

Towards competency-based medical education in addictions psychiatry: a systematic review

Vers une éducation médicale axée sur les compétences dans le domaine de la psychiatrie des toxicomanies: une revue systématique

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Abstract

Background: Current curriculum guidelines for addiction training in psychiatry need to be adapted to the competency by design framework to integrate clinical skills in addiction.

Objective: We conducted a systematic review to identify curricular and educational interventions to build competency among psychiatry residents and fellows in addiction psychiatry.

Methods: We followed the PRISMA guidelines, searching five databases from inception to August 2020 for relevant evaluation-type studies exploring addiction psychiatry competency among psychiatry residents and fellows. We appraised study quality using the Joanna Briggs Institute's risk of bias tool for observational designs.

Results: From 1600 records, 17 studies met inclusion criteria. Addiction psychiatry competencies spanned themes involving core knowledge development; attitudinal, communication and leadership skills; screening, assessment, diagnosis; management; and special populations. Examples of effective educational interventions to enhance addiction competency include specific modules for substance use disorders and integrated clinical rotations that simultaneously combine multiple types of skills. Lived experience improved trainee attitudes towards addiction psychiatry.

Conclusions: While there is current evidence supporting strategies for developing competency in addiction psychiatry, the lack of studies measuring sustained competence over a longer-term follow-up period and the absence of randomized controlled trials limit the overall strength of evidence in this review. Current psychiatry entrustable professional activities (EPAs) involving addiction only partly overlap with curriculum training guidelines and studies identified in this review. These EPAs need to be better identified for training programs, competence in those EPAs better delineated for residents and preceptors, and evaluations should be done to ensure that adequate competence in addictions is attained and sustained.

Résumé

Contexte : Les directives actuelles du programme d'études pour la formation sur les toxicomanies en psychiatrie doivent être adaptées au cadre de la CPC pour intégrer les compétences cliniques en toxicomanie.

Objectif : Nous avons effectué une revue systématique de la littérature afin de repérer les interventions éducatives visant à renforcer les compétences des résidents et des stagiaires post-doctoraux (fellows) en psychiatrie des toxicomanies.

Méthodes : Suivant les lignes directrices PRISMA, nous avons effectué une recherche dans cinq bases de données couvrant la période allant de leur création jusqu'à août 2020 pour recenser les études de type évaluation portant sur le développement de compétences en matière de toxicomanie par les résidents et les stagiaires postdoctoraux (fellows) en psychiatrie. Nous avons évalué la qualité des études à l'aide de l'outil d'évaluation du risque de biais de l'Institut Joanna Briggs pour les études observationnelles.

Résultats : Dix-sept des 1600 études répertoriées répondaient à nos critères d'inclusion. Les compétences en matière de psychiatrie des toxicomanies couvrent les thèmes de l'acquisition de connaissances de base; l'attitude, la communication et le leadership; le dépistage, l'évaluation et le diagnostic; la prise en charge; et les populations particulières. Parmi les exemples d'interventions éducatives efficaces visant à améliorer les compétences en matière de toxicomanie figurent les modules portant sur les troubles liés à l'abus de substances et les stages cliniques intégrés qui combinent simultanément plusieurs types d'habiletés. L'expérience concrète vécue semble améliorer l'attitude des apprenants à l'égard de la pratique de la psychiatrie des toxicomanies et de leur traitement.

Conclusions : Il existe actuellement des preuves à l'appui de stratégies visant à approfondir les connaissances sur les toxicomanies, à améliorer les attitudes envers les personnes souffrant de dépendances et les résultats des traitements, à concevoir des stages cliniques/programmes de perfectionnement (fellowships), à développer l'auto-évaluation et des innovations « érudites ». Le APC actuellement qui abordent la dépendance ne recourent que partiellement les lignes directrices pour les cursus de formation et le contenu des études recensées dans notre revue. Ces APC doivent être mieux définies dans les programmes d'études et les compétences qu'elles visent mieux circonscrites pour les résidents et les superviseurs. De surcroît, des évaluations doivent être effectuées pour garantir l'atteinte et le maintien d'une compétence adéquate en matière de toxicomanie.

