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Access and Health System Impact of an Early Intervention Treatment Program for Emerging Adults with Mood and Anxiety Disorders

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Original Research

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Accès et impact sur le système de santé d'un programme d'intervention précoce pour adultes émergents souffrant de troubles anxieux et de l'humeur

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Abstract

Objectives: Early intervention programs are effective for improving outcomes in first-episode psychosis; however, less is known about their effectiveness for mood and anxiety disorders. We sought to evaluate the impact of an early intervention program for emerging adults with mood and anxiety disorders in the larger health system context, relative to standard care.

Methods: Using health administrative data, we constructed a retrospective cohort of cases of mood and anxiety disorders among emerging adults aged 16 to 25 years in the catchment of the First Episode Mood and Anxiety Program (FEMAP) in London, Ontario, between 2009 and 2014. This cohort was linked to primary data from FEMAP to identify service users. We used proportional hazards models to compare indicators of service use between FEMAP users and a propensity score–matched group of nonusers receiving care elsewhere in the health system.

Results: FEMAP users ($n = 490$) had more rapid access to a psychiatrist relative to nonusers (hazard ratio [HR], 2.82; 95% confidence interval, 2.45 to 3.26; median time, 16 vs. 71 days). In the year following admission, FEMAP users also had lower rates of emergency department use for mental health reasons (HR, 0.73; 95% CI, 0.53 to 0.99). We did not observe differences in psychiatric hospitalization rates.

Conclusions: An early intervention model of care for mood and anxiety disorders is associated with better access to psychiatric care and lower use of the emergency department. Our findings suggest that early intervention services for mood and anxiety disorders may be beneficial from a health systems perspective, and further research on the effectiveness of this model of care is warranted.

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Abrégé

Objectifs : Les programmes d'intervention précoce améliorent efficacement les résultats du premier épisode de psychose; toutefois, leur efficacité est moins bien connue quand il s'agit des troubles anxieux et de l'humeur. Nous avons cherché à évaluer l'impact d'un programme d'intervention précoce pour adultes émergents souffrant de troubles anxieux et de l'humeur dans le contexte plus vaste du système de santé, relativement aux soins réguliers.

Méthodes : À l'aide des données de santé administratives, nous avons construit une cohorte rétrospective de cas de troubles anxieux et de l'humeur chez des adultes émergents de 16 à 25 ans, dans le secteur du programme du premier épisode d'anxiété et de l'humeur (PPEAH) de London, Ontario entre 2009 et 2014. Cette cohorte a été liée aux données primaires du PPEAH afin d'identifier les utilisateurs des services. Nous avons utilisé des modèles des risques proportionnels pour comparer les indicateurs de l'utilisation des services entre les utilisateurs du PPEAH et un groupe de non-utilisateurs apparié par score de propension et recevant des soins ailleurs dans le système de santé.

Résultats : Les utilisateurs du PPEAH (*n* = 490) bénéficiaient d'un accès plus rapide à un psychiatre relativement aux non-utilisateurs (RR = 2,82; IC à 95 % 2,45 à 3,26, délai moyen = 16 jours c. 71). Dans l'année suivant l'admission, les utilisateurs du PPEAH avaient aussi des taux plus faibles d'utilisation des services d'urgence pour des motifs de santé mentale (RR = 0,73; 0,53 à 0,99). Nous n'avons pas observé de différences en ce qui concerne les taux d'hospitalisation psychiatrique.

Conclusions : Un modèle d'intervention précoce de soins pour les troubles anxieux et de l'humeur est associé à un meilleur accès aux soins psychiatriques et à une utilisation moindre du service d'urgence. Nos résultats suggèrent que les services d'intervention précoce pour les troubles anxieux et de l'humeur peuvent être bénéfiques du point de vue des systèmes de santé. Plus de recherche sur l'efficacité de ce modèle de soins est justifiée.

Keywords

mood disorders, anxiety disorders, early intervention, emerging adults, mental health services, health administrative data

Background

Nearly 75% of all lifetime mental disorders begin during adolescence and early adulthood.[1] Recognition of this has led to an increased interest in and emphasis on the mental health of emerging adults. Over the past 20 years, mental health systems worldwide have devoted extensive resources toward the development and implementation of early intervention services for a first episode of psychotic disorder. These programs have been shown to be both effective[2-4] and cost-effective[5] for improving outcomes in first-episode psychosis.

