Estimation of Needs for Addiction Services: A Youth Model

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ABSTRACT. **Objective:** In the field of health care services, resource allocation is increasingly determined based on a population needs model. Although service needs models have been developed for adults with substance use problems, it would seem inappropriate to apply them indiscriminately to young people. **Method:** The method used proposes six steps: (1) targeting the population, (2) estimating the proportion of the population affected by substance misuse and (3) the proportion of youths who should receive services, (4) identifying categories of services, (5) estimating the proportions of youths who should have access to each category of services, and (6) applying the model to real use of services by youths to recalibrate it. **Results:** Youths ages 12–17 from the Province of Québec were classified within a tiered model comprising four levels of substance use severity. Youths in need of services varied from 38% (*weak response*) to 95% *(high response)* for the highest severity cases. Service categories retained are detoxification/intoxication, outpatient, and residential, with each one being subdivided into four categories. The proportion of youths from each tier who should access categories and subcategories of services varied widely. After a pre-experimentation, the model was adjusted. **Conclusions:** The model can be applied in different jurisdictions, with the caution of adjusting prevalence to local reality. Further improvement will be based on more accurate information concerning the path of clients through services, better strategies to reach youths in need of services, and increased knowledge of optimal service categories. Models adapted to low- or moderate-income countries, where the health care system has minimal services in the areas of mental health and addiction, should be developed. (*J. Stud. Alcohol Drugs, Supplement 18,* 64–75, 2019)

RÉSUMÉ. **Objectif :** Dans le domaine des services de santé, les ressources allouées sont de plus en plus déterminées à partir de modèles basés sur les besoins de la population. Bien que des modèles de besoins de services aient été développés pour des adultes présentant des difficultés d'utilisation de substances, il semble inapproprié de les appliquer sans distinction aux jeunes. **Méthode :** La méthode utilisée se déroule en six étapes : cibler la population (étape 1), estimer la proportion de la population qui présente des difficultés liées à l'utilisation de substances (étape 2) et la proportion de jeunes qui devraient recevoir des services (étape 3), identifier les catégories de services (étape 4), estimer la proportion de jeunes identifiée à l'étape 3 qui devraient avoir accès à chaque catégorie de service (étape 5) et réajuster le modèle en fonction de l'utilisation réelle des services par les jeunes (étape 6). **Résultats :** Les jeunes âgés de 12 à 17 ans de la province de Québec ont été classés dans un modèle qui comporte quatre niveaux de sévérité d'usage de substances. Les jeunes ayant besoin de services varient de 38% (réponse faible aux besoins) à 95% (réponse élevée aux besoins) pour les cas les plus sévères (4e niveau). Les catégories de services retenues sont celles liées à la désintoxication et à l'intoxication, les services en consultation externe et les services résidentiels, chacune étant divisée en quatre sous-catégories. Sur la base de l'opinion d'experts et d'informations provenant de la base de données, la proportion de jeunes qui doivent accéder aux catégories et sous-catégories de services dans chacun des niveaux varie considérablement. Après une pré-expérimentation, le modèle a été ajusté. **Conclusion :** Tel qu'illustré à l'aide des services offerts dans la province de Québec, ce modèle peut s'appliquer à différentes réalités territoriales en prenant soin d'ajuster la prévalence aux particularités locales. D'autres améliorations pourraient provenir d'informations plus précises concernant la trajectoire des clients dans les services, de meilleures stratégies pour rejoindre les jeunes ayant besoin de services ainsi que d'une meilleure connaissance des catégories optimales de service. Des modèles adaptés aux pays présentant des revenus faibles à modérés, où les systèmes de soins en addiction et santé mentale sont minimalistes, devraient être développés.

