU healthcare systems. At the governance level, funding incentives for providers should better align with the care needs of patients.

A paradigm shift in which providers are seen as an integral part of a broader system of collaborative MHSU care reflects the future. This entails supporting providers to be part of a team, educating them on the opportunities to refer patients to related care providers such as early psychosis and substance use therapy, as well as an openness to accept referrals from community-based providers to better meet patient needs (97). This could include engagement in networks that offer centralized patient intake and care referral, and enabling primary care practices to include allied health professionals such as case managers to better serve those with concurrent disorders. Reforming payment modalities can reward physicians for their involvement in collaborative care teams and local networks of centralized care access. Legislative changes can also improve the scope of concurrent MHSU care by including more psychologists and front-line workers under the fee-for-service payment system. Sharing clinical information among providers enhances collaboration and better patient outcomes. Future studies on integrated networks with centralized service access that include cross-training mechanisms to foster common understandings, relationship-building and reduce discrepancies in care would enhance our understanding of promising models of care.

LIMITATIONS

Our assessment of the challenges in accessing coordinated MHSU care included a broad range of literature that was triangulated with an analysis of auditor general reports to counter potential bias. A number of limitations nonetheless remain. First, the review was limited to the search of English language studies even though research on coordinating MHSU care has been conducted in French speaking provinces. Moreover, the analysis may be somewhat unbalanced given the number of studies based in Ontario. Although auditor general reports from Alberta and Ontario were most referenced, findings from many other provinces were included (B.C., Nova Scotia, New Brunswick, Newfoundland and Labrador, and Saskatchewan). The results may also not be generalizable outside Canada as the design of healthcare systems varies across countries (i.e., public vs. private funding). Lastly, despite our attempt to conduct a thorough literature search, it is possible we missed studies on models of MHSU care in our analysis.

AUTHOR CONTRIBUTIONS

MW conceptualized the study and introduction, contributed to the analysis of the literature and auditor general reports, and substantively edited the manuscript. AA conducted the literature search and analysis, wrote the methods, developed the decision tree, table summarizing the studies included and first draft of the results. KD analyzed the auditor general reports, contributed to the analysis of the literature, developed the discussion and conclusion and organized the references. SB contributed to the conceptualization of the study, supported the literature search, decision tree, and critically edited the manuscript.

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Online Intervention as Strategy to Reach Men Who Have Sex With Other Men and Who Use Substances in a Sexual Context. Development of the MONBUZZ.ca Project

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Men who have sex with men (MSM) use more psychoactive substances and a greater variety of them compared to their heterosexual peers. In this population, substance use is particularly characterized by polydrug use, binge, and sexualized substance use. MSM who use substances do not recognize themselves in public health messages targeting substance users. In addition, they recognize their problematic substance use later than heterosexuals and, as a result, they use addiction services later in their addiction trajectories. When accessing addiction services, the links between drug use and sexual life are rarely considered. Because of this profile, online interventions are a promising way to reach this hard-to-reach population. Currently available online interventions targeting MSM address the topics of substance use and sexual life separately. To deal with this situation, our team wanted to develop an online intervention platform for MSM who use substances in a sexual context. Given that online addiction interventions do not address sex and that MSM drug use is highly related to sexual activity, we first explored the literature related to online interventions targeting MSM and HIV risk behaviors, as well as online interventions targeting general population in order to: (1) identify relevant (or personalized) intervention methods; (2) describe the approaches used; and (3) describe their effects. Second, we turned to the literature to develop the MONBUZZ.ca project in collaboration with community organizations. The results of the narrative review provided a critical portrait of online interventions for MSM and guided the development process of MONBUZZ.ca. We discuss issues of co-development of a research and brief intervention tool based on promising practices as well as challenges of its implementation and evaluation.

Keywords: sexualized substance use, MSM (men who have sex with men), online interventions, outreach, community-based research

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INTRODUCTION

Men who havesex with men (MSM) tend to use more psychoactive substances than do men who do not have sex with men (1–3). Among MSM who use drugs, some use these substances mostly in a sexual context (4, 5) and the phenomenon of "chemsex" has been increasingly documented. "Chemsex" refers to the use of substances such as methamphetamines (especially in North America and Australia), mephedrone (especially in Europe), GHB/GBL and ketamine to extend, intensify or diversify sexual activities (1, 6, 7). Other authors characterize chemsex by the combined use of these substances and other products such as erectile dysfunction drugs and certain substances, sometimes sold legally, such amyl nitrites (*poppers*) (8). More broadly, Hickson (9) defines chemsex as a social and cultural phenomenon that involves voluntary risk taking, powerful emotions and strong sensations within the context of dating apps and biomedicalized sexuality (i.e., use of HIV pre-exposure prophylaxis, or PrEP).There is no consensus around the definitions of "chemsex." However, the definitions presented above suggest that type of substances varies depending on cultural and geographical context. These definitions also incorporate intent (or motivation) to use these substances to enhance different aspects of the sexual experience. In this article we will use "substance use in a sexual context" to refer to use of any psychoactive substances, including alcohol, in a sexual context, regardless of the intention or function sought by the users. Substance use in a sexual context is sometimes associated with health-risk sexual behaviors (1, 6, 7). In addition, condomless sex is also common among MSM using substances in a sexual context (8, 10), as is injection drug use and sharing of injection paraphernalia (10–12). Therefore, substance use in a sexual context among MSM represents a major public health concern (10), which could be translated into public health activities that take into account the context in which substance use takes place (9).

Some MSM with problematic substance use do not receive services for this problem (3) for several reasons. First, like many other substance users, some MSM with problematic substance use are unaware of the problem. In turn, their lack of awareness explains why prevention and treatment messages targeting substance users do not resonate with this audience (3, 13). Second, problematic substance use is not always detected by health care professionals who work either in general services or specialized sexual health services (3). Therefore, their substance use profiles are sometimes more severe once they enter into services (11). Third, fear (which can be well-founded) of health care workers' negative attitudes toward LGBTQ+ people and a theoretical lack of addiction services adapted to their needs decrease MSM's use of addiction services (14). There is a consensus about the magnitude and severity of substance use among some MSM and about the fact that they are a difficult population to reach (15). Therefore, specific actions are necessary to reach this population, whose use of services is limited. In this context, online interventions represent a promising strategy to reach and serve this population (16).

Online interventions provide care exclusively over a computer or mobile device and are sometimes combined with traditional services (17). These interventions convey general information or information tailored to each user's profile, and also include virtual discussion spaces where individuals can talk with a health care professional via synchronous or asynchronous interfaces (17). These platforms can be in the form of educational modules on dedicated web platforms, text messages, live chat sessions, discussion forums, social media interventions or ecological momentary interventions (17, 18). Online interventions have a number of benefits. For example, not having to talk to someone in person reduces feelings of stigma or discomfort that users of health care services may experience with health care professionals (19, 20). These interventions can also eliminate the financial, time, and geographical barriers of traditional services, thereby improving access to hard-to-reach populations (21). Finally, gay, bisexual and other MSM, like many other populations including young people, have quickly adopted the Internet to socialize and get health information, and are willing to participate in Internet research projects (22). Therefore, online interventions represent an outreach opportunity to interact with these populations in their daily lives.

Our team wanted to develop an online intervention tool for MSM who use substances in a sexual context. It was important to integrate the experiences and best practices from the scientific literature to provide the most rigorous intervention possible and overcome challenges identified by other authors and by the stakeholders collaborating in the project. Given that most online addiction interventions do not address sex and MSM substance use in a sexual context is a concern, we first explored the literature related to online interventions targeting MSM and HIV risk behaviors, as well as online interventions that target substance users (regardless of sexual orientation or sex with same sex partners). Our aim was to (1) identify relevant (or personalized) intervention methods; (2) describe the approaches used; and (3) describe the effects of those methods. Second, we turned to the literature to develop the MONBUZZ.ca project in collaboration with community organizations. The project co-development will be described and discussed in the second part of this article, as well as the use made of scientific documentation throughout the development process of MONBUZZ.ca.

METHODOLOGY

For the Narrative Literature Review

To meet the above-mentioned goals, we explored three major concepts: online interventions; sexual health and prevention of HIV and other sexually-transmitted and blood-borne infections (STBBI); and substance use. Multiple keywords were defined for each concept and combined with Boolean operators (for example, substance use, sexualized substance use, risk behaviors, online interventions, web-based interventions). These themes and keywords were searched in the following databases: MEDLINE with Full Text; CINAHL Plus with Full Text; ERIC; FRANCIS; PASCAL; PsycARTICLES; PsycCRITIQUES; PsycEXTRA; Psychology and Behavioral Sciences Collection; PsycINFO; Social Work Abstracts; and SocINDEX.

Since the goal of the review was to further our reflection on how to develop the MONBUZZ.ca platform, we decided to focus on studies about the effectiveness of similar interventions.

Our selection criteria for this review consisted of articles about randomized controlled studies of interventions aimed at changing substance use habits or at-risk sexual behaviors. The article also had to be published in English or French and pertain to MSM or adult gay/bisexual men. We excluded articles that did not address the impact of interventions as well as reviews. Data extraction was performed by two research professionals. Given the diverse goals of the interventions and varied study populations and contexts, we performed a narrative analysis. A narrative analysis allows inclusion of documents with a wide variety of methodological terms. This analysis did not allow us to draw conclusions based on the level of evidence in the selected studies; however it was particularly useful for identifying the main themes surrounding a subject, in this case online interventions targeting MSM (23).

RESULTS

Study Selection

For the narrative review, an initial literature search of online interventions and substance use yielded 2,644 results. The literature search on the theme of online interventions to address the sexual health of MSM yielded 80 results, while the one on sexual health, substance use and online interventions targeting MSM generated only 8 results. Given the scarcity of studies specifically focusing on our theme of interest, we decided to consider (1) substance use online interventions targeting heterosexuals ($n = 601$); and (2) sexual health online interventions targeting MSM, specifically the prevention of HIV and other STBBIs ($n = 80$). After assessing the relevance of 681 titles and abstracts according to the selection criteria, we selected 26 studies.

Description of Studies Selected for the Review

Twenty-six articles were selected for the review. The online interventions described in these studies aimed to increase knowledge about the prevention of HIV and other STBBI as well as to decrease at-risk sexual behavior (24–31). Some online interventions aimed to increase the use of HIV or STBBI testing among adult MSM (32, 33) or young adult MSM (34) who live in urban or rural settings (24). The interventions of the reviewed studies are based on different theoretical approaches, such as the integrated behavioral model (34), health belief model (32), information motivation behavioral skills model (24, 25, 29, 31), social learning theory (26), STD-related cognitive approach and fear appeal approach (28), and the sexual health model approach to HIV prevention (30).

In terms of intervention approaches, most were carried out with multiple modules (24, 25, 29, 31) that included videos or multimedia presentations (25, 29–31). In some studies, different types of video (informative, documentary or dramatic) were used for the intervention (26, 28, 32). In some cases, the interventions were adapted to the participants' profiles (27, 31) or how they identify themselves with regard to their sexual orientation or gender, e.g., they could choose a character in a story based on the sexual identity they listed to take part in the intervention (32). The participants received personalized feedback based on their profile or their answers to the questions asked (27, 31, 34). In one study, the intervention was done via e-mail (27). In other cases, it was done via a closed group on a social network, with discussions between moderators and participants (33).

Effects of Interventions on Testing for HIV and Other STBBI

Bauermeister et al. (34) conducted a randomized controlled trial to assess the effectiveness of a pilot project to promote the testing of HIV and other STBBI among young MSM (13–25 years old). The eligible participants were assigned to either an experimental intervention (a personalized website called Get Connected!) or a controlled intervention (a website that allowed people to locate screening services within their geographic reach). All participants completed a baseline questionnaire that was used, among other things, to personalize the navigation on the web site. Those in the experimental group had access to four webpages: the first page presented an information table on different STBBIs; the second assessed participants' motivations, strengths and values around STBBI screening; the third evaluated barriers to screening; and the fourth offered a list of resources, which was identical to that received by participants in the control group. Finally, participants were asked about the feasibility and acceptability of the intervention (single session intervention). Overall, 130 young MSM participated in the study and 104 responded to the 1 month follow-up (brief survey measuring the primary outcomes). Compared to their peers in the control intervention, the participants exposed to the experimental intervention were significantly more likely to ask their sexual partners to get tested for HIV (2.27 vs. 1.75; $t = 2.59$; $p < 0.05$) and to get tested for a STBBI (2.22 vs. 1.81; $t = 1.95$; $p < 0.05$). They were also significantly more likely to educate other people about HIV and STBBI using the information they received through the intervention (2.72 vs. 2.14; $t = 2.63$; $p < 0.01$).

An increase in testing among MSM who do not identify as gay was also observed in the randomized controlled trial of Blas et al. (32). The goal of this study was to compare the impact of a video intervention using a motivational approach (experimental group) and a standard public health message in a text format (control group) on HIV testing. The video intervention was tailored to three types of MSM: those who self-identify as gay, those who do not self-identify as gay, and trans people. The tailored videos lasted 5 min; participants were exposed to one video, depending on their profile (single session intervention). The article focuses on two sub-groups (MSM who self-identify as gay and those who do not self-identify as gay). A total of 239 participants were assigned to the experimental intervention: 142 in the group of men identifying as gay and 97 in the group who did not identify as gay. The control group had 220 subjects that included 130 men who identified as gay and 90 who did not identify as gay. Compared to the participants in the control group, the participants who were part of the experimental intervention and who did not identify as gay were more inclined to report an intention to get tested for HIV in the 30 days following the intervention ($RR = 2.77$; 95% CI: 1.42–5.39). This same group was also more inclined to make an appointment over the Internet to get tested for HIV ($RR = 1.48$; 95% CI: 1.13–1.95).

In a more targeted way, the study of Young et al. (33) aimed to determine whether an intervention through closed Facebook groups would increase HIV testing with a self-testing kit among African American or Latin American MSM who live in Los Angeles. The main outcomes measured were the actions of ordering a self-testing kit, returning the kit, and following up to get the results. This study consisted of two experimental groups and two control groups (all groups made up of African American or Latin American MSM). For 12 weeks, the experimental groups were exposed to information about HIV, whereas the control groups received general health information. Participants were assigned either to one of the experimental groups or one of the control groups. Each group had moderators who were randomly assigned to one of the 4 groups. Participants were instructed to use Facebook as they normally would. They were not obliged to respond to moderator messages or other members of the closed group. In addition, they could control the information they wanted to share with others in the group. A group operating guide was also given to them. Moderators could start discussions and remind participants to take part in the discussion weekly. A total of 112 MSM participated in the study: 57 were assigned to the experimental intervention and 55 to the control group. Of these, 53 participants from the control group completed the follow-up, while 52 from the experimental group did it. Every 4 weeks, the participants received messages telling them that they could order a free HIV self-testing kit that they could use at home. The results showed that more subjects assigned to the experimental intervention ordered HIV self-testing kits compared to those in the control group [44 vs. 20%, mean difference, 24% points (95% CI, 8–41% points)]: 25 participants in the experimental group ordered self-testing kits; among them, 9 returned the kits and 8 followed up to get the results. In the control group, 11 participants ordered self-testing kits; among them, 2 returned the kits and none followed up to get the results.

Impact on HIV and Other STBBI Sexual Risk Behaviors

Carpenter et al. (25) conducted a randomized controlled trial to evaluate the effectiveness of an online intervention with regard to the at-risk sexual behavior of MSM whose HIV status was negative or unknown. All participants were asked to complete a baseline questionnaire (lasting about 25 min) before being randomized to the experimental or control group. A total of 81 MSM completed the experimental intervention and 73 completed the control intervention. Of this number, 59 (experimental group) and 53 (control group) completed the 3 months follow-up. The experimental intervention included seven interactive modules lasting about 20 min that could be completed within 1 week. This intervention aimed to reduce the risks associated with HIV and other STBBI, to improve the participants' abilities to engage in safer behavior and increase their motivation to change their behavior. The control intervention consisted of a stress reduction training program called eTranquility. Controlling for general time effects, participants in the experimental group tended to show a decrease in self-reported instances of unprotected sexual intercourse with at-risk partners for the following practices: anal intercourse in general ($F = 7.59$; $df = 1.101$; $p = 0.007$; $\eta^2 = 0.070$), insertive anal intercourse ($F = 7.24$; $df = 1.101$; $p = 0.008$; $\eta^2 = 0.067$); insertive oral intercourse ($F = 7.45$; $df = 1.101$; $p = 0.007$; $\eta^2 = 0.069$); and receptive oral intercourse ($F = 8.45$; $df = 1.101$; $p = 0.004$; $\eta^2 = 0.077$). However, there was no decrease for receptive anal intercourse ($F = 4.79$; $df = 1.101$; $p = 0.248$; $\eta^2 = 0.013$). Relatively similar results in terms of decreased at-risk practices were obtained in the study by Bauermeister et al. (34), the methodology of which is described above. The authors observed that, 30 days after the intervention, participants in the experimental and the control groups had significantly increased safer sex practices. They reported fewer sexual partners (1.84 vs. 1.39; $t = 2.26$; $p < 0.05$), less receptive anal intercourse (0.80 vs. 0.56; $t = 2.43$; $p < 0.05$), less unprotected receptive anal intercourse (0.46 vs. 0.29; $t = 2.90$; $p < 0.05$) and less insertive anal intercourse (0.72 vs. 0.55; $t = 1.99$; $p < 0.05$).

The goal of the randomized controlled trial by Hirshfield et al. (26) was to evaluate the impact on HIV of five different interventions, including a 9 min dramatic video, a 5 min documentary video, both the dramatic and documentary videos (broadcast randomly), and a prevention webpage (experimental group interventions), in comparison with web links to HIV information and prevention resources (control group intervention). All participants could view the information only once. A total of 3,092 MSM participated in the study, and 1,631 participants completed the 60-days follow-up. After 60 days, a decrease in unprotected anal intercourse was observed among HIV-negative participants who were exposed to different videos ($OR = 0.70$; 95% CI: 0.54–0.91) as well as among participants exposed to the information and prevention pages ($OR = 0.43$; 95% CI: 0.25–0.72). The HIV-negative participants who watched the videos reported a decrease in unprotected anal intercourse ($OR = 0.38$; 95% CI: 0.20–0.67) and in unprotected anal intercourse with a casual and serodiscordant partner ($OR = 0.53$; 95% CI: 0.28–0.96), compared to participants exposed to other interventions. The participants exposed to one of the videos were more likely than those in the control group to disclose their HIV status to their sexual partner ($OR = 1.51$; 95% CI: 1.16–1.98) as well as to ask their partner about their status and disclose their own ($OR = 1.32$; 95% CI: 1.01–1.74).

Regarding the effects of some approaches on changes in at-risk sexual behavior, Lau et al. (28) conducted a three-arm randomized controlled trial to assess the effectiveness of an online intervention based on the following: Sexually transmitted diseases (STD)-related cognitive approach (arm 1) and STD-related cognitive approach plus fear appeal imagery approach (arm 2), compared to a control intervention (informative webpage about HIV) (arm 3). In the experimental arms, participants were exposed to three videos: two 5 min videos based on an STD-related cognitive approach, and a 10 min video based on fear appeal approach (experimental interventions), in comparison with an informative intervention about HIV (control intervention). In total, 396 men participated in the study, 133 were assigned to the STD-related cognitive approach (94 completed the study), 133 to the STD-related cognitive approach and fear appeal approach (109 completed the study), and 136 to the control group (102 completed the study). The participants were followed at 1 and 3 months after the intervention. The study found no significant relationship between the level of fear induced by the interventions and the prevalence of unprotected anal intercourse. However, significant differences were observed within some groups. In comparison to baseline, results after 3 months showed a significant decrease in unprotected anal intercourse with regular partners and with all types of partners among participants in the three study arms.

Maintaining Behavior Changes Over Time

The study by Mustanski et al. (29) assessed the feasibility, acceptability and preliminary efficacy of an online intervention called *Keep It Up!*. The intervention included 7 modules and a booster session which could be completed within 24 h. Each module lasted about 2 h. The intervention control also consisted of seven modules (which were shorter than those in the experimental intervention and did not include interactive tools). The participants had follow-up assessments at 6 and 12 weeks after the intervention. A total of 102 participants were included in the study −50 assigned to the experimental group and 52 to the control group. Among the 50 subjects assigned to the experimental group, 44 completed the 6 weeks follow-up and 41 completed the 12 weeks follow-up. Of the participants in the control group, 50 completed the 6 weeks follow-up and 49 completed the 12 weeks follow-up. After 12 weeks, participants in the experimental group had a lower rate of unprotected anal intercourse compared to participants in the control group ($RR = 0.56$; $p < 0.05$). Intervention acceptability was measured immediately after the intervention and a mean acceptability score was calculated. The authors reported a good level of acceptability for participants in the experimental group ($M = 5.29$, $SD = 0.73$) and for those in the control group ($M = 5.31$, $SD = 0.67$).

Rosser et al. (30) observed significant changes in at-risk behavior in their study; however, these changes were not maintained over time. The goal of their randomized controlled trial was to test an online interactive intervention to prevent HIV among MSM. The intervention consisted of modules that users could complete within a 7 days. The modules included interactive gamified tools along with video segments and animations. The article does not provide any information about the number of modules nor about the lasting effects of each module. For the control group, the participants were put on a waitlist. All participants were invited to fill out follow-up surveys at 3, 6, 9, and 12 months. Overall, 650 MSM participated in the study. Of this number, 337 were assigned to the experimental group and 313 to the control group. Retention rates at 12 months were 82% (experimental group) and 89% (control group). The results contrasting the first (after the baseline) and the last measurement time showed at the 3 months follow-up, a decrease of 15.6% in condomless anal intercourse among participants in the experimental group (95% CI: 0.704–1.013; $p = 0.0068$). No significant difference was observed at the 12 months follow-up.

Improved Knowledge About HIV and Condom Use

The randomized controlled trial of Schonnesson et al. (31) assessed the effectiveness of an online intervention (SMART) that aimed to reduce HIV risk behavior among Swedish MSM. The intervention was divided into three interactive modules with personalized feedback based on the participants' responses. Each module lasted ∼20 min and was divided into 2 sessions. The participants had 48 h to complete each session and had to wait 24 h before completing the next module. Follow-up was done after 30 days. The participants were assigned to either the experimental intervention (SMART) or a waitlist (control group). Overall, 112 MSM participated in the study: 54 were assigned to the intervention and 58 to the control group. The 1 month follow-up retention rate was 43% for the experimental group and 61% for the control arm. The participants in the experimental group improved their knowledge about HIV ($OR = 2.02$; 95% CI: 1.18–3.46; $p < 0.01$), and they also had a greater belief that condom use was an act of responsibility ($OR = 3.28$; 95% CI: 1.07–10.06; $p < 0.04$). Compared to participants in the control group, participants in the experimental group were more likely to use a condom with every new partner all the time ($OR = 4.01$; 95% CI: 1.13–14.20; $p < 0.03$). They were also more likely to experience increased personal effectiveness when using condoms in challenging situations ($OR = 5.19$; 95% CI: 1.31–20.59; $p < 0.02$).

Lau et al. (27) conducted a randomized controlled trial to evaluate the effectiveness of an online intervention that included periodic information on HIV, the monitoring of behavior with interactive feedback, as well as peer counseling. The experimental intervention consisted of emails sent bi-weekly over 6 months with graphics adapted to the target population about modes of HIV transmission, correct condom use, HIV testing, emotional relationships, as well as the links between substance use and sexual activity. Each month, the participants had to fill out a questionnaire about their HIV sexual risk behavior in the past 30 days. A total of 477 men participated in the study, of which 140 participants from the experimental group and 140 from the control group completed the follow-up at 6 months. The participants were men aged 18 years and over who had reported engaging in oral or anal sex with a man in the previous 6 months and who regularly use the Internet. The control intervention consisted of sending educational materials on the topic. No significant difference was observed between the groups at baseline or at the 6 months follow-up.

Just one study addressed the use of substances and at-risk sexual behavior (35); however, this study only focused on a single substance (methamphetamine). Although it was not a randomized trial, we included it in the literature review because of its relevance to the project we were developing. This study evaluated a pilot intervention with 52 MSM who had reported having unprotected anal sex and using methamphetamine in the previous 2 months. Interventions over text message were developed based on the social support theory, social cognitive theory, and health belief model. Predetermined text messages personalized to the participants' profiles were sent out daily for

2 weeks. Follow-up was done 2 months later. The results showed that exposure to messages based on the health belief model and the social cognitive theory significantly reduced the self-reported use of methamphetamine. Also, the messages based on social cognitive theory significantly reduced the number of occasions of unprotected anal intercourse with a serodiscordant partner as well as transactional sex.