However, the field of mood and anxiety disorders has been slow to follow this lead, despite growing consensus that models of care targeting emerging adults in the early stage of illness are needed.[6] There is emerging evidence that an extended duration of untreated illness is associated with poor outcomes for mood and anxiety disorders.[7-9] If left untreated, adolescent mental disorders often recur and become chronic,[10,11] potentially leading to impaired social, educational, and career development and poor trajectories into adulthood.[12,13] Furthermore, suicide is the second leading cause of death among emerging adults between the ages of 15 and 24 in North America,[14,15] and more than 75% of youth suicides involve a history of depression.[16] Recent data suggest that all-cause mortality is nearly 3 times higher among emerging adults with depression, relative to matched controls, in the 3-year period after first diagnosis.[17] Early intervention models of care have reduced this early all-cause mortality for psychotic disorders.[4]

To our knowledge, there is currently only one established early intervention program for mood and anxiety disorders in

Canada—the First Episode Mood and Anxiety Program (FEMAP) in London, Ontario, targets emerging adults between the ages of 16 and 25 years who are experiencing moderate to severe symptoms and who have not yet experienced longstanding functional deterioration.[18] The goal of FEMAP is "to identify youth at critical developmental life stages who are just beginning to depart from their expected developmental trajectory and intervene by providing outpatient treatment before these youth become chronically disabled from mental illness."[18] This program is based on the early intervention for psychosis model, and its evolution has been described in detail elsewhere.[19] In brief, key components of FEMAP include community outreach and engagement; provision of services in a youth-friendly, nonstigmatizing, community-based setting; an open door self-referral policy; a detailed, in-person intake assessment to determine suitability for the program; treatment regimen and duration based on clinical need and provided by a multidisciplinary team; and linkages with alternative services, if needed.[19]

We sought to evaluate the access to and impact of FEMAP within the larger health system context using linked population-based health administrative data from multiple service providers. Our objectives were 1) to describe how users of FEMAP differ from emerging adults with mood and anxiety disorders in the program catchment area who do not use these services, based on sociodemographic, clinical, and service use characteristics, and 2) to evaluate the impact of FEMAP by comparing mental health process and outcome indicators between emerging adults with mood and anxiety disorders using FEMAP services and a matched group of

Table 1. Description of the Linked Health Administrative Databases Used to Construct the Cohort of Incident Cases of Nonaffective Psychotic Disorder.

Source of Data	Description	Variables of Interest	Years
Registered Persons Database (RPDB)	Sociodemographic and mortality information	Age at index diagnosis, gender, rural residence, income quintile	1990-2015
Immigration, Refugees, and Citizenship Canada (IRCC)	Information on all permanent residents who land in Ontario	Migrant status	1985-2015
Ontario Health Insurance Plan (OHIP)	Information on all physician services and outpatient visits	Case definition, index diagnosis, diagnosing physician, prior alcohol-related disorder, prior substance-related disorder, family physician contact in previous 6 months, psychiatrist contact in previous 6 months	1991-2015
Discharge Abstracts Database (DAD)	Data on acute hospitalizations	Case definition, index diagnosis, inpatient status, prior alcohol-related disorder, prior substance-related disorder, hospitalization in previous 6 months	1988-2015
Ontario Mental Health Reporting System (OMHRS)	Information on inpatient mental health hospitalizations to designated psychiatry beds. *Note: data on psychiatric hospitalization prior to 2005 available in DAD*	Case definition, index diagnosis, inpatient status, prior alcohol-related disorder, prior substance-related disorder, hospitalization in previous 6 months	2005-2015
National Ambulatory Care Reporting System (NACRS)	Information on visits to the emergency department	Case definition, index diagnosis, prior alcohol-related disorder, prior substance-related disorder, emergency department visit in previous 6 months	2000-2015

concurrent controls not accessing these services. We compared use of outpatient psychiatry (process indicator), primary care, emergency department (ED) visits, inpatient hospitalizations, and involuntary admissions for the 1-year period following FEMAP admission.

Methods

Study Setting

FEMAP is the only program targeted at emerging adults with mood and anxiety disorders in the area, and the program accepts patients from across the catchment of the local health authority. This covers a wide geographic area with a mix of urban and rural communities. It includes approximately 125,000 emerging adults in the age range served by FEMAP, and the city of London, Ontario, is also home to 1 university, 3 affiliated university-colleges, and 1 community college, which leads to an influx of approximately 40,000 postsecondary students during the academic year.

Emerging adults with mood or anxiety concerns are admitted to FEMAP if they meet the following eligibility criteria: 1) aged 16 to 25 years; 2) evidence of a primary mood disorder (including bipolar disorder) or anxiety disorder; 3) lifetime duration of psychotropic medication of less than 18 months; 4) absence of developmental delays, major comorbid medical issues (e.g., cancer, cystic fibrosis, uncontrolled epilepsy), or history of serious head injury; 5) absence of a primary substance use problem that preceded the mood or anxiety symptoms based on patient history;

and 6) no outstanding legal issues requiring ongoing contact with the criminal justice system.[19]

Source of Data

We obtained access to the health administrative data holdings at the Institute for Clinical Evaluative Sciences (ICES), which contains information on all medically necessary services covered by the provincial universal health care system, known as the Ontario Health Insurance Plan (OHIP). These linked databases contain information from physician billings, hospitalizations, and ED visits and include nearly the entire population of Ontario—of exception, we will have missed very recent (<3 months) migrants who are not yet covered by OHIP, as well as students attending postsecondary school from out of province. A description of the databases used in the current study is presented in Table 1.

