Initial insights from a quality improvement initiative to develop an evidence-informed young adult substance use program

Jillian Halladay RN, MSc, PhD; Victoria Stead PhD; Catherine McCarron RSW, MSW; Marina Kennedy MSW, RSW; Kyla King; Michelle Venantius MD, FRCPC; A. Carter, RSW; Sabrina Syan PhD; Mareena Matthews NP; Saba Khoshroo BA, MSc; Myra Massey BA; Liah Rahman BA; Jacinda Burns BA; Kiran Punia MSc; Emily MacKillop PhD, CPsych, ABPP; Holly Raymond MHA, MSW, RSW; James MacKillop PhD

Abstract

High rates of substance misuse during emerging adulthood (~17-25 years of age, also referred to as young adulthood) require developmentally appropriate clinical programs. This article outlines: 1) the development of an evidence-informed young adult outpatient substance use program that takes a biopsychosocial patient-centred approach to care; 2) a quality improvement process and protocol; and 3) the patient characteristics of an initial cohort. Literature reviews, program reviews, environmental scans, and consultations with interested parties (including individuals with lived expertise) were used to develop the program. A 12-week measurement-based care program was developed comprising: 1) individual measurement-based care and motivational enhancement therapy sessions; 2) group programming focused on cognitive behavioural therapy, mindfulness, distress tolerance, and emotional regulation; 3) clinical consultations for diagnostic clarification and/or medication review; and 4) an independent Community Reinforcement Approach Family Training (CRAFT) group for loved ones. A measurement system was concurrently created to collect clinical and program evaluation data at six time points. In the first 21 months of the program, 152 young adults enrolled in the program (mean age = 21 years old, 47% female gender) primarily reporting treatment targets of cannabis (68%) and alcohol (63%) and almost all presenting with co-occurring mental health concerns (95%). The initial cohort who completed the program showed symptom improvements. Collectively, the program demonstrates the feasibility of developing an evidence-informed young adult substance use program using measurement-based care, but also the need for flexibility and ongoing monitoring to meet local needs.

Key Words: emerging adults; substance use; cannabis; alcohol; addiction
Résumé

Des taux élevés d’abus de substances durant la vie d’adulte émergente (~17-25 ans d’âge, aussi nommé jeune âge adulte) nécessitent des programmes cliniques appropriés au développement. Cet article présente : 1) le développement d’un programme fondé sur des données probantes sur l’utilisation de substances des jeunes patients ambulatoires qui adopte une approche biopsychosociale axée sur les patients; 2) un processus et un protocole d’amélioration de la qualité; et 3) les caractéristiques du patient d’une cohorte initiale. Les revues de la littérature, les examens de programme, les analyses de l’environnement, et les consultations avec les parties intéressées (notamment les personnes ayant une expertise vécue) ont servi à élaborer le programme. Un programme de soins de 12 semaines basés sur la mesure a été élaboré qui comprend: 1) des soins individuels basés sur la mesure et des séances de thérapie d’amélioration de la motivation; 2) une programmation de groupe axée sur la thérapie cognitivo-comportementale, la pleine conscience, la tolérance à la détresse, et la régulation émotionnelle; 3) les consultations cliniques pour la clarification du diagnostic et/ou la revue des médicaments; et (4) un groupe indépendant d’Approche de renforcement communautaire Formation familiale (ARCFF) pour les êtres chers. Un système de mesure a été créé simultanément pour recueillir les données cliniques et d’évaluation du programme à six points dans le temps. Dans les 21 premiers mois du programme, 152 jeunes adultes s’y sont inscrits (âge moyen = 21 ans, 47 % de sexe féminin) et déclaraient principalement que les cibles du traitement étaient le cannabis (68 %) et l’alcool (63 %) et presque tous présentaient des problèmes de santé mentale co-occurents (95 %). La cohorte initiale qui a terminé le programme présentait des améliorations des symptômes. Collectivement, le programme démontre la faisabilité de développer un programme d’utilisation de substances pour jeunes adultes fondé sur des données probantes et utilisant des soins basés sur la mesure, mais également le besoin de flexibilité et de surveillance constante pour répondre aux besoins locaux.

Mots clés: adultes émergents, utilisation de substances; cannabis; dépendance à l’alcool

Introduction

Emerging adulthood, roughly operationalized as 17-25 years of age—also described as young adulthood—putatively represents an “in-between” developmental period at the interface of adolescence and adulthood (1). Relative to adolescents and adults, young adults experience the highest incidence and prevalence of substance use disorders (SUDs) and comorbid mental health disorders (2-4). This occurs alongside many important neurodevelopmental and psychosocial changes, including the transition from pediatric to adult healthcare systems (1, 5). Thus, young adults may be seeking out substance use services for the first time or transitioning to new providers with the emergence of worsening and comorbid symptoms in a system that lacks navigation support and developmentally-tailored programs (6, 7). Existing substance use services are often aimed at adults, and young adults within these programs tend to have lower motivation to change, lower engagement and retention, and, ultimately, poorer responses to treatment (6). However, entering SUD treatment early has been related to better long-term quality of life and functioning (8), making developmentally-tailored clinical programs for young adults a high priority.