Background

Addiction psychiatry is a discipline within general psychiatry dedicated to the care and support of individuals with substance use disorders and behavioural addictions.¹ All Canadian psychiatry residents must receive at least one month of supervised experience in treating patients with substance-related and addictive disorders in various settings evaluated separately from other rotations Surgeons of Canada (RCPSC) guidelines.²

As there is substantial variability in the extent and offering of addiction services and training opportunities, the type of addiction experience a psychiatry resident receives depends on where they work. Some residency training programs meet the requirement through a distinct one-month rotation in addiction psychiatry, while others offer a longitudinal experience equivalent to one month. Timing and setting also vary. Some programs use a residential treatment setting for the experience early in psychiatric training to meet the requirements. In contrast, others integrate addiction psychiatry training with other core clinical rotations, such as consultation-liaison psychiatry, emergency psychiatry, inpatient psychiatry and outpatient–community services, meaningful to future clinical practice.^{3,4}

Ultimately, psychiatry residents must gain competence with primary addiction treatment modalities, such as detoxification, ambulatory care, and rehabilitation.^{3,5-7} Surveys of Canadian psychiatry residents and psychiatrists report they feel most unequipped to manage patients who present with addiction-related issues.^{5,8,9} As we usually consider psychiatrists the experts in mental illness and addiction, this discrepancy between professional responsibility and real-world practice points to a more systemic problem in psychiatry residents' training. While addiction psychiatry is not currently a subspecialty of psychiatry, the RCPSC has recently approved an Area of Focused Competence (AFC) in Addiction Medicine, where trainees at an approved program can obtain Diplomate status via the RCPSC to recognize an area of supplemental or advanced training.^{10,11}

Considering increasing criticism of traditional time-based models of residency training,¹² Canadian residency programs have shifted to Competency by Design (CBD) as of July 1, 2020.¹³ CBD aims to prepare physicians for practice by orienting training to competencies derived from the needs of society and patients.¹⁴ To operationalize CBD, the RCPSC has adopted “entrustable professional

activities” (EPAs),¹⁵ which are units of professional practice that can be entirely entrusted to a trainee as soon as there is a demonstration of the necessary competence to execute the activity unsupervised.¹⁶ Within psychiatry, several national CBD working groups, have undertaken the task of defining EPAs across all stages of residency training and subspecialties.¹⁷⁻⁴¹ While some psychiatric subspecialties have dedicated EPAs, the CBD elements for addiction psychiatry were defined by general working groups and hidden within the 17 overall EPAs for all psychiatric training,^{42,43} making their identification challenging and needed skills for entrustment uncertain. Preceptors evaluating an addiction psychiatry-based EPA may lack the training and skills in addiction psychiatry, resulting in limited improvements in competency unless the skills required are further spelled out and made explicit.⁴

Within these 17 EPAs, there are three EPAs in the Foundations of Discipline (FoD) stage and three EPAs in the Core of Discipline (CoD) stage that address addiction psychiatry. In the FoD stage, the three EPAs include: assessing, diagnosing, and participating in the management of patients with medical presentations relevant to psychiatry involving at least one substance intoxication and at least one overdose and/or withdrawal; performing psychiatric assessments referencing a biopsychosocial approach and developing a basic differential diagnosis for patients with mental disorders involving a case of substance use disorder; and developing and implementing management plans for patients with psychiatric presentations of low to medium complexity involving a substance use disorder. In the CoD stage, the three EPAs include: developing comprehensive treatment/management plans for adult patients involving at least one substance use disorder; integrating the principles and skills of psychotherapy into patient care involving at least two sessions in one other evidence-based modality (with motivational interviewing listed as an option); and integrating the principles and skills of psychopharmacology into patient care involving at least one each of managing benzodiazepines and opioid agonist therapy (OAT).

Furthermore, the 2015 CPA position papers defined stage-specific competencies and curriculum topics for addiction psychiatry training for Canadian psychiatry residents.^{3,4} Specialty training requirements suggest working knowledge in motivational interviewing—an evidence-based intervention for substance use disorders. In contrast,

the CPA position statements emphasize that psychiatrists require proficiency in a broader range of evidence-based psychosocial interventions for substance use disorders, such as cognitive-behavioural therapy. Psychiatrists also require proficient knowledge and skills in the appropriate use of pharmacotherapeutic agents to treat alcohol, tobacco, and opioid use disorder and managing concurrent psychiatric and substance use disorders.

While having a theoretical framework of competency in addiction psychiatry is helpful, it is unclear how best to enhance these psychiatry residents' competencies. To that end, the combination of theoretical frameworks and evidence-based approaches to improving specific skills in addiction psychiatry could increase the likelihood that future CBD models will include addiction psychiatry EPAs. To help fill this gap, we conducted a systematic review of addiction psychiatry educational interventions for psychiatry residents and fellows, focusing on educational outcomes related to acquiring competency in addiction psychiatry as per the 2015 CPA position statements.^{3,4}

Methods

Review registration

We registered this review with PROSPERO (CRD42019136906) and followed the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines.^{44,45}

Eligibility criteria

We developed our eligibility criteria using the population-intervention-comparison-outcome-study design (PICOS) framework:⁴⁶

1. Population: psychiatry residents and fellows.
2. Intervention: addiction psychiatry educational interventions, such as courses, curriculum, modules, self-assessment tools, or competency frameworks.
3. Comparator: not required.
4. Outcomes: addiction psychiatry competencies as defined by the 2015 CPA position statement (Table 1).
5. Study design: we considered any evaluative study (e.g., pre-post, randomized controlled trials, surveys); we excluded commentaries, editorials, and review articles.