Cohort Creation

Using ICES data, we created a retrospective cohort of cases of mood and anxiety disorders among emerging adults who presented to services between 2009 and 2014 in the FEMAP catchment area, identified by the 6-digit postal code of the service provider. We mirrored the inclusion criteria of the FEMAP program to the extent possible in the health administrative data. Cases were defined as emerging adults between the ages of 16 and 25 years who had at least 2 physician billing claims or ED visits with a diagnostic code for a mood or anxiety disorder in any 12-month period or an inpatient hospitalization with a primary discharge diagnosis

of a mood or anxiety disorder (codes presented in Suppl. Table S1). People with a history of a nonaffective psychotic disorder were excluded. Although this algorithm has not been validated in the ICES databases, it has demonstrated a high positive predictive value (>90%) in other health administrative data sets.[20]

We linked this cohort to primary data from FEMAP, thereby identifying emerging adults treated by this program. We used a deterministic linkage based on the encrypted OHIP numbers of all patients treated at FEMAP, and the data were subsequently encrypted to protect privacy as per ICES data linkage protocols. Emerging adults within the cohort who were also in the FEMAP data were classified as FEMAP users, and all remaining cohort members were classified as nonusers. A small number of people in the FEMAP database were not captured by our cohort definition (8.5%) due to the requirement for 2 outpatient diagnoses—we considered the presence of a FEMAP diagnosis to supersede the requirement for 2 physician billings for mood or anxiety disorders and included these people in the FEMAP users group to preserve the sample.

The Health Sciences Research Ethics Board at the University of Western Ontario approved the linkage of the primary data to the ICES data holdings. Patient-level data were linked using unique coded identifiers, and the deidentified data sets were analyzed on site at ICES. We followed the RECORD guidelines for observational studies using routinely collected data (Suppl. Table S2), and a description of codes and algorithms used to create the variables is presented in Suppl. Table S1.

Sociodemographic, Clinical, and Service Use Variables

The date of the first diagnosis of mood or anxiety disorder within our study window was set as the index date. We extracted information on sociodemographic, clinical, and service use characteristics for all emerging adults in our cohort from the ICES data holdings. Available sociodemographic variables include age at index diagnosis, gender, migrant status, neighbourhood-level income quintile derived from census data, rural place of residence, and whether the primary place of residence was outside the program catchment area. We also extracted information on several clinical factors, including type of index diagnosis (mood vs. anxiety), source of index diagnosis (inpatient, psychiatrist, other MD), and whether there was evidence of prior contact with services for an alcohol- or substance-related disorder. Binary indicators of mental health service use in the 6-month period preceding the index diagnosis were also constructed, including record of any family physician visit, outpatient psychiatrist visit, ED visit, self-harm attempt, or psychiatric hospitalization. There were minimal missing data (<1%) for covariates of interest, and people with missing data were excluded.

Propensity Score Matching

Process and outcome measures (described below) were compared between FEMAP users and a propensity score–matched comparison group of nonusers. A propensity score uses logistic regression to model the probability that an individual is 'exposed' (i.e., FEMAP user/nonuser), conditional on observed covariates.[21] Matching on the propensity score functions to achieve balance between groups on the variables included in the propensity score model[21] but does not achieve balance on unmeasured confounding factors as in a randomized trial.

We computed a propensity score for each person in the study cohort—the model included baseline covariates representing sociodemographic characteristics, clinical factors, and indicators of prior mental health service use at the index date (Suppl. Table S2), and it did not include any data from the follow-up period. We used a greedy matching technique without replacement to match FEMAP users to nonusers based on year of index diagnosis and the propensity score (caliper width = 0.02 standard deviance of the propensity score).[22] We also hard-matched on the source of index diagnosis and residence outside the program catchment area, as these variables were not well balanced on initial matching attempts. The matching was done with a variable ratio of up to 1:2, and each nonuser was assigned the same admission date as the FEMAP user in the matched set.

Process and Outcome Measures

Health system process and outcome measures can be used when evaluating health services—process indicators denote the care that was provided, whereas outcome indicators reflect the health status of the patient.[23] We constructed both process and outcome indicators for the 1-year period following FEMAP admission—this observation window was defined by the date of FEMAP admission, and the nonusers assumed the admission date of their matched FEMAP user. The process indicators included contact with a psychiatrist and time to first psychiatric contact, and the outcome indicators included contact with a family physician or ED for mental health reasons, psychiatric hospitalizations, and involuntary admissions. We had also planned to assess indicators of self-harm, suicide, and all-cause mortality but found too few events for these rare outcomes to allow meaningful comparisons, so they were dropped from further analyses. We obtained data on any use of these services as an indicator of access (binary variable), intensity of service use (count variable), and time between FEMAP admission and first encounter with each service.