Objetivo: En el campo de los servicios de atención médica, la asignación de recursos se determina cada vez más en función de un modelo de necesidades de la población. Aunque se han desarrollado modelos de necesidades de servicios para adultos afectados por problemas de uso de sustancias, parece inapropiado aplicarlos de manera indiscriminada a los jóvenes. **Método:** El método utilizado propone seis pasos: Paso 1, dirigido a la población, Paso 2, estimación de la proporción de la población afectada por el abuso de sustancias y la proporción de jóvenes que deberían recibir servicios (Paso 3), identificación de categorías de servicios (Paso 4), estimar la proporciones de jóvenes identificados en el paso 3 que deben tener acceso a cada categoría de servicios (Paso 5) y aplicar el modelo al uso real de los servicios por parte de los jóvenes para recalibrarlo (Paso 6). **Resultados:** Jóvenes de 12 a 17 años de edad de la provincia de Quebec fueron clasificados dentro de un modelo escalonado compuesto de cuatro niveles de gravedad uso de sustancias. Los jóvenes que necesitan servicios variaron del 38% (respuesta débil a las necesidades) al 95% (alta respuesta a las necesidades) para los casos de mayor gravedad (Nivel 4). Las categorías de servicios retenidas son desintoxicación / intoxicación, ambulatoria y residencial, cada una de las cuales se subdivide en cuatro categorías. Basado en las opiniones de los expertos y la información de la base de datos, la proporción de jóvenes de cada nivel que deberían acceder a las categorías y subcategorías de servicios varía ampliamente. Después de una pre-experimentación, se ajustó el modelo. **Conclusión:** Como se ilustra con los servicios de la provincia de Quebec, este modelo se puede aplicar en diferentes jurisdicciones con la precaución de ajustar la prevalencia a la realidad local. La mejora adicional se basará en información más precisa sobre la trayectoria de los clientes a través de los servicios, mejores estrategias para

llegar a los jóvenes que necesitan servicios y un mayor conocimiento de las categorías de servicio óptimas. Modelos adaptados a países con niveles de ingresos bajos o moderados, en los cuales los servicios de atención médica en las áreas de salud mental o adicciones son mínimos, deberían ser desarrollados.

PREVALENCE STUDIES REGULARLY identify significant proportions of youths who struggle with alcohol and drug-related problems. In 2015 in the United States, 1.2 million adolescents ages 12–17 (5%) had a substance use disorder (SUD; abuse or dependence, as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*) (Center for Behavioral Health Statistics and Quality [CBHSQ], 2016). Among Canadian youths (ages 15–24), 11.9% report substance abuse or addiction (Statistics Canada, 2014). Furthermore, some provincial results estimate the proportion of youths (ages 12–17) with a severe alcohol or drug-related problem at 5.1% (Laprise et al., 2012), and at 10.2% to 16% for youths with a substance use problem (Boak et al., 2015; Laprise et al., 2012). Despite the availability of diverse effective treatments for substance use and addiction (Samson & Tanner-Smith, 2015; Tanner-Smith et al., 2013), access to services still seems inconsistent with the proportions of youths for whom these services are destined. In fact, only 3.7% to 15% of youths having an alcohol and other drug (AOD) problem reported accessing these services (Boak et al., 2015; Haughwout et al., 2016; Merikangas et al., 2011), and approximately one third of youths with an SUD had accessed specialized services (Costello et al., 2014).

The gap between SUD prevalence and access to services naturally leads to the following question: how many youths should be accessing these services? The first, simplest, and most frequently used answer is obtained by simply equating the needs for services to prevalence (Wang et al., 2007). For example, the Substance Abuse and Mental Health Services Administration (SAMHSA) has historically defined the need for treatment as follows: "People are defined as needing substance use treatment if they had a SUD in the past year or if they received substance use treatment at a specialty facility" (CBHSQ, 2016, p. 27). This assumption of equivalence between diagnosis and the need for treatment has been judged to be inadequate by different researchers for at least two decades (Pincus et al., 1998; Regier et al., 1998) because it does not take into account clinical significance. Indeed, some postulate that for the same diagnosis, more severe cases will have a greater need for treatment (Frances, 1998). Following the same argument, Shepard and colleagues (2005) conducted a Massachusetts survey to estimate the need for addiction-specialized services and operationalized the clinical significance of SUD using an ASAM (American Society of Addiction Medicine) level of care criteria; the need for specialized services was roughly one fifth of the SUD prevalence.