Online Interventions to Change Substance Use in the General Population

Campbell et al. (20) conducted a randomized controlled trial to evaluate the effectiveness of an online intervention called the Therapeutic Education System (TES) in addition to in-person interventions. Participants were assigned to either the usual intervention (control group) or to the usual intervention combined with TES (experimental group). The two interventions were conducted over 12 weeks, with follow ups at 3 and 6 months. Urine tests were performed at follow up visits. The TES included 62 interactive modules lasting 20 to 30 min and based on contingency management. Overall, 255 people were assigned to the experimental intervention and 252 to the control group. Participants in the experimental group completed an average of 36.6 (SD = 18.1) of the 62 TES modules. Participants in the experimental group had higher abstinence rates than those assigned to the control group ($OR = 1.62$; 95% CI: 1.12–2.53; $p = 0.010$). The hazard ratio values showed that the former were also less likely to abandon treatment ($HR = 0.72$; 95% CI: 0.57–0.92; $p = 0.010$).

Lewis et al. (36) conducted a randomized controlled trial to evaluate the effectiveness of an intervention based on personalized normative feedback about alcohol-related risky sexual behavior (RSB). After completing the baseline in approximately 20 min, participants answered a 30 min questionnaire (single session intervention). They were then asked to complete a 50 min questionnaire 3 and 6 months after completing the baseline. Participants could be assigned to one of four online interventions developed using social learning theory. Three interventions were experimental (alcohol-only, alcohol-related RSB-only, combined alcohol and alcohol-related RSB) and one a control intervention. Participants were university students aged 18 to 25 years attending a public university in the United States. A total of 480 students participated in the study: 119 were assigned to the alcohol-only intervention, 121 to the alcohol-related RSB-only intervention, 119 to the combined alcohol and alcohol-related RSB intervention, and 121 to the control group. The 6 months retention rate was 85%. Compared to the participants in the other groups, those assigned to the alcohol-only and alcohol-related RSB-only interventions reduced their frequency of drinking alcohol by between 10 and 20% at 3 and 6 months after the intervention. Three months after the intervention, the participants in these same groups had decreased their frequency of drinking alcohol before sexual intercourse.

The goal of the randomized controlled trial conducted by Sinadinovic et al. (37) was to assess the efficacy of two online interventions (experimental arm): a brief personalized normative feedback intervention (eScreen.se) and a self-help intervention based on the principles of cognitive-behavioral treatment (Alkoholhjalpen.se) (experimental interventions). In one session, sScree.se measured consumption of alcohol and other substances, the place of substance use in the lives of respondents and their readiness to change. A personalized assessment based on the answers and references to appropriate services were then offered. Alkoholhjalpen.se consisted of 18 modules with interactive activities that participants completed as they wished. The platform also provided opportunity for discussion in an open forum with other participants. Participants could log in to both websites with personalized usernames and passwords, and use the websites as they wanted with no time limit. The control intervention was a web-based screening tool. The target outcome of the interventions was to reduce problematic alcohol use. The participants were followed at 3, 6, and 12 months. Overall, 633 people participated in the study: 211 were assigned to eScreen.se, 212 to Alkoholhjalpen.Se, and 210 to the control group. The 12 months retention rates were 59.2, 54.3, and 52.4%, respectively. After taking attrition into account, the average scores from the tools used to measure alcohol use decreased significantly for participants in all intervention groups (experimental and control) at 3 months. These scores remained stable but not statistically significant at 6 and 12 months.

The eScreen.se project was the focus of a randomized controlled trial by the same team (38). The purpose of this study was to assess the effects of this Internet-based screening and brief intervention site (eScreen.se) compared to web-based screening-tool only control group. Measurements were taken at 3 and 6 months after the intervention. In total, 202 people participated in the study, 101 of whom were assigned to the experimental group and 101 of whom were assigned to the control group. The attrition rates in the experimental component were 67.3% at the 3 months follow-up and 73.3% at 6 months follow-up. For the control group, these rates were 67.3% at 3 months and 65.4% at 6 months. The average scores on instruments measuring substance use, including alcohol, decreased significantly in the two groups (experimental and control) at the 3 months follow-up. However, the significant decrease was observed at the 6 months follow-up only for the experimental group.

Tait et al. (21) randomized controlled trial assessed the effectiveness of the “Breakingtheice” online intervention on the consumption of amphetamine-type stimulants. The control group was placed on a waitlist and could only access the intervention 6 months later. The participants could log on to the intervention site with a username and password. A total of 160 people participated in the study, 81 of whom were assigned to the experimental intervention and 79 of whom were assigned to the control intervention. Retention rates at 6 months follow-up were 47% for the experimental group and 52% for the control group. The intervention consisted of three modules based on cognitive behavioral theory and motivational enhancement theory. Participants had to complete each module within a week and could not advance to the next module before finishing the previous one. Compared to those in the control group, the participants in the experimental group were significantly more likely to seek help for their substance use ($RR = 2.16$; 95% CI: 1.14–4.10) or have the intention to seek help ($RR = 1.17$; 95%

CI: 1.05–1.31). Participants in the intervention group were more likely than those in the control group to move to the action stage of change (*OR* = 4.13; 95% CI: 1.03–16.58).

Bewick et al. (39) conducted a randomized controlled trial to evaluate the effectiveness of an intervention that gave subjects the chance to have their alcohol use evaluated (with the CAGE questionnaire) and get personalized online feedback. This feedback addressed their degree of alcohol use, the percentage of students who reported drinking less alcohol than the participant, and general information. The participants entered a secure code to see their profile via the study webpage. This webpage was available for 12 weeks and participants could visit it as they wanted. The control intervention only provided an assessment of alcohol use. A total of 539 participants were assigned to the experimental group and 536 to the control group. Of this number, 179 participants in the control group and 138 in the experimental group completed the 12 weeks follow-up. The participants assigned to the experimental group reported a lower average alcohol consumption per occasion compared to the control group ($F = 5.74$; $df = 1{,}313$; $p = 0.02$).

Bock et al. (40) conducted a randomized controlled trial to assess the feasibility, acceptability and preliminary efficacy of a program to reduce alcohol use via text message (Text Message Alcohol Program: TMAP). This program was compared to text messages on motivation in general (not related to alcohol use). The participants were community college students, and they were followed for 6 and 12 weeks after the baseline assessment. A total of six scheduled messages per week were sent out for 6 weeks. The participants were then asked to rate the text messages received on a 10-point scale. The messages in the experimental intervention included information on alcohol, strategies to limit alcohol use and related risks, as well as motivational messages. Overall, 31 people were assigned to the experimental intervention and 29 to the control group, and 93.3% of all participants completed follow-up at week 6, while 88.3% did so at week 12. At week 12, proportionately more participants in the experimental group compared to their peers in the control group (48.4 and 34.5% respectively) reported less than one episode of heavy drinking in the previous 2 weeks (*OR* = 1.78; 95% CI: 0.63–5.04). Compared to participants in the control intervention, those assigned to the experimental intervention were significantly less likely to have experienced negative consequences from their alcohol use (*OR* = 4.77; 95% CI: 1.17–19.40).

Copeland et al. (41) randomized controlled trial assessed the short-term efficacy of two interventions that addressed problematic cannabis use: an intervention combined with brief feedback and an intervention combined with extended feedback. These interventions were based on the motivational approach and were part of the website Grassessment: Evaluate Your Use of Cannabis. Overall, 156 participants were assigned to the intervention with brief feedback and 131 to the intervention with extended feedback, and 68% of participants completed the 1 month follow-up. Participants in both groups significantly reduced the median number of days of cannabis use in the previous month as well as the amount used in the same period. Only participants in the brief feedback group showed a significant decrease in the severity of their dependence between baseline and1 month follow-up.

The randomized clinical trial of Gustafson et al. (42) assessed whether patients leaving treatment for alcohol problems and who had access, in addition to the usual services, to an application that provided support for their recovery (experimental group) would report fewer risky drinking days compared to those with no access to the application and who received the usual post-treatment services (control group). The application was called Addiction-Comprehensive Health Enhancement Support System (A-CHESS). This app had static and interactive content and participants could use it for 8 months. Through the project, participants with access to the application received a smartphone loaded with the application as well as phone service and a data plan. The participants were followed at 4, 8, and 12 months after baseline. A total of 170 people were assigned to the experimental intervention and 179 to the control group. The 12 months retention rates were 77.7% for the experimental group and 77.6% for the control group. At 12 months, participants in the experimental group reported significantly fewer risky drinking days compared to those in the control group. Again at 12 months, participants assigned to the experimental intervention were also significantly more likely to report more days of abstinence in the previous month than those assigned to the control group (*OR* = 1.94; 95% CI: 1.14–3.31).

McCambridge et al. (43) conducted a three-arm randomized controlled trial to evaluate the effectiveness of a brief online intervention to change alcohol consumption habits among university students. Participants were assigned to three possible interventions: alcohol use evaluation and feedback (arm 1); alcohol use evaluation only (arm 2); and, information web site about alcohol (arm 3). Overall, 4,969 people were assigned to arm 1, 4,969 to arm 2, and 4,972 to arm 3. Only 25.1% of all participants completed the 3 months follow-up after baseline. Significantly, participants assigned to arm 3 reported 3.7% more at-risk alcohol consumption compared to participants in arm 1. They were also significantly more likely to report episodes of heavy drinking.

Palfai et al. (44) conducted a randomized controlled trial to examine the effectiveness of an email with a link to a web-based screening and brief intervention for alcohol use? evaluation and prevention. The experimental group consisted of participants who received feedback on their alcohol use ($n = 890$), while the control group included participants who received general feedback on their health ($n = 446$). The intervention lasted about 15 min. The participants were first-year university students in the United States. Follow-up was conducted at 5 months after baseline. The retention rate of participants who had agreed to be contacted for follow-up was 62%. The only significant results were observed among participants who had reported not drinking alcohol at baseline. Participants who did not drink alcohol at baseline and who were assigned to the experimental group were less likely to have consumed alcohol at the 5 months follow-up compared to participants in the control group who also reported not drinking alcohol at baseline (*OR* = 0.50; 95% CI: 0.26–0.98).

DISCUSSION

Main Findings From the Literature and Development of MONBUZZ.ca

Randomized controlled trials conducted on non-LGBTQ+ population have demonstrated the effectiveness of interventions to decrease the use of alcohol (20, 36, 37) or other substances (21, 38). Other studies have supported the effectiveness of online interventions to reduce unprotected sex among MSM (25, 29, 30). Just one study addressed the use of substances and at-risk sexual behavior (35); however, this study only focused on a single substance (methamphetamine).

The relevance of using Internet to reach MSM and offer them online interventions regarding HIV or other STBBI has shown promise (45, 46), to the extent that the World Health Organization (47) has recommended using the Internet to reach MSM with at-risk profiles. However, we still know little about interventions that can address both substance use and health-risk sexual behaviors related to substance use. We do know that substance use among MSM is associated with sexual activities and sometimes to health-related sexual risk behaviors (1, 7). Studies that have assessed the effectiveness of online interventions with substance users did not address sexual aspects and did not target MSM (20, 21, 37). On the other hand, studies of online interventions that do target MSM focus above all on at-risk sexual behavior and do not address substance use.

The reviewed literature shows that online interventions can change some risk behaviors among MSM in different settings (32, 33). However, it can be seen that in interventions with multiple follow-up times, attrition rates can vary significantly, ranging from 75% (39, 43) to 4% (33). The extent of these rates is greater than those observed by Vandelanotte et al. (48) regarding attrition rates in web-based health interventions, which ranged from 10 to 50% after 3 months. In addition to methodological differences, the studies consulted showed significant variations regarding the number of follow-up times and the duration of these follow-up interventions. Therefore, it is difficult to make assumptions about the reasons for attrition rates. However, given our observations, we consider attrition prevention as an important issue. We also see that interventions with modules have good results in terms of behavior change but that between-module dropout risks must be considered (24, 25, 31).

This literature review indicates that longitudinal interventions are often module-based. However, the number of modules and the duration of each module vary. Nevertheless, this kind of intervention seems interesting in terms of effects but seems less adapted to a particular population, which results in a high dropout rate. The literature also shows that interventions taking place in a single session and offering evaluation and individualized feedback limit drop-out during intervention while allowing changes of certain risk behaviors (37, 38, 41, 43). This may be a more interesting strategy in some contexts, which can be supplemented with complementary modules, thus providing a level of service tailored to the needs of a targeted population.

The interventions that we identified intended to change behavior but did not establish the intervention needs of the participants. Considering that MSM who use substances do not all do so in a problematic way and that MSM who have substance use problems do not always ask for professional help (for various reasons) (3), we believed that developing an intervention that allows participants to assess the degree of their SU would be a necessary first step. Secondly, brief intervention approaches have demonstrated their capacity to modify behaviors among people who use substances (37, 38, 41, 43). Thirdly, we have seen in the literature that interventions based on motivational approaches (25) have demonstrated to be effective at reducing at-risk sexual behavior in MSM. Given that we are interested in MSM whose substance use can range from low to high and that, as a result, their motivation to change their behavior will be highly varied, we believed it necessary to measure the participants' level of motivation to change. This approach appears to be either directly related to effectiveness or a means to promote the commitment necessary to enhance participant retention. Finally, the literature suggests that personalized interventions (31) and interactive activities (25, 29–31) are shown to be effective. Therefore, we decided to develop personalized feedback based on participants' substance use profiles and their level of motivation to change. In addition, the interactivity of MONBUZZ.ca was developed taking into account how to ask the questions and setting up a discussion box. The purpose of these features was to create an interactive interface and offer the opportunity to interact with a community counselor after the intervention.

Community-University Co-development of the MONBUZZ.ca Project

Community Approach

The project was co-developed based on results of the literature review and on the experience and expertise of the community. MONBUZZ.ca was developed using a community research approach in which all members of the team (academic and non-academic) have an equitable partnership throughout all stages of the research process (49, 50). This partnership involves the sharing of expertise as well as a shared responsibility in terms of decision-making, knowledge creation, and improvement of community health through interventions and improvements to public policies (49, 50). The platform was built using a co-construction approach involving stakeholders in addiction and sexual health from the community, public, private, and public health sectors. This allowed us to gain the perspective of stakeholders, researchers and potential users of the platform.

Everyone involved in the project was divided into three committees, which became spaces for discussion and co-construction: (1) The management committee, made up of researchers, managers, and stakeholders of the RÉZO organization, who were directly involved in the project; (2) the development committee, which consisted of potential users of the platform, addiction, and sexual health stakeholders from different environments, and researchers; and (3) the advisory committee, composed mainly of managers and researchers who are subject matter experts and who worked externally on the project. The role of the management committee was to take the required actions to carry out the project. The development committee's role was to support and provide feedback about the implementation of the portal and the interventions. The advisory committee, for its part, guided and assessed the project with regard to the interventions, knowledge transfer activities, and research.

Theoretical Approach

MONBUZZ.ca was designed in order to share the best available practices on sexual health, addiction rehabilitation, and online interventions for MSM. The developed intervention model is based on the components and principles of the Screening, Brief Intervention and Referral to Treatment (SBIRT) model (51). This model has demonstrated its effectiveness in reaching the target population, raising awareness, enhancing motivation and reducing the consequences associated with substance use and referring users to services in a variety of contexts and for different populations (51). The SBIRT model components include screening on substance use with validated instruments, personalized feedback based on results, brief intervention, as well as referrals to services. The brief interventions that we have described in this article have been adapted for online format (37, 38, 41, 43). As part of this project, we relied on the literature and the needs of the community to develop the short intervention of MONBUZZ.ca. The Montreal context surrounding substance abuse among MSM and the limited services available led us to develop a platform for self-evaluation of substance use and motivation to obtain personalized feedback (brief intervention that could enhance the motivation for change some health related risk behaviors) and the reference to relevant services according to the profile of the participants. This format appeared relevant at an initial stage of development to offer an adapted intervention in one session, with the possibility of including other interventions in subsequent phases of development. This component seemed appropriate to reach people who were not already receiving services, who may or may not be aware of their problematic substance use, and who are willing to change their substance use habits or health-related sexual risk behaviors.

Tools to Develop the Web Platform

The choice of data collection tools was discussed with the management committee and development committee. During this consultative process, the members of the development committee suggested that the language be as accessible as possible. It was decided that the informal second person, or *tu* form, in French would be used in all tools. To help users navigate the platform, questions were asked in the form of a text message conversation (see **Figure 1**). Two studies cited in this article have successfully used text message interventions (35, 40). We rely on this data as well as the expert opinion (community counselors, clinicians and potential users) for the choice of an interface similar to that of text messages. Again, to help users navigate the platform, the questions were created in the form of scales that can be answered with emoticons or graphical scales. The use of text messaging during the assessment and a chat box after the personalized feedback enhanced interactivity while using well-known formats for smart phones and social media users.

Participant Questionnaire

For the inclusion criteria, 15 items were developed on the sociodemographic status of the participants, the target population, and how they found out about MONBUZZ.ca. The questionnaire was developed by the management committee to be brief and easy to use so that users would be motivated to finish their evaluation according to the format suggested by the development committee. The indicators were selected based on those recommended in the addiction research (52).

Questionnaire on Substance Use

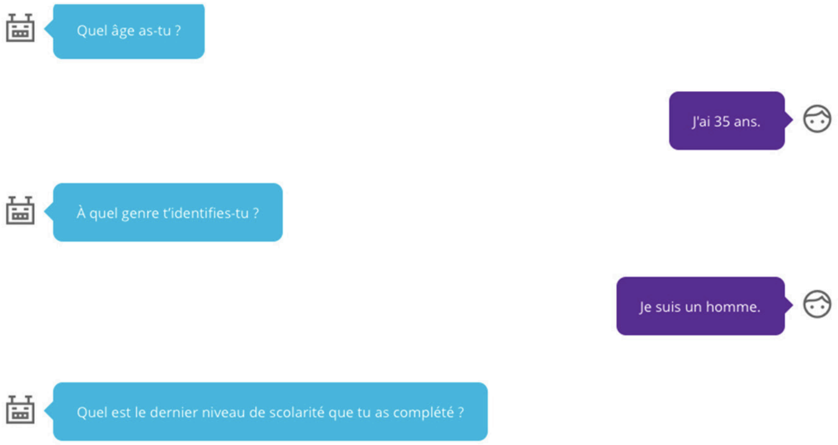
The French version of ASSIST 3.0 (53) was used to determine the substances used and to detect a substance use problem. As recommended by the WHO, only the names or some substances were changed to account for regional and cultural differences and to preserve the instrument's validity. This self-reported questionnaire was selected because it has been the focus of many studies that support its reliability, validity and usefulness in different contexts and with diverse populations (53), because it can detect problems with both alcohol and other substances, because it is brief (5–10 min), and because it is consistent with the SBIRT intervention model (54). The results were interpreted using an algorithm to determine, for each substance, use risk level (low, moderate and high) associated with referral to a level of intervention intensity (no intervention, brief intervention, brief intervention followed by intensive treatment), and some possible risks of maintaining regular, moderate or high substance use specific to sexual functioning (54).

Questionnaire on Motivation to Change Substance Use

An adaptation of the French translation (55) of the *Readiness to Change Questionnaire* (56) was used to determine users' stage of change in terms of their use of alcohol or other substances (precontemplation, contemplation or action) as per the Transtheoretical model of change (57). This self-reported questionnaire was selected because studies of the original version have supported its reliability, validity and usefulness with users of substances, and the questionnaire is shorter than other instruments (58). The results were interpreted using an algorithm to determine the user's stage of change and to adapt the brief intervention to the user.

Questionnaire on the Influence of Substance Use on Sexual Activity

The Links SU-Sex questionnaire (59) was developed, as there was no instrument that had been studied regarding the influence of substance use on sexual activity, beyond the risk of HIV infection and other STBBI. Its development is part of an iterative process between researchers and the development committee. The developed evaluation had to be relatively short, based on best current knowledge available, address several dimensions of sexuality, show a non-judgmental view of the influence of drug use on sexuality, and be accessible and useful to users. The questionnaire was designed to let participants reflect on the influence of their substance use on their sexual activity, with both the positive and negative aspects of this use, and get feedback


Quel âge as-tu ?

J'ai 35 ans.

À quel genre t'identifies-tu ?

Je suis un homme.

Quel est le dernier niveau de scolarité que tu as complété ?

FIGURE 1 | Example of some sociodemographics questions.

on each aspect. In this respect, no overall result was subject to interpretation.

Steps to Use MONBUZZ.ca

The sequence of steps that users take when they get to the MONBUZZ.ca intervention site are as follows: (1) Users arrive at the portal, where the general information is presented (e.g., objectives, content); (2) After consenting to participate in the study, they are asked to fill out a questionnaire on some of their characteristics to ensure that the feedback is tailored to the targeted population (e.g., be an adult man who has had sex with men in the past year); (3) They are invited to complete the screening component ("Screening") made up of questionnaires on their use of substances (see **Figure 2**) and the associated consequences, the influence of their use of substances on their sexual activity, as well as their motivation to change their substance use; (4) They are invited to receive automatic and personalized feedback about the above-mentioned elements (see **Figure 3**), and this feedback is based on best practices in the area of substance use in a sexual context (13, 54, 60–62); (5) When they present with at-risk or problematic use (except for tobacco use) or if they report concerns about the influence of their substance use on their sexual lives, they are asked to take part in a live chat room for 20 to 30 min, immediately following the intervention or at a later time, depending on their preference and the availability of community counselors ("Brief Intervention"); and (6) They are then automatically referred to the best resources for their needs in their region ("Referral to Treatment"). These last two steps are based on the results of some studies cited in this article (37, 38, 41, 43).

Study Limitations

The studies analyzed in this article report high rates of attrition. *Post-hoc* analyses suggest that these rates vary according to certain sociodemographic characteristics of participants (age, ethnocultural background, HIV status, etc.). This indicates that some populations could benefit from other kinds of online interventions. Moreover, in our sample, 11 studies reported greater proportions of white participants (more than half of the sample) (20, 25, 26, 29, 30, 34, 36, 40–42, 44). Therefore, the results must be interpreted as valid for this population, but not necessarily for minority ethnocultural groups.

In the reviewed literature, there was a heterogeneity in terms of intervention objectives. There were also various needs among the targeted populations. MONBUZZ.ca aimed to reduce substance use risk behaviors, but also to raise awareness about problematic substance use and refer some participants to existing services. This was less in the forefront in reported studies that focused on behavioral changes regarding risk taking. Considering the purpose of MONBUZZ.ca, other elements than efficacy were important to consider.

We did a narrative synthesis of the literature to develop MONBUZZ.ca. As previously mentioned, a narrative analysis allowed us to synthesize data from studies with high variability in methodological terms. Indeed, the studies reviewed focus on the effects of online interventions on various variables associated with both health related risks sexual behaviors and substance use. Given this diversity, it is not possible to calculate the pooled effect of these interventions. Moreover, when the effect size is reported, it varies and is in a low (0.2) to moderate (0.5) level (63). In this sense, we invite readers to interpret with caution some of the reported results.

Finally, another limitation of this study is that it relied solely on the effectiveness of interventions from randomized controlled trials (RCT). Although the findings from these studies are more robust, other components associated with the ability to initiate and maintain participants' engagement in the intervention are important, particularly in online interventions. In addition, in RCT, participants' commitment and follow-up is enhanced by monitoring and financial compensation strategies. Indeed, some authors believe that online interventions must be based on user-centered approaches, encourage engagement and collaboration, and quickly implement and test interventions (64).

- ☐ Tabac ?
- ☐ Boissons alcooliques ?
- ☐ Cannabis ?
- ☐ Cocaïne ?
- ☐ Stimulants de type amphétamine (speed, ecstasy, crystal meth) ?
- ☐ Inhalants (poppers) ?
- ☐ Calmants ou somnifères (GHB) ?
- ☐ Hallucinogènes (kétamine) ?
- ☐ Opiacés (héroïne) ?
- Autre : inscris ta réponse

FIGURE 2 | Example of some ASSIT (53) questions.