Statistical Analyses

We compared the baseline characteristics of FEMAP users and nonusers using standardized differences, and values greater than 10% indicated significant between-group

Table 2. Comparison of Sociodemographic, Clinical, and Service Use Characteristics of Users of Early Intervention Services for Mood and Anxiety Disorders Compared to Nonusers for Both the Unmatched and Matched Samples.[a]

Variable	Unmatched Sample			Matched Sample		
	FEMAP Users (n = 497)	Nonusers (n = 29,389)	Standardized Difference, %	FEMAP Users (n = 490)	Nonusers (n = 967)	Standardized Difference, %
Age at index date, mean ± SD	19.3 ± 2.4	21.0 ± 2.8	66	19.3 ± 2.4	19.2 ± 2.4	5
Male gender	159 (32.0)	11,473 (39.0)	15	158 (32.2)	320 (33.1)	2
Rural residence	27 (5.4)	6396 (21.8)	49	25 (5.1)	49 (5.1)	0
Income quintile						
(Low) 1	87 (17.5)	6625 (22.5)	13	86 (17.6)	162 (16.8)	2
2	84 (16.9)	5992 (20.4)	9	84 (17.1)	178 (18.4)	3
3	84 (16.9)	5804 (19.7)	7	81 (16.5)	171 (17.7)	3
4	103 (20.7)	5372 (18.3)	6	102 (20.8)	187 (19.3)	4
(High) 5	139 (28.0)	5596 (19.0)	21	137 (28.0)	269 (27.8)	0
Migrant status						
Nonmigrants	472 (95.0)	27,823 (94.7)	1	465 (94.9)	927 (95.9)	5
Immigrant	>20 (>4.0)	1096 (3.7)	4	>20 (>4.1)	31 (3.2)	7
Refugee	<6 (<1.2)	470 (1.6)	10	<6 (<1.2)	9 (0.9)	4
First mood/anxiety diagnosis age, mean ± SD	18.5 ± 3.1	19.4 ± 4.1	26	18.5 ± 3.1	18.3 ± 3.0	5
Index diagnosis						
Mood disorder	211 (42.5)	6085 (20.7)	48	209 (42.7)	364 (37.6)	10
Anxiety disorder	286 (57.5)	23,304 (79.3)	48	281 (57.3)	603 (62.4)	10
Source of index diagnosis						
Inpatient	18 (3.6)	399 (1.4)	15	16 (3.3)	31 (3.2)	0
Outpatient psychiatrist	423 (85.1)	11,699 (39.8)	106	418 (85.3)	824 (85.2)	0
Other physician	56 (11.3)	17,291 (58.8)	115	56 (11.4)	112 (11.6)	0
Prior alcohol-related disorder	14 (2.8)	1168 (4.0)	6	14 (2.9)	29 (3.0)	1
Prior substance-related disorder	16 (3.2)	2046 (7.0)	17	16 (3.3)	31 (3.2)	0
Family physician visit in previous 6 months	295 (59.4)	19,287 (65.6)	13	291 (59.4)	581 (60.1)	1
Psychiatrist contact in previous 6 months	38 (7.6)	2205 (7.5)	1	38 (7.8)	72 (7.4)	1
Mental health ED visit in previous 6 months	64 (12.9)	3678 (12.5)	1	63 (12.9)	142 (14.7)	5
Self-harm attempt in previous 6 months	<6 (<1.2)	493 (1.7)	10	<6 (<1.2)	<6 (<1.2)	6
Psychiatric hospitalization in previous 6 months	10 (2.0)	570 (1.9)	1	10 (2.0)	17 (1.8)	2

ED, emergency department; FEMAP, First Episode Mood and Anxiety Program; SD, standard deviation.
[a]Values are presented as number (%) unless otherwise indicated.
Standardized differences of >10% suggest significant between-group differences.

differences.[24] We used multivariate logistic regression models to estimate the association between sociodemographic, clinical, and service use factors and odds of admission to FEMAP. For comparison of the process and outcome indicators, we used Cox proportional hazards models with robust variance estimators to account for clustering within matched sets to model indicators of time to access to care (binary), and we used modified Poisson regression to model intensity of service use (counts). Observations were censored at the end of the follow-up period, termination of OHIP eligibility, or death.