Search strategy

We consulted a research librarian to prepare a systematic search of five electronic databases from inception to

August 2020: Embase, Medline, PsycInfo, PubMed, and ProQuest (Appendix A). We used terms including "competency," "curriculum," and "education," combined with "addiction psychiatry" to identify relevant peer-reviewed articles. We filtered our search results to English-language articles that involved human participants.

Study selection

Two reviewers independently screened the titles and abstracts of records retrieved from the systematic search against the eligibility criteria. All disagreements were resolved by consensus.

Table 1. Stage-specific competencies in substance-related and addictive disorders adopted from the 2015 Canadian Psychiatric Association position statement^{3,4}

Variable	PGY-1	PGY-2 to -3	PGY-4 to 5 ^a	
Knowledge	Substance effects	WK	Prof	Adv
	Biopsychosocial understanding	WK	Prof	Adv
	Epidemiology	Intro	WK	Prof and/or Adv
	Community resources	Intro	WK	Prof and/or Adv
	Screening	WK	Prof	Adv
	Assessment and diagnosis	WK	Prof	Adv
Skills	Management of intoxication and or withdrawal	WK	Prof	Adv
	Patient placement	Intro	WK	Prof and/or Adv
	Concurrent disorder treatment	WK	Prof	Adv
	Pharmacotherapy	Intro	WK	Prof and/or Adv
	Psychotherapy			
	Brief Interventions	WK	Prof	Adv
	MI	Intro	WK	Prof and/or Adv
	CBT and/or relapse prevention	Intro	WK	Prof and/or Adv
	TSF and contingency management	Intro	WK	Prof and/or Adv
	Family	Intro	WK	Prof and/or Adv

^aPsychiatry three- to six-month selective training and (or) fellowship training
Adv = advanced; Intro = introductory knowledge; Prof = proficient; TSF = 12-step facilitation; WK = working knowledge; MI = motivational interviewing; CBT = cognitive behavioural therapy.

Data extraction

We used Cochrane's Covidence, a web-based systematic review manager, to extract information from each study.

We collected the following data items using the PICOS format:

- Population: sample characteristics
- Intervention: type of educational strategy used
- Comparison: if used
- Outcome: outcome variables
- Study: authors, location, study design, experimental processes

Quality assessment

We assessed the studies' risk of bias per the Joanna Briggs Institute's risk of bias tool⁴⁷ (Appendix B).

Analysis

We could not analyze the data using meta-analysis because of significant heterogeneity in the designs, outcomes, and data types reported across studies. As meta-analysis primarily involves pooling studies using the same intervention, the sheer diversity in approaches taken across studies effectively rendered this approach impossible, given that no two studies explored the same process. Only a handful of studies presented quantitative data; hence, we could only pool a small portion of the studies and data had we undertaken meta-analysis. Given these limitations, we opted to provide a descriptive synthesis of the findings across studies using the Cochrane guidelines for non-quantitative reviews.⁴⁸ We also explored potential heterogeneity in the results because of differences in study designs (e.g., cross-sectional studies, commentaries, program evaluations, reviews coming to different conclusions about the particular aspects of an intervention or concept). We then highlighted similarities and differences in the findings within the review and using summary tables.

Results

From 1600 records, 17 original articles met our inclusion criteria (Figure 1). We present our findings in Appendix C.

Study quality

As there were also no randomized controlled trials identified, we appraised the quality of the 17 non-randomized studies using the Joanna Briggs Institute instrument. Nine of these were of "low" quality, seven were of "medium" quality, and one was of "high" quality (Appendix B). Most studies rated low or medium quality did not measure outcomes using validated instruments or identified potentially confounding factors.

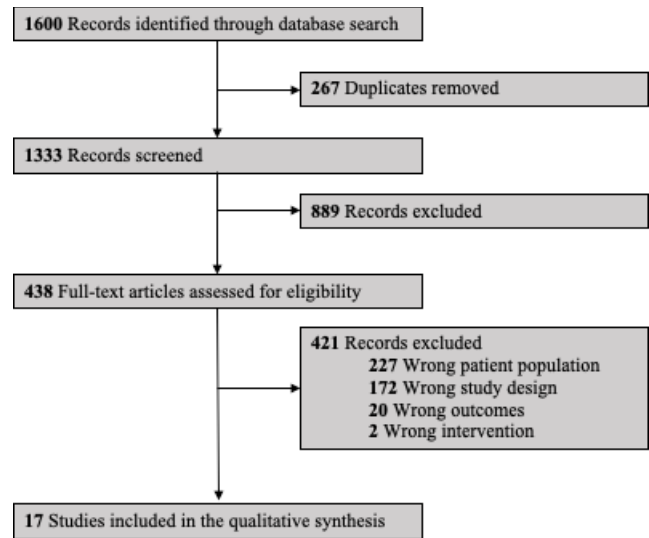


Figure 1. PRISMA flow diagram.