Parlons de ta consommation

Tu as identifié certains aspects de ta consommation que tu apprécies et d'autres qui te préoccupent. Ce bilan te permet d'avoir une idée des risques possibles afin que tu puisses prendre des décisions qui correspondent à tes valeurs et à ta situation. Ce bilan ne vise pas à juger tes choix ni ton mode de vie. Ta décision entourant ta consommation t'appartient pleinement!

Que signifie les niveaux de risque ?

● **Faible**
Un niveau faible de risque veut dire qu'il est peu probable que ta consommation comporte des risques pour ta santé ou ton bien-être si tu continues de consommer de la manière dont tu le fais. Il est souhaitable que tu maintiennes ce niveau.

■ **Moyen**
Un niveau moyen de risque veut dire qu'il est possible que ta consommation t'amène déjà à vivre certains problèmes liés à ta santé ou ton bien-être ou qu'il est possible que tu en vives dans le futur si tu continues de consommer de la manière dont tu le fais.

▲ **Élevé**
Un niveau élevé de risque veut dire qu'il est probable que ta consommation t'amène déjà à vivre plusieurs difficultés dans différentes sphères de ta vie (santé, conséquences sociales, financières, légales ou relationnelles) et que tu as perdu ou que tu pourrais perdre le contrôle en consommant plus que tu ne le souhaites ou à des moments non désirés.

FIGURE 3 | Example of feedback.

CONCLUSION

The Main Challenges of Co-construction

As previously mentioned, MONBUZZ.ca development has followed a co-construction approach involving stakeholders in the field of addiction and sexual health. This allowed us to have the perspective of researchers, addiction counselors and potential users. However, this approach entailed some challenges. Although the goals pursued by academic researchers and community researchers were the same, the visions of the length of the online intervention and its data collection tools could sometimes differ. There has been some negotiation regarding community needs and the need for rigorous clinical and scientific intervention. For example, some community stakeholders and potential users wanted to modify data collection tools to make them shorter and more adapted to the local context. However, for academic researchers, it was essential to use validated tools, which made any modification difficult. In this sense, several discussions were held to evaluate the pros and cons of each position and to decide what was the most appropriate for the project implementation phase. These discussions were inspired by debates about the development of HIV interventions for MSM, described by Otis (50).

The members of the development committee wanted MONBUZZ.ca to be easy to navigate and attractive to users. This aspect of the interventions has not been widely discussed in the reviewed articles but is of great importance. Committee members dismissed from the outset the possibility that the MONBUZZ.ca looks like a web questionnaire. After several discussions between the development committee and the firm that developed the website, it was decided that the questions asked in each of the data collection tools would look like a chat window. For example, each question was asked by a robot in a personalized way. Visually, questions and answers looked like a text exchange. In addition, when questions required answer choices, each choice was represented by an emoji. These choices reflect both the needs of academic researchers (using validated instruments) and the preferences community researchers (ensuring that the platform was attractive to participants).

Perspectives in Research and Intervention

MONBUZZ.ca was launched in September 2017 and data collection continued until May 2018. Preliminary analyzes show that 152 MSM completed their assessments (out of 237 men who started to navigate the site, which represents 64.1%). The issue of retention is central to this project because of the length of the intervention (about 25 min) and the fact that participants did not necessarily ask for help regarding their substance use, nor started a behavior change process (65). Preliminary analysis of user characteristics reveals that the MONBUZZ.ca has reached a vulnerable population. In fact, while 90.4% of participants have risky or problematic substance use profiles, only 20.5% have already used addiction services. In addition, of those who reported having sex during the last year (83.6%), 75.4% reported that their substance use decreased their ability to develop safer sexual practices (65).

The findings suggest MONBUZZ.ca's has the ability to reach people with risky or problematic substance use and engage them in a brief online intervention. However, the effectiveness of the intervention to (1) sensitize people about substance use; (2) to guide them to the adequate services; and (3) to reduce health-related substance use sexual risks over the time remains to be proven?. Among the MSM who completed the assessments, a negligible number agreed to be contacted at two time intervals to follow the evolution in their substance use, their sexual behaviors and their experiences on the site. This situation was due to a problem with the website that could not be fixed during the research process. The few studies that evaluated online interventions with MSM substance users in sexual contexts, targeted people who have already decided to change their behaviors and were recruited offline (35). In addition, these interventions consisted of sending text messages, which did not require participants to have an ongoing interventional commitment (35). For the effect evaluation, a consultation process with experts and potential users seems necessary to identify the main effect indicators for a project like MONBUZZ.ca as well as to model those indicators in an evaluation protocol. Moreover, since we have used a participative approach of co-construction for the development of the platform, it is logical that this evaluation process follow this same approach. Thus, an evaluation component of the MONBUZZ.ca project will be developed soon.

ETHICS STATEMENT

This project has received ethical approval from the local research ethics committee (Project number AA-HCLM-16-016) and the research committee of the associated community-based organization.

AUTHOR CONTRIBUTIONS

JF-A and MG are the principal investigators of the MONBUZZ.ca project. CL-O was a project intern. The manuscript was prepared by JF-A and MG. Work associated with the literature review was conducted by CL-O and JF-A. The reviews were conducted by MG and CL-O.

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SYSTEMATIC REVIEW
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A Meta-Analysis of the Efficacy of Case Management for Substance Use Disorders: A Recovery Perspective

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Background: Case management is a client-centered approach to improve the coordination and continuity of service delivery, especially for persons with substance use disorders (SUD) and multiple and complex support needs. This intervention supports individuals by helping them identify needed services, facilitate linkage with services, and promote participation and retention in services. However, it is questionable whether case management is equally effective in promoting recovery and aspects of personal functioning. The objective was to conduct an updated meta-analysis and to assess whether case management was more effective than treatment as usual (TAU) among persons with SUD for improving treatment-related (e.g., successful linkage with and retention in treatment) as well as personal functioning outcomes (e.g., substance use).

Methods: This meta-analysis focuses on randomized controlled trials (RCTs) that included persons with alcohol or drug use disorders and compared case management with TAU. To be eligible, interventions had to meet core case management functions as defined in the literature. We conducted searches of the following databases to May 2017: the Cochrane Drugs and Alcohol Specialized Register, CENTRAL, PubMed, Embase, CINAHL, and Web of Science. Also, reference lists of retrieved publications were scanned for relevant (un)published studies.

Results: The overall effect size for case management compared to TAU across all outcome categories and moments was small and positive (SMD = 0.18, 95% CI 0.07–0.28), but statistically significant. Effects were considerably larger for treatment tasks (SMD = 0.33, 95% CI 0.18–0.48) than for personal functioning outcomes (SMD = 0.06, 95% CI −0.02 to 0.15). The largest effect sizes were found for retention in substance abuse treatment and linkage with substance abuse services. Moderator effects of case management models and conditions were assessed, but no significant differences were observed.

Conclusions: The primary results from earlier meta-analyses were supported: case management is more effective than TAU conditions for improving outcomes, but this

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effect is significantly larger for treatment-related tasks than for personal functioning outcomes. Case management can be an important supplement to available services for improving linkage and retention, although further research is needed to assess its potential for supporting recovery from a longitudinal perspective.

Keywords: case management, addiction, systematic review, effectiveness, treatment

INTRODUCTION

Rationale

Substance use disorders (SUD) are associated with a wide range of consequences, including adverse health, social and economic outcomes (1–4). The health status of persons with alcohol and drug problems is often negatively affected by their substance abuse and SUDs contribute significantly to the global burden of disease (4, 5). Consequently, life expectancy and disability adjusted life years are often much lower among this population (6, 7). The co-existence of SUDs and other psychiatric disorders is widely documented and poses specific treatment challenges (8). Moreover, people with alcohol or drug use problems are more likely to be negatively affected on key employment measures such as being employed (9), maintaining productivity, and remaining in the workforce (10). Housing, judicial and relational problems are also pervasive among persons with SUDs, including a negative impact on partners, parents and children (11).

Persons with SUDs frequently have significant problems functioning in multiple areas of their lives, which seriously affects their social reintegration and recovery process (12). Some of these problems may have preceded substance abuse, or are direct results of it. In either instance, few treatment programs are equipped to provide the broad range of services necessary to meet the diverse support needs of this population (2, 13–15). SUDs are commonly recognized as chronic and relapsing disorders, requiring continuous support to promote recovery (2, 16, 17). The observation that many persons with SUDs have other lasting problems in addition to using substances was the main impetus for implementing case management as an addition to traditional treatment services from the 1980's onwards (18).

Following deinstitutionalization and the emerging recovery movement, case management was successfully adapted to the treatment and community-based support of various mental health populations in the United States, Canada, Australia and Europe (19–23). Its potential effectiveness for persons with SUDs was suggested in various narrative reviews (14, 18). Multiple randomized clinical trials of substance abuse case management have examined the intervention's impact on varied substance abusing populations: dually diagnosed persons, HIV infected drug users, opiate dependent individuals, female substance abusers, crack cocaine users, and homeless persons. Substance abuse case management has been adapted to work with persons in and out of treatment and in settings as diverse as treatment programs, emergency wards, welfare offices, correction and probation facilities, homeless shelters, and centralized intake units.

Case management is an intervention designed to enhance coordination and continuity of care and support, especially for persons with multiple, and complex needs (2). One of the first definitions described case management as "that part of substance abuse treatment that provides ongoing supportive care to clients and facilitates linking with appropriate helping resources in the community" [(24), p. 182]. Case management is an intervention that supports individuals by helping them "identify needed services, select the most appropriate services available, facilitate linkage with services and promote continued retention in services by monitoring participation, coordinating activities of multiple services when present and when necessary, and advocating for continued participation" [(25), p. 615]. In clinical trials, case management has been associated with over 450 different types of outcomes, which were clustered around 10 broad outcome categories in a meta-analysis focusing on studies published until 2011 (25). The association of case management with so many different outcomes suggests very unfocused expectations about where case management's value lies along the treatment continuum.

As in mental health care, several models of case management are identified, including brokerage, generalist, intensive, strengths-based, and clinical case management, as well as assertive community treatment (18). These different models facilitate the above-mentioned goals somewhat differently. *Brokerage case management* is intended to address some of these functions in a very minimalist manner in one or two contacts. Assessment, planning, linking, monitoring, and advocacy are core case management functions and central to *generalist* or standard case management. *Intensive case management* involves intensive contacts between case manager and client, although the extent of such involvement is not always specified. *Assertive community treatment* includes the provision of services by a multidisciplinary team, as well as referral to outside services and resources. *Strengths-based case management* focuses on utilizing individuals' strengths and assets and the use of informal rather than formal supportive networks. Finally, the *clinical model* of case management combines case management with clinical activities, for example psychotherapy and counseling (2).

Objectives and Research Questions

Case management is likely to support the recovery process, but few studies have looked beyond substance use outcomes or included substantial follow-up periods. Also, findings from available systematic reviews are limited to narrative and global appreciations of study findings, repeatedly stressing its importance for improving individuals' overall functioning and—to a certain extent—substance use outcomes, and for enhancing linkage and retention (14, 18, 26–29). Meta-analyses offer additional opportunities to statistically synthesize data from various studies and to calculate effect sizes per study and outcome category, controlling for sample size, and various follow-up moments (30). Available meta-analyses of substance abuse case management are outdated (2) and/or focused on a variety of outcomes rather than effects of single studies (25).

This updated review will provide evidence either supporting or refuting the earlier findings, which will be discussed from a recovery perspective. The additional studies available for this review can also provide more details about moderators that might affect case management's efficacy. The objectives of this meta-analysis are threefold: (1) to assess the efficacy of case management for linking persons with SUDs with services they need and promoting treatment retention compared with 'treatment as usual' (TAU); (2) to evaluate whether case management positively impacts substance use and other life domains to a larger extent than standard treatment; (3) to study the role of potential moderating variables (e.g., type of population served, setting, model of case management, implementation fidelity affect case management outcomes). This review will address the critical questions of: (1) Is substance abuse case management efficacious compared with TAU; (2) Is case management equally effective in improving treatment task and personal functioning outcomes; (3) Is the effect of substance abuse case management the same across all outcome categories and models?

METHODS

Study Design

This study is a meta-analysis of randomized controlled trials (RCTs) that have evaluated the efficacy of case management, reporting at least one follow-up measurement and one or multiple outcome indicators. Only RCTs that compared (a specific model of) case management with TAU were included. Studies were excluded if the randomization procedure was stopped or violated at some point, resulting in non-equivalent groups. In case the experimental and control condition received different pharmacological interventions, studies were excluded [see also (2, 29)].

Participants, Intervention, and Comparators

The study sample consisted of persons with a SUD (abuse or dependence of any legal or illegal substance), not necessarily confirmed by a DSM diagnosis. Studies including subjects with other physical or mental health problems were eligible, if the entire sample had a SUD.

If manuscript authors called an intervention "case management," the intervention was assessed based on the case management criteria developed by the US National Association of Social Workers (31). The proposed case management intervention had to meet at least four of the five functions of case management recognized by the NASW (assessment, planning, advocacy, linking, monitoring/evaluation) (25). In those instances where the intervention did not meet these criteria, it was excluded from the review. Interventions not labeled "case management" by manuscript authors could fit ≥4 NASW criteria and be included in the meta-analysis. Since case management has been applied for more than 30 years in the US (24), some trials have used it as part of a more comprehensive intervention for persons with SUDs (e.g., coordinated/integrated treatment) or combined with another intervention (e.g., motivational interviewing, vouchers or money to purchase treatment). Studies were excluded if it was impossible to disentangle case management effects from these of other interventions.

Only studies that compared case management with "treatment as usual" (TAU), as defined by the study authors, were selected. TAU may include various interventions called "standard of care," "usual care," or "standard treatment," but generally refers to treatment as it is commonly provided. Case management has also been applied as a control condition in some studies, assuming its outcomes to be inferior than these of the experimental condition. Although inclusion of such studies could counter potential publication bias (32), these were excluded given the wide variation in type and intensity of case management as control condition and the loose description of these practices. Also, studies in which one case management model was compared with another were not included, since this was regarded a comparison of different modalities/intensities of the same intervention. In the absence of a non-case managed control condition, it was unclear which case management model should be regarded as control condition. Finally, studies that compared case management with clearly defined active (therapeutic, behavioral, or motivational) interventions [e.g., contingency management, motivational interviewing (25)] were beyond the scope of this review.

Systematic Review Protocol

As case management is implemented among various populations with diverse objectives (2), it has been associated with hundreds of different outcomes. According to a review by Rapp and colleagues (25), case management's effectiveness has been evaluated across at least ten outcome categories, including over 450 different outcome measures. For the purpose of this review, the same 10 categories will be assessed, including diverse measures of each outcome. The first five categories relate to personal functioning outcomes and refer to changes in the behavior of persons with SUDs that are often reported in the recovery literature: reductions in substance use, risk behavior and legal involvement; improved health status and social functioning. The second group of treatment-related outcomes reflects the processes of treatment that can conceivably be affected by case management: linkage and retention in both substance abuse treatment itself and in referral to supportive, ancillary services.

1. Substance use (e.g., self-reported alcohol and drug use, biological markers, problem severity as measured by a standardized instrument).
2. Physical and mental health status (e.g., number of days in a hospital for physical/psychological problems, problem severity, quality of life).

(3) Legal status (e.g., number of days incarcerated, problem severity).
(4) Social inclusion, covering employment functioning, social and family relationships, and living situation (e.g., income from work, homelessness, problem severity, extent of the social network).
(5) Risk behavior, including drug and sexual risk behavior.
(6) Linkage (self-reported or administratively verified) with substance abuse services, including detox, outpatient, or residential treatment or aftercare).
(7) Linkage with ancillary services that are supportive of other needs of persons with SUDs, such as housing, employment, mental health, and medical services.
(8) Retention (self-reported or administratively verified) in substance abuse services (e.g., number of days of contact/treatment).
(9) Retention in ancillary services (e.g., number of days of contact).
(10) Satisfaction with treatment [e.g., individuals' satisfaction, acceptance or attitude about the treatment experience (in substance abuse and ancillary services)].

In case several outcome measures were reported in a given category, a single effect size was computed for each area per study, by averaging the effect sizes for each category (25). The outcome categories were assessed at all available follow-up moments and an averaged effect size per study across all follow-up moments was calculated.

Search Strategy

Both electronic and manual searches were undertaken to identify papers, journal articles, research reports and book chapters for this review. We built on the search strategy of a previously published (withdrawn) Cochrane review (2) and updated this search by identifying relevant studies that met the predefined inclusion criteria in following electronic databases (search period January 2006 to May 2017): Web of Science (Thomson Reuters), EMBASE (Ovid), MEDLINE (PubMed), the Cochrane Drugs and Alcohol Group Specialized register and the Cochrane Central Register of Controlled Trials. We combined search terms that could identify the intervention ("case management"; "casemanagement"; "case managed"), population ("substance use disorders," "addiction," "substance abuse" or "dependence"), type of study ("randomized controlled trial") and its focus ("efficacy," "effectiveness," "outcomes," "evaluation"). Databases of ongoing clinical trials were also searched (www.isrctn.com and www.clinicaltrials.gov). We scanned the reference lists of retrieved reviews, journal articles, conference abstracts, and gray literature for other relevant (un)published studies (2). There were no language or publication year restrictions.

Data Sources, Studies Sections, and Data-Extraction

Two authors (RCR, WVDP) independently screened the abstracts of all publications that were obtained through the search strategy. In case of disagreement, the study was assessed by a third author (JDM) and discussed between the three assessors. Two authors (RCR, WVDP) independently assessed the full texts of potentially relevant studies for inclusion. Again, any disagreement was resolved by involving a third author (JDM) and discussing eligibility between all three authors [see also (2)].

Two authors (RCR, WVDP) extracted data from the selected studies. WVDN checked all data extraction files. Any inconsistencies or obscurities were resolved by discussion between all three authors. Following information was extracted: number and characteristics of study participants, authors' names and country of origin, types of outcomes and potential conflicts of interest. Additional variables (see **Table 1**) were extracted that are particularly relevant for case management: model and location of case management, type of substance abusers, treatment status of participants upon study entry, presence/absence of a manual/protocol, or supervision, fidelity assessment (2). Also, the length of the follow-up period from which outcomes were presented was recorded.

As this is an update of a previously published review [(2), p. 5], we used the same protocol for data-extraction and extracted any relevant data for each of the outcome categories described above. For example, concerning drug use, if a study reported the ASI drugs severity and the number of abstinent days for each subject, we registered all data that allowed us to compute (averaged) effect sizes for each indicator. Data had to include either means or standard deviations for both the control and experimental group, a proportion for both the control and experimental group or statistics that allowed us to calculate an effect size, such as a univariate *F*-statistic, *t*-statistic, or a χ^2-statistic with one degree of freedom. For each outcome measure, we recorded data on the degree of change in the experimental and comparison group, when available (2).

Risk of Bias Assessment

Three authors (WVDP, RCR, WVDN) independently assessed the risk of bias in included studies. To make these judgements, the criteria indicated by the Cochrane Handbook for Systematic Reviews of Interventions were used (32). The domains of sequence generation and allocation concealment (avoidance of selection bias) were assessed by a single entry for each study. Blinding of participants, personnel, and outcome assessor (avoidance of performance bias and detection bias) was considered separately for objective (e.g., drop-out, substance use measured by urine analysis) and subjective outcomes (e.g., severity of withdrawal symptoms, self-reported use of substances). We included incomplete outcome data (avoidance of attrition bias) for all outcomes, except for drop-out from treatment, which is very often the primary outcome measure in substance abuse trials.

When several indicators reflecting the same construct are measured but only statistically significant effects are reported, publication bias may arise (2), leading to inflated overall effect estimates in a meta-analysis. The effect of publication bias (and therefore the inflation of the overall effect size) is likely to be larger for small studies: whereas for large studies even small observed effect sizes will be statistically significant, for small studies only the largest observed effect sizes will be statistically significant. We used visual inspection of funnel plots (plots of

TABLE 1 | Characteristics of included controlled trials and studies.

Source + studies from same trial (indicated with*)	Type of substance abuse	Case management location	Treatment status	Case management model	Comparison condition	Implementation fidelity	
						Supervision	Manual
Martin and Scarpitti (36)	Polysubstance users	Criminal justice system (leaving prison on parole)	Out	Assertive Community Treatment (ACT)	Parole Only	No	Yes
Braucht et al. (37)	Polysubstance users (homeless)	Community	Out	Intensive CM	Residential Treatment Program	No	No
Zanis et al. (38)	Injectable drug users	Outpatient treatment (MMT)	In	Other (clinical)	Existing referral	No	Yes
Rhodes and Gross (7)	Polysubstance users	Criminal justice system (probation offices)	Out	Generalist CM	Existing referral	Yes	No
Cox et al. (39)	Alcohol dependent persons (homeless)	Community	Out	Intensive CM	Existing referral	No	No
Rapp et al. (40)	Polysubstance users	Outpatient treatment (entering aftercare)	In	Strengths-Based CM	Existing treatment (aftercare)	Yes	Yes
Siegal et al. (41)*							
Vaughan-Sarrazin et al. (42) In,Out	Polysubstance users	Residential and outpatient Treatment	In	Strengths-Based CM	Existing treatment	No	No
Saleh et al. (43) In,Out*							
Saleh et al. (44) In,Out*							
Vaughan-Sarrazin and Hall (45) In,Out*							
Saleh et al (46) In,Out*							
Hall et al. (47) In,Out*							
Scott et al. (48)	Polysubstance users	Community (Central Intake Unit)	Out	Generalist CM	Existing referral	Yes	No
Sorensen et al. (49)	Injectable drug users (HIV positive)	Community (hospital)	Out	Other (hybrid brokerage and full service)	Existing referral	Yes	Yes
Sorensen et al. (50)	Injectable drug users	Community	Out	Generalist CM	Existing referral	No	Yes
Barnett et al. (51)*							
Coviello et al. (52)	Injectable drug users	Community	Out	Generalist CM	Existing outreach	Yes	Yes
Jansson, (53)	Female polysubstance users (parents)	Community (hospital)	Out	Intensive CM	Existing referral	Yes	No
Morse et al. (54)	Polysubstance users (homeless + dually diagnosed)	Community (mental health centers)	Out	Assertive Community Treatment (ACT)	Existing referral	Yes	Yes
Morgenstern et al. (55)	Female polysubstance users	Community (welfare offices)	Out	Intensive CM	Existing referral	Yes	Yes
Morgenstern et al. (56)*							
Rapp et al. (57)	Male polysubstance users	Community (Central Intake Unit)	Out	Strengths-Based CM	Existing referral	Yes	Yes
Carr et al. (58)*							
Morgenstern et al., (12)	Polysubstance users	Community (welfare offices)	Out	Other (coordinated care management)	Existing referral	Yes	Yes
Morgenstern et al., (59)*							
Guydish, (60)	Female polysubstance users	Criminal Justice system (probation offices)	Out	Other (probation case management)	Probation only	Yes	Yes
Prendergast et al. (61)	Polysubstance users	Criminal Justice system (leaving prison on parole)	Out	Strengths-Based CM	Parole Only	Yes	Yes
Wu et al. (62)	Injectable drug users	Community	Out	Strengths-Based CM	Existing referral	No	No
Braback et al. (63)	Injectable drug users	Community	Out	Strengths-Based CM	Existing treatment	Yes	Yes
Drummond et al. (64)	Alcohol dependent persons	Community	Out	Assertive Community Treatment (ACT)	Existing referral	No	No

**Indicates: study that is part of the afore-mentioned trial.*

the effect estimate from each study against the sample size or effect standard error) to explore whether there is evidence for a negative association between the observed effect size and sample size. We want to note however that such a negative association is to be considered merely as an indication for publication or reporting bias, because it may be induced by other factors, such as an association between the study size and characteristics of the population or the intervention, or merely the role of chance. We inspected funnel plot symmetry when there were at least 10 studies included in the meta-analysis for a specific outcome measure.

Data-Analysis

For each clinical trial, we calculated effect sizes separately for each outcome measure, as in the original meta-analysis [(2), p.5]. In case multiple indicators were reported that were relevant for a single outcome measure (e.g., number of drinks/day, days abstinent), we computed an effect size for each indicator separately, before averaging effect sizes per outcome. We also calculated all effect sizes separately for various follow-up moments. If feasible, measures with unknown or unsatisfactory psychometric properties were dropped from these analyses. Exceptions were: data from registers (e.g., treatment records, prison records) and objective data related to persons' living situation (e.g., employment status, receiving welfare benefits). Also, we used data from urine tests and other biological tests for analyses, even if no specific data on the validity of these tests were provided (2).