Results were consistent across access to care and intensity of service use indicators; therefore, we opted to present results of the access indicators (full results available by request from the authors). All results are presented as odds ratios (ORs) or hazard ratios (HRs) with corresponding 95% confidence intervals (CIs), with the models comparing FEMAP users to a nonuser reference group. All analyses were conducted using SAS Enterprise Guide Version 7.12 (SAS Institute, Cary, NC).

Results

Over the 5-year period between 2009 and 2014, nearly 30,000 emerging adults had contact with mental health services for mood or anxiety disorders in the FEMAP catchment area, representing a treated prevalence of approximately 4%. Of those, 554 were treated by FEMAP, and we linked 89.7% (n = 497) of FEMAP users to health administrative data. The characteristics of the study sample are presented in Table 2, and results of the multivariate logistic regression analysis are presented in Table 3.

Access to FEMAP Services—Unmatched Sample

We found that FEMAP users were significantly younger (OR, 0.77; 95% CI, 0.73 to 0.81), less likely to be male (OR, 0.70; 95% CI, 0.58 to 0.85), and less likely to live in rural areas (OR, 0.21; 95% CI, 0.14 to 0.32) compared with other emerging adults with mood and anxiety disorders in our study cohort. We also found differences by neighbourhood-level income quintile, with emerging adults

Table 3. Factors Associated with Use of FEMAP Services Relative to Emerging Adults from the Program Catchment Area Who Are Not Using These Services.

Variable	OR	95% CI
Age at index date	0.77	0.73 to 0.81
Male gender	0.70	0.58 to 0.85
Rural residence	0.21	0.14 to 0.32
Income quintile		
(Low) 1		Reference
2	0.81	0.62 to 1.06
3	0.64	0.48 to 0.85
4	0.62	0.47 to 0.82
(High) 5	0.60	0.45 to 0.79
Migrant status		
Nonmigrants		Reference
Immigrant	0.88	0.63 to 1.23
Refugee	NA	NA
Age at first mood/anxiety diagnosis	1.08	1.04 to 1.13
Index diagnosis		
Mood disorder		Reference
Anxiety disorder	0.41	0.34 to 0.49
Source of index diagnosis		
Inpatient		Reference
Outpatient psychiatrist	1.63	0.98 to 2.71
Other physician	0.13	0.08 to 0.24
Prior alcohol-related disorder	1.01	0.58 to 1.76
Prior substance-related disorder	0.65	0.39 to 1.08
Family physician visit in previous 6 months	0.88	0.73 to 1.06
Psychiatrist contact in previous 6 months	0.67	0.47 to 0.95
Mental health ED visit in previous 6 months	0.74	0.57 to 0.98
Self-harm attempt in previous 6 months	0.17	0.05 to 0.52
Psychiatric hospitalization in previous 6 months	0.73	0.39 to 1.40
Year (2009-2015)	1.17	1.11 to 1.23

CI, confidence interval; ED, emergency department; FEMAP, First Episode Mood and Anxiety Program; NA, data not available due to small cell size; OR, odds ratio.

living in the most deprived areas less likely to be a FEMAP user compared to those living in the least deprived areas (OR, 0.60; 95% CI, 0.45 to 0.79). We did not observe differences in access for first-generation migrant groups, although the proportion of migrants in the sample was small (5.3% of total sample).

FEMAP users were much less likely to have a diagnosis of an anxiety disorder, compared with nonusers (OR, 0.41; 95% CI, 0.34 to 0.49). FEMAP users were more likely to receive the first diagnosis from a psychiatrist (OR, 1.63; 95% CI, 0.98 to 2.71) and less likely to be diagnosed by other types of physicians (OR, 0.13; 95% CI, 0.08 to 0.24), relative to nonusers. We did not observe a significant difference between FEMAP users and nonusers on prior diagnosis of alcohol- and substance-related disorders in our multivariate models.

Contact with a family physician for mental health reasons in the 6-month period prior to their first diagnosis of mood or anxiety disorder did not differ between FEMAP users and nonusers (OR, 0.88; 95% CI, 0.73 to 1.06). FEMAP users were significantly less likely to have had prior help-seeking

contacts with a psychiatrist (OR, 0.67; 95% CI, 0.47 to 0.95), with the ED for other mental health reasons (OR, 0.74; 95% CI, 0.57 to 0.98), or for self-harm (OR, 0.17; 95% CI, 0.05 to 0.52). Few people in our sample had prior psychiatric hospitalizations, and this did not differ between FEMAP users and nonusers.

Impact of FEMAP Services—Matched Sample

Seven FEMAP users were dropped from this portion of the analysis due to an inability to find a suitable control, for a final matched sample of 490 FEMAP users and 967 controls. The groups were well balanced in sociodemographic, clinical, and prior service use factors (Table 2).