Another observation arguing against using diagnosis as an estimate of the need for services is the significant proportion of cases of youths who will experience remission without

any professional help (Sareen et al., 2013). In addition, the significant proportion of in-treatment cases who do not satisfy the last-year-diagnosis criteria, (i.e., nondiagnosed or subthreshold patients) constitutes an argument in favor of a more complex estimation of a service needs model (Bruffaerts et al., 2015; Druss et al., 2007). Finally, the client's subjective experience must also be considered: The vast majority of youths reporting substance abuse or addiction do not report a need for treatment (Wu & Ringwalt, 2006) and, thus, do not seek help in the related services.

Another strategy is to estimate treatment needs based on the historical allocation of resources, presuming that the previous demand accurately reflects the need for treatment. Many analyses have shown inequities in treatment access among social subgroups or geographical regions, which illustrates how this mode of allocation is not sufficiently sensitive to the needs of subgroups (CBHSQ, 2016). Applying traditional methods of providing and distributing resources ensures that inequities are perpetuated and deters service innovations meant to adapt treatment strategies to population needs (Kamis-Gould & Minsky, 1995).

Another aspect to consider when estimating the need for services is their definition. Very few authors have focused on this aspect; they have estimated the number of cases in need of care without defining which services will be needed and by whom. As proposed by Ritter and colleagues (2019—this issue), the diversity of treatment should be included in the planning model and not presuppose that "one size fits all." Hence, one strategy to better describe services would be to conduct surveys with key informants (Kamis-Gould & Minsky, 1995). Therapists, youths, families, and stakeholders could all provide detailed information about the adequacy of services and what should be added or modified. Because each person may be too focused on the services that are already familiar to him or her (Kamis-Gould & Minsky, 1995), a diverse range of participants would help to ensure that complementary viewpoints are collected (Lasalvia et al., 2000).

Ritter and colleagues (2019) argue that estimating service needs requires complex models that take into account both prevalence and other variables that drive the demand for services. For example, diagnosis should be only one criterion among several others, such as severity of symptoms, degree of disability, comorbidity, recent stressors, and the need for treatment maintenance after some form of remission (Aoun et al., 2004).

Among these complicating factors in the planning of AOD disorder services for youth, mental health co-morbidity is central, resulting in greater overall problem severity, a need for more services (Grella et al., 2004), and poorer outcome

(Shane et al., 2003). Externalizing behaviors (e.g., delinquency, opposition, interpersonal aggressive behavior), one of the most frequent co-occurring behavioral problems in this population (Diamond et al., 2006), is also a factor that complicates treatment. Adolescents entering substance abuse treatment can present a picture of multidimensional difficulties, aside from mental health or delinquency/interpersonal aggressiveness problems that are linked to substance abuse and outcome of interventions. These include low school attachment (Li et al., 2011; Rovis et al., 2016), low parental supervision or support (Pettigrew et al., 2017; Serafini et al., 2018), low peer support or even victimization (Richter et al., 1991), and high rates of social and material poverty in the neighborhood (Duncan et al., 2002). These complex cases must be matched to more integrated treatments tagging multiple life dimensions (Godley et al., 2014), this being based on the observation that highly complex cases perform better with more intensive, integrated treatments (Henderson et al., 2010).

Over the past few decades, Rush (1990) elaborated on a service planning model for alcohol use disorders in Canada, initially based on alcohol sales per capita and focused on specialized services. He subsequently improved his model by defining it with five tiers, targeting the whole spectrum of AOD use from at-risk to high severity use. He also provided a complex definition of services as accessed by individuals in each tier in accordance with their specific needs (Rush et al., 2014, 2019–this issue). Addiction services in the Province of Québec have been using Rush's adult model for a decade to plan the allocation of resources.