There was much variation in the way the results were reported in the primary studies. For continuous data, we used Hedges' g and corresponding standard errors, corrected for small-sample bias. If this information was not available from the primary studies, we made use of summary statistics (like means, standard deviations and group sizes) to calculate Hedges' g and standard error, or converted reported effect sizes (e.g., Pearson's r) or test statistics (e.g., *t*-statistics) to Hedge's g. For dichotomous outcomes, we used the log odds ratio (LOR) and standard error. If these were not reported, we calculated the LOR and standard error using information on odds ratios, cell frequencies, proportions and/or test statistics. Afterwards, these LORs were converted to Hedges' g. All calculations and conversions were done in Comprehensive Meta-Analysis (CMA) (33).

For the majority of the included trials, we had multiple observed effect sizes. One of the reasons is that for some clinical trials, we found effect sizes in multiple publications. This induced dependencies: effect sizes from the same study are likely to be related. We dealt with these dependencies by calculating the mean effect size for each study, before combining these averages in a traditional meta-analysis.

Heterogeneity was assessed by performing Q-tests for homogeneity. The between-study variance, tau^2, was estimated as well. Moderator analyses were conducted to explore reasons for heterogeneity: when sufficient effect sizes were available (i.e., at least two per category), effect sizes were divided in categories and the effect of these categorical moderators was evaluated using the Q-test. By doings so, the effect of following categorical moderators was studied: case management model, treatment status (in/out of treatment), recruitment setting (community, welfare service, substance abuse treatment, criminal justice setting), drug use preference, and implementation quality (use of a manual/protocol and/or supervision).

Because the individual trials differ from each other in many aspects that may have an influence on the size of the effects, it is unlikely that the population effect sizes are exactly the same in all studies, not even after correcting for the influence of the moderator variables that were coded in our meta-analyses. Therefore, we made use of random effects models that take into account a possible (residual) heterogeneity in population effect sizes. To account for the risk of bias, we explored the moderating effects of allocation concealment (selection bias), blinding of outcome assessor (detection bias) and attrition bias. We performed sensitivity analyses by excluding trials with high risk of bias from the analyses. No differences were found for the primary outcomes between trials with a different level of risk of bias; when we excluded trials at high risk of bias for the three domains, it did not change conclusions.

RESULTS

Study Selection and Characteristics

Based on the search strategy outlined above, 2,515 unique documents were identified (see **Figure 1**). One hundred and fifty-seven (157) studies received in-depth screening, which led to the elimination of 139 studies for a variety of reasons. Reasons for exclusion were the following: the study was not a randomized clinical trial or not truly randomized ($n = 40$); not all of the study participants were persons with SUDs or at least some of the participants were children/adolescents ($n = 32$); case management was combined with another intervention and the effects of case management could not be separated out ($n = 25$), or the intervention did not meet the requirements for case management established in the protocol ($n = 11$). In other studies, two models of case management were compared ($n = 9$) or case management was compared with an active intervention rather than TAU ($n = 14$). In a few studies, reported outcomes did not conform to the study protocol ($n = 5$) and three studies that were otherwise eligible were excluded, because findings were not presented in a form that allowed calculation of an effect size.

The 18 eligible studies were combined with 13 studies from a previously published Cochrane review, resulting in 31 studies available for this meta-analysis. Two studies from the Cochrane review ($n = 15$) were removed as one appeared not randomized (34), while the other didn't compare case management to TAU (35). The 31 included studies were conducted as part of 21 different RCTs; some clinical trials generated more than one distinct published study.

Core characteristics of included trials and studies are outlined in **Table 1** and are briefly described below. Sixteen of the 21 clinical trials resulted in one study/publication, four trials were published as two publications (40, 41, 51, 56–59, 65) and (55, 56) and one trial was reported in six studies/publications (42–47). Case management was most frequently compared with existing referral procedures (11 trials). Other trials compared case management with existing treatment (4 trials), parole supervision

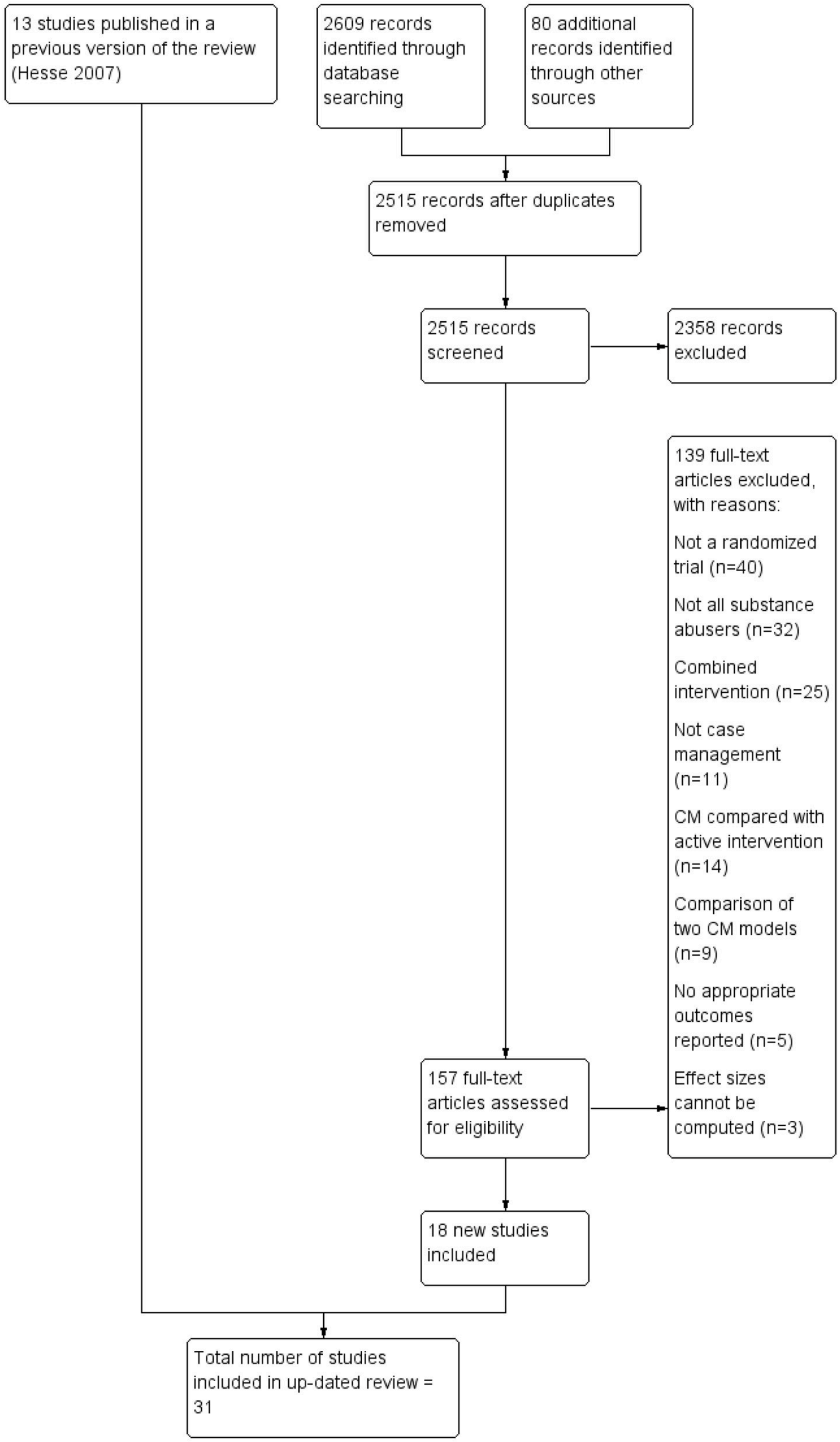


FIGURE 1 | PRISMA study flow diagram.

($n = 2$), standard probation ($n = 2$), routine outreach ($n = 1$), or passive referral ($n = 1$).

A total of 7,431 unduplicated participants were randomized in the 21 clinical trials. The mean size of the trials was 354 subjects, ranging from a small study with 41 subjects (38) to a large trial including 1,369 subjects (7). Two typologies of substance use problems could be discerned: heroin or cocaine users involved in injectable drug use (IDU) (6 trials) and polysubstance abusers, that is, a mixed group of substance abusers where no one type of drug predominated (10 trials). Two trials contained a relatively homogenous substance abusing population consisting of individuals who were alcohol dependent (39, 64). Typically, study authors reported findings on specific subpopulations, including individuals who were homeless, dually diagnosed, HIV positive or female only (with children). Some of the study populations consisted of substance abusers involved in the criminal justice system: individuals on probation (7, 60) or persons on parole (36, 61). The Morgenstern trials (12, 55) involved substance users in public welfare settings, while two trials recruited individuals in central intake units (48, 57). At the time they entered the study, the majority of study participants were not in treatment. Only three clinical trials were composed exclusively of in-treatment substance abusers (38, 40, 42) (see **Table 1**).

Several case management models have been identified in the literature [see (18)]. The term "generalist case management" was assigned to four clinical trials that did not specify a conceptual or working name for the model of case management that was used. The term "intensive case management" was retained for the four trials using the term, although none specified what the term "intensive" meant. Six trials described case management as "strengths-based," three as "Assertive Community Treatment" (ACT) and four were labeled as "other", as they referred to case management using an unusual term: hybrid case management (49), outreach case management (38), coordinated care management (12, 59) or probation case management (60). Ten of the selected trials reported using both supervision and a manual/protocol to monitor quality control and fidelity of the case management intervention. Three trials used a manual, but not supervision, and conversely, three trials used supervision, but not a manual. Five trials used neither a manual nor supervision.

Out of the 7,431 unduplicated participants randomized in the 21 clinical trials, 6,179 were re-contacted at the first follow-up point, which means an overall follow-up rate of 83.2%. First follow-up moments for clinical trials ranged from 1.5 to 12 months for one of the studies. The modal first follow-up assessment was 6 months. Among the 21 clinical trials, seven had follow-up rates of 100% because information came from administrative records. Five trials had follow-up rates of 90.0–99.9%, 3 trials had rates between 80.0 and 89.9% and 5 trials had rates between 70.0 and 79.9%. One trial had unsatisfactory follow-up rates below 50%. Sample and follow-up rates were not used when follow-up data consisted of participants who had provided data at only one of multiple follow-up points. In some instances, it was not possible to identify exact sample sizes at each follow-up measurement due to unclear information provided in the retrieved publications.

Synthesized Findings

All 21 clinical trials (31 studies in total) that reported a comparison of case management (CM) and TAU on one or more outcome indicators were included in the initial meta-analysis. The overall effect size for case management compared to TAU across all outcome categories and moments was small and positive, but statistically significant ($z = 3.34$, $p < 0.001$) with a mean effect of SMD = 0.179 (95% CI [0.07–0.28] (see **Figure 2**). Observed effect sizes were positive for 16 of the 21 studies, with five exceptions (12, 36, 49, 63, 64). Overall effect size estimates for the clinical trials ranged from −0.202 (64) to 1.707 (38).

There was little evidence for publication bias, as a visual examination of a funnel plot of standard errors appeared relatively symmetric (see **Figure 3**). Based on the trim-and-fill method, one effect size was added, and so the estimated overall treatment effect changed slightly (from 0.179 to 0.170). Egger's intercept test confirmed that there was little evidence for publication bias ($t = 1.38$, $df = 19$, $p = 0.18$).

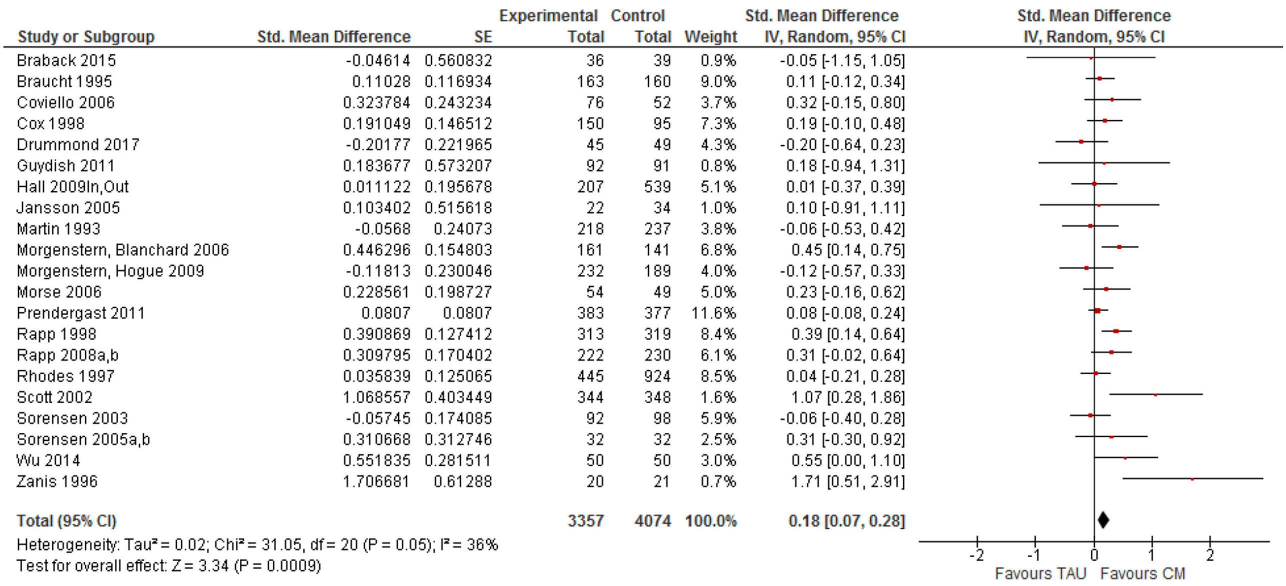
We found some evidence for heterogeneity between studies. The estimate of the systematic between-study variance is equal to 0.018, I^2 is equal to 35.59. This means that about 36% of the variance in observed effect sizes does not seem due to random sampling variance, but rather to systematic variation between studies. Despite this relatively large proportion of variance, the Q-test showed that this variance is statistically not significant when using a significance level of 0.05 ($Q = 31.05$, $df = 20$, $p = 0.06$). This does, however, not exclude the possibility that there are moderator variables affecting case management outcomes. Therefore, we performed several moderator analyses.

The effect of case management was studied using 10 different outcome types that were categorized into two broad groups: (1) treatment tasks (linkage with substance abuse and ancillary services, retention in substance abuse and ancillary services, and attitudes toward treatment) and (2) personal functioning outcomes (substance use, health status, legal involvement, risk behavior, and social functioning) (25). Of the 21 trials, 19 contained treatment task outcomes, and 15 trials reported personal functioning outcomes. Two separate meta-analyses were performed for these two categories of outcomes.

Case Management and Treatment Tasks

For treatment tasks, a positive effect size was found in 17 (out of 19) trials ranging from 0.037 (39) to 1.707 (38) (see **Figure 4**). Only two trials showed a (very small) negative effect size for treatment tasks (49, 63). Seven of the trials had effect sizes above 0.5, what can be considered as a moderate effect (66). Overall, a weak to moderate effect of CM was found regarding treatment-related tasks, SMD = 0.33, 95% CI [0.18, 0.48]. Again, no clear evidence for publication bias was found.

Based on separate meta-analyses, we estimated the effect sizes for each of the five treatment tasks. The largest effect size was found for retention in substance abuse treatment (SMD = 0.47, 95% CI [0.13, 0.81]). Smaller effect sizes were found for linkage with substance abuse services (SMD = 0.23, 95% CI [0.11, 0.35]), satisfaction with treatment



Study or Subgroup	Std. Mean Difference	SE	Experimental Total	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Braback 2015	-0.04614	0.560832	36	39	0.9%	-0.05 [-1.15, 1.05]
Braucht 1995	0.11028	0.116934	163	160	9.0%	0.11 [-0.12, 0.34]
Coviello 2006	0.323784	0.243234	76	52	3.7%	0.32 [-0.15, 0.80]
Cox 1998	0.191049	0.146512	150	95	7.3%	0.19 [-0.10, 0.48]
Drummond 2017	-0.20177	0.221965	45	49	4.3%	-0.20 [-0.64, 0.23]
Guydish 2011	0.183677	0.573207	92	91	0.8%	0.18 [-0.94, 1.31]
Hall 2009In,Out	0.011122	0.195678	207	539	5.1%	0.01 [-0.37, 0.39]
Jansson 2005	0.103402	0.515618	22	34	1.0%	0.10 [-0.91, 1.11]
Martin 1993	-0.0568	0.24073	218	237	3.8%	-0.06 [-0.53, 0.42]
Morgenstern, Blanchard 2006	0.446296	0.154803	161	141	6.8%	0.45 [0.14, 0.75]
Morgenstern, Hogue 2009	-0.11813	0.230046	232	189	4.0%	-0.12 [-0.57, 0.33]
Morse 2006	0.228561	0.198727	54	49	5.0%	0.23 [-0.16, 0.62]
Prendergast 2011	0.0807	0.0807	383	377	11.6%	0.08 [-0.08, 0.24]
Rapp 1998	0.390869	0.127412	313	319	8.4%	0.39 [0.14, 0.64]
Rapp 2008a,b	0.309795	0.170402	222	230	6.1%	0.31 [-0.02, 0.64]
Rhodes 1997	0.035839	0.125065	445	924	8.5%	0.04 [-0.21, 0.28]
Scott 2002	1.068557	0.403449	344	348	1.6%	1.07 [0.28, 1.86]
Sorensen 2003	-0.05745	0.174085	92	98	5.9%	-0.06 [-0.40, 0.28]
Sorensen 2005a,b	0.310668	0.312746	32	32	2.5%	0.31 [-0.30, 0.92]
Wu 2014	0.551835	0.281511	50	50	3.0%	0.55 [0.00, 1.10]
Zanis 1996	1.706681	0.61288	20	21	0.7%	1.71 [0.51, 2.91]
Total (95% CI)			**3357**	**4074**	**100.0%**	**0.18 [0.07, 0.28]**

Heterogeneity: Tau² = 0.02; Chi² = 31.05, df = 20 (P = 0.05); I² = 36%
Test for overall effect: Z = 3.34 (P = 0.0009)

FIGURE 2 | Forest plot of Case management vs. TAU: Overall CM effect across outcome categories.

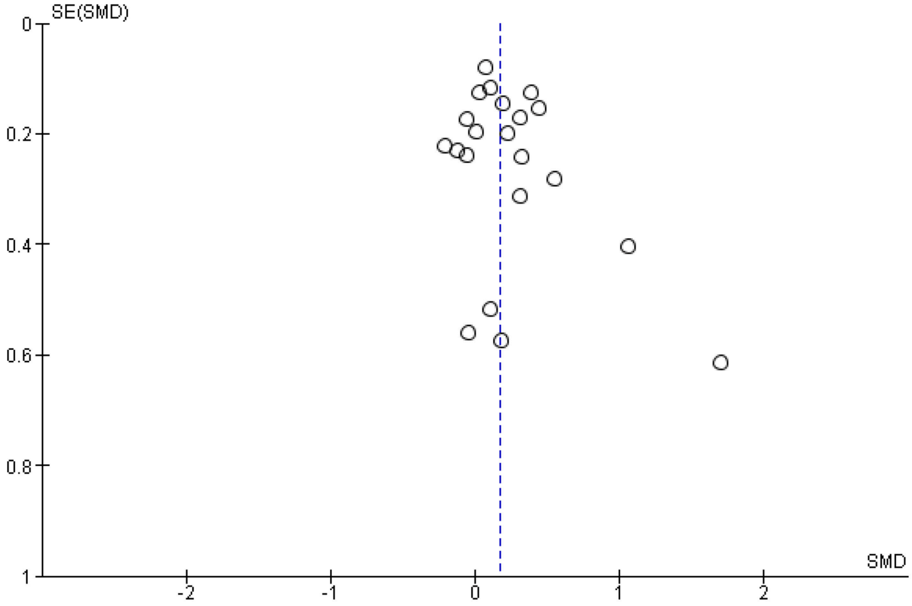
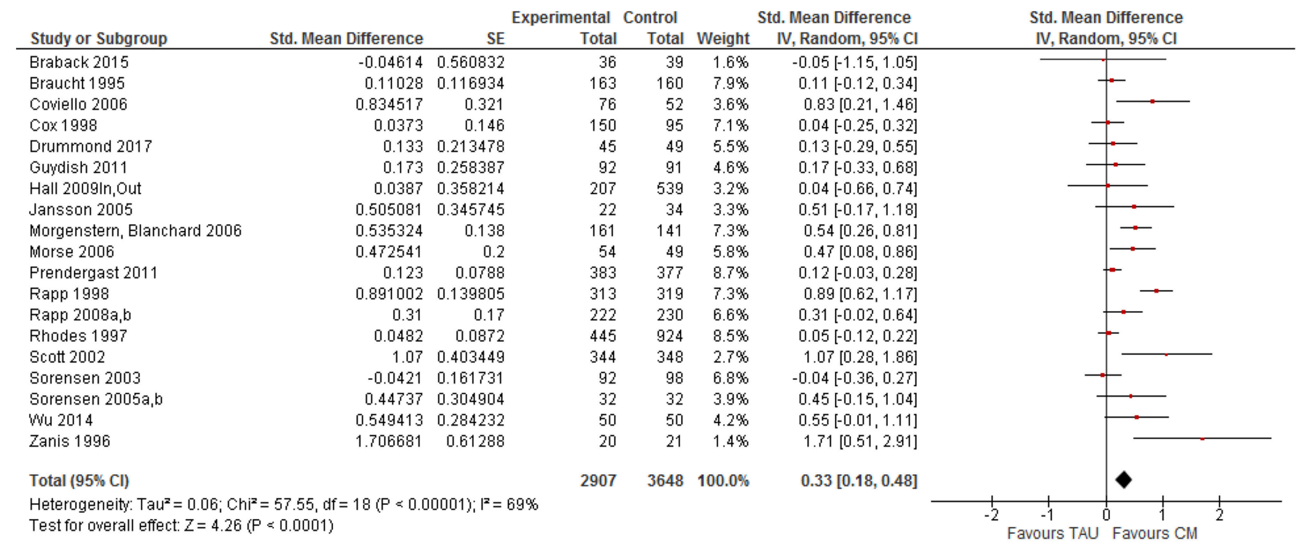


FIGURE 3 | Funnel plot of Case management vs. TAU comparison: Overall CM effect across outcome categories.

(SMD = 0.17, 95% CI [−0.04, 0.38]), retention in non-substance abuse services (SMD=0.12, 95% CI [−0.01, 0.25]) and linkage with other types of services (SMD = 0.11, 95% CI [−0.11, 0.34]).

Case Management and Personal Functioning

Of the 15 clinical trials with personal functioning outcomes, all but four had positive effect sizes that ranged from 0.003 (53) to 0.608 (62) (see **Figure 5**). Three studies had a very small negative effect size for functioning outcomes (12, 36, 49), but one study reported a negative effect size of −0.34 (64). Effect sizes were in general very small, including only three trials (39, 52, 55) with an effect size >0.20 (66) and two other studies (39, 60) with an effect size around 0.20. The overall SMD for personal functioning outcomes (SMD = 0.06, 95% CI [−0.02, 0.15]) was very small and statistically not significant. A funnel plot does not give evidence for publication bias.