The results of the proportional hazards model comparing process and outcome indicators between FEMAP users and nonusers are presented in Table 4. FEMAP users were nearly 3 times more likely to see a psychiatrist (HR, 2.82; 95% CI, 2.45-3.26), with more rapid access to a psychiatrist (median, 16 days vs. 71 days). They were also less likely to access primary care for mental health reasons (HR, 0.84; 95% CI, 0.71 to 0.98) and had lower use of the ED for mental health reasons (HR, 0.73; 95% CI, 0.53 to 0.99). We did not find a difference in psychiatric hospitalizations between groups (HR, 0.80; 95% CI, 0.48 to 1.33), but the overall event rate was low (FEMAP users = 4.5%, nonusers = 5.6%). There was some evidence that FEMAP users may have lower rates of involuntary admissions (HR, 0.71; 95% CI, 0.47 to 1.04), but larger samples are needed to confirm this.

Discussion

Our analysis of health administrative data suggests that adoption of an early intervention model of service delivery aimed at emerging adults with mood and anxiety disorders may have an impact at a health system level—specifically, more rapid access to a psychiatrist and reduced number of mental health–related ED visits. These findings are consistent with the FEMAP logic model, which identifies direct access to mental health services and lower use of emergency services for psychiatric care as short-term outcomes.[19] The FEMAP logic model identifies reduced use of inpatient hospitalizations as a long-term program outcome,[19] which we did not find in the current study; however, our sample size and follow-up period may have been insufficient for detecting a difference. These findings suggest that further research on the effectiveness of this model of care for the treatment of mood and anxiety disorder among emerging adults is warranted.

Our findings suggest that FEMAP users relied less on primary care services for mental health needs, with greater use of specialized psychiatric services. Importantly, clinical data from FEMAP confirm that this is an appropriate use of specialized care, as FEMAP users are a population in urgent need of specialized services. Previous reports showed that nearly three-quarters of patients had received some form of

Table 4. Outcomes for Users of Early Intervention Services for Mood and Anxiety Disorders, Compared to Matched Nonusers (1:2), for the 1-Year Period after Admission.

Outcome	FEMAP Users (n = 490)		Nonusers (n = 967)		HR (95% CI)
	Events, n (%)	Time to Event (days), Median (IQR)[a]	Events, n (%)	Time to Event (days), Median (IQR)[a]	
Contact with primary care	229 (46.7)	90 (28 to 203)	506 (52.3)	84 (31 to 163)	0.84 (0.71 to 0.98)
Contact with psychiatrist	398 (81.2)	16 (8 to 35)	504 (52.1)	71 (23 to 150)	2.82 (2.45 to 3.26)
ED visit	49 (10.0)	113 (55 to 224)	131 (13.5)	118 (59 to 214)	0.73 (0.53 to 0.99)
Hospitalization	22 (4.5)	113 (47 to 166)	54 (5.6)	123 (60 to 192)	0.80 (0.48 to 1.33)
Involuntary admission	36 (7.3)	145 (46 to 302)	99 (10.2)	125 (57 to 208)	0.70 (0.47 to 1.04)

CI, confidence interval; ED, emergency department; HR, hazard ratio; IQR, interquartile range.
[a]Among those with event.

mental health care prior to FEMAP, and symptom levels remained moderate to severe despite this.[18] In addition, over 50% of FEMAP patients were found to be at moderate to high risk of a substance use problem,[25] and over two-thirds endorsed suicidal ideation, with 15% of those expressing serious intent.[18] FEMAP patients reported missing an average of 2.6 days per week of work or school and being underproductive an average of 4.2 days per week.[18] Data from FEMAP also showed that emerging adults treated by the program showed reductions in mood and anxiety symptoms, improved levels of functioning, and high levels of patient satisfaction at both short- and intermediate-term follow-up.[25,26]

Although it is unlikely that all emerging adults identified in our study cohort were in need of the specialized care provided by FEMAP, the program treated less than 2% of identified cases over the study time period. Furthermore, it has been estimated that up to half of emerging adults with mental disorders do not seek help for their symptoms[27] and therefore will not have been captured in our study cohort, suggesting a huge amount of potential unmet need in this population. Research from other jurisdictions suggests that emerging adults with depressive symptoms who do not access mental health services at age 14 are over 7 times more likely to have a depressive disorder at age 17, relative to emerging adults who did access services.[27] FEMAP is currently functioning at full capacity, with growing demand for its services and increasingly lengthy wait times.[19] To meet the needs of the population, we need to expand access to youth-friendly treatment options for people with mood and anxiety disorders, and consequences for the social, educational, and career trajectories could be dire should the status quo persist.