A further priority is increasing integrated treatment capabilities to minimize the risk of young adults “falling through the cracks” between child/adolescent and adult healthcare sectors (9-12). However, there are gaps in the literature regarding young adult treatment that contributes, in part, to a lack of evidence-based services (6, 7, 13). Given the unique developmental factors and varying needs, young adult substance use programs may benefit from a measurement-based care (MBC) approach. Specifically, MBC uses structured, patient assessment involving routine use of validated scales that are integrated into care (14). MBC has been associated with multi-faceted clinical benefits, including better engagement and patient outcomes than traditional care (14-19). Further, MBC data can also be used for quality improvement, program evaluation, and empirical research. To date, MBC is underutilized in mental health and substance use treatment (15, 20), but may offer a number of benefits for young adult substance use treatment.

The substance use and comorbid mental health concerns during this critical developmental period, compounded with the mismatch with available adult SUD programs, calls for the creation of young adult concurrent disorders programs. This article reviews the development of a young adult outpatient program, the Young Adult Substance Use Program (YA-SUP) at St. Joseph’s Healthcare Hamilton (SJHH), a collaboration between the hospital’s Peter Boris Centre for Addictions Research (PBCAR) and its Community Psychiatry Clinics/Concurrent Disorders Program. The YA-SUP takes a biopsychosocial patient-centred approach to care, one that is informed by evidence and uses MBC to maximize personalized treatment.
Program Development: The Young Adult Substance Use Program (YA-SUP)

Program Development Process
Program development broadly followed recommendations for developing and evaluating complex interventions (21) and is consistent with quality improvement implementation guidance (22). First, the YA-SUP was iteratively developed through a comprehensive environmental scan using internal and external data sources (23). Both passive (i.e., existing data, reports, guidelines, research) and active (i.e., observations, consultations) data sources were collected. Internal sources included reviewing adult program procedures, structure, and data as well as consulting with clinicians, leadership, and administrators. A similar approach was taken with related internal clinical programs. External passive sources included reviewing current best practices for adolescent and adult SUDs, local service gaps, novel research on young adult SUDs, existing adolescent and young adult mental health and substance use program components and structures at other institutions, and evaluated psychotherapeutic manuals. External active sources of data included consultations with key informants including national and international experts leading research and clinical practice related to adolescent or young adult substance use, local young adults with lived expertise, and clinicians within pediatric mental health services. A foundational program model was created based on existing best-practices that was presented to interested parties and updated based on feedback.

Young adult perspectives were incorporated and amplified in several ways. First, we drew on published reports and papers that have systematically collected and synthesized youth perspectives on mental health care, substance use services, and transitions to the adult system (24-28). Second, we consulted with researchers and clinicians who routinely engage in co-creation and youth engagement for their services and projects. Third, in line with national standards for youth engagement (29-31), we engaged in direct youth consultations with two local young adults with lived experience prior to and following the initial program launch (32).

Environmental Scan Summary
Broadly, recommendations for young adult substance use treatment are that it should be grounded in harm-reduction, take a trauma-informed and concurrent disorders lens, be multidisciplinary, be grounded in a biopsychosocial model, be patient-centred and driven, foster inclusivity, and focus on engagement rather than strict adherence (6, 24, 25). Young adults are biologically, socially, and psychologically unique, yet research looking specifically at treatments for young adults is sparse. Nonetheless, recommendations to “meet the patient where they are at,” being non-judgemental, and emphasizing patient self-efficacy and collaborative treatment planning are consistent with the principles of motivational interviewing (33), harm reduction (34, 35), and the existing practice recommendations for SUDs among both adolescents and adults (36, 37).

Cognitive behavioural therapy (CBT) combined with motivational enhancement therapy (MET) is the current recommended first line psychotherapeutic approach for treating both adolescent and adult SUDs (36, 37). Of note, many guidelines recommend simultaneous screening and treatment of both substance use and other mental health disorders (38) and CBT is a first-line psychotherapeutic treatment for common co-occurring mental health disorders like anxiety and depression (39-45). A review of adolescent-specific treatment indicated the most promising treatments are family-based therapies, CBT, and multicomponent approaches (e.g., MET/CBT) (46). A meta-analysis of 12-20 year-olds further extended support for the importance of family-based interventions, brief motivational interviewing, and MET/CBT for youth alcohol use, other drug use, and related substance use problems (47). Specific to brief motivational interventions, benefits have been observed for alcohol and other substance use problems among adolescents (48) and adults (49, 50) with mixed evidence for cannabis use; though some evidence suggests benefit regarding symptoms of cannabis use disorder among young adults (47, 51). While limited, the literature specific to young adults consistently reveals potential program engagement and clinical benefits from cognitive-behavioural and motivational interventions as well as integrated mental health and substance use treatment (6, 52, 53). Notably, the adolescent community reinforcement approach (ACRA) is well-supported (46, 54) and combines key CBT ingredients and family-based approaches with a strong focus on substance-free reinforcement (55). There is also emerging evidence for adjunctive approaches, some of which include exercise, goal setting and progress monitoring, and ‘third-wave’ CBT including Dialectical Behaviour Therapy (DBT) skills (namely, emotion regulation and mindfulness) (46, 54, 56, 57). Overall, these findings suggest a suite of CBT interventions, and additionally encourage incorporating social support interventions and increasing engagement in substance-free activities (6), as well as adjunctive behavioral programming.