Improving knowledge-based competencies using targeted modules

Knowledge-based addiction psychiatry competencies, such as substance-specific effects, the pathophysiology of addiction, addiction epidemiology, and the principles of addiction treatments, appeared to improve in residents and fellows who completed didactic or virtual modules. For example, among graduating-year psychiatry residents who received buprenorphine training, there were more positive attitudes towards OUD and its management, which persisted into practice.⁴⁹ General psychiatry, pediatrics and child and adolescent psychiatry residents and fellows who attended a lecture on internet gaming disorder (IGD) reported a significant increase in confidence in identifying internet gaming criteria, using screening tools, and discussing IGD with patients.⁵⁰ Similarly, US psychiatry residents who completed a three-hour web-based curriculum on tobacco use disorder (TUD) demonstrated an improved willingness to assess, advise, and treat patients and prescribe specific treatments for TUD.⁵¹ Psychiatry residents from Northern California participating in a four-hour curriculum on tobacco use disorder reported improved knowledge, confidence, and counselling behaviours for patients.⁵² For addiction psychiatry and psychology fellows at the Yale University School of Medicine who completed an acupuncture module as an adjunct for addiction treatment, 90% reported satisfaction with the training and found it beneficial to their practice.⁵³ After completing a 2.5-hour online training session on opioid agonist therapy (OAT), psychiatric trainees at a sizeable Victorian adult mental health service reported improved knowledge regarding OAT and opioid use

disorder (OUD) treatment. Still, they did not report feeling more confident with the assessment of OUD.⁵⁴ Addiction psychiatry fellows also reported that virtual addiction modules spanning multiple themes—opioids, alcohol, tobacco, stimulants, psychosocial treatments for addiction, addiction in pregnancy, and the intersection with pain—were valuable and feasible for fellowship training.⁵⁵

Thus, targeted modules may help address areas missed in training, like that related to special populations, but also have the potential to focus on niche areas that may or may not be as necessary for general addiction psychiatry competence. However, while didactic and online content appears to be effective in ensuring knowledge content attainment in addiction psychiatry, clinical experience is required for confidence to apply learnings to practice.

Enhancing positive attitudes towards addiction and its treatment using multimodal strategies

Several educational approaches appeared to enhance attitudinal skills among psychiatry residents and fellows. For example, attitudes towards addiction and the treatment of substance use disorders improved six months after all first-year psychiatry and internal medicine residents completed an online training module on addiction-related stigma.⁵⁶ Furthermore, training in evidence-based treatment for addictive disorders appears to improve attitudes towards addiction concomitantly. For example, psychiatry residents trained in motivational interviewing (MI) had more positive attitudes towards addiction and treatment and gained specific MI competence.⁵⁷ Likewise, Michigan state general psychiatry residents who attended addiction psychiatry conferences reported improved, positive attitudes towards people with substance use disorders and addiction treatment. They also reported enhanced interest in obtaining further addiction psychiatry training, such as fellowship programs.⁵⁸ In a similar vein, first-year psychiatry residents at the University of Toronto who participated in a one-month reflective techniques course embedded into a core addiction psychiatry rotation were rated valuable at promoting care for patients with addiction.⁵⁹ In another study, Toronto psychiatry residents reported improved understanding of the lived experience of recovery and a greater sense of shared humanity with service users after participating in a six-month pairing with patients with lived experience of addiction and concurrent psychiatric disorders.⁶⁰ In summary, focusing on stigma, MI, self-reflection, and including persons with lived experiences

improves addiction and treatment among psychiatry trainees.

Encouraging scholarly development and research in addiction

Scholarly development to develop future teachers and mentors of addiction psychiatry has also been demonstrated in the literature. Fellows enrolled in the Boston University Medical School Research in Addiction Medicine Scholars (RAMS) program have significantly increased their scholarly activity after enrolment in a two-year intensive research mentorship program, including numerous publications, conference presentations, and grants.⁶¹ Similarly, addiction psychiatry fellows at Yale University School of Medicine who completed a module on educational skills alongside individual mentorship to lead a case conference were satisfied with the program, with 91% reporting an improvement in their education and presentation skills.⁶²

The impact of multidisciplinary addiction training programs on enhancing competencies