Study or Subgroup	Std. Mean Difference	SE	Experimental Total	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Braback 2015	-0.04614	0.560832	36	39	1.6%	-0.05 [-1.15, 1.05]
Braucht 1995	0.11028	0.116934	163	160	7.9%	0.11 [-0.12, 0.34]
Coviello 2006	0.834517	0.321	76	52	3.6%	0.83 [0.21, 1.46]
Cox 1998	0.0373	0.146	150	95	7.1%	0.04 [-0.25, 0.32]
Drummond 2017	0.133	0.213478	45	49	5.5%	0.13 [-0.29, 0.55]
Guydish 2011	0.173	0.258387	92	91	4.6%	0.17 [-0.33, 0.68]
Hall 2009In,Out	0.0387	0.358214	207	539	3.2%	0.04 [-0.66, 0.74]
Jansson 2005	0.505081	0.345745	22	34	3.3%	0.51 [-0.17, 1.18]
Morgenstern, Blanchard 2006	0.535324	0.138	161	141	7.3%	0.54 [0.26, 0.81]
Morse 2006	0.472541	0.2	54	49	5.8%	0.47 [0.08, 0.86]
Prendergast 2011	0.123	0.0788	383	377	8.7%	0.12 [-0.03, 0.28]
Rapp 1998	0.891002	0.139805	313	319	7.3%	0.89 [0.62, 1.17]
Rapp 2008a,b	0.31	0.17	222	230	6.6%	0.31 [-0.02, 0.64]
Rhodes 1997	0.0482	0.0872	445	924	8.5%	0.05 [-0.12, 0.22]
Scott 2002	1.07	0.403449	344	348	2.7%	1.07 [0.28, 1.86]
Sorensen 2003	-0.0421	0.161731	92	98	6.8%	-0.04 [-0.36, 0.27]
Sorensen 2005a,b	0.44737	0.304904	32	32	3.9%	0.45 [-0.15, 1.04]
Wu 2014	0.549413	0.284232	50	50	4.2%	0.55 [-0.01, 1.11]
Zanis 1996	1.706681	0.61288	20	21	1.4%	1.71 [0.51, 2.91]
Total (95% CI)			**2907**	**3648**	**100.0%**	**0.33 [0.18, 0.48]**

Heterogeneity: Tau² = 0.06; Chi² = 57.55, df = 18 (P < 0.00001); I² = 69%

Test for overall effect: Z = 4.26 (P < 0.0001)

FIGURE 4 | Forest plot Case management vs. TAU: Treatment related tasks.

Based on separate meta-analyses, we calculated the effect sizes for the five personal functioning outcomes. The biggest, although small and non-significant effects were found for social functioning (e.g., housing, employment) (SMD = 0.14, 95% CI [−0.01, 0.28]) and substance use outcomes (SMD = 0.10, 95% CI [−0.02, 0.21]). Even smaller (positive) effects favoring case management were found for risk behavior (SMD = 0.05, 95% CI [−0.07, 0.17]) and legal involvement (SMD = 0.02, 95% CI [−0.07, 0.10]), while a similarly small negative effect was found regarding health outcomes (SMD = −0.16, 95% CI [−0.40, 0.08]). None of these effects, however, were statistically different from zero.

Moderators

Six moderator variables were tested for their impact on the efficacy of case management, i.e., model, treatment status, setting, population, and intervention quality (manual or supervision).

Studies were characterized by the type of case management model they used. The highest effect sizes were found for generalist CM ($k = 4$): SMD=0.32, 95% CI [−0.05, 0.68], the lowest for Assertive Community Treatment ($k = 3$): SMD = 0.01, 95% CI [−0.25, 0.27] (see **Figure 6**). Estimated effect sizes were very similar for strengths-based CM ($k = 6$): SMD = 0.22, 95% CI [0.05, 0.38], intensive case management ($k = 4$): SMD = 0.22, 95%CI [0.06, 0.38], and for other types of CM ($k = 4$): SMD = 0.20, CI = [−0.33, 0.72]). Differences between CM models in the size of the intervention effect were statistically not significant ($Q = 2.57$, $df = 4$, $p = 0.63$).

Included studies were categorized as having participants who could be either "in" or "out" of treatment when the intervention started. Because the treatment status could vary within studies, we performed two separate meta-analyses. If the treatment status was 'in', the estimated mean effect was 0.18 ($k = 3$). If the treatment status was "out," the overall effect size was very similar (SMD = 0.17, $k = 19$).

Studies were characterized as having participants in one of four types of settings at the time the study started: community/street (SMD = 0.16), criminal justice system (SMD = 0.20), substance abuse treatment (residential, outpatient, or mixed) (SMD = 0.23), or welfare offices (SMD = 0.19). Differences between these four categories appeared to be very small and statistically not significant ($Q = 0.24$, $df = 3$, $p = 0.97$).

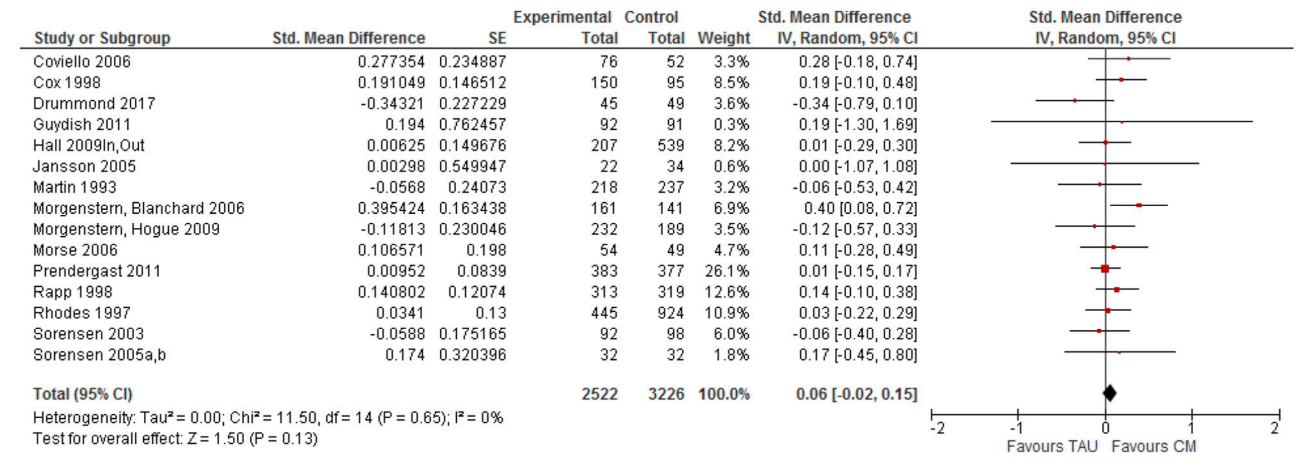
Studies were characterized by the primary type of substance use, either alcohol, poly substance use or IDU. Although the estimated effect size for studies targeting injectable drug users was considerably higher (SMD = 0.33 for IDUs vs. 0.18 for poly substance users, and 0.03 for alcohol abusers), the moderating effect of the type of population on CM outcomes was statistically not significant ($Q = 1.29$, $df = 2$, $p = 0.52$).

Clinical trials were identified as having methods in place to promote the fidelity with which the intervention was implemented, one of these being a manual/protocol and the other clinical supervision. No significant difference in estimated effect size was found between studies with (SMD = 0.20) and without supervision (SMD = 0.16) ($Q = 0.10$, $df = 1$, $p = 0.75$). Also, no significant difference was found between studies with (SMD = 0.17) and without manual (SMD = 0.19) that described the intervention in detail. Effect sizes were very similar ($Q = 0.05$, $df = 1$, $p = 0.83$).

Risk of Bias

We assessed all included studies ($n = 31$) for risk of bias, since several clinical trials included ≥1 publication/study that focused on specific outcomes or follow-up moments. We distinguished between following types of bias: selection bias, performance bias, attrition bias, detection bias and reporting bias [see (32)]. For each type of bias, studies were judged to be at "low," "high" or "unclear" risk of bias.

Eighteen studies (11 clinical trials) reported an adequate randomization method and were judged to be at low risk of bias



Study or Subgroup	Std. Mean Difference	SE	Experimental Total	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Coviello 2006	0.277354	0.234887	76	52	3.3%	0.28 [-0.18, 0.74]
Cox 1998	0.191049	0.146512	150	95	8.5%	0.19 [-0.10, 0.48]
Drummond 2017	-0.34321	0.227229	45	49	3.6%	-0.34 [-0.79, 0.10]
Guydish 2011	0.194	0.762457	92	91	0.3%	0.19 [-1.30, 1.69]
Hall 2009In,Out	0.00625	0.149676	207	539	8.2%	0.01 [-0.29, 0.30]
Jansson 2005	0.00298	0.549947	22	34	0.6%	0.00 [-1.07, 1.08]
Martin 1993	-0.0568	0.24073	218	237	3.2%	-0.06 [-0.53, 0.42]
Morgenstern, Blanchard 2006	0.395424	0.163438	161	141	6.9%	0.40 [0.08, 0.72]
Morgenstern, Hogue 2009	-0.11813	0.230046	232	189	3.5%	-0.12 [-0.57, 0.33]
Morse 2006	0.106571	0.198	54	49	4.7%	0.11 [-0.28, 0.49]
Prendergast 2011	0.00952	0.0839	383	377	26.1%	0.01 [-0.15, 0.17]
Rapp 1998	0.140802	0.12074	313	319	12.6%	0.14 [-0.10, 0.38]
Rhodes 1997	0.0341	0.13	445	924	10.9%	0.03 [-0.22, 0.29]
Sorensen 2003	-0.0588	0.175165	92	98	6.0%	-0.06 [-0.40, 0.28]
Sorensen 2005a,b	0.174	0.320396	32	32	1.8%	0.17 [-0.45, 0.80]
Total (95% CI)			**2522**	**3226**	**100.0%**	**0.06 [-0.02, 0.15]**

Heterogeneity: Tau² = 0.00; Chi² = 11.50, df = 14 (P = 0.65); I² = 0%
Test for overall effect: Z = 1.50 (P = 0.13)

FIGURE 5 | Forest plot of Case management vs. TAU: Personal functioning outcomes.

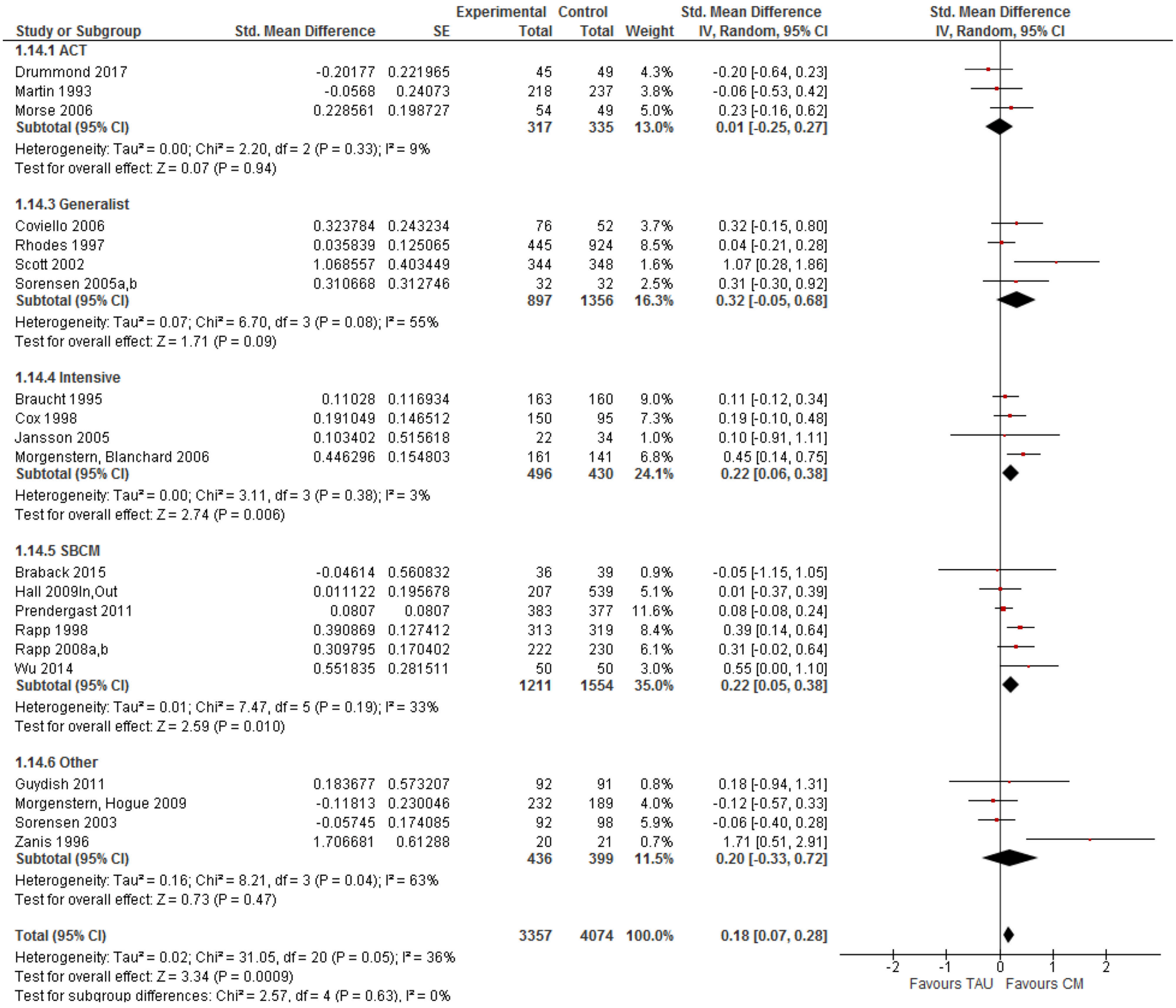
for "Random Sequence Generation," 10 studies (4 clinical trials) were at high risk of bias, while the risk was unclear in 3 studies. Four early studies (7, 36, 37, 42) did not apply a systematic method of sequence generation. Similarly, 18 studies (13 clinical trials) described adequate concealment of the allocation sequence and were at low risk of bias for "Allocation Concealment," 8 studies (4 clinical trials) did not report an adequate procedure for allocation concealment and in 5 studies this risk was deemed unclear. Due to the type of intervention, participants and staff could not be blinded for receiving/providing case management. Still, blinding of participants and personnel (performance bias) was assessed to be at low risk of bias in all studies (21 trials), as it was deemed unlikely that knowledge of receiving case management will have affected outcomes. Researchers reported blinding of outcome assessors in 20 studies (15 clinical trials), which were assessed to be at low risk of detection bias. The risk of detection bias was high in 6 studies (2 clinical trials), and in 5 studies the risk was unclear. Follow-up rates were high in most studies, because at least part of the outcome data were collected using administrative records. One trial had very low follow-up rates (<50%) and 15 trials had a high follow-up rate ≥80%. Attrition bias was judged as high risk in 11 studies (6 clinical trials), primarily due to follow-up rates <70% for at least some outcome areas. The risk of within-study selective outcome reporting was deemed low in most studies (n = 23; 17 trials), while high risk of reporting bias was observed in 7 studies (3 clinical trials) and "unclear" in 1 study.

DISCUSSION

Summary of Findings

The current study examined the effects of case management regarding various indicators of recovery and service utilization, updating results from two previous meta-analyses (2, 25) and adding effect sizes for various types of outcomes to available systematic reviews (14, 27–29). Outcomes were clustered around 5 personal functioning and 5 treatment-related outcomes as described elsewhere (25). The primary results from the earlier studies were supported: case management was significantly more effective than TAU conditions for improving outcomes, although the overall effect was small (SMD = 0.18). The effect size was significantly larger for treatment related tasks (SMD = 0.33) than for personal functioning outcomes (SMD = 0.06), questioning its additional value in individuals' recovery process. However, substantial heterogeneity was observed between as well as within studies.

The findings suggest a positive role for case management over standards of care, but two factors make it difficult to fully understand the findings. First, numerous diverse outcome indicators (>450) are presented in clinical trials, including reduced substance use and criminal involvement, improved parenting skills and overall well-being, and linkage with treatment. Such broad expectations of a single intervention seem unwarranted, "as it is unlikely that any single psychosocial intervention can affect so many different areas of participants' lives" [(25), p. 614). Second, the TAU comparisons varied widely in their intensity, providing very different comparisons to case management. In ten of the trials, the TAU comparison was "existing referral practices," a broad category that was usually ill-defined. In three trials, the comparison condition was either residential or aftercare treatment, both of which would quite possibly be more intensive than case management. Finally, in four trials TAU actually consisted of probation or parole, which is certainly an intensive comparison condition given the possibility of individuals being incarcerated. The finding that case management had a weak to small effect across all outcomes, even when some of the comparison conditions were relatively intense, suggests that the reported effect sizes are conservative and would have been larger if case management was compared to no treatment or waitlist controls (25).



Study or Subgroup	Std. Mean Difference	SE	Experimental Total	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
1.14.1 ACT						
Drummond 2017	-0.20177	0.221965	45	49	4.3%	-0.20 [-0.64, 0.23]
Martin 1993	-0.0568	0.24073	218	237	3.8%	-0.06 [-0.53, 0.42]
Morse 2006	0.228561	0.198727	54	49	5.0%	0.23 [-0.16, 0.62]
Subtotal (95% CI)			**317**	**335**	**13.0%**	**0.01 [-0.25, 0.27]**
Heterogeneity: Tau^2 = 0.00; Chi^2 = 2.20, df = 2 (P = 0.33); I^2 = 9%						
Test for overall effect: Z = 0.07 (P = 0.94)						
1.14.3 Generalist						
Coviello 2006	0.323784	0.243234	76	52	3.7%	0.32 [-0.15, 0.80]
Rhodes 1997	0.035839	0.125065	445	924	8.5%	0.04 [-0.21, 0.28]
Scott 2002	1.068557	0.403449	344	348	1.6%	1.07 [0.28, 1.86]
Sorensen 2005a,b	0.310668	0.312746	32	32	2.5%	0.31 [-0.30, 0.92]
Subtotal (95% CI)			**897**	**1356**	**16.3%**	**0.32 [-0.05, 0.68]**
Heterogeneity: Tau^2 = 0.07; Chi^2 = 6.70, df = 3 (P = 0.08); I^2 = 55%						
Test for overall effect: Z = 1.71 (P = 0.09)						
1.14.4 Intensive						
Braucht 1995	0.11028	0.116934	163	160	9.0%	0.11 [-0.12, 0.34]
Cox 1998	0.191049	0.146512	150	95	7.3%	0.19 [-0.10, 0.48]
Jansson 2005	0.103402	0.515618	22	34	1.0%	0.10 [-0.91, 1.11]
Morgenstern, Blanchard 2006	0.446296	0.154803	161	141	6.8%	0.45 [0.14, 0.75]
Subtotal (95% CI)			**496**	**430**	**24.1%**	**0.22 [0.06, 0.38]**
Heterogeneity: Tau^2 = 0.00; Chi^2 = 3.11, df = 3 (P = 0.38); I^2 = 3%						
Test for overall effect: Z = 2.74 (P = 0.006)						
1.14.5 SBCM						
Braback 2015	-0.04614	0.560832	36	39	0.9%	-0.05 [-1.15, 1.05]
Hall 2009In,Out	0.011122	0.195678	207	539	5.1%	0.01 [-0.37, 0.39]
Prendergast 2011	0.0807	0.0807	383	377	11.6%	0.08 [-0.08, 0.24]
Rapp 1998	0.390869	0.127412	313	319	8.4%	0.39 [0.14, 0.64]
Rapp 2008a,b	0.309795	0.170402	222	230	6.1%	0.31 [-0.02, 0.64]
Wu 2014	0.551835	0.281511	50	50	3.0%	0.55 [0.00, 1.10]
Subtotal (95% CI)			**1211**	**1554**	**35.0%**	**0.22 [0.05, 0.38]**
Heterogeneity: Tau^2 = 0.01; Chi^2 = 7.47, df = 5 (P = 0.19); I^2 = 33%						
Test for overall effect: Z = 2.59 (P = 0.010)						
1.14.6 Other						
Guydish 2011	0.183677	0.573207	92	91	0.8%	0.18 [-0.94, 1.31]
Morgenstern, Hogue 2009	-0.11813	0.230046	232	189	4.0%	-0.12 [-0.57, 0.33]
Sorensen 2003	-0.05745	0.174085	92	98	5.9%	-0.06 [-0.40, 0.28]
Zanis 1996	1.706681	0.61288	20	21	0.7%	1.71 [0.51, 2.91]
Subtotal (95% CI)			**436**	**399**	**11.5%**	**0.20 [-0.33, 0.72]**
Heterogeneity: Tau^2 = 0.16; Chi^2 = 8.21, df = 3 (P = 0.04); I^2 = 63%						
Test for overall effect: Z = 0.73 (P = 0.47)						
Total (95% CI)			**3357**	**4074**	**100.0%**	**0.18 [0.07, 0.28]**
Heterogeneity: Tau^2 = 0.02; Chi^2 = 31.05, df = 20 (P = 0.05); I^2 = 36%						
Test for overall effect: Z = 3.34 (P = 0.0009)						
Test for subgroup differences: Chi^2 = 2.57, df = 4 (P = 0.63), I^2 = 0%						

FIGURE 6 | Forest plot of Case management vs. TAU according to CM model.

Differential Efficacy for Treatment Task and Personal Functioning Outcomes

Previous meta-analyses have suggested a differential effect of case management based on the type of outcomes being considered. One group of outcomes—treatment tasks—focused on the process of treatment, that is, do individuals link with and stay involved in both substance abuse treatment and ancillary substance abuse-related services. Attitudes toward attending treatment are also part of treatment task outcomes. The second group of outcomes consists of aspects of psychosocial and behavioral functioning that are generally the primary focus of substance abuse treatment. These areas encompass improved functioning regarding substance use, physical and psychological health, legal involvement, social status (housing, employment, family relations), and risk behavior. A clinically important and statistically significant difference was observed in case management's impact on treatment task outcomes compared to personal functioning outcomes [see also (2, 25)]. Effect sizes for the highest personal functioning areas, social functioning and substance use, were considerably lower compared with effect sizes for following treatment tasks: retention in substance abuse services and linkage with substance abuse and ancillary services.

Similar results were found in meta-analyses of case management with other mental health populations (21, 67, 68). Given the primary goals of case management (to help individuals identify needed services, facilitate linking with these services, monitor treatment participation and retention, coordinate service provision, and advocate on clients' behalf) (31, 69), its greater effect on treatment tasks is not surprising. The findings support an obvious premise: if individuals with SUDs do not link with and remain in treatment, especially in substance abuse services, they cannot benefit from these services (25).

Consequently, case management should be regarded as a missing link in substance abuse treatment (24, 70).

Case Management's Role in Supporting Recovery

The emerging international (mental health) recovery movement has stressed the importance of personal and subjective experiences of recovery [e.g., (71, 72)], besides "clinical recovery." The latter refers to the absence of symptoms and illness ((i.e. most personal functioning outcomes) (73, 74), while "personal recovery" refers to a deeply personal process of change and "living a satisfying, hopeful and contributing life, within the limitations imposed by illness" [(75), p. 15]. Addiction recovery has been defined in more behavioral terms and is characterized as involving control over substance use, global health and well-being, and active citizenship (or community participation) (76, 77). Only a few studies selected for this review have included measures of personal recovery like quality of life and overall daily functioning, despite the recognition of SUD as a chronic relapsing disorder (17). The effect of case management on personal functioning outcomes found in this meta-analysis was weak to small, and only for employment and housing outcomes (social functioning, SMD = 0.14) and substance use (SMD = 0.10) a weak effect was found. A weak, negative effect was found for health outcomes (SMD = −0.16), a combination of physical and mental health indicators, typically measured from a clinical recovery perspective. Recovery should be regarded as a long process involving several life domains and abstinence is not a necessary, nor a sufficient marker of recovery, as it concerns a personal and experiential journey to life satisfaction and well-being (72). The transition from early stages of recovery to 'stable recovery' averages around 5 years, with the recognition that there are multiple pathways to recovery (78).

All models of case management have in common the goal of linking persons with SUDs and their families with needed resources in order to promote personal functioning and recovery (57). Linking with and effective use of community resources and services addresses their needs for substance abuse treatment, safe housing, improved employment, management of health problems, and avoiding legal problems. Resolution of these problems should increase individuals' opportunities to effect recovery. Case management further promotes that persons with SUDs keep on using these services and stay in treatment (14, 28, 41). Consequently, case management is thought to directly affect treatment-related outcomes (e.g., linkage, retention) and, by doing so, to indirectly impact on personal functioning outcomes (e.g., alcohol and drug use, employment, health status, family relations) and thus recovery.

Although case management was not found to be directly associated with improved personal functioning, two other mechanisms may be in operation (14, 25, 56). First, case management may have an indirect effect on separate personal functioning outcomes and overall recovery through its impact on treatment tasks such as linking and retention. Treatment participation and retention are widely documented predictors of remission and recovery (73, 79). For example, recently released parolees with SUDs who were receiving case management, were retained in treatment significantly longer than persons not receiving this intervention (60). Longer retention was associated with reduced substance use, less criminal justice involvement and risk behavior, and improved housing and employment situations at follow-up. Consequently, improved functioning should be viewed as a result of case management's ability to improve linkage and retention rather than as a direct effect.