Importantly, we demonstrated that FEMAP services provide access to mental health care in more appropriate settings by diverting emerging adults with mental health needs from the ED, a finding that has also been demonstrated for early intervention services for psychosis.[4] This is particularly important given that mental health–related ED visits among emerging adults have increased in North America.[28-30] In Ontario, this increase has occurred at more than

double the rate of corresponding increases in outpatient mental health visits, with anxiety disorders being the most common reason for ED presentations.[28] Furthermore, research suggests that more than half of emerging adults who present to the ED for mental health reasons have not previously sought mental health care from outpatient providers,[31] suggesting that early intervention models that provide timely access to mental health services could reduce inappropriate use of the ED.

Strengths and Limitations

These findings demonstrate the health system potential of a novel treatment program aimed at emerging adults with mood and anxiety disorders—to our knowledge, this is the first evaluation of an early intervention model of care for these disorders. Data were linked to a population-based health administrative database including multiple service providers that allowed for a comprehensive examination of the impact of FEMAP services on important health system indicators. We used propensity score matching to select a comparison group with a similar distribution of confounding factors. Finally, we used concurrent controls matched on year of first diagnosis to ensure equivalent temporal and contextual factors between groups.[32]

It is important to note the inherent limitations associated with the observational study design that we employed. Although propensity score methods attempt to mimic some of the characteristics of a randomized trial,[21] we are only able to achieve balance on the confounding factors included in the propensity score model, unlike a randomized trial that also balances unmeasured confounding factors. In addition, these methods allow for the estimation of the average treatment effect among the treated, that is, people who have a similar probability of admission to FEMAP services.[21] Given that there were significant differences between FEMAP users and nonusers prior to matching, we are not able to infer the effect of an early intervention model of care on emerging adults who have a low probability of encountering these services. Randomized trials using standardized diagnoses and clinically relevant outcome measures are

needed to fully evaluate the effectiveness of an early intervention model of care for mood and anxiety disorders.

In addition, our data do not contain information on emerging adults with mood and anxiety disorders who were not presenting to the public health care system and may instead have received assessment and treatment from private psychologists, social workers, or other community mental health care providers not covered by OHIP. However, if we assume that this would occur more frequently in the nonusers group, it would function to underestimate the impact of FEMAP. Furthermore, we included a small proportion of cases (8.5%) in the FEMAP group who were not captured by our algorithm for defining the larger cohort. Although this was done to maximize the available data on FEMAP users, it may have introduced bias if these emerging adults differed in some distinct way from the larger cohort. However, we believe the potential impact of this bias on our findings is mitigated by the propensity score matching procedure that we used, combined with hard matching on the source of index diagnosis (outpatient psychiatrist), and should therefore have only a minimal impact on our findings.

Finally, we are limited by the availability of information in the health administrative data holdings, and our findings may be due to residual confounding by factors that we did not have data for, such as severity of illness. On one hand, our algorithm may have identified mild or self-remitting cases of mood and anxiety disorder that would not require more specialized treatment, which would result in nonusers having a less severe illness profile. On the other hand, we do not know how many emerging adults in our nonusers group would be eligible for admission to FEMAP—we attempted to mirror the program criterion as closely as possible but were unable to assess factors such as duration of prior medication use and contact with the criminal justice system, and our data on alcohol and substance use were restricted to diagnosed disorders. This could result in FEMAP users having a less severe illness profile. We have attempted to mitigate the impact of these potential differences by including sociodemographic, clinical, and service use factors in our propensity score model, and the groups were well balanced on all available indicators.

Conclusions

Mood and anxiety disorders are highly prevalent among emerging adults and represent a significant public health burden that calls for an increased focus on the early detection and intervention among emerging adults experiencing them. Our findings suggest that adopting an early intervention model of care for mood and anxiety disorders may lead to more rapid access to effective psychiatric services and diversion of mental health–related help seeking from the ED. Further research on the effectiveness of this model of care is warranted.

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References

1. Kessler RC, Berglund P, Demler O, et al. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity survey replication. Arch Gen Psychiatry. 2005;62(6):593-602.

2. Bird V, Premkumar P, Kendall T, et al. Early intervention services, cognitive-behavioural therapy and family intervention in early psychosis: systematic review. Br J Psychiatry. 2010;197(5):350-356.

3. Marshall M, Rathbone J. Early intervention for psychosis. Cochrane Database Syst Rev. 2011;(6):CD004718.

4. Anderson KK, Norman R, MacDougall A, et al. Effectiveness of early psychosis intervention: comparison of service users and nonusers in population-based health administrative data. Am J Psychiatry. 2018;175(5):443-452.

5. Mihalopoulos C, Harris M, Henry L, et al. Is early intervention in psychosis cost-effective over the long term? Schizophr Bull. 2009;35(5):909-918.

6. de Girolamo G, Dagani J, Purcell R, et al. Age of onset of mental disorders and use of mental health services: needs, opportunities and obstacles. Epidemiol Psychiatr Sci. 2012; 21(1):47-57.