Across studies, integrated clinical rotations and fellowship programs appeared to provide the most comprehensive enhancement in several knowledge skill-based competencies, as defined in Table 1. Although the makeup of addiction training programs is heterogeneous, most involve multidisciplinary teams, including physicians from family medicine, psychiatry, internal medicine, nurses, and social workers.^{63–66} For example, the addiction medicine consult team (AMCT) at St. Paul's Hospital in Vancouver offers a structured clinical rotation that involves a four-week rotating addiction educational curriculum consisting of didactic lectures, journal clubs, mortality and morbidity rounds, and grand rounds presentations.^{64,67,68} Trainees are supervised in learning to conduct addiction medicine consults, including inpatient withdrawal management, MI, coordination of addiction treatment for medical comorbidities, screening, brief intervention and referral to treatment (SBIRT) and pharmacological management of substance use disorders.^{64,67,68} The AMCT then conducts all follow-up treatment recommendations and coordination. For enhanced skills learners (practicing family physicians), the rotation can last up to six months, and occasionally, shorter rotations (<1month) can refresh skills and knowledge about addiction care.⁶⁶ Residents and fellows who participated in the St. Paul's Hospital AMCT training program improved their competencies in multiple categories, including substance use screening, history taking, treating withdrawal, relapse prevention, the

management of nicotine and opioid use disorder, safe prescribing for opioid use disorder, and the neurobiology of addiction.⁶⁴ In summary, integrated clinical rotations and fellowship programs are efficient in enhancing multiple addiction psychiatry competencies simultaneously.^{63,66} General psychiatry residents from Michigan state who completed a 50-item test on general knowledge about substance use disorders showed improved retest scores upon completing their rotations.⁶⁵

However, it should be noted that there was only one study that directly assessed addiction training using a specifically developed instrument. Psychiatry residents at Creighton University Department of Psychiatry piloted an Addiction Training Scale (ATS), a self-report tool for psychiatry residents, which appeared to identify self-reported deficits in training.⁶⁹ Furthermore, there were no found studies of objective evaluations or studies using EPAs to assess addiction competence.

Discussion

This is an important comprehensive review of establishing competency in addiction psychiatry for psychiatry residents and fellows. Our review identified 17 studies evaluating diverse methods of addiction educational practices, one type of addiction educational assessment tool, and approaches to implementing addictions curriculum and its components—including addiction psychiatry knowledge and skills with means to improve attitudes towards persons with addiction and treatment outcomes, as well as the development of scholars and future mentors.

Studies addressing addiction knowledge and skills included in the review were more likely to focus more on easily taught didactic content, including substance effects, epidemiology, diagnostic criteria, neurobiology, screening and assessment, management of intoxication/withdrawal and pharmacotherapy, particularly OAT. There was one study on MI training. There were no studies explicitly addressing skill development in the biopsychosocial formulation of addiction, developing awareness of community resources, patient placement decision making, managing concurrent disorders, pharmacotherapy of addictions other than OUD, or other evidence-based psychotherapies for addictions (i.e., CBT, TSF, contingency management, family therapy).

While the new CBD-based EPAs address some areas of required competence in addictions, they are not identified separately, thus difficult to locate. The EPAs address

management of intoxication and withdrawal, assessment and diagnostic skills with some treatment planning, OAT management (not necessarily initiation) and benzodiazepine tapering. MI can be part of the psychotherapy skill EPA, but residents can meet the EPA without demonstrating specific addiction psychotherapy skills as the EPA is not specific to addiction. The EPAs addressing addiction do not describe particular content that needs to be covered or how observers would evaluate the trainee as meeting competence in the identified areas. The EPAs only partly map onto findings from this review and those identified in the training guidelines.^{4,42} Furthermore, the existing EPAs do not address other evidence-based psychotherapies for addiction, pharmacological management for substance use disorders other than OUD or benzodiazepine use disorder, or the nuances to managing concurrent disorders, which would be the bread and butter of psychiatric practice. While not ideal, the current EPAs represent a good start. Still, given the increasing demands for addiction competency for Canadian psychiatrists,^{70,71} better mapping of the EPAs onto identified competencies is required. This is how competency is determined for the specific EPAs.

Despite the described deficits, addiction psychiatry is well-positioned for integration within CBD. National standards for postgraduate addiction fellowships have been in place for more than three decades,⁴² and established training guidelines.^{4,42} Early on, fellowship programs in addiction psychiatry have emphasized three pillars: knowledge base, skills, and attitudes.⁴³ In recent years, competency-based models in addiction psychiatry have highlighted attitudinal skills,^{3,5-7} biopsychosocial-spiritual formulation,^{1,3,5,72} addiction neurobiology,^{5,72} psychological treatments,^{3,5-7} pharmacotherapy,^{1,4,5,7,73} and concurrent disorder management.^{1,4,73} To that end, CBD in addiction psychiatry has been successfully implemented outside of Canada, with several dedicated EPAs integrated into residency training programs in Australia and New Zealand⁷⁴ and the United States.⁷⁵ Studies evaluating the effectiveness of the adopted approaches are required to demonstrate benefit.