Second, personal functioning outcomes—and eventually recovery—may be enhanced by combining case management with specialized skills and activities (e.g., a strengths approach) (25). Case management may include a variety of direct interventions, ranging from providing information and advice and substance abuse counseling to being clients' primary therapist in clinical models of case management (18). For example, clinical case managers receive specialized training to combine therapeutic support and case management (80). In this instance, it may be warranted to expect that case management contributes to improved personal functioning outcomes such as reductions in psychiatric symptoms and improved well-being (25, 81). Case management can also be combined with other interventions such as risk reduction activities, motivational interviewing, and recovery management [see (51, 62)]. Expanded case management services have been frequently applied among substance users with additional mental health (82, 83) and HIV/AIDS problems (49, 84). It is a standard part of comprehensive case management models like intensive case management (53, 55) and Assertive Community Treatment (ACT) (54, 64). Importantly, various studies were excluded from this review, as they offered comprehensive interventions combining case management with other viable approaches (e.g., cognitive behavioral therapy, Housing First programs), in which case management effects could not be disentangled from these additional interventions. Such promising combinations are worthwhile reviewing, although separating specific case management effects will be challenging. These observations illustrate that the variety between case management conditions (from brief models to comprehensive, long-term approaches) may at least be as diverse as the variety observed in TAU conditions, which is likely to affect case management's efficacy.

Toward a Recovery-Oriented Research Agenda

The increased interest in case management resulted in the addition of several new trials (especially from outside the US) in this updated meta-analysis and over 130 recent studies (non-randomized, quasi-experimental, and observational studies) were excluded, primarily because they didn't apply a randomized study design or did not focus exclusively on substance users. Case management is often used to address severely disadvantaged populations with multiple and complex needs. This does not only challenge the randomization process in real-life settings and leads to the adoption of less rigid study methodologies (85), but also reduces the likelihood of finding large effect sizes (14). Also, the finding that case management is effective for improving linkage has contributed to its incorporation in comprehensive treatment programs (86–88) and to its acceptance as a mainstream intervention. In some clinical trials (89–91), case management was even applied as a standard of care control condition, assuming that this intervention would be inferior to the experimental intervention. These studies were not included in this systematic review, but should be reviewed in a separate meta-analysis that compares case management to other active interventions. Given the comparison with other viable (or even evidence-based) interventions, it is likely that case management's efficacy will be lower than compared with TAU.

Despite the increasing popularity of quality of life and other indicators of subjective well-being for evaluating interventions among persons with chronic disorders (92), such outcomes have hardly been studied in clinical trials of case management. Although these studies have often included self-report measures of health and substance use outcomes, they mostly refer to high expectations and socially desirable changes (e.g., abstinence from alcohol and drugs, no arrests, employment) rather than to individuals' perceived well-being and quality of life. Yet, such measures might shed an alternative light on individuals' situations and personal functioning outcomes (93). As case management is primarily applied among severely affected substance using populations, a focus on subjective and person-centered outcomes is more likely to demonstrate the benefits of case management in individuals' daily lives. Introducing a recovery perspective in controlled studies of case management will also allow to measure its impact on individuals' satisfaction with life and participation in society, as well as factors directly or indirectly affecting it. A number of trials were recently set up or are still ongoing that could potentially fill some of these gaps (94, 95).

Quality of the Evidence and Limitations of This Review

According to the GRADE criteria (96), the quality of the evidence regarding the reported outcome categories would be rated moderate to low, primarily due to multiple risks of bias and substantial heterogeneity, or a combination of both. About 1 in 4 studies did not describe the randomization and concealment method adequately. Outcomes assessors were only blinded for group allocation in 2 out of 3 studies and most studies did not use blinding of study participants and case managers. When outcomes are self-reported behaviors and when participants are not blinded to study conditions, overestimation of intervention effects is a potential risk (97). However, since administrative data or objective outcome indicators (e.g., biological markers) were used in at least half of the trials, this risk was minimized. Attrition rates were not acceptable in one trial (42). Follow-up rates sometimes differed within one trial, as several studies used administrative records and assessments to evaluate study outcomes. Attrition bias may limit the applicability of study results or the power to detect between-group differences (97). Despite low attrition in some studies, this may not be problematic if attrition rates are similar in the experimental and control condition (97). We observed few indications for differential attrition rates in the included studies. Finally, publication bias may hamper the conclusions from any systematic review. Visual inspection of funnel plots suggested no evidence for publication bias, and the use of the trim-and-fill method only changed effect sizes slightly. Still, 1 in 5 studies were at high risk of reporting bias, as only some outcome indicators were reported in retrieved publications. Since this meta-analysis is based on published study outcomes, we may not underestimate the likelihood of publication bias as journals tend to publish studies including significant findings. Yet, the fact that several of the included RCTs generated no (or even inverse) effects favoring the case management condition illustrates that reported outcomes are not limited to significant positive outcomes.

This meta-analytic review has some limitations, most of which are typical for meta-analyses (98). First, all included studies were randomized clinical trials (25). Quasi-experimental trials are another source of evidence for case management studies, but these were excluded as we focused on studies in which all subjects were randomly assigned to either case management or a comparison condition. Second, even though all studies in this review were randomized, substantial methodological differences were observed (25). For example, studies used a variety of instruments to measure personal functioning outcomes, and at least 15 different substance use measures were used. This resulted in numerous different outcomes per outcome category. Third, fairly distinct populations were included in the clinical trials, e.g., persons with dual diagnosis, female welfare recipients, homeless alcohol dependent men, HIV infected intravenous drug users and incarcerated drug offenders. Even within these groups, study participants had diverse treatment needs, which may affect case managers' activities (14) Moreover, individual-level characteristics determine the effects of an intervention. For instance, there is evidence that SUDs are associated with various individual characteristics such as gender, comorbid disorders and psychosocial functioning [e.g., (99)], and it is possible that the likelihood of success of case management is associated with such factors. Ideally, this meta-analysis should have been based on the raw data of all individuals included in the selected clinical trials, so that we could perform a multilevel analysis accounting for covariates at the within-study level, in addition to covariates at the between-study level. By modeling the interaction effect of these individual characteristics and the intervention, we could have evaluated the moderating effects of these characteristics. In this meta-analysis, however, we had to rely on effect sizes summarizing effects for whole samples of participants, since the raw data were not available. It would still be interesting to study moderating effects of individual characteristics aggregated at sample level, but unfortunately, individual participant characteristics were not systematically measured and reported in the selected studies, so that we were not able to perform such moderator analyses (with the exception of the type of population studied). Therefore, part of the between-study variance in treatment effects may be due to differences in the composition of the samples in terms of participant characteristics. Fourth, in the absence of fidelity measures, we could not determine case management dosage or quality, nor could we control for eventual differences through moderator analyses (25). Fifth, we could not quantify all of the intervention features that might affect outcomes, although we used several characteristics of case management as moderators to help explain its efficacy. Case management is often characterized as being contextual and reflective of the network of services in which it is implemented (23), suggesting that the availability of services influences its overall efficacy (25). Consequently, the quality of service provision is likely to be beyond the control of case managers, even when resources are available. Finally, all study outcomes are characterized by substantial heterogeneity between and within study outcomes, which can be explained by the large variation in study populations, settings and treatment status, but also by within study variation regarding population, case management dosage and multiple follow-up measurements. We tried to control for some of these influences through moderator analyses.

CONCLUSION

Three extensive meta-analyses, including this one, have now confirmed that substance abuse case management is efficacious in improving important treatment-related outcomes such as linking with and staying engaged (retention) in substance abuse and ancillary services compared with standards of care. Substance abuse programs often experience challenges in delivering and coordinating ongoing support and in providing access to additional services for persons with SUDs and multiple and complex problems. Enhanced linking and retention in substance abuse and ancillary services have been associated with improved abstinence rates (100), less frequent hospital readmissions (101), and adequate functioning in the community (102). Linking with and engaging in treatment are therefore necessary prerequisites to persons with SUD having an opportunity to benefit from these services. Although most models of case management seem to be equally effective in promoting these outcomes, this point is still not clear given the shortage of (comparative) trials of models of case management. Substance abuse case management did not have a significant direct effect on personal functioning outcomes compared with standards of care. The positive, but limited impact of this intervention on substance use and other clinical recovery-related outcomes is supposed to be mediated by case managed individuals' use of substance abuse and ancillary services and participation in treatment. Consequently, case management should be an integral part of comprehensive, wrap-around interventions to promote linkage and treatment participation and retention, and indirectly, personal functioning outcomes and recovery.

Further areas of research are at least 3-fold. First, studies that continue to include personal functioning outcomes should use methodological strategies that allow to assess the relationship between treatment linkage and retention on the one hand, and improved functioning outcomes on the other hand. Second, additional research is needed regarding some outcome categories (e.g., retention in and satisfaction with treatment), as case management is most likely to favor this type of understudied outcomes. Some type of outcomes have hardly been assessed in case management studies (e.g., quality of life, subjective well-being), although such indicators of personal recovery may enhance our knowledge substantially. Also, intensity and dosage of case management have been poorly studied. Third, despite the evidence that case management works for some specific purposes and populations, it remains largely unknown how it works and for whom at various stages of the treatment continuum. Future reviews should consider including quasi-experimental studies, since such designs usually resemble real-life settings more closely and the eventual question whether something works is whether it works in practice rather than under strictly controlled study conditions.

AUTHOR CONTRIBUTIONS

WVDP together with RCR selected the studies for this review, checked extracted data, assessed risk of bias in the selected studies, wrote the results and discussion section, and supervised this publication. RCR together with WVDP selected the studies for this review, extracted data from the selected studies and managed in- and excluded studies, assessed risk of bias in the selected studies and wrote the introduction, and methods section. JDM contributed to the search and study selection process and helped with writing the background and discussion section. WVDN calculated all effect sizes based on the extracted data, ran all meta-analyses, assessed various types of bias and revised the methods, and results section.

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REVIEW
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Mobile Intervention for Individuals With Psychosis, Dual Disorders, and Their Common Comorbidities: A Literature Review

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Over 50% of people diagnosed with a severe mental illness, such as schizophrenia or bipolar disorder, will meet criteria for a substance use disorder in their lifetime. This dual disorder often starts during youth and leads to significant societal costs, including lower employability rates, more hospitalizations, and higher risk of homelessness and of suicide attempts when compared to those with a serious mental illness without substance misuse. Moreover, many individuals presenting with comorbid disorders also present with other psychological difficulties as well, such as personality disorders or anxiety and depression, also known as complex comorbid disorders. Transdiagnostic treatments that focus on core difficulties found in people with complex dual disorders, such as emotional regulation, are direly needed. Emotional regulation skills can help reduce distress related to psychotic symptoms and maintain abstinence in substance use disorders. New technologies in the field of communications have developed considerably over the past decade and have the potential to improve access to such treatments, a major problem in many health care settings. As such, this paper aims at: presenting core difficulties present in many individuals with dual disorders, reviewing the scientific literature pertaining to the use of mobile applications in mental health and addictions, and presenting the development and potential of a new application for emotional regulation for people with dual disorders.

Keywords: severe mental illness, dual disorders, schizophrenia, psychosis, substance use disorder, mental health apps, emotion regulation

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INTRODUCTION

Severe mental illness (SMI) typically includes psychotic episodes and can be characterized by the presence of positive (e.g., delusions, hallucinations) symptoms, but also negative or depressive symptoms (e.g., flat affects, avolition) or symptoms of disorganized thought and behavior (1). It is also in this category that bipolar disorders are grouped, which are characterized *inter alia* by the alternation between depressive and manic or hypomanic episodes (i.e., irritable or abnormally high mood). It is estimated that about 3.5% of the population will be diagnosed with an SMI at some point in their lives—the highest incidence reported or recorded being between 15 and 30 years (2). SMI is also characterized by mild to moderate cognitive deficits in the majority of individuals (25% of them will maintain a cognitive functioning within the norm) (2). Although they have traditionally received less attention than the symptoms associated with psychosis (e.g., positive symptoms), these features are among the most important determinants when it comes to estimating the patient's capacity to function autonomously in his/her environment (2, 3).

SMIs are marked by social functioning difficulties (more specifically difficulties starting or maintaining a conversation, attaining a goal, or meeting basic needs requiring a simple conversation/interaction with others). Furthermore, these difficulties will lead to social integration problems that can occur throughout different stages of the disorder (2). Studies report that the fear of being stigmatized and the fear of being judged (the latter often linked to social phobia) are two of the most frequently reported obstacles to integration by participants (4). Because of its significant influence on an individual's social integration capacity, an increasing number of interventions focus first and foremost on the individual's functional capacities rather than solely on the reduction of symptoms (5).

In terms of clinical presentation and important difficulties people with SMI face, substance misuse needs to be addressed. Indeed, over half of people with an SMI will also have a lifetime substance use disorder (2, 6–8). A hypothesis that might explain this phenomenon is that individuals with SMI have a deficit in the reward circuit (i.e., neural network involving the ventral tegmental area and the nucleus accumbens) (9). This would make individuals with SMI sensitive to the gratifying effects of drugs, and so, it would be more difficult for them to resist the urge to consume (10, 11). However, it has been documented that people with SMI will use substances for similar reasons as those of people without SMI use, such as to feel more socially comfortable, to relax, to fight boredom, to feel euphoric, etc. Among the consequences related to dual disorders (i.e., SMI + substance use disorder), we find a higher rate of violent crimes (12, 13), more hospitalization, poorer compliance to treatment (13, 14), more relapses (14), a higher rate of sexually transmitted and blood-borne infections (STBBIs, including HIV) (15), a higher rate of homelessness (16, 17), more psychiatric symptoms (14, 18), poorer treatment outcomes (19), and a greater suicide rate (20) than people with a noncomorbid SMI.

DUAL DISORDERS AND COMMON COMORBIDITIES

Concurrent disorders are often accompanied by other issues that complicate the clinical presentation. SMI is unfortunately recognized to be associated with a greater prevalence of traumatic experiences. One in three patients with SMI currently undergoing treatment has a post-traumatic stress disorder (PTSD) (2). In dual disorders, the rate of comorbid PTSD and traumatic experiences is 49% and 73%, respectively. Traumatic experiences in individuals with psychotic disorders are related to more pronounced symptoms, increased use of services, more substance use, increased incidence of physical illness, and increased high-risk behaviors (2). Group B personality disorders (i.e., histrionic, borderline, narcissistic, and antisocial) are known for emotional instability, the tendency to dramatize certain situations, and unpredictable behaviors (1). A significant portion of these individuals struggle with substance use issues. An epidemiological study reports that 78% of individuals with borderline personality disorder met the criteria for substance use disorder at least once in their lifetime (21). Individuals with group B personalities are known to show more impulsive behavior, greater mood swings, and more depressive symptoms (22). In a study on psychotic disorders, a significant proportion of patients (close to 30%) diagnosed with SMI displayed problematic personality traits associated with group B without necessarily being diagnosed with a personality disorder. Wickett et al. (23) reported the presence of these traits in 27 (59%) of the 46 individuals enrolled in their studies [the presence of traits associated in this study was determined by the MCMI-III score (i.e., score between 75 and 84)].

Fifty percent of people recently diagnosed with SMI report experiencing depressive symptoms (24). In dual disorders, a study of the different clinical correlates in SMI with data from the *National Institute of Mental Health* (NIMH) in the United States (n=1,460) mentioned that 32.2% of individuals with concurrent disorders reported having a major depressive episode in the 5 years preceding the study (18). Substance use in concomitant disorders is associated with more severe symptomatology than noncomorbid SMI (25). There is a much higher rate of completed suicides in SMI compared to the general population (147 to 750 deaths per 100,000 persons compared to 11 per 100,000 per year) (2).

EMOTION REGULATION AND PSYCHOSIS

The study of emotional regulation is mainly based on two predominant conceptual frameworks (26). The first, Gross's (27, 28) model, defines emotion regulation as the use of different strategies to increase, decrease, or maintain an affective experience and its expression. This model is mainly used when trying to establish the usefulness and/or effectiveness of specific emotion regulation techniques in psychiatric symptoms (26). The second model, presented by Gratz and Roemer (29), is more integrative. It addresses emotion regulation in the context of the general affective functioning of the individual, subdivided into four dimensions: 1) the awareness, understanding, and acceptance of affective experience; 2) the ability to engage in a goal-oriented activity and restrain from acting impulsively when experiencing negative emotions; 3) the ability to use techniques that are appropriate to the context in which one finds himself/herself to modulate the emotional response; and 4) the openness to feeling negative emotions when pursuing a meaningful activity. According to this model, an individual having difficulty regulating his/her emotions will thus present difficulties in one or more of these dimensions (26). Studies using this model report that difficulties in all four dimensions are frequently observed in depressive, anxiety, eating, substance use, and borderline personality disorders (26), some of which are frequently associated with SMI (see the section Dual Disorders and Common Comorbidities).

Emotion regulation difficulties have also been identified as one of the explanatory factors for substance use in schizophrenia. In their model, Blanchard et al. (30) suggest that individuals with certain personality traits (i.e., negative affectivity/neuroticism and disinhibition/impulsivity) who also show difficulties in applying effective coping methods (e.g., interpersonal problem-solving) are more at risk of using substances to cope with negative emotion when encountering important stresses. This model has been partly supported by the literature (31).

Studies have shown that the use of good emotion regulation strategies leads to a reduction in the intensity and distress associated with auditory hallucinations (32, 33). It would also lead to a decrease in the likelihood of developing psychotic symptoms and prescribing medication in "high-risk" individuals (34) and a reduction in the relapse rate (35). Emotion regulation difficulties are central in comorbidities associated with SMI. Emotional regulation difficulties in individuals diagnosed with PTSD would be associated with, among other things, difficulties in functioning and more pronounced symptomatology (36). A study conducted by Ehring and Quack (37) on individuals with PTSD (n = 616) demonstrated that the severity of trauma-related symptoms is negatively associated with participants' emotional regulation abilities (i.e., greater difficulties = more severe symptomatology). The authors of the study also point out that there are no differences between individuals with complex PTSD (i.e., repeated abuse, often starting in childhood) and those experiencing "one" trauma, with regard to their abilities to regulate their emotions. These difficulties are also a central issue in group B personality disorders (38) and substance use disorders (39). Indeed, many individuals will use substances in an attempt to cope with difficult emotions, as an avoidance strategy.

Today, more and more authors place a strong emphasis on emotional processes in the treatment of SMIs such as schizophrenia (40). This phenomenon may be explained in part by the fact that the level of distress experienced is proportional to the intensity of psychotic symptoms reported (41). Studies on emotion regulation within SMI have focused primarily on the use of two cognitive strategies—suppression and re-evaluation. Suppression is a strategy where the individual tries to voluntarily limit the expression of an emotion when it occurs; it is categorized as a regulation technique centered on the emotional response. Re-evaluation is a technique in which the individual tries to modify the meaning of an event in order to change the emotional response; it is a strategy centered on the antecedents of the emotional response (i.e., before feeling the emotion) (42). As for the suppression strategy, two diverging trends seem to emerge from the studies. The explanatory model of blunted affects by Kring and Werner (43) presents this manifestation as resulting from difficulties in increasing the affective experience and a less adapted use of regulation strategies. Following this idea, researchers have identified the use of suppression strategies as one of the potential explanations of blunted affect (42, 44, 45). Other studies report that participants with SMI use suppression as much as control participants (42, 46). Studies seem more consistent with the fact that people with SMI use fewer reassessment strategies than the average person (45, 46). This strategy is known to be associated with a reduction in depressed mood and better social functioning (42). The emotional processes observed in substance use disorders suggest that the search for stimulation through the consumption of substances would aim to lessen the experience of anhedonia, an often-reported state in this population (47, 48). We can also find more recent results going in the same direction where a study reported positive correlations between novelty research, craving, and anhedonia in patients previously dependent on opioids or alcohol (49). Those correlations have been reproduced through several studies; research on the subject identifies, in a somewhat paradoxical way, that the experience of anhedonia may be a consequence of substance use (48).

Emotion regulation is central to third-wave cognitive behavioral therapy approaches (50). These therapies often encourage the use of mindfulness and appear to have encouraging results in terms of improving emotion regulation when employed with individuals with psychotic disorders (51) as well as those with substance use disorders (52). Among these approaches, some of the better known are dialectical behavior therapy, mindfulness therapy, and acceptance and commitment therapy (ACT). Dialectical behavioral therapy is an intervention initially intended for individuals with borderline personality disorder with a suicidal tendency; it was subsequently adapted to all issues involving emotional regulation difficulties (28). This therapy proposes strategies for emotion regulation according to six dimensions: 1) emotional vulnerability factors; 2) events (internal/external) leading to an emotional response; 3) interpretation of events; 4) the emotional response (physiological, cognitive, experiential aspects)…; 5) the verbal/nonverbal response and the actions taken; and 6) the impacts of the emotion felt (e.g., secondary emotion) (53). Mindfulness-based therapy is an intervention aimed at developing awareness of the present moment by taking an attitude of nonjudgment (28). Finally, ACT promotes the acceptance emotional states in order to help individuals commit to goals in accordance with their values (54). Studies support that this intervention is associated with an improvement in emotion regulation and a decrease in anxiety and depression symptoms for those with early psychosis (51) as well as those with SMI with comorbid traumatic childhood experiences (55). Third-wave treatment among users of different substance categories also produced encouraging results in which there was a significant reduction in drug use but also a better retention than in treatment as usual (56). Interventions, such as third-wave treatments, that offer better emotion regulation strategies to people with comorbid disorders, namely SMI with substance misuse, are needed and could likely improve the individuals' lives not only by diminishing the need to use drugs to cope but also by helping decrease distress, associated with various clinical presentations.

ACCESS TO TREATMENT

Difficulties in accessing mental health services are a major global concern, particularly in relation to drug and alcohol addiction issues (57, 58). This situation is even more concerning given the link between difficulties in receiving services and the onset use of injectable drugs among individuals already experiencing substance use disorders (59). In order to better target accessibility needs, Lesvesque and colleagues (60) suggest conceptualizing access to services in five dimensions, derived from a synthesis of the literature on the subject: accessibility, acceptability, availability, costs, and relevance of services. Accessibility refers to the importance of services being known to the population. This is particularly important considering findings that suggest that individuals with substance abuse disorders are more likely to favor familiar treatments (61). Acceptability refers to the cultural and social dimensions that must be compatible with the type of service offered (e.g., belief in the cause and treatment of diseases). Availability refers to the resources required for a facility to provide services to the entire population and to be "physically" accessible (e.g., within-territory distribution based on the density of population, flexibility of work schedules, and adaptation of the environment for people with reduced mobility). Service costs refer to the capacity of individuals to spend money in order to receive a service. Finally, the dimension of relevance of services highlights the importance of matching services to the needs of clients.

Issues regarding the availability of services seem to be one of the main barriers to access in addiction issues, particularly in relation to the problem of waiting time (59, 61–65). Studies on this matter conducted among individuals with dual disorders also report difficulties in the relevance of care provided in this population, who, when compared to individuals with a unique diagnosis of substance use disorder, appear as those being the least satisfied with services rendered due to a lack of compatibility with their needs (e.g., treatment setting for a specific disorder that doesn't accept people with substance use disorder) (66). Acceptability of care has also emerged as an important issue in this population—with the majority of individuals indicating that they prefer to manage their symptoms independently (66). In addition, individuals with dual disorders often report feeling excluded from health care services because of the dual diagnosis (mental health services do not accept them because of substance use disorder and vice versa). A preference for more personalized services, such as integrated treatments, was mentioned along with detailed reports regarding the lack of perceived usefulness of a parallel treatment focusing on a single diagnosis at a time (67).

Canadian studies on access to services seem to raise the same concerns as elsewhere in the world with a few exceptions. As the public health system bears the costs of certain interventions such as the use of opioid antagonists, it is possible that issues related to the cost of certain services may be less significant than in other countries lacking a similar structure (64). In Ontario, a report on the quality of mental health and addiction services states that individuals unable to access services reported problems of availability (i.e., difficulties with language, service hours in conflict with working hours), accessibility (i.e., not knowing where/how to get help), costs related to services (e.g., insurance does not cover certain services), and acceptability (e.g., fear of stigma related to the request for help) (62). In Quebec, a study by Champagne and Contandriopoulos (68) on the impact of the recent reorganization of health care services between 2015 and 2017 reveals a number of disturbing findings regarding the accessibility of care in mental health and addiction treatment (68). Based on the information collected in the integrated health and social service centers [Centres Intégrés de Santé et de Services Sociaux (CISS)], the organizations in charge of providing services in the region, researchers found that access to mental health services remains problematic and inadequate for the whole region (i.e., less privileged centers offer fewer services than more privileged centers). With regard to access to addiction services, researchers point out that although several centers have recently integrated detection and early intervention services, only one CISSS (center) had a satisfactory accessibility score (i.e., 79% of patients had been consulted within 15 days).