Although the adult healthcare system typically operates independent from the family, family-based approaches have demonstrated some of the strongest benefits for adolescent substance use (36, 47) and there appears to be continued
clinical importance of family engagement during young adulthood (6, 58). Professional and lived experience experts have also indicated that parent, caregiver, and partner involvement should be offered, while simultaneously respecting the young adults' autonomy and independence, such as through separate programming (6, 24, 58, 59). Community Reinforcement Approach and Family Training (CRAFT), a version of ACRA created for loved ones, supports their understanding and implementation of positive contingencies and natural consequences, positive communication and motivational strategies, and self-care strategies to improve personal well-being (60). CRAFT is commonly recommended in family-involvement calls to action (58, 59) as CRAFT has previously been shown to increase patient treatment engagement (61, 62), improve family functioning (60, 62), reduce patient substance use (63), and improve the loved ones' perceived empowerment (64) and mental health (65).

Though treatments traditionally adopt an abstinence-based approach, there is increasing awareness of the need for harm reduction options with young people (34, 35, 66, 67). Harm reduction aims to minimize overall harm from substance use, but not necessarily requiring reductions in or cessation of use. Harms include the substance itself (e.g., overdose), risky patterns of use (e.g., mixing, unsafe delivery mechanisms, patterns and control of use), the physical and social environments surrounding use (e.g., using in safe settings, avoiding driving intoxicated), and general safety practices (e.g., access to naloxone, drug checking, not using alone, clean paraphernalia). These approaches can mitigate social, legal, and health-related harms including infectious disease and overdose, while increasing commitment to and engagement in treatment (34, 35, 66). Though the evidence-based harm reduction literature is predominantly focused on adult samples, the previously discussed motivational strategies align with the goals of harm reduction; for example, being nonjudgmental and prioritizing patient-determined abstinence and non-abstinence-based goals.

Lastly, best practices include access to both substance-related (particularly for opioid use disorder) and other psychiatric medications (53, 68, 69). Although it is important to simultaneously treat psychiatric disorders pharmacologically when needed, solely intervening with medications for non-substance related psychiatric concerns is considered insufficient to treat young adult SUD (70) and other psychological and pharmacological interventions for SUDs are recommended to be delivered concurrently (71).

**Initial Program Structure**

The YA-SUP’s mission is to provide young adults with the support and skills to: 1) reduce the negative impact of substance use on their lives, whether that be through abstinence, reduction in use, or other harm reduction approaches; 2) improve mental health and wellbeing by considering the whole-person; and 3) increase engagement in substance-free activities and create a life that aligns with their values and goals. The YA-SUP values include providing young adult centered care, creating a safe(r) space, considering the whole person, collaborating with young adults and community providers, using evidence-based practices, and contributing to evidence. The YA-SUP acknowledges the contribution of biological, psychological, and sociocultural factors in the development of addiction as well as recovery (72). This incorporates: 1) psychological treatment including identification, psychoeducation, and treatment related to comorbid mental health concerns (e.g., psychotherapy to increase coping, identification and management of triggers, and promotion of ongoing recovery); 2) sociocultural treatment including enhancing social support for recovery and establishing sets of pleasurable substance-free activities; and 3) biological and medical treatment including diagnostic assessments and pharmacotherapy where warranted. The program development process has been implemented in a Plan-Do-Study-Act (PDSA) cycle: P) developing a tailored program and measurement system; D) stepwise implementation; S) tracking patient trends; A) adjusting processes.

**Young Adult Stream.** Structurally, the YA-SUP operates around a core 12-week cycle including separate streams for young adults and their loved ones. The Young Adult stream is freely available to individuals 17-25 who are covered by the Ontario Health Insurance Plan (OHIP) and who are: 1) interested in making healthy changes to substance use, including reducing harms, reducing use, or stopping use, and 2) interested in participating in the primarily group-based treatment. Young adults are not eligible if they are in immediate crisis, primarily presenting for another condition, in acute substance withdrawal requiring pharmacological management, in acquired brain injury services, or if they could be better served by another program at the hospital (e.g., early episode psychosis). Young adults can be directly referred by clinicians or self-refer through a centralized intake service. The Young Adult stream includes a combination of manualized core components that are intended to be delivered to all patients and peripheral and adaptable optional content that, though often manualized, has more flexibility with delivery and individual patient participation (22). These components are: 1) five individual sessions (core components) grounded in MBC and MET which are supplemented by ACRA-related interventions (e.g., values,
substance-free reinforcers, quality of life and related goals); 2) near daily group programming (peripheral components, presented as a menu of options) including CBT skills (strongly recommended as a core component), Mindfulness Based Stress Reduction, DBT informed emotion regulation and distress tolerance skills, substance related health promotion (i.e., exercise, sleep, nutrition); and 3) consults for diagnostic clarification and/or medication review and initiation (peripheral component, based on need and patient preference).