This model has helped government authorities to better respond to pressure to invest new funds in specific services and also to estimate fair funding between administrative regions by grounding decisions in a population needs planning model. Based on this success, the public funder for substance use and addiction services requested a model adapted for youth. Indeed, there are many ways in which planning models developed for adults do not apply to youth (Flanzer, 2005). These include, for example, a binge use habit, the lack of acquired tolerance, and being less in need of detoxification services and more in need of acute intoxication services. There is also the developmental process (e.g., the degree of autonomy largely varying between 12 and 17 years old), which calls for therapeutic adaptations using, among other things, various combinations of family and individual interventions (Bertrand et al., 2006). This article will describe the method used and the results of this work (i.e., the Needs for Addiction Services Estimation Model for Youths [NASEM-Y]).

Method

The general model used by Rush and colleagues (Rush, 1990; Rush et al., 2014) was adapted for this study and com-

prised six steps (Step 4 previously included two tasks, which we divided into two distinct steps and to which we added a final step aimed at a pre-experimentation that would allow us to recalibrate the model; cf. Table 1). The targeted population was youths ages 12–17 living in the Province of Québec, Canada (Step 1; i.e., targeting a regional population). Step 2 aimed to estimate the proportion of the youth population affected by substance misuse ranging from an at-risk use to a highly deleterious one. Data were extracted from the 2010–2011 *Enquête québécoise sur la santé des jeunes du secondaire* (EQSJS), which determined the prevalence for alcohol and drug misuse among youths. The measure used to obtain this information comprised a three-level indicator of severity (low/green light, moderate/yellow light, high/red light) as measured with the Detection of Alcohol and Drug Problems in Adolescents (DEP-ADO; Landry et al., 2004), which has good psychometric properties (Bernard et al., 2005).

The survey also provided multiple, well-validated indicators of mental health problems and indices of psychosocial difficulties in five domains: school, peer relations, delinquency, family, and socioeconomic (cf. Table 2; Institut de la statistique du Québec, 2013). Severity of alcohol and drug use was combined with indices of mental health and psychosocial difficulties to organize the cases into severity tiers and estimate the percentage of these youths in each tier. Step 3 estimated the proportion of youths from each tier (i.e., from Step 2) who should receive services within a 12-month period. These proportions were estimated based on the continuum of the penetration rate in specialized services in the province during one fiscal year.

Step 4 identified categories of services that should be available to respond to the severity continuum of AOD use among youths. Two sources of information were used: (a) a literature review of the services that are offered internationally (and the definitions of these services) and retrieved from orientation documents produced by government agencies from the Organisation for Economic Co-operation and Development (OECD) countries and from a scientific literature database search and (b) experts' opinions on the adequacy of these categories collected through Delphi consensus group technique (Hasson et al., 2000). Experts were invited to talk about service categories that were not evident in the literature.

In a second round of these Delphi consensus group discussions (Step 5), the same experts voiced their opinions concerning the proportion of youth in need of services at each tier (as identified at Step 3) and who should have access to each of the retained service categories (cf. Step 4). Experts were aware, in their estimation, that large proportions of the young people would probably refuse these services because of a lack of motivation.

To avoid an idealistic estimation of the proportion of youths who would realistically participate in each service

Table 1. Method used to estimate the proportion of youths using AOD and needing different service categories

Step	Task	Strategies
Step 1	Targeted population	Youths 12–17 years old living in the Province of Québec, Canada
Step 2	Estimation of the proportion of Step 1 affected by substance misuse	Date extracted from EQSJS–2010–2011. Four tiers are extracted.
Step 3	Estimation of youths from each tier (i.e., from Step 2) who should receive services within a 12-month period	National surveys provide a paucity of information on youth consultation rates. Based instead on the continuum of penetration rates in specialized addiction services (corresponding to Tier 3) in the province during a fiscal year.
Step 4	Identification of service categories needed to respond to the severity continuum of AOD use among youths	International literature review of definitions of services provided in OECD countries. Final decision on chosen categories made with the Delphi consensus group technique ($n = 83$ experts from Canada).
Step 5	Estimation of the proportion of youths from Step 3 who should have access to each service category retained in Step 4	A second round of the Delphi consensus group with the same experts as in Step 4. Recalibration of experts' estimations.
Step 6	Pre-experimentation and adjustment of the model	Comparisons between (a) estimations of youths in need of each service category and (b) flow of youths in the province's addiction services from six administrative regions, so as to identify inconsistencies and adjust the model if needed.