THE SMARTPHONE, AN INCREASINGLY POPULAR TOOL

Assessment

We have witnessed a significant increase of people with cell phones from 2010 to 2015 (69). This phenomenon is observed in several age groups, different socioeconomic levels, and several different cultures from around the world (70). A study of patients attending hospital emergency departments reported that 70% (176/249) of individuals struggling with homelessness in the past year had a cell phone (or a smartphone—76/176, 43.2%) in their possession (71). In its annual report on the issue, the United Nations–sponsored international telecommunications union estimates that 90.3% of people in developed countries have a subscription to a mobile phone service (72). With regard to people suffering from a psychotic disorder, a survey assessing 1,592 individuals with a serious mental illness (i.e., schizophrenia, schizoaffective disorder, and bipolar disorder) reported that 72% of participants had a smartphone (73). The smartphone adaptation of mental health interventions offers several advantages that can potentially mitigate certain problems encountered by the community. It could allow the assessment of individuals in their natural environment, where some mental health issue originally emerged, instead of studying them in more artificial contexts such as a clinic or a hospital (5). Furthermore, by allowing someone to assess his/her current state (see section below) and to access support at any time (and any place) needed, this new medium could be part of the answer to treatment accessibility issues (74).

Data collection using applications can be organized in different ways. Among these approaches, the ecological momentary assessment (EMA), defined as "methods using repeated collection of real-time data on subjects' behavior and experience in their natural environments" (75, p. 3), appears as a promising method in the use of new technologies in mental health and addiction (70). Shiffman et al. have published a comprehensive record on the issue in the 2008 *Annual Review of Clinical Psychology* (75). The authors report that this method makes it possible to overcome the important stakes of memory bias (e.g., memory salience depending on emotional valence), which researchers are necessarily confronted with when relying on retrospective evaluation of a phenomenon occurring in the natural environment of the subject. They also mention that this method makes it possible to capture more precisely the variations of a phenomenon over time (for example, mood levels during the week evaluated twice a day) because it makes repeated measurements of the phenomenon in a relatively small time gap. These two factors contribute to increasing the ecological validity of the EMA (70, 76, 77). This greater validity could potentially help better understand the "risk situation–feelings of craving–consumption of substances" sequence in substance use disorders (78). Shiffman et al. (75) proposed four potential uses of EMA in research: identifying individual differences by comparing multiple groups, tracking the "natural history" of one or more topics to capture variations in phenomena across time, studying the interaction of two or more phenomena in an individual's environment (e.g., mood levels following a stressful event), and studying the temporal sequence of certain phenomena (e.g., contextual or internal factors leading to substance use). By offering the possibility to perform assessments on a regular basis or according to the events under study, the EMA is flexible enough to adapt to the study of several psychological phenomena such as episodes of craving in substance use—an event occurring in a small time frame—or general mood that often requires multiple assessments (75). Much research in the field of mental health applications has incorporated this approach. Researchers working among adolescents have reported that using this method would produce valid results in the assessment of symptoms, environmental contexts, and coping strategies used in real time by users (79). A study by Comulada et al. (80) including adolescents with substance use disorders (13 to 18 years old) was able to clarify the external and internal cues related to drugs and alcohol consumption. With the help of an application-based EMA, these researchers were able to establish that, compared to other drugs, alcohol consumption occurs mainly on evenings and weekends. In the field of SMI, research using this method has suggested a link between the environmental context and the intensity of hallucinations (81) and a greater reactivity to daily stresses between individuals at risk of developing psychosis (82).

Intervention

Following the same principles as EMA, interventions using smartphone applications or ecological momentary intervention (EMI) are considered interventions in the individual's everyday environment (83). Although the study of these interventions is still in its infancy, researchers have reported encouraging results for the use of EMI for several health issues, such as weight loss (84), reduction of anxiety levels (85), reduction in the number of cigarettes smoked (86), and increase in physical activity (87).

The National Institute of Mental Health (NIMH) in the United States identifies six categories of mental health apps (74):

a) Applications designed to promote autonomous disease management that provide feedback to the user based on information previously entered.
b) Applications to correct thinking biases (i.e., cognitive restructuring), mainly for people with psychotic disorders.
c) Applications for skills training (e.g., stress management).
d) Applications to get in touch with a mental health professional.
e) Applications that automatically record indirect indicators believed to be related to a disease (e.g., number of text messages sent for a socialization index, duration of calls,…).
f) Applications that collect multiple categories of data automatically.

Growing evidence tends to support these different applications as effective methods of prevention and intervention (70). Among other things, these apps have already been associated with a reduction in depressive symptomatology and anxiety and an improvement in substance use problems in several studies (88). However, it is important to note that this field of research is still young; the majority of research published in this field are pilot studies with no comparison group or randomized studies [Randomized controled trials (RCTs)] that have not yet been replicated (89). Recent research has also reported that this intervention format is well received by adolescents dealing with mental health issues (90, 91) or physical health issues (92).

In the field of SMI, a literature review by Firth and Torous (93) identified five applications, evaluated in seven separate articles—those apps were primarily designed to promote self-management of the disease. The authors report that the majority of applications were very well received by participants, with an estimated average use of 85% of the days in which the studies were conducted, 3.95 times per day. It also states that people at risk for a psychotic episode and those who just experienced their first psychotic episode were most likely to use the app. Another study involving 33 individuals with SMI or schizoaffective disorder assessed the feasibility and acceptability of the FOCUS app, an application offering the possibility of obtaining clinician assistance, and reported positive results going in the same direction (use: 86.5% of days, 5.2 times per day) (94). An original aspect of this study was that the design of the application took into consideration the cognitive impairments of the targeted population (95). A recent study by Schlosser et al. (96) has also reported encouraging results on the use of the PRIME application (i.e., personalized real-time intervention for motivational enhancement) among individuals who have recently experienced a first psychotic episode. Aimed at fostering goals for better health, quality of life, interpersonal relationships, and greater productivity, PRIME invited participants to select one of 36 life goals (e.g., improve my relationship with my family) that they wish to pursue. Short-term goals derived from life goals (e.g., doing a fun activity with a family member) were then suggested to the participant. The application also allowed users to send messages to experienced clinicians and other users of the application on an online platform for advice or support to achieve their goals. Researchers report that individuals who used the app over a 12-week period significantly improved their sense of self-efficacy and motivation and had a significant reduction in the severity of their depressive symptoms and defeatist thoughts (96).

Encouraging results have also been seen for applications targeting disorders that are often comorbid in SMI. In September 2018, the Food and Drug Administration (FDA) authorized the marketing of the first application designed to assist in the treatment of substance use disorders, the application reSET. It is the first application of its kind available only under medical prescription (97). The application consists of a contingency management module of 62 exercises aiming at enhancing personal well-being without resorting to substance use (i.e., how to improve communication, mood management, prevention of transmission of sexually transmitted infections, …). In order to facilitate monitoring, the user's activity on the application is listed on a web page accessible to the physician (97, 98). The validation study of the application, performed with 507 people, demonstrated that the use of the application was associated with more days of abstinence and a lower rate of attrition than in the treatment-as-usual condition (98). It is important to mention that this study, which served as justification for the approval of the application by the FDA, was performed on a desktop-based intervention, which was subsequently adapted to the format of a mobile application (97, 98). In the adult cannabis-using population, a mobile app called Stop-cannabis was developed in Switzerland by one of the authors (YK) and colleagues and reported more than 73,000 users in 4 years (currently about 1,300 active users and 13,000 sessions per month). Based on the self-determination theory, this application aims to promote autonomy, competence, and relatedness as part of a process to reduce cannabis use. Following these principles, the various interventions offered by the application are based on brief intervention in substance use disorder, motivational interviewing, and the principles of relapse prevention for substance use disorder (99). More specifically, the application first gives access to a series of psychoeducation modules on the effects of cannabis withdrawal and suggests alternatives to consumption for a craving episode (e.g., call a loved one, entertain yourself on social networks). Following the principles of motivational interviewing, the application allows the user to identify the advantages and disadvantages of stopping cannabis use. The home page also displays several cues to facilitate cannabis cessation (i.e., the number of days without consumption, the amount of money saved due to the cessation of consumption, and the possibility of purchasing rewards after a certain number of days without taking cannabis). In 2016, an analysis of data related to 22,000 users showed that they compiled 722,000 app sessions, with more than 30% of people having more than 6 sessions. Furthermore, a subgroup of 10% of users had performed 20 or more sessions. In terms of satisfaction, around 70% of them reported daily use of the app, and 80% reported that the app helped them to stop or reduce cannabis consumption "a little" or "a lot" (99). The Stop-cannabis app is currently under validation, and preliminary results demonstrate its feasibility and potential for cannabis adult users wishing to stop using. This application combined with an EMA program is now under study with adolescents with dual disorders (100). Young cannabis users (mean age: 20 years) who followed two sessions of motivational enhancement therapy combined with a mobile intervention designed to prevent relapse have reported a reduction of the craving sensation and a decrease in the amount of cannabis consumed (101). Furthermore, several cannabis-related psychoeducation online platforms were launched recently, but the evidence on their effectiveness is limited, as they have rarely been properly evaluated with regard to the content quality (102). These results are particularly encouraging for some countries such as Canada (the first G-7 country to legalize cannabis), knowing that the profiles of cannabis users in this country are quite different from those of users of other substances, with most cannabis users being under the age of 20 and still in high school. This profile should influence the content of the treatment and the manner in which the treatment is offered (103). Many youths will wait years before deciding to seek professional help for their cannabis use. This is partly due to the stigma associated with seeking professional help, as well as the fact that it can take that long for youths to realize that their cannabis use might be a problem.

In alcohol-related problems, researchers using an application designed to provide support to people with alcoholism (Addiction—Comprehensive Health Enhancement Support System or A-CHESS) were able to partially predict the number of days of consumption based on the level of use of the application by the user (i.e., number of times spent on the application, number of pages viewed) (104). As in the case of the Stop-cannabis application presented above, the design of the A-CHESS application was based on the model of the self-determination theory. In trauma-related conditions, Possemato et al. (105) evaluated the effectiveness of an application (PTSD Coach) in reducing the symptoms associated with trauma in groups of veterans diagnosed with PTSD separated into two conditions (application with or without clinician assistance). The application has been associated with a decrease in symptoms under both conditions, with a significant benefit for the clinician-assisted condition. Other studies also report positive outcomes with the use of mobile applications for the management of different mood disorders (106–108).

Some recent research in mental health apps has evaluated the effectiveness of interventions that promote emotion regulation. To date, two applications were developed for a population with borderline personality disorder. EMOTEO, an application developed by a research team at the University of Geneva, was developed with the aim of providing emotional support during crises occurring between consultation sessions with the health care team (109). It allows the user to use mindfulness or distraction exercises according to the level of distress that has been reported initially using a distress scale ranging from 0 to 10 (i.e., mindfulness exercise when the tension is between 1 and 6 and distraction exercises when it is between 7 and 10—following the idea that users in intense emotional distress don't have a lot of resources to focus on a more complex exercise). The user is invited to report his/her level of distress once again after completing the exercise. The levels of distress that have been reported over time are reported on a graphic accessible from the main menu. The application also allows a direct call to emergency services if the app user feels the need to make one (109). DBT Coach is an application designed to promote the implementation of new skills acquired in therapy in the natural environment of the individual. More specifically, it aims to help the user develop the competency of the opposite action, a technique taught in DBT that consists of acting in a way that neutralizes a negative overwhelming emotion (110).

In order to suggest an opposite action adequate for the state of the individual, the application first asks the user to evaluate the intensity (on a scale of 0 to 10) and the quality of the emotion felt. After this information is entered, the program asks the individual whether or not he/she is ready to change the emotion. In the case of a positive response, the application will ask the user to indicate a specific action urge that he/she feels in connection with the reported emotion and will then provide a list of opposing actions that can be performed in response to this emotion. A negative answer will show windows where the user can indicate the "pros" and the "cons" to changing an emotion. Both applications have shown promising results in reducing the distress associated with a dysphoric mood, in reducing the "urgency to consume" ("craving"), and in the improvement of the depressive state (109, 110).

Mobile apps are increasingly recognized as effective tools for facilitating behavioral change (111). Their practical format facilitates the implementation of new strategies directly in the environment where their difficulties have emerged (5). Emotion regulation applications help individuals manage the different features of an emotional reaction when they occur in their environment. Following this principle, several mood-enhancing applications have been shown to be effective in reducing anxiety levels (e.g., 88, 112, 113). and improving depressive symptoms (e.g., 107, 108, 112, 114), two emotions known to increase the risk of relapse in substance use (115, 116). Applications could then potentially reduce the risk of relapse by aiming to stabilize the emotions associated with it.

Challenges and Limitations

Issues of security and privacy of applications are a major barrier to the acceptability of mental health applications, particularly when it comes to the transmission of non-Internet information (117). Not only does the information collected have the potential to be detrimental to the individual; applications may record a substantial amount of data on the individual [e.g., visited environments that have been recorded through geo-location system (118)]. Studies report very few mental health applications with an adequate privacy policy or secure data transmission methods (119–121). Huckvale et al. (122) conducted a systematic assessment of the applications presented on the English National Health Service (NHS) website, a public health organization with a mandate to ensure compliance with data protection regulations in England (122). Applications were evaluated based on their compliance with data collection/transmission/storage guidelines, confidentiality, privacy policy content, and the adequacy of these policies for the application's actual behavior. One of the main findings reported by the research team concerns the high variability of the security level of the applications. Only one-third of the apps available had a confidentiality policy, which, in most cases, was incomplete (e.g., no specification on the use of data by a third party or incomplete explanations of the process for requesting changes to registered data as allowed by law). The study also reports that a large number of applications stored and transmitted unencrypted personal information. In light of these findings, the researchers point out that enforcement accreditation by a government agency does not guarantee the security of the data that will be recorded and invite users to exercise caution. Some authors also link the lack of consistency in the security of applications to the fact that government regulations in this field are sometimes ambiguous—e.g., an application pretending to cure a condition will not be subject to the same level of evaluation as an application designed to "improve mood" (89). Unfortunately, policies protecting app users are not rigorously being applied today and are lacking information in some important areas such as the use of data by a third party (121). As a result, users are encouraged to exercise caution when choosing a mental health application (74).

The speed at which technology is evolving today makes it difficult to accommodate the empirical validation process, which always requires a certain amount of time (74). Moreover, several issues regarding the validation of EMA tools are still in need of attention. First, although the EMA is more suitable for capturing intra-individual differences over time, this is not always the case for recall-based questionnaires (75). One challenge in this situation would be to adapt and validate tools compatible with the characteristics of the EMA. Furthermore, very few studies have examined the psychometric properties of tools used to collect information on mobile phones. These properties could potentially differ from those used for more traditional questionnaires, because they are not always used in the same context—e.g., users could fill out the questionnaire on their phone while they perform other tasks at home (123). Finally, it is possible that the small number of items generally used in EMA tools may produce limited results where we only scratch the surface of a particular phenomenon.

It is important to mention that the use of mental health apps in a population presenting a substance use disorder carries a risk of cross-dependence (124). Several studies have found similarities between certain behaviors associated with the problematic use of the Internet (i.e., gambling, compulsive pornography viewing) and substance use problems, including 1) unsuccessful attempts to reduce or put an end to the problematic behavior, 2) concerns (feeling of craving) leading to problems of functioning, and 3) continuation of behavior despite deleterious effects (124–126). There is also evidence of an association between behavioral addiction (i.e., pathological gambling, compulsive buying, Internet addiction, work addiction, and exercise addiction) and problematic use of mobile phones in youth (127).

CONCLUSION

The treatment of individuals with SMI is often long and complex, in part because of the important functioning impairments but also because of the clinical presentation. The clinical presentation is often complicated by the presence of many comorbidities, such as substance use disorders, which are more often the rule than the exception. As in other mental health conditions, individuals with SMI and comorbid substance misuse often face accessibility difficulties for treatments offered in mental health settings. The mobile phone could potentially be part of the solution to this issue by providing immediate access to strategies, when needed. Studies on this new form of intervention method report encouraging results for several psychiatric conditions. However, more research with comparison groups is needed to determine their clinical efficacy with greater certainty. In terms of intervention techniques, treatments aimed at improving emotion regulation have been shown to be effective for people with different diagnoses, including SMI and substance misuse.

In this perspective, an intervention promoting the development of emotional regulation skills for a population with comorbid SMI and substance misuse could potentially facilitate access to care and promote better management for those individuals. Our research team is now working on the development and evaluation of such an application, focusing on emotional regulation, that takes into account the specific characteristics of this population by applying the rules for designing applications for persons with cognitive deficits (95). The application for dual disorders, called Chill Time, includes a module dedicated to assessing distress and a module offering different intervention strategies primarily based on cognitive behavioral and third-wave strategies for emotion regulation. The application consists of 20 exercises divided into four categories: 1) cognitive, 2) emotional, 3) behavioral, and 4) spiritual strategies. Each of the strategies employed by the user is evaluated on its perceived usefulness once the exercise is completed. The application is currently under final development and validation. Should the results be positive, such an application may increase access to services and help link actual *in vivo* strategies with therapeutic outcomes, as assessed by clinicians. The assessment module includes a notification system that is similar to what can be observed with other social network apps; two alerts per day in total will be sent to the user. Once the notification is opened, the user will be redirected to the application, where he/she will be asked to rate his/her distress on a scale of three anchor points (i.e., good, neutral, not good). Should the response be neutral or negative, the user is redirected to a list of two exercises he/she could perform to emotionally self-regulate (stemming from two different categories). The two suggested exercises are chosen on the basis of the user's past evaluations of the strategies' usefulness (the exercises offered are initially randomly offered until the application has collected enough information on the preferences of the users).

Mobile applications have the potential to assist people with dual disorders in using strategies between treatment sessions without having to rely on their memory. Future studies are needed in order to demonstrate their efficacy and to offer profiles of emotional strategies used and their impact on substance misuse. Although multiple applications are being developed, only those with strong empirical support should be recommended and used.

AUTHOR CONTRIBUTIONS

AP did most of the writing and research. The other three authors (TL, SP, YK) contributed to the article by writing and editing the sections corresponding to their area of expertise in collaboration with the first author.

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Recovery Attitudes and Recovery Practices Have an Impact on Psychosocial Outreach Interventions in Community Mental Health Care

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The most recent mental health policies implemented in the province of Québec, Canada, have emphasized recovery-oriented mental health practice. Part of this impetus has resulted in significant importance placed on the development of community mental health models in the public health system. The forms of community mental health programs have evolved considerably over time in Québec but are largely inspired by the evidence-based model of Assertive Community Treatment (ACT). However, if mental health policies and programs in Québec are now emphasizing the role of community mental health, it is also clear that actors on the field are implementing the evolving practice paradigms that dominate our mental health policies, such as recovery, participation, citizenship, in a variable way (1, 2). This article presents an ethnographic inspired research study conducted in 2014 and aims to contribute to the understanding of how recovery-oriented mental health policies are understood and implemented in an ACT team in downtown Montréal, Québec. With the aim of developing integrated knowledge on the issue of recovery in mental health and the conditions it presupposes, this research draws on field experiences from various actors, including service users with severe mental health problems, typically with concomitant disorders and complicated by substance use and/or living in a situation of homelessness. Using a critical constructivist approach, the research sought to a) explore how participants (stakeholders, users, and psychiatrists) achieve their social order; b) understand the meaning of recovery in mental health for participants and the actions associated with recovery as a process or as a practice; c) apprehend the potential of community interventions to connect the individual to the collective. The results indicate that the (over)use of medicolegal tools and the unchanging conception of "madness" represent obstacles to the sustained development of interventions centered on the person, his living conditions, and his recovery. Nevertheless, many interactions between service providers and service users indicate the potential for emerging recovery-oriented practice interventions, particularly when those interactions are based on positive and egalitarian conceptions between service providers and service users that led to the development of spaces for the co-construction innovative practice approaches.

Keywords: recovery, community mental health, attitudes, co-construction, ethnography

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INTRODUCTION

The concept of mental health recovery is the dominant organizing principle for public mental health services in many countries (1). This has resulted in important changes in the strategic direction and in the practice guidelines of mental health delivery systems. For example, recovery-oriented practice guidelines (2) in Canada stipulate that recovery "occurs in the context of one's life" (p. 38) and points to the imperative need for mental health professionals to consider and act upon social determinants of health. The literature has supported the idea that, although an individual will go through the process of recovery, professional intervention can facilitate this process (3–6). This requires certain critical values focused on egalitarian and relational attitudes (6), hope, implication, and relationships (7) that are supported by both training and organizational structures (1). The integration of mental health recovery as an approach and philosophy underlying mental health policy at an international level underscores the importance of the recovery concept; it is process oriented, person focused, and shapes governance structures toward social inclusion, quality of life, citizenship, and participation. However, there are documented difficulties in implementing a recovery-oriented practice approach (1, 8–11) that has led to misapplications, misunderstandings, and critiques (12, 13).

In Québec, mental health policies and care (Mental Health Action Plan 2005–2010; 2015–2020, hereafter MHAP) have evolved with an impetus to develop recovery-oriented community mental health teams, such as Assertive Community Treatment (ACT). Part of the continuum of mental health reform, community mental health care offers the possibility to avoid potentially stigmatizing psychiatric care by placing the person and her living environment at the center of care services. In Québec, ACT teams were developed with this care logic but also with a logic of cost efficiency (14–16).

The ACT program is a model that was developed within the walls of a psychiatric institution as an alternative to hospitalization in the context of deinstitutionalization; it is defined as providing round-the-clock, individualized psychiatric services in a person's home or community (17). However, it has a history of coercive and intrusive interventions that are almost singularly focused on pharmacological adherence to manage symptoms (18, 19). The objective of ACT is to provide comprehensive outreach in the community where service users can access the same type of treatment team they would access if they were in an inpatient setting. Elaborated in the Québec landscape, the ACT program aims to help people with serious mental health problems, often with substance use disorders or concomitant disorders, develop their individual competencies. The objective is to promote their autonomy and social integration by shifting (20) psychiatric treatment and psychosocial follow-up out of the hospital and into the individual's community [Gélinas, 1997, in Ref. (18)], particularly through supportive housing and targeted work placement programs.

The aim of this study was to shed light on the interactional experiences of providing and using services from an ACT program, particularly in an urban setting, wherein service users presented with complex mental health and social problems, including dual diagnosis for substance use and concomitant disorders. In Québec, the Centre for Excellence in Mental Health regulates and evaluates the ACT teams.[1] However, until now, there has been very little knowledge regarding the daily interactions, actions, and relational dynamics that support recovery within an ACT team, despite findings that point to the importance of social processes and social dynamics in reinforcing a recovery culture (1, 21). Based on these previous findings, the hypothesis was that the relationship between service users and service providers would be primordial to reports of subjective recovery journeys, and that service providers would capitalize on the proximity of their interactions to surmount organizational constraints when intervening with complex issues.

I conducted a critical ethnography at an urban ACT team whose service users experienced serious mental health problems combined with complex social problems, such as poverty, isolation, and gentrification. Many service users also had concomitant addiction disorders, and the professionals on the field had to adapt their interventions and recovery perspectives *in situ* to respond to the particular needs and aspirations of this population.

MATERIALS AND METHODS

Methodology

Critical ethnographies are a way to provide an informed reflection based on real-world contact with mental health service users and providers in highly marginalized and simultaneously gentrified urban areas for a sustained period. A key strength of ethnographic case studies is the ability to tease out the underlying value systems of the specific organizational cultures and their contexts, which can then provide key lessons to understand other situations (22). Its questioning of the relationship of social order and social structures and its methods of "reconstructing social reality by privileging multiple voices" (23) are techniques indispensable to describing and explaining relationships between people and systems within the larger political, economic, social contexts (24). At the same time, critical ethnography is considered to be a methodology that refuses to separate theory from methods (25), thereby offering a way for professionals to become "more consciously aware of how they take up their professional authority in managed mental health care contexts" (26, p. 173). Moreover, ethnographic inquiry results in not only a "thick description" (27, p. 10) of the culture being studied but also an inductive analytical strategy that requires the researcher to uncover relationships in the context of the observational and interview data. I adopted a cross-paradigm framework, including Healy's (28) conceptual model of critical practice that speaks to the importance of context and power relations in intervention construction and on Garfinkel's (29) ethnomethodological focus on the interactional and *in situ* nature of interventions. The use

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[1] The Centre's Web site specifically notes that the services of these teams are intended to respond to service users with severe mental health problems who may also have concomitant addiction disorders.

of multiple frameworks is coherent with qualitative research and enhanced the research to "to see in new and different ways what seems to be ordinary and familiar" (30).