Individual and group sessions are structured to facilitate assessment, treatment, and referrals for young adults within ~12-week cycles (target dose: two sessions or groups per week), however, young adults in the program can still access care beyond this period. The 12-week cycle was selected to balance evidence-based research, where manualized treatments often last 8-12 weeks, and available resources (See Figure 1). The Young Adult Stream is based on common core components of existing evidence-based manuals that were adapted prior to program launch to meet the unique needs of young adults. To address these multi-pronged goals, the YA-SUP has a multi-disciplinary collaborative team which includes a social worker, community support counsellors, nurse practitioner, clinical psychologists and trainees, psychiatrist, and researchers. Frontline staff were provided training related to all manualized sessions. See Figure 2 for a summary of the YA-SUP Functional Analysis of how each program component fits based on putative causal mechanisms of young adult substance use (6).

The program implemented unique service delivery and structural characteristics recommended for young adult programs. Where possible, we utilize technology, such as program promotion through social media, co-creation of a program webpage, text messaging appointment reminders, and telemedicine or e-delivery of programming (6, 24, 46). Groups are delivered through telemedicin, and individual follow-ups are available via telemedicine if desired. Flexible drop-in programming and short wait times, such as same-day appointments and rolling enrollment are offered (6, 13, 24).

In line with recommendations to include harm-reduction as a goal to treatment, all interactions are grounded in motivational interviewing strategies that are nonjudgmental and support patient-centred goals (whether abstinence or non-abstinence based). Clinicians work with young adults to discuss and create personalized harm reduction plans. This includes reviewing clients' risks related to the types, patterns, and route of administration of substance use as well as social and physical settings and subsequently collaboratively discussing strategies to reduce these identified risks (e.g., taking a small test “shot” and using slowly). At the first appointment, all clients are encouraged to take a naloxone kit for overdose prevention and are provided with related psychoeducation and administration training; this is especially emphasized to clients using illicit substances. When needed, clinicians provide access to other community resources or locations for accessing harm-reduction supplies (e.g., how and where to dispose of drug supplies and paraphernalia, location and instructions for using supervised consumption sites, and contact information for the National Overdose Response Service).

**Loved Ones Stream.** An 8-session Loved Ones Education Group was created based on CRAFT (60, 73) and tailored to the specific needs of the loved ones of young adults (e.g., drawing on content from The Center for Motivation and Change (74)). The sessions include: 1) group overview, safety, and self-care; 2) understanding substance use; 3) understanding co-occurring mental health concerns; 4) positive communication; 5) past patterns and new strategies; 6) rewards and coping with intoxication; 7) allowing negative consequences; 8) talking about treatment, review, and next steps. The specific goals for this group are to create a sense of community, increase knowledge, and provide attendees with new strategies.

**Creating a Measurement-Based Care System**

The YA-SUP was developed to be a learning health system, whereby data are collected and used to continuously update the program and respond to patient needs (22). Alongside clinical chart reviews used to gather information related to program process and participation (e.g., dose, types of groups, number and nature of consults), the YA-SUP embedded a structured system of assessments to promote personalized and adaptive treatment (i.e., MBC). The YA-SUP assessment package evolved through literature reviews, discussion of clinically important outcomes with interested parties, and assessments that have been successfully deployed in other MBC settings (75-77).

We adopted the definition of recovery from Witkiewitz and colleagues (2020) (78) as: “a dynamic process of change characterized by improvements in health and social functioning, as well as increases in well-being and purpose in life.” (pg 10). This definition supports both abstinence and harm reduction goals which have been highlighted as important aspects of young adult care (6, 24, 25), allowing for a person-centred approach, and capturing the multidimensionality and heterogeneity of symptoms and recovery (56, 57, 71). This also follows clinical definitions of SUD remission, where the focus is on reducing problems related to use, enhancing meaningful activities, and increasing control over use rather than narrowly focusing on abstinence or
reductions in substance use (79). It also supports expansion of clinical outcomes to include mental health and wellbeing; social, academic, and occupational functioning; quality of life and valued living; and engagement in substance-free activities, which are particularly important for young adults (47, 51, 80). This multi-dimensional approach aligns with recommendations by the International Consortium for Health Outcome Measurement (ICHOM) (81). Further, reports summarizing youth voices indicate improvements in quality of life are perceived as more important than reductions in substance use per se (24-28), which was echoed in consultations. Thus, the core objectives of the YA-SUP evaluation are to examine decreases in substance use, alongside improvements in mental health and quality of life.