The transitions of psychiatry residency programs to CBD is a critical time for reflection on the vision for the future of medical education in addiction psychiatry, given the growing burden of substance use disorders and the increasing demand for addiction competency. There remains a relative scarcity in Canada of psychiatrists skilled in and practicing addiction psychiatry. Psychiatry residency training programs would benefit from having the six EPAs

related to treating substance use disorders within the current CBD framework better identified. Also, what constitutes competence for an addiction-based EPA needs to be more clearly defined and how to provide appropriate feedback for it as well, given that many of the assessments will be observed by practitioners who may have limited addiction psychiatry competence themselves. Furthermore, programs should expand on developing evidence-based psychotherapeutic skills for addictions, managing concurrent addictive and psychiatric disorders, and increased the breadth of pharmacotherapeutic management skills for all substance use disorders.

Limitations

Our study's strengths include the use of published standards to improve its overall quality, the comprehensive search strategy to have both published and grey literature, as well as the use of a quality assessment rubric. However, several limitations exist. The primary study limitation was the high degree of heterogeneity in our findings (precluding quantitative synthesis) and variability in methods used across studies—with some studies not fully delineating the feasibility or effectiveness of their interventions. Furthermore, most studies involved simple research designs (e.g., pre-post, cross-sectional). Hence, there is a lack of higher-quality or more empirically-based studies (e.g., randomized controlled trials).

Most importantly, most included studies involved brief, single-interventions, such as a one-month rotation or single-day conference. While it may not be challenging to establish short-term competency following exposure to educational activities, there is a high likelihood that participants can quickly lose these competencies afterward. The lack of studies measuring sustained competence over a longer-term follow-up period was another limitation of our review. Finally, as there were also no randomized controlled trials identified, the included studies were observational designs, and more than half (9/17) were of “low” quality; thus, the quality of the component studies is another potential limitation of our review as the overall strength of evidence to support these interventions is limited.

Future research

Within addiction psychiatry and CBD, there are several areas for future research. First, existing EPAs need to be evaluated to see if they are appropriately assessed to address the content and skills necessary for competence to practice and efficiently meet their milestones. Second, we

must determine if the existing EPAs for addiction psychiatry promote preceptor coaching feedback that incorporates evidence-based practices and emphasizes critical addiction psychiatry knowledge and skills for practice. Third, through their training, psychiatry residents should also have their development of addiction psychiatry skills beyond the EPAs assessed and any deficits identified where the ATS may prove to be a valuable tool for self-assessment.⁶⁵

Determining the adequacy of the current EPAs addressing addiction, preceptor coaching feedback, and overall training content will support the current cohort of Canadian psychiatry residents to meet their training requirements in addiction and help build the pool of available addiction psychiatrist practitioners to train subsequent cohorts. Competencies in addiction psychiatry need to be sustained and maintained beyond training. Ensuring that EPAs address psychiatric practice after residency training will be essential to evaluate in the future. There is a need to promote additional training in addiction psychiatry for current psychiatry residents and preceptors to ensure EPAs are met and adequately evaluated using evidence-based practices.

Conclusions

Our review findings demonstrate that there is potential to implement addiction psychiatry training within a CBD framework. However, current evidence supporting strategies for developing knowledge of addiction content, improved attitudes towards persons with addiction and treatment outcomes, clinical rotations/fellowships design, self-assessment and scholarly development only partly overlap with curriculum training guidelines and psychiatry resident EPAs addressing addiction. These EPAs need to be better identified for training programs, competence in those EPAs better delineated for residents and preceptors, and evaluations to ensure that adequate competence in addictions is attained and sustained.

Conflicts of interest: MD reports personal fees from Eisai Ltd, personal fees from Winterlight Labs, outside the submitted work.

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Role of Authors: All authors contributed to this study's design, the interpretation of the data, subsequent manuscript drafts (and revisions), and final approval for

submission. Two authors (AB & JS) conducted a systematic review and appraised the risk of bias. One author (AB) wrote the initial draft of the work and managed revision feedback from all authors.

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Appendix A. Search strategy

EMBASE: inception to August 16, 2020		
#	Searches	Results
1	exp opiate addiction/ or exp game addiction/ or exp addiction medicine/ or exp sexual addiction/ or exp addiction/ or exp food addiction/ or exp cannabis addiction/ or exp mobile phone addiction/ or exp social media addiction/ or exp "drugs used in the treatment of addiction"/ or exp behavioral addiction/ or addiction.mp. or exp internet addiction/ or exp computer addiction/ or exp morphine addiction/ or exp exercise addiction/	439303
2	exp curriculum/ or exp clinical competence/ or exp medical education/ or competency based medical education.mp.	430694
3	exp resident/ or exp residency education/ or psychiatry resident.mp.	68738
4	1 and 2 and 3	340
5	limit 4 to (human and English language)	297