The ethical considerations specific to ethnography were considered, and they were attended to through a consistent reflexive stance and structured journaling. Although Husserl's notion of "bracketing" and putting aside historical and cultural assumptions to attain objectivity is vigorously contested (31), the reflexive ethnographic researcher can acknowledge these assumptions to be more thoughtful, critical, responsible, and informed of potential biases, expectations, and judgments.

Sampling and Data Collection

I was on site for 3 days a week over the course of 7 months engaging in participant observation. The interview component consisted of six interviews with service users and 12 interviews with health and social care professionals, including two psychiatrists, three nurses, four social workers, two psychoeducators, and one criminologist with years of experience ranging from 6 months to 10+ years. The service users who participated in the critical ethnographic study had been involved with the program from 1 month to 5 years. Although only six service users were interviewed, the care trajectories of approximately 20 service users were followed in observation and through access to their case files. During the study period, I observed service providers accompany two service users to a long-term addiction rehabilitation facility; one service user was hospitalized against his will after a substance-induced psychotic episode; one service user's intervention plan focused around his debt accumulation for the purchase of illegal substances; and another was concurrently followed at the methadone clinic. I used a strategy of triangulation[2] of sources by using three data collection techniques—participant observation, document analysis and case file analysis, and individual interviews.

Measures and Analysis

Consistent with a qualitative tradition, the data were analyzed using the NVIVO software and by using techniques of thematic analysis that began with an initial open coding phase. Understanding the concept of recovery from the subjective perspective of participants was achieved not only through inductive coding but also through identification of i) the influence of agency and policy contexts on practice, ii) the analysis of practice descriptions, and iii) recovery-oriented perspectives of the implementation of the mental health policy. The analysis considered microlevel dimensions of recovery, such as social interactions with friends, family, and neighbors, mesolevel dimensions, such as social interactions with professionals and institutions, and macrolevel dimensions, such as community engagement and participation. The ethnographic component of the 2014 study meant that data collection and analysis were simultaneous. Analysis was very tangled up with every stage of the research process (22).

Funded by the *Fond de recherché du Québec-Société et culture* (FQRSC) doctoral award, this ethnographic study is governed by deadlines respecting ethics and integrity. The study received approval from the Université de Montréal's Research Ethics Board and Université de Montréal Health Centre's Research Ethics Board. All of the participants signed consent forms and kept a copy of the signed agreement. The informed and free consent of participants was assured.

RESULTS

The everyday world of this urban ACT team is dynamic and in action. My findings related to the subjective participant meanings and accomplishment of recovery-oriented mental health care that are embedded in this dynamic active state.

The thematic analysis underscored three key elements to the interactions and actions that are derived from the social processes and organizational structures of this ACT team. These three elements, flexibility in practice, complexity of practice, and relationships in practice, are located at the intersection of difficult practice moments, which I refer to as "practice tensions." These three elements sum up the particular nature of the culture of intervention of an urban ACT team with a population experiencing complex mental health problems and social problems as well as the meanings and actions involved in recovery-oriented attitudes and practices.

Flexibility in Practice—A Key Component of Recovery-Oriented Practice

Major differentiating factors of the ACT team compared to other specialized mental health care teams are the flexibility and intensity that are hallmarks of the ACT fidelity scales. What do these descriptors look like in real life? The organizational structure of ACT provides a good foundation for service providers to be flexible with their timing and schedule and for all service providers to influence the overarching team perspective on care. That means that when they visit a service user for a coffee, to deliver or administer medication, or for a visit, they can take as long as the service user needs. Sometimes this is 5 min, and sometimes a simple medication delivery becomes a 30-min intervention. The ACT program's continuity of service through its connection to a parent institution is a key factor ensuring flexibility and clinical autonomy, as per one of the psychiatrists who explains:

> *It's clearer and clearer in the literature that ACT is a flexible and adaptable platform … because we are attached to a hospital, we can ensure continuity … we have the privilege of direct admission, we don't need to negotiate…*

Thus, the notion of flexibility remains rooted in a hospital-centric approach where it is understood by the link with admission units and the psychiatric emergency. The traditional case management model does not seem to provide a context for making sense of the construction of interventions

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[2] Guba and Lincoln, 1985;Quivy and Campehoudt, 1995.

that can influence community links, social cohesion, or social participation.

Service providers described tensions in their desire to develop interventions that are recovery oriented and the current organizational framework, which is influenced by a rigid, institutional design. However, the ethos of this team, that is, the way it believes that service users should behave, develop, and feel (27), influences the meaning prescribed to interactions and influences the flexibility that is promulgated regarding both through relationship building and within the organizational framework.

The intimacy that both the intensity and the intrusiveness of ACT programs requires can be potentialized to gain in-depth knowledge and trust with a service user. This is particularly supportive of recovery-oriented interventions with service users who have complex social problems or present with addiction or concomitant disorders. As explained by one service provider:

> *That's the difference, it's not in an office … being at a client's home, it's intimate. The home can tell you a lot about a client. We have access to things that you wouldn't access in an office meeting.*

Flexibility exists in the professional autonomy experienced by service providers. Although the choice of practice approaches is somewhat regulated by the Centre for Excellence in Mental Health based on fidelity to the TMACT scale (32), many innovative interventions are constructed *in situ* to respond to the diverse and complex needs of service users. These include street-level work, such as meeting a service user at a downtown bus station when she returns from an addiction rehabilitation center or meeting a service user daily in his home to structure his budget and his daily activities to reduce his recourse to debt accumulation and substance use.

For example, this particular ACT team demonstrated its harnessing of the flexibility of the ACT program to develop practices that are not included in their fidelity scales and evidence-based mandate. These attitudes and practices led to the development of new services within the team, such as a mini-team to intervene specifically with a homeless population experiencing mental health problems. This new way of working, above and beyond their mandate of ensuring supportive housing and medication adherence, is an example of flexibility in intervention, wherein recourse to medicolegal tools or pharmacology was not perceived as the only option for service providers.

The personal influence that individuals have on how flexibility is defined should not be underestimated. Regardless of that, there is an important inescapable rigidity in the tools that are available to the team. These are mostly related to the way medication and a reductionist biomedical perspective continue to have a structuring role. In many ways, this is an elite team of mental health professionals who have experience, knowledge, and a significant amount of power as they enter into people's homes and communities. The notion of flexibility in practice is an element in tension because, despite the community location, there are few community-focused interventions. The choice of intervention is constructed according to the subjective values of the actors in action rather than by the technical platform of the ACT model that is physically located in a community-based setting.

Complexity of Practice—A Key Component to Addressing Authority and Autonomy in Practice

The complexity of practice is evidenced as a situated action wherein the tensions in the position of ACT as a specialized, elite, and experienced team and the subjective concerns regarding coercion, authority, and risk management are explicated. Situated action is at the heart of an ethnomethodological and interactionist research perspective because it emphasizes how participants use common-sense practices to produce, analyze, and make sense of each other's actions and circumstances.

This elite team also expressed feelings of powerlessness at being the end of the line of care. Court orders offer an upper hand in negotiations to ensure compliance and treatment. As one social worker explained:

> *This is the last stop in services for these people … I think once they are back on their feet, then they are ready … but it's difficult to establish a relationship, we represent an authority that reminds them of their illness … the people followed here are very unstable … We need court orders.*

The program priorities of both avoiding hospitalization and maintaining autonomous housing as well as the emotional need for service providers to alleviate their feelings of helplessness sometimes led to service providers attending to clinical-administrative priorities rather than person-centered clinical impacts. As one service provider told me, "If the person decompensates, we'll look like clowns." The tension for the service users is that they are relieved to be avoiding multiple hospitalizations in collaboration with the ACT team but they also reported experiencing uneasiness with the supervision and control of their actions and interactions.

These statements belie the control and surveillance that service providers feel are necessary to accomplish their roles, manage risk, and interact with service users. One of the service providers, Robert, explained that he justifies the imposition on service users that his role as an ACT service provider requires by framing it as a way to force collaboration. Other service providers echoed the sentiments that "there is no choice with an ACT clientele but to be coercive." The team lead offers a softer approach to the tension between coercion and collaboration. She explains that the coercive nature of the ACT program, engrained into its very *raison d'être*, requires the service providers to be "strategic in their negotiations [with the service user] so that the outcome is in the service user's advantage." This is often accomplished by "striking a deal" with the service user and avoiding legal orders. For example, there was one situation in which there was the possibility for a young adult, who came to the service when she was living on the streets and using heroin, to live in stable institutional housing. Specifically, the team agreed that they could offer this service user less frequent visits and more weekly money to help her feel secure in exchange for her accepting the housing agreement.

The central implication of this element, complexity in practice, is that recovery actions and interactions are dependent on the conception the team has of the service user, the subjective service provider beliefs, and the understanding of risk management that is at the heart of daily decisions of stakeholders. But discursive processes, the team culture of dialogue, and social cohesion among service providers seem to be protective factors in the evolution of risk analysis and subsequent measures put in place. I observed a very cohesive team built by the service providers and the psychiatrists who share their knowledge and concerns informally in the corridors but also officially in daily meetings. Internal decision making is horizontal, and service providers themselves often challenge the dominant medical discourse. They consciously avoid using diagnostic language.

Relationships in Practice—A Key Component to Building Trust, Hope, and Implication

It is not surprising that service providers' subjective experiences affect their affiliation and affinity toward certain service users. Therapeutic alliance implies getting to know persons for who they are, their interests, their life stories, and thus going beyond a reductionist description of symptoms. One service provider explained the centrality of the therapeutic alliance:

> *A relationship. When we have a relationship with a client, we have everything. The rest is candy. A trusting relationship, a human relationship.*

Service providers and service users made the assertion that focusing on symptoms and medications and even reverting to hospitalizations are "the easy way out."' The varying complexities of social scenarios remind the team lead, a social worker, of the role of psychosocial elements in the vulnerable and marginal situations that the service users find themselves in. The team lead suggested that her professional standpoint, which is a result of her professional and personal experiences, has made her realize that:

> *We need to flirt with risk … I am not afraid of madness and so I have access to madness when I meet with people.*

The relationships, the therapeutic alliances, the community housing, and the social networks that are developed in the ACT structure are not created only within the confines of the four walls of the ACT office. They are also created and developed on the street, in the bus, in cars, in apartments, in short, in circulation in the community. These relationships that are amicable and sometimes even affective are bound by the professional role of the service providers. These are institutional relationships that are uniquely joined at the locus of the human condition, juggling the reality of implicit control through medication and explicit trust building predicated on the acceptance and facility with madness. The affinity among actors is woven by the social links between service providers and between service providers and service users. Although some participants pointed to the long-term follow-up that is accorded within an ACT program as a necessary element to relationship building, this element also exposed tensions regarding sustainable and authentic social integration.

One psychiatrist on the team expressed some distress at having to juggle the biomedical paradigm and more progressive person-centered approaches. However, she suggested that the coercive practices, which are anchored in the traditional psychiatric philosophy, are a status quo that must be worked around rather than revoked:

> *How do we deal with the coercive aspect of our job … I find it hard … It is a challenge. I do not want to harm anyone. It is a clientele that is not always easy, the risk is ultimately complex.*

The ACT team, through their frequent contacts with the service users and, for the most part because of the sincere interest from the service providers, has succeeded in initiating a trust relationship with most participants. This also serves to understand, respect, and recognize a person's fears or concerns. The ACT program activities provided a context in which interventions and interactions among actors take place in intimate settings, such as the service user's home. The variety of places and spaces for intervention leads to a permutation of many aspects of the lives of the users; I observed that often the service providers' role paralleled that of friend and family. This leads to a quality of interaction based on special attention to people's lives and circumstances. Although the intimacy of home visits is often experienced by the service user as an intrusion and management of her private space, it was also welcomed by many and qualified as "human" and "calming."

The tension lies in the location of these interactions being both a unique opportunity to have access to the singular experiences of the service user but are also obstacles to integration and to actual inclusion in the community. The results demonstrate that the ACT team has become a social network for users. However, clear professional boundaries ensure that the development of this social network is unidirectional, empty of the reciprocity found at the core of human relationships, reducing the interaction to a simple service offer.

DISCUSSION

In the present research, my aim was to examine both the understandings and affinity to recovery-oriented practice and to understand how and if it is constructed by service users and services providers. The results show that one of the strengths of the constant tug of war the ACT team experiences, whether it be about what they do with the flexibility the program accords them, or how they use tools and professional autonomy to mobilize community resources, or how they respond to social inequalities, is that the dialectic is not suppressed. Although social change is not addressed or mandated, specific microlevel interventions are distinguished based on the service provider's relationship with the service user and the assessment of a service user's potential for personal change.

In the ACT team, every action and interaction are parts of a hybrid service culture that is on the one hand person centered and flexible and on the other hand symptom focused and coercive. Once a strong therapeutic alliance has been created in a professional-patient dyad, and in the ACT team it is often on the premise of developing a social relationship, then the line between a paternalistic interaction and one that is egalitarian and potentially collaborative is blurred. The authority inherent in the role of professionals and particularly in their role as professionals in an ACT team is not lost on the service users. One service user, whose relationship with her service providers has been mitigated by their intervention plans that include inpatient addiction rehabilitation services, explains the tensions that she experiences with the professionals who are at once personable and warm and also hold immense power and control over the lives of service users.

The space and place used by the ACT team can have paradoxical impacts on the multiple actors. The occupation of these spaces at different times and in different circumstances gives rise to tensions that are often invisible to the official structure of the program. The social roles that are played by the actors in an ACT team are varied and numerous, echoing the seminal discussions by Goffman (33, 34) that a group, or in this case a team, plays a central role in the actions and interactions of individuals within that team. Once they know the established roles and rules of play, the service providers “improvise” individual actions that are to be chosen based on the effect that they might have on others.

Proximity, Intensity, and Recovery

The different ways of engaging in relationships in close proximity make up the specificity of ACT interaction and are often referred to by the service providers as “accompaniment.” These actions and interactions are not framed by clinical tools or clinical guides and are often context and person dependent. They can range from feeding a service user’s cat when they are hospitalized to helping them move apartments or to buying groceries and cooking supper together. For service users, the hope and time that are offered through the structure of the ACT team are important for their recovery process specifically as it relates to social relationships.

The service provider-service user relationships, which are embedded in a professionalism that maintains strict boundaries, do not erase power inequalities and the specificity of the belonging to a certain group (service user, professional, psychiatrist). This division is a major challenge for the ACT team as it works toward improving the quality of life, and supporting a life of quality, for service users in the community. Service providers generally concurred that they focus on the observable mental health difficulties, whereas other teams, groups, or services will work in partnership with them to manage and support in other aspects of the person’s life.

Two-Tiered Recovery Practice

This study found that recovery-oriented practice is accomplished through a form of institutional accompaniment that is developed based on a singular, intimate knowledge of each service user and through a negotiation of outcomes for groups of service users. Service providers believe in the general idea of recovery as per my observations and the interviews, but the construction of recovery-oriented practice is more elusive. There are paradoxes and complexities specifically related to institutional accompaniment. The institution offers a more traditional role of providing a safety net for service users. The discourse of recovery is prevalent among service providers only when asked directly; however, the actions and the sense given to recovery-oriented practice are evidenced through their discursive practices and their innovative and emerging practice. This ACT team seems to accomplish a hybrid type of recovery-oriented practice, in which some service users are externally evaluated as being on a “maintenance” track and others on a “recovery” track. Interventions and relationships are constructed in consequence of the outcome that is a priori determined for the service users. Both tracks include interventions that aspire to positively affect the service user’s social environment (housing, social network, hygiene) and have a symbolic value associated with well-being, recognition, solidarity, and participation. Moreover, the two tracks in this recovery practice are embedded in the role that ACT plays as a proxy, unidirectional social network for most service users. The development of a proxy social network might be stimulated by the social skills training offered by ACT; it might also be reassuring and structuring for service users who require and desire that. However, there is a risk that it becomes a mechanism for “social contention” and limits effective development of sustainable and reciprocal social connections and social cohesion.

Despite the most progressive intentions of service providers, the recovery process and the construction of potential recovery-oriented interventions are negotiated not only for individual service users but also for groups of service users based on social workers’ expectations of that group. Thus, there is a two-tiered approach to recovery for service users evaluated as having a capacity for rehabilitation, who are judged as having adequate insight, and another approach for services users that are judged to have low insight and therefore incapable of rehabilitation for the time being. For the former group, the type of interventions that are constructed can be categorized as “accompaniment” and for the latter group as “maintenance and safety net.”

The two-tiered recovery approach represents a paradoxical institutional arrangement of accompaniment that remains highly individualized and relegates social inequalities to an unexamined background reality. Complex social problems, such as homelessness, are addressed more directly through the development of new organizational structures (PRISM) and approaches (street psychiatry), with the goals of providing solutions to individualized mental illness through medication and housing. Although this outreach is a first step to connecting and building a relationship with certain people experiencing distress, the framework of recovery is not a consideration or used as an orientating approach. Social interventions, both for those service users who are to be maintained in their stability and for those who are grouped into the category as having potential for transformation, are lacking a broader concern for social and collective concerns.

Service providers often cite the organizational constraints and the subsequent legal, medical, and administrative pressures as the most influential factor in the way interventions are conceived and constructed. These constraints and pressures lead to a focus on symptom reduction, harm and risk reduction, avoiding hospitalization, maintenance in the community through housing, and improved social connections/cohesion. The complex social difficulties and inequalities faced by the service users are often through interventions shaped by purpose rather than process and lead to recovery being reconceptualized into an individual responsibility. The context in which that individual must take responsibility for her recovery process, both socioeconomically and clinically, is not a predominant consideration. In other words, a service user, such as Liz, is experiencing feelings of hopelessness, marginalization, and also living with the effects of poverty and stigmatization, within the ACT context, she is able to establish therapeutic relationships that support and accompany her in finding housing, managing her substance use, and connecting with her family. However, Liz does not report being in a process of recovery because her existential goals are not being met. Moreover, the predominant recovery framework that is used is one in which Liz alone is responsible for her recovery, despite the current context in which her treatment, housing, and certain broader life choices are controlled by the very relationship she developed with the ACT team.

The Importance of Interactions and Relationships

What I have explicated in this research is the appearance of different intervention strategies in ACT mental health practice. Service providers harness their organizational structures and their professional autonomy and knowledge to either a) access privileged moments and spaces for potentially transformative interventions or b) interact with service users through techniques that maintain spatial, temporal, and interpersonal stability. Despite the most progressive intentions of service providers, outcomes are negotiated not only for individual service users but also for groups of service users based on service providers' expectations of that group. That means that some groups of service users are considered to be on the "recovery track," and more complex interventions are envisioned, whereas other groups of service users, usually those with more complex problems, are on the "maintenance track," and more technical interventions are accomplished. The unequal outcomes by level of distress or suffering suggest that stigma or discrimination has become structured into the ACT program and the parent institution, through daily actions and interactions among actors in a mental health team, despite the goodwill and professionalism of many workers. Larger structural inequalities are not only constructed but also maintained within these interactions because service users and service providers are mobilized to accomplish tasks within the public space, outside of the institution, rather than to transform it.

Although service providers might feel empathy, compassion, and even affection for some service users, clear professional boundaries ensure that the development of a social network is unidirectional. Service providers, often social workers, find themselves in privileged spaces to develop relationships and promote dialogue with services users. These spaces can be in cab rides, walking down the street, moving, having a coffee. During these interactions, small acts of kindness, which service providers often dismiss as inconsequential, are interpreted as very meaningful and moving by service users. These small acts of kindness, which are not yet included in best practices literature, are developed when the dyadic relationship enters into a "dialogue" mode. It is perhaps, as suggested by Linda Bourgeois (35), a former service user, the first step to self-transformation and social transformation. These small gestures and acts of kindness are perhaps invisible actions and interactions that serve to reinforce a more flexible and participatory relationship, despite the fact that they are not easily categorized into a specific intervention approach. The quality of the interactions became apparent from how case managers paid attention, listened, and communicated while engaging in these shared activities. This study illustrates that although the structural aspects of SIM provided the context and opportunities for engagement, the quality of the interaction between the case managers and residents played a key role in engagement.

The particularity of the service providers that compose the ACT team is their continued hope, built through professional respect and through an awareness, if not necessarily always the capacity, to intervene in different ways than what is typically sanctioned in psychiatry and in our overarching results-based health and social service sector. The service provider who deals almost exclusively with the Individualised Placement Program explained that his passion for his work is based on his strong belief that it will provide hope for the service users and for himself as a professional.

CONCLUSION

In short, in 2014, within this urban ACT team, the question of participative, service user-oriented practices in psychiatry is already being debated. This debate can be understood as situating this particular ACT team as not only a physical space where community mental health work is accomplished but also a social and political space wherein madness is woven into the fabric of the community and of society. This latter occupation unearths many of the constraints and questions regarding the relationship this psychiatric team has with the idea of madness and with the realities experienced by service users. The description of recovery and recovery-oriented perspective within this urban Montreal ACT team unveils an organizational structure that is opening the space for potentially creative and participative actions and interactions among actors—that is to say, interventions that seek out and sustain the participation of service users in their treatment and in their lives in the community. Perhaps paradoxically, this same structure is governed by traditional practices and neoliberal policies that maintain and support traditional professional-patient relationships and cost-efficient treatments. Moreover, the position of this elite team within the psychiatric care structure might even legitimize the use of more coercive practices.

This research offered an opportunity to identify the ways in which service users and service providers understand recovery-oriented practice in action. Specifically, this research demonstrated that the challenges of recovery-oriented practice lie in the conception of the service user in relation to his or her mental health difficulties. The findings indicate that the interactions between service providers and service users, and the subsequent conceptualization of the service user and the interpretation of varying situations, continue to be entrenched in a paternalistic and patriarchal approach. Nevertheless, the study findings show that several service providers offer less medicalized and less paternalistic perspectives than expected. Their interventions seem to be the result of an evolving interpretation, or conceptualization, of "the mental health service user" and of specific situations. It is vital to underscore how representations of a situation or a person can potentially change practice; perhaps the quality of the interpretation of situations and people can actually transform the potential of the human relationship between service providers and service users and practice interventions.

Although the study provides a portrait of a specific community mental health team in an urban environment, the results offer significant practice-near insights and observations into the daily actions and interactions of the team. The literature points to the need for a compounded effort to describe and analyze practice-near understandings of recovery-oriented practice (10) not only to explicate barriers and facilitators of recovery-oriented community mental health practice with service users presenting with complex needs but also to highlight promising and emerging practices.

LIMITATIONS

This study has several limitations. First, ACT teams in Québec are demonstrated to be heterogeneous (15) and adapted to the population they serve. This generalization of the present results across different models could be problematic. As well as the single author observation and analysis of the data. I used the phenomenological approach of "bracketing" (36) and the critical ethnographic stance of ethical responsibility for a researcher's positionality (31). Like Giorgi (37) in Tufford & Newman (2010), I bracketed by suspending those biases, with the assistance of journal writing, memos, and conversations with my research director to reflect on the forces that have shaped my interpretations during the writing and analysis process. However, I also developed an awareness of my preconceptions before the beginning of the study through reflexive journal writing throughout my doctoral studies. As far as I know, this research was the first that examined the social processes and interactions within an urban ACT team with a critical recovery-oriented perspective. This study aimed to uncover not only the meanings prescribed to recovery-oriented community mental health practice with a population experiencing important mental health difficulties and addiction and concomitant diagnosis but also the actions and interactions that make up practice.

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of the Université de Montréal's Research Ethics Board and the Université de Montréal Health Centre's Research Ethics Board with written informed consent from all participants who kept a copy of their signed agreement. The protocol was approved by the Université de Montréal Health Centre's Research Ethics Board.

AUTHOR CONTRIBUTIONS

EK came up with the project idea,in collaboration with her doctoral research supervisor, Dr. Lourdes Rodriguez del Barrio. EK was responsable for the study design, data collection, data analysis, and writing the article.

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