7. Post RM, Leverich GS, Kupka RW, et al. Early-onset bipolar disorder and treatment delay are risk factors for poor outcome in adulthood. J Clin Psychiatry. 2010;71(7): 864-872.

8. Ghio L, Gotelli S, Marcenaro M, et al. Duration of untreated illness and outcomes in unipolar depression: a systematic review and meta-analysis. J Affect Disord. 2014;152-154(1): 45-51.

9. Ghio L, Gotelli S, Cervetti A, et al. Duration of untreated depression influences clinical outcomes and disability. J Affect Disord. 2015;175:224-228.

10. Lewinsohn PM, Rohde P, Klein DN, et al. Natural course of adolescent major depressive disorder: I. Continuity into young adulthood. J Am Acad Child Adolesc Psychiatry. 1999;38(1): 56-63.

11. Birmaher B, Williamson DE, Dahl RE, et al. Clinical presentation and course of depression in youth: does onset in childhood differ from onset in adolescence? J Am Acad Child Adolesc Psychiatry. 2004;43(1):63-70.

12. Woodward LJ, Fergusson DM. Life course outcomes of young people with anxiety disorders in adolescence. J Am Acad Child Adolesc Psychiatry. 2001;40(9):1086-1093.

13. Fergusson DM, Woodward LJ. Mental health, educational, and social role outcomes of adolescents with depression. Arch Gen Psychiatry. 2002;59(3):225-231.

14. Statistics Canada. Table 102-056: leading causes of death, total population, by age group and sex, Canada. CANSIM Database 2015 [cited 2015 Sep 9]. http://www5.statcan.gc.ca/cansim/a26

15. Centers for Disease Control and Prevention. Injury prevention and control. Inj Stat Query Report Syst. 2016 [cited 2018 Feb 8]. www.cdc.gov/injury/wisqars/fatal.html

16. Shaw D, Fernandes JR, Rao C. Suicide in children and adolescents: a 10-year retrospective review. Am J Forensic Med Pathol. 2005;26(4):309-315.

17. Simon GE, Stewart C, Yarborough BJ, et al. Mortality rates after the first diagnosis of psychotic disorder in adolescents and young adults. JAMA Psychiatry. 2018;75(3):254-260.

18. Ross E, Vingilis E, Osuch E. An engagement and access model for healthcare delivery to adolescents with mood and anxiety concerns. Early Interv Psychiatry. 2012;6(1):97-105.

19. Osuch EA, Vingilis E, Fisman S, et al. Early intervention in mood and anxiety disorders: the first episode mood and anxiety program (FEMAP). Healthc Q. 2016;18(Spec No):42-49.

20. Alaghehbandan R, Macdonald D, Barrett B, et al. Using administrative databases in the surveillance of depressive disorders—case definitions. Popul Heal Manag. 2012;15(6): 372-380.

21. Austin PC. An introduction to propensity score methods for reducing the effects of confounding in observational studies. Multivariate Behav Res. 2011;46(3):399-424.

22. Austin PC. A comparison of 12 algorithms for matching on the propensity score. Stat Med. 2014;33(6):1057-1069.

23. Donabedian A. The quality of care: how can it be assessed? JAMA. 1988;260(12):1743-1748.

24. Austin PC. Using the standardized difference to compare the prevalence of a binary variable between two groups in observational research. Commun Stat Simul Comput. 2009;38(6):1228-1234.

25. Osuch EA, Vingilis E, Summerhurst C, et al. Process evaluation of an early-intervention program for mood and anxiety disorders among older adolescents and young adults. Psychiatr Serv. 2015;66(10):1113-1117.

26. Osuch E, Vingilis E, Summerhurst C, et al. Intermediate-term process evaluation of an early intervention program for mood and anxiety disorders in emerging adults. Psychiatr Serv. In Press.

27. Neufeld SAS, Dunn VJ, Jones PB, et al. Reduction in adolescent depression after contact with mental health services: a longitudinal cohort study in the UK. Lancet Psychiatry. 2017;366(17):1-8.

28. Gandhi S, Chiu M, Lam K, et al. Mental health service use among children and youth in Ontario: population-based trends over time. Can J Psychiatry. 2016;61(2):119-124.

29. Mapelli E, Black T, Doan Q. Trends in pediatric emergency department utilization for mental health–related visits. J Pediatr. 2015;167(4):905-910.

30. Simon AE, Schoendorf KC. Emergency department visits for mental health conditions among US children, 2001-2011. Clin Pediatr (Phila). 2014;53(14):1359-1366.

31. Gill PJ, Saunders N, Gandhi S, et al. Emergency department as a first contact for mental health problems in children and youth. J Am Acad Child Adolesc Psychiatry. 2017;56(6):475-482.e4.

32. Farewell VT, D'Angio GJ. A simulated study of historical controls using real data. Biometrics. 1981;37(1):169-176.