The assessment package was created with the aim of capturing the complexity of factors seen in young adults...
Presenting to addictions services. We included measures of demographics, historical experiences, substance use, mental health symptoms, quality of life and functioning, possible mechanisms of substance use recovery and vulnerability, and satisfaction (Table 1). Young adults are asked to complete assessments via RedCap (82) on six occasions (with the support of a clinical research assistant): at intake, three check-in appointments ~4 weeks apart following discharge, and ~12 weeks after discharge. The check-in assessments are used to generate near real-time reports at multiple levels including personalized feedback for use at individual sessions, clinician summary reports to aid in conceptualization and clinical decision-making, and weekly program monitoring reports using aggregated patient data, while building a database to use for subsequent program quality improvement and research (Hamilton Integrated Research Ethics Board #12926). The clinician report includes a summary of patient demographics, substance use and readiness to change, history of trauma or head injury, and flags for clinical cut-offs across all psychiatric concerns assessed. The key components for personalized feedback reports include: 1) substance use frequency and targets for treatment; 2) quality of life; 3) SUD symptom scores; 4) anxiety and depression symptoms; and 5) personal values. Iterative adjustments of the program, following PDSA cycle procedures, are based on clinical and patient feedback obtained through the clinical measurement system including discharge assessments that use mixed-methods to capture experience (22).

Preliminary Findings from the First Cohort

Patient Characteristics and Outcomes

Between February 11, 2021 and November 25, 2022, 302 young adult intakes were scheduled, 204 intakes initiated (i.e., 32% intake absentee rate), and 152 fully enrolled (i.e., completed both intake sessions) in the program (74.5% of intakes). For intakes, 18% of young adults did not show up to an originally scheduled intake and did not reschedule or engage in the program. Of young adults who fully enrolled in the first ~21 months (n=152), the mean age was 21 years of age (SD=2.4) and 47% were women (See Table 2). Most young adults came to the program for their cannabis (68%), alcohol (63%), cigarette (36%), e-cigarette (27%), and/or cocaine use (24%) (Figure 3). On SUD symptom scales, 84%, 65%, and 20% of young adults exceeded moderate-high clinical cut-points for cannabis, alcohol, and drug use disorder symptoms respectively (i.e., CUD, AUD, DUD). Further, using context-specific cut-offs (76), almost all young adults (95%) exceeded at least one clinical threshold for co-occurring non-substance mental health symptoms. The mean number of mental health symptom clinical thresholds surpassed by young adults in the YA-SUP was five. In terms of specific conditions, 83% endorsed moderate to severe generalized anxiety symptoms, 72% moderately severe to severe depressive symptoms, 65% borderline personality disorder (BPD), and 65% attention deficit hyperactivity disorder (ADHD) symptoms above clinical cut-offs, and there was a high prevalence of trauma exposure (88%) with 61% surpassing PTSD thresholds.

Of the 61 young adults who completed the program up to November 2022, 72% attended at least one group (most common: 46% CBT, 39% DBT, 26% mindfulness), 74% received at least one consult (54% nurse practitioner, 15% psychiatry, 15% psychology), and 39% received supplemental MAT sessions. Forty-four (72%) young adults had a documented psychotropic medication prescribed prior to the YA-SUP, with twenty-eight (46%) receiving a prescription by a YA-SUP provider (82% antidepressants; 46% anticonvulsants, primarily gabapentin for mood, anxiety, and withdrawal symptoms; 25% antipsychotics; 7% stimulants). Some young adults (n=12) were prescribed withdrawal or anti-craving medications (most commonly naltrexone) by other providers immediately before or during the YA-SUP. See Figure 4 for treatment outcomes.

The program also delivered four cycles of the Loved Ones Education Group, with all attendees identifying as parents or caregivers of young adults with substance use concerns. Of the attendees (n=~37), a majority of their young adult loved ones were not in treatment (78%) and predominantly using cannabis (81%), alcohol (49%), and/or cigarettes (22%).