MEDLINE: inception to August 16, 2020		
#	Searches	Results
1	exp "Internship and Residency"/ or psychiatry resident.mp. or exp Education, Medical, Graduate/	69974
2	addiction.mp. or exp Addiction Medicine/ or exp Behavior, Addictive/ or exp Alcoholism/ or exp Opioid-Related Disorders/ or exp Heroin Dependence/ or exp Substance-Related Disorders/	305471
3	Exp Education, Medical, Graduate/ or exp Education, Medical/ or exp Competency-Based Education/ or competenc*. mp. or exp Clinical Competence/	328742
4	1 and 2 and 3	507
5	limit 4 to (English language and humans)	326

PsycINFO: inception to August 16, 2020		
#	Searches	Results
1	addiction psychiatry.mp.	176
2	exp Psychiatric Training/ or exp Medical Residency/ or psychiatry resident.mp.	7718
3	Exp Nonsubstance Related Addiction Measures/ or exp Food Addiction/ or exp Drug Addiction/ or exp Sexual Addiction/ or exp Heroin Addiction/ or exp Addiction Treatment/ or exp Addiction/ or addiction.mp. or exp Internet Addiction/	83265
4	1 or 3	83265
5	exp Professional Competence/ or exp Competence/ or competence.mp.	71201
6	exp Medical Education/	24143
7	2 or 5 or 6	93361
8	4 and 7	740
9	limit 8 to (human and English language)	632

PubMed: inception to August 16, 2020		
#	Searches	Results
1	("addiction psychiatr*") AND ("education," OR "competen*" OR "curriculum," OR "train")	97

ProQuest: inception to August 16, 2020		
#	Searches	Results
1	"addiction psychiatry," AND ("education," OR "competen*" OR "curriculum," OR "train")	128

Appendix B. Joanna Briggs Institute's risk of bias assessments

Study	Were the inclusion criteria clearly defined?	Were the participants and the setting described?	Was the exposure measured validly and reliably?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured validly and reliably?	Overall appraisal
Agrawal 2016 ⁶⁰	Yes	Yes	No	N/A	No	N/A	No	Low
Athanasiou 2019 ⁵⁵	Yes	Yes	Yes	N/A	No	N/A	No	Medium
Avery 2018 ⁵⁶	Yes	Yes	Yes	N/A	Yes	No	No	Medium
Ballon 2008 ⁵⁹	Yes	Yes	No	N/A	No	N/A	No	Low
Foo 2014 ⁵⁴	Yes	Yes	Yes	N/A	Yes	No	No	Medium
Gorfinkel 2019 ⁶⁴	No	No	No	N/A	No	N/A	Yes	Low
Jha 2016 ⁵⁷	Yes	Yes	No	N/A	Yes	No	No	Medium
Karam-Hage 2001 ⁵⁸	Yes	Yes	No	N/A	No	N/A	No	Low
Karam-Hage 2014 ⁶⁵	Yes	Yes	Yes	N/A	Yes	No	Yes	High
Kats 2019 ⁵⁰	Yes	Yes	Yes	N/A	No	N/A	Yes	Medium
Muvvula 2016 ⁶²	Yes	Yes	No	N/A	No	N/A	No	Low
O'Connor 2017 ⁶¹	Yes	Yes	No	N/A	No	N/A	No	Low
Prochaska 2008 ⁵²	Yes	Yes	Yes	N/A	No	N/A	No	Medium
Sattar 2004 ⁶⁹	Yes	Yes	Yes	N/A	Yes	No	No	Medium
Serafini 2016 ⁵³	Yes	Yes	No	N/A	No	N/A	No	Low
Suzuki 2014 ⁴⁹	No	No	No	N/A	Yes	No	No	Low
Williams 2020 ⁵¹	No	No	Yes	N/A	No	N/A	Yes	Low

Appendix C. Characteristics of Studies (n = 17)