Leveraging the Measurement System for Quality Improvement

By reviewing patient characteristics from the MBC assessments alongside implementation outcomes (such as reach, uptake, and dose), clinical insights from the care team, and follow-ups with young adults, the program continues to iteratively adjust to improve services. Specifically, like other similar programs, we saw relatively high levels of service disengagement early in the program (83-85). In line with quality improvement implementation guidance (23), we made a number of systematic modifications to the delivery and evaluation of the program during the first year based on these findings. These adaptations included: 1) separating content initially developed for single sessions into multiple sessions (e.g., intake, CBT identifying and challenging thoughts); 2) adjusting group structure (e.g., reducing the number of group options) and content (e.g., adding more co-occurring mental health content for loved ones and
<table>
<thead>
<tr>
<th>General Construct</th>
<th>Time Point(s)</th>
<th>Specific Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td>Intake</td>
<td>Age, gender, sex, race, living status, subjective social status, education, student status, employment status, recent mental health related Emergency Department visit, recent controlled environment (e.g., hospital, residential treatment, jail)</td>
</tr>
</tbody>
</table>
| Substance Use Related Indicators | All | • Alcohol  
• Cannabis  
• Tobacco Cigarette |
| Past month frequency (1=never to 8=more than once per day) | All | • Poppers (cannabis and tobacco)  
• E-cigarette  
• Cocaine  
• Prescription Stimulants  
• Methamphetamine  
• Sedatives  
• Opioids  
• Ecstasy, MDMA, molly |
| Primary and secondary reasons for treatment | Intake | • Hallucinogens (LSD, acid, mushrooms)  
• Inhalants  
• Other |
| Solitary use (adapted (87)) | All | • Alcohol, cannabis, and other drugs |
| Readiness, importance, and confidence rulers (88) | Intake | • Alcohol, cannabis, other drugs |
| 3 months  
| 6 months | |
| 3 months  
| 6 months | |
| Age at first use | Intake | • Cannabis use with or without authorization  
• Number of cigarettes per day  
• Type of e-cigarettes |
| Substance use disorder symptoms | Intake | • Generalized Anxiety Disorder (GAD-7; α=0.91; (92))  
• Depression (Patient Health Questionnaire 9 [PHQ-9]; α=0.86; (93))  
• Post-Traumatic Stress Disorder (PCL-5; α=0.95; (94))  
• Youth-Centric Quality of Life (adapted MyLifeTracker; α=0.86; (95))  
• Global quality of life item and health item (World Health Organization Quality of Life [WHOQOL-BREF]; (96)) |
| Substance-specific questions | Intake | • Attention Deficit Hyperactivity Disorder (World Health Organization Adult ADHD Self Report Scale [ASRS]; α=0.86; (97))  
• Borderline Personality Disorders (McLean Screening Instrument for BPD [MSI-BPD]; α=0.77; (98))  
• Prodromal Symptoms of Psychosis (Prodromal Questions [PQ]; α=0.84; (99))  
• Eating Disorder Symptoms (Patient Health Questionnaire Eating Disorders [PHQ-ED]; (100)) |

continued
the young adult CBT group); 3) piloting a closed DBT-informed skills group with a concurrent focus offered to those with heightened emotion dysregulation difficulties (e.g., co-occurring BPD); 4) clarifying, adding, and streamlining questions in the assessment package and refining clinician reports and patient personalized feedback based on these assessments (i.e., the measurement system); and 5) expanding the clinical team (notably, hiring a community support worker focused on community outreach, engagement, collaboration, and capacity building). Additionally, we were able to explore statistical trends in predictors of retention and engagement in our population. Identifying these trends has led to ongoing development and piloting of programing focused on individualized harm reduction, trauma, and group readiness.

**Summary**

The Young Adult Substance Use Program (YA-SUP) represents the combination of best practices, contemporary research, and input from interested parties, while operating within the parameters of available program resources. This program demonstrates that developing an integrative evidence-informed MBC young adult substance use program is feasible, though requires flexibility and ongoing adaptations to meet local needs. In the first two years of the program, cannabis and alcohol use were the most common reasons for treatment and young adults presented with a high degree of comorbidity, particularly regarding internalizing mental health disorders and near-universal trauma exposure. The level of complexity and comorbidity among young adults presenting to the program was higher than anticipated. By taking a MBC and learning health system approach, we have been able to simultaneously monitor who our program is serving and how our program is doing to inform immediate improvements to the program and contribute to gaps in research.

There are several considerations that pertain to the current program. First, generalizability regarding specific program components and patients is limited due to the program being created for and implemented in a single city that also

---

**Table 1. Summary of key measures in the structured assessment package (table continued)**

<table>
<thead>
<tr>
<th>General Construct</th>
<th>Time Point(s)</th>
<th>Specific Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mental Health Related Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Social Phobia (Ontario Child Health Study Emotional Behavioural Scales [OCHS-EBS]; $\alpha=0.84$; (101))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oppositional Defiant Disorder (adapted OCHS-EBS; $\alpha=0.85$; (101))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Conduct Disorder (adapted OCHS-EBS; $\alpha=0.81$; (101))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Problem Gambling Severity (Problem Gambling Index; $\alpha=0.95$; (102))</td>
</tr>
<tr>
<td>Intake only historical experiences and values</td>
<td>Intake</td>
<td>• Valued Living Questionnaire (adapted VLQ; (103))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Brief Trauma Questionnaire (BTQ; (104))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Traumatic Brian Injury (TBI)</td>
</tr>
<tr>
<td><strong>Candidate Mechanisms and Satisfaction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candidate mechanisms</td>
<td>Intake</td>
<td>• Mindfulness (adapted Mindfulness Attention Awareness Scale; $\alpha=0.85$; (105))</td>
</tr>
<tr>
<td></td>
<td>3 months</td>
<td>• 5-Trial adjusted Delay Discounting Task (106)</td>
</tr>
<tr>
<td></td>
<td>6 months</td>
<td>• Impulsive Behaviour Scale (SUPPS-P; $\alpha=0.58-0.81$; (107))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Frequency of physical activity (Physical Activity and Sedentary Behaviour Questionnaire [PASB-Q]; (108))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sleep (items from PHQ-9 and PCL-5)</td>
</tr>
<tr>
<td>Discharge only</td>
<td>~3 months</td>
<td>• Satisfaction with the program (including closed and open-ended questions)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Perceived helpfulness of the program (including closed and open-ended questions)</td>
</tr>
</tbody>
</table>

---

*Please contact the corresponding author if interested in further details regarding measurement selection and measurement properties within our clinical sample.*

* Cronbach’s alpha ($\alpha$) measures internal consistency (scores >0.7 indicate good internal consistency).