Study	Population	Intervention (s)	Outcome (s)	Design	Results	Overall appraisal
Agrawal 2016 ⁶⁰	The University of Toronto psychiatry residents (n = 21)	A six-month pairing between residents and patients with lived experience, who served as mentors	Global impression of the program, orientation to recovery-oriented care, and empathy	Pre-post-follow up study	Residents reported an improved understanding of the lived experience of recovery and a greater sense of shared humanity with service users	Low
Athanasios 2019 ⁵⁵	Addiction psychiatry fellows at the University of California (n = 3)	Addiction medicine modules, offered through a comprehensive online platform	Satisfaction and engagement with the material and method	Pre-post survey	Fellows reported the materials were valuable and workable for fellowship training	Medium
Avery 2018 ⁵⁶	All first-year psychiatry and internal medicine residents at Weill Cornell Medicine (n = 29)	Online training module on stigma	Attitudes toward individuals with substance use disorders	Pre-post-follow up study	Attitudes improved six months after completion of the online training module	Medium
Ballon 2008 ⁵⁹	First-year psychiatry residents at the University of Toronto (n = 28)	Twelve-hour reflective techniques course embedded into a one-month addiction psychiatry rotation	Overall impression and exploration of reflective experiences through journaling exercises	Pre-post survey	Trainees deemed reflective techniques valuable to help promote care in addiction	Low
Foo 2014 ⁵⁴	Psychiatric trainees at a sizeable Victorian adult mental health service (n = 20)	2.5-hour training session on opioid agonist therapy	Confidence with assessment, initiation, continuation, and relevant knowledge for opioid agonist therapy	Pre-post survey	There was no change in the percentage of those surveyed who felt confident in assessing for opioid addiction	Medium
Gorfinkel 2019 ⁶⁴	A mixed sample of residents and fellows (n = 43)	Four-week hospital-based addiction medicine rotation	Addiction medicine skills, such as history taking, signs and symptoms examination, and treatment	Pre-post-follow-up survey	Significant increases in self-reported knowledge	Low
Jha 2016 ⁵⁷	A random sample of chief-psychiatry residents in the United States (n = 45)	Indirect assessment of motivational interviewing (MI) training received in residency	Attitudes towards substance use disorders and the care of people with addiction	Anonymous survey	Residents trained in MI had much more positive attitudes towards addiction and its treatment	Medium
Karam-Hage 2001 ⁵⁸	Michigan state general psychiatry residents (n = 52)	A one-day conference on addiction management basics	Changes in perspectives and fellowship interests in addiction psychiatry	Pre-post-follow-up survey	Attendance of the conference promoted positive attitudes to addiction and interest in further training	Low
Karam-Hage 2014 ⁶⁵	General psychiatry residents from Michigan state (n = 26)	50-item test on substance use disorders	Acquired knowledge of addiction	Pre-post-follow up study	Significant improvement in retest scores	High
Kats 2019 ⁵⁰	General psychiatry and pediatrics residents, and child & adolescent psychiatry fellows (n = 43)	A lecture on internet gaming disorder (IGD)	Background knowledge and comfort in assessing, treating, and discussing IGD with patients and families	Pre-post survey	Significant increase in confidence in identifying internet gaming criteria, using screening tools, and discussing IGD with patients	Medium
Muvvala 2016 ⁶²	Addiction psychiatry fellows at Yale School of Medicine (n = 14)	Training module on educational skills, individual mentorship to prepare a case presentation	Satisfaction and confidence in presenting an academic topic	Post-program evaluation survey	82% were satisfied with the program; 91% found an improvement in their education and presentation skills	Low
O'Connor 2017 ⁶¹	Addiction medicine and psychiatry fellows enrolled in the Boston University Medical School RAMS program (n = 19)	Research in addiction medicine scholars (RAMS) program	Scholarly activities (e.g., publications, funding)	Pre-post-follow up study	Scholars have published over 20 publications since enrolling in the program and are recipients of four grants	Low
Prochaska 2008 ⁵²	Psychiatry residents from Northern California (n = 55)	Four-hour curriculum on tobacco use disorder	Knowledge, attitudes, and counselling behaviours for treating tobacco use disorder	Pre-post-follow up study	Improved knowledge, confidence, and counselling behaviours for patients	Medium
Sattar 2004 ⁶⁹	Psychiatry residents at Creighton University Department of Psychiatry (n = 21)	Addiction Training Scale (ATS), a self-report tool for psychiatry residents	Level of preparedness and confidence in addiction psychiatry training	Psychometric validation	ATS appears to identify self-reported deficits in training reliably	Medium

Serafini 2016 ⁵³	Addiction psychiatry and psychology fellows at the Yale University School of Medicine (<i>n</i> = 20)	Module in acupuncture as an adjunct for addictions treatment	Satisfaction with training	Post- program evaluation survey	90% reported satisfaction with the training, and 95% said it was beneficial to their training	Low
Suzuki 2014 ⁴⁹	A random sample of graduating-year psychiatry residents (<i>n</i> = 93)	Indirect assessment of buprenorphine training in residency	Attitudes to addiction, barriers to opioid agonist therapy prescribing	Anonymous survey	Psychiatrists receiving the buprenorphine training had more positive attitudes towards opioid use disorder and its management	Low
Williams 2020 ⁵¹	A random sample of US psychiatry residents (<i>n</i> = 89)	Three-hour web-based curriculum on tobacco use disorder	Knowledge and frequency of offering tobacco use disorder treatments to patients	Pre-post- follow-up survey	Improved willingness to assess, advise, and treat patients and to prescribe specific treatments	Low