* Due to an administrative error, response options were slightly different from the original measure; for questions 3 and 8 response options included: never, monthly or less, 2-4 times a month, 2-3 times a week, daily or almost daily.
offers a separate Rapid Access Addiction Medicine Clinic that focuses on medication management, primarily related to alcohol and opioids. Second, though the assessment package includes widely used psychometrically validated measures, standardized diagnostic interviews, biological drug screening, or other more lengthy measures, such as the Timeline-Follow-Back interview, were not used due to staff resources and patient burden. Third, the only routine qualitative program assessment comes from open-ended questions in discharge surveys. Given recovery and harm reduction are nuanced and individualized, primarily relying on quantitative measures is unlikely to fully capture program outcomes and experience. Fourth, though young adults were consulted during program development and implementation, and young adult feedback continues to be used to improve the program, the program was not fully co-designed with youth partners from the initial planning stages. Fifth, though contingency management is a common best-practice for substance use treatment (86) it was not incorporated in the YA-SUP given it is often (though not always) used for abstinence-based programs, it was not identified as a local priority, and there were concerns about the sustainability of ongoing financial incentives. Lastly, several suggestions from interested parties have not yet been incorporated to permit orderly modifications to the program due to resource limitations.

This program overview can help inform the development and evaluation of future tailored programs. Future considerations for our program and others include expanding the flexibility in the referral pathways, timing, and location of services; expanding program offerings to focus on other

<table>
<thead>
<tr>
<th>Demographics</th>
<th>% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race category (white)</td>
<td>78.9 (120)</td>
</tr>
<tr>
<td>Sex (female)</td>
<td>54.6 (83)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>46.7 (71)</td>
</tr>
<tr>
<td>Man</td>
<td>42.8 (65)</td>
</tr>
<tr>
<td>Gender Diverse (transfeminine, transmasculine, non-binary, 2-spirit)</td>
<td>7.9 (12)</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>2.0 (3)</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>0.7 (1)</td>
</tr>
<tr>
<td>Living Situation</td>
<td></td>
</tr>
<tr>
<td>Living with family</td>
<td>57.9 (88)</td>
</tr>
<tr>
<td>Living independently</td>
<td>15.8 (24)</td>
</tr>
<tr>
<td>Living with a partner, roommate(s), or in residence</td>
<td>23.7 (36)</td>
</tr>
<tr>
<td>Living in a group home, shelter, or homeless</td>
<td>2.6 (4)</td>
</tr>
<tr>
<td>Subjective Socioeconomic Status</td>
<td></td>
</tr>
<tr>
<td>Not enough to pay bills</td>
<td>15.1 (23)</td>
</tr>
<tr>
<td>Enough to pay bill, but have to cut-back</td>
<td>28.9 (44)</td>
</tr>
<tr>
<td>Enough to pay bills without cutting back</td>
<td>27.0 (41)</td>
</tr>
<tr>
<td>Enough for extras</td>
<td>28.9 (44)</td>
</tr>
<tr>
<td>Student</td>
<td></td>
</tr>
<tr>
<td>Not a student</td>
<td>69.1 (105)</td>
</tr>
<tr>
<td>Part time or less</td>
<td>11.8 (18)</td>
</tr>
<tr>
<td>Full time</td>
<td>19.1 (29)</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
</tr>
<tr>
<td>Not employed</td>
<td>46.7 (71)</td>
</tr>
<tr>
<td>Casual or part time</td>
<td>31.6 (48)</td>
</tr>
<tr>
<td>Full time</td>
<td>21.7 (33)</td>
</tr>
</tbody>
</table>
Figure 3. Substance use prevalence and frequency

![Substance use prevalence and frequency graph]

Legend:
- 1 = never
- 2 = 1 day/month
- 3 = 2-3 days/month
- 4 = 1-2 days/week
- 5 = 3-4 days/week
- 6 = 5-6 days/week
- 7 = once per day
- 8 = > once per day

Figure 4. Mean changes in core measures from intake to check-in 3 (reported as means with standard errors, * p<0.001)

### 4.1 Substance Use Disorder Symptoms

<table>
<thead>
<tr>
<th>Measure</th>
<th>Intake Mean (SE)</th>
<th>3 Months Mean (SE)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol Use Disorder Symptoms (AUDIT)</td>
<td>20 (0.5)</td>
<td>15 (0.4)</td>
<td>*</td>
</tr>
<tr>
<td>Cannabis Use Disorder Symptoms (CUDIT)</td>
<td>18 (0.6)</td>
<td>13 (0.5)</td>
<td>*</td>
</tr>
<tr>
<td>Drug Use Disorder Symptoms (DUDIT)</td>
<td>12 (0.4)</td>
<td>8 (0.3)</td>
<td>*</td>
</tr>
</tbody>
</table>

### 4.2 Anxiety and Depressive Symptoms

<table>
<thead>
<tr>
<th>Measure</th>
<th>Intake Mean (SE)</th>
<th>3 Months Mean (SE)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety (GAD7)</td>
<td>10 (0.3)</td>
<td>7 (0.2)</td>
<td>*</td>
</tr>
<tr>
<td>Depression (PHQ9)</td>
<td>12 (0.4)</td>
<td>8 (0.3)</td>
<td>*</td>
</tr>
</tbody>
</table>

### 4.3 PTSD Symptoms

<table>
<thead>
<tr>
<th>Measure</th>
<th>Intake Mean (SE)</th>
<th>3 Months Mean (SE)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD (PCL5)</td>
<td>45 (0.5)</td>
<td>40 (0.4)</td>
<td>*</td>
</tr>
</tbody>
</table>

### 4.4 Quality of Life

<table>
<thead>
<tr>
<th>Measure</th>
<th>Intake Mean (SE)</th>
<th>3 Months Mean (SE)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of Life (MLT)</td>
<td>7 (0.2)</td>
<td>8 (0.2)</td>
<td>*</td>
</tr>
</tbody>
</table>

Note: AUDIT=Alcohol Use Disorder Identification Test; CUDIT=Cannabis Use Disorder Identification Test; DUDIT=Drug Use Disorder Identification Test; GAD7=Generalized Anxiety Disorder 7; PHQ9=Patient Health Questionnaire 9; PTSD=Post-traumatic Stress Disorder; PCL5=PTSD checklist for DSM-5; MLT=MyLifeTracker
areas of health and functioning (e.g., occupational support, housing, exercise, finance, substance-free activities); increasing access to longer term psychopharmacotherapy monitoring; increasing the number of available individual psychotherapy sessions, when clinically indicated; including more targeted programming (e.g., cannabis use-specific, ADHD-specific, and trauma-specific groups); hiring and integrating a peer support worker with lived expertise; increasing closed group offerings; mutual support or weekly structured relapse prevention groups; and community capacity building for adolescent services in collaboration with other local youth substance use services.

Limited evidence-based recommendations currently exist for substance use and concurrent disorder treatment in young adults. The YA-SUP was created by drawing on recommendations from existing research, consultations with experts, and focused meetings with interested parties. MBC, including clients’ feedback and reactions to our offered programming, has been embedded in the program from its initiation. Based on the feedback and patient data, iterative modifications have been made and continue to be implemented to improve the program and meet the needs of the local community. Overall, the process of the initial development, ongoing evaluation, and continued programming enhancement of the YA-SUP, illustrates the value of utilizing MBC in young adult focused programming, as well as the combined incorporation of young adult voices with best practice recommendations to optimize outcomes for this population.

Additional Information

Specific information about consultations, measurement selectivity and psychometric properties, manuals, or more detailed results are available upon request from the corresponding author. Some of this information, including examples of personalized feedback reports, are available at doi: https://doi.org/10.1101/2022.10.21.22281362.

Acknowledgements

We thank the Boris Family for their generous donation that made this program possible. Additional support came from St. Joseph’s Healthcare Hamilton and the Peter Boris Centre for Addictions Research. JM is supported by the Peter Boris Chair in Addictions Research and a Tier 1 Canada Research Chair in Translational Addiction Research. JH is supported by a Canadian Institutes of Health Research Banting Postdoctoral Fellowship. We also want to thank all of the research, clinical, and young adult experts who consulted on program development including: Brandon Bergman, PhD; Khrista Boylan, MD, FRCP(C), PhD; Penny Burley, CRPO; Kim Corace, PhD; Andrew Costa, PhD; Sarah Feldstein Ewing, PhD; Melissa Griffin, PhD; Taylor Hatchard, PhD; Lisa Hawke, PhD; Joanna Henderson, PhD; Ellen Lipman, MD, FRCP(C), MSc; Lisa Jeffs, MA; Madeline Luvisa, BSW; Leslie Martin, MD; Mackenzie Mawson, BScN, RN; Catherine McCarron, RSW, MSW; Robert Miranda Jr., PhD MEd; Catharine Munn, MD, FRCP(C), MSc; Jim Murphy, PhD; Dawn Pierce, RN; Tim O’Shea, MD; Christine Squires, Community Support Worker; Elizabeth Osuch, MD; John Westland, MSW. We would also like to thank all the clinical and research trainees and staff who have worked with the YA-SUP. Additionally, we would like to thank the patients and families who trust us with their care.

Conflicts of Interest

JM is a principal in BEAM Diagnostics, Inc. and a consultant to Clairvoyant Therapeutics, Inc. No other authors have any conflicts of interest to declare.

References


report from the youth to adult transitions in health care - the case of mental health services in Ontario research team


Initial insights from a quality improvement initiative to develop an evidence-informed young adult substance use program


Initial insights from a quality improvement initiative to develop an evidence-informed young adult substance use program