Notes: AOD = alcohol and other drugs; EQSJS = *Enquête québécoise sur la santé des jeunes du secondaire;* OECD = Organisation for Economic Co-operation and Development.

category, a research database comprising information on the actual path of youths in the services (Tremblay et al., 2014) was used to weight the experts' estimates of the perceived needs for youths. The weighting process was conducted with proportions of youths who, after assessment, were either offered a specific service and refused it (e.g., the professional estimated that the adolescent would need a short-term residential service, but the adolescent refused), or accepted it but never used it. At Step 6, the model was applied in the pre-experimentation phase using databases containing information on the observed use of services made by youths in different administrative regions in Québec. These observed lower and upper bounds of penetration rates for specific services were used to recalibrate lower and upper response rates in the model only when estimations were unrealistic.

The Delphi consensus group is a strategy for arriving at a consensus out of the individual opinions of experts who debate with each other in iterative meetings on a specific topic (Hasson et al., 2000). This strategy is used when the scientific literature cannot provide enough information on a given theme. For this study, experts were chosen based on their clinical knowledge and lengthy experience with youths with substance and treatment difficulties. A greater variety of experts from different regions leads to a greater validity in the conclusions (Keeney et al., 2006).

As generally proposed by authors (Green et al., 1999; Keeney et al., 2006; Procter & Hunt, 1994), a first round of discussion allows researchers to collect information that they then summarize. A second round brings the groups together to review and recap their conclusions to arrive at a final consensus. In this study, the process was conducted twice:

the first time for service categories and a second time for the proportion of young people who should have access to each category of service (two meetings per theme with each group). A good indicator that consensus has been reached among experts is when there is a stable opinion in both groups and meetings (Hasson et al., 2000).

A total of nine groups of experts were created for this purpose: six from Québec and three from the rest of Canada (Toronto, Calgary, and Vancouver). A total of 83 experts participated in the Delphi consensus groups. The vast majority of these experts provided services to youths in different settings, such as specialized substance addiction services ($n = 40$), school services ($n = 8$), primary care and hospitals ($n = 8$), juvenile delinquency centers ($n = 6$), and charity services ($n = 4$). The other participating experts were service administrators who were very well informed of the youths' path through services ($n = 17$). Group sessions were conducted from September 2014 to March 2015.

Results

Youth classifications drawn from the 2010–2011 EQSJS survey (Pica et al., 2012) and organized into levels of severity provided a four-tier model. Three levels came from the DEP-ADO (Landry et al., 2004), which comprises, as mentioned previously, three levels of substance use risk. Because comorbidity is associated with higher impairment and, thus, higher needs for services, the third and highest level of substance use severity was divided into two tiers, with youths presenting mental health comorbidity and other psychosocial difficulties being in Tier 4 and representing 1% of the youth

TABLE 2.   Classification of youths 12–17 years old ($n = 490,567$) by tiers based on EQSJS 2010–2011, Province of Québec

Tiers and prevalence	Criterion 1: Severity of AOD use based on DEP-ADO[1]	Criterion 2: Mental health problems indicator	Criterion 3: Psychosocial risk factor indicators by domains
Tier 4 1.0% ($n = 4,906$)	Red light (score ≥ 20, i.e., problematic use of AOD)	Presence of at least two of the following indicators (20.3%)	Presence of at least two of the following domains:[a] **School domain (20.2%)** • High risk of school dropout[f] (19.9%) *or* • Low school attachment[g] (1.3%)
		- Diagnosis of anxiety disorder, depression, or eating disorder (anorexia, bulimia)[b,c] (12%) - High psychological distress[d] (12%) - High attention deficit, with or without hyperactivity[e] (6.9%)	**Peer relationships domain (10.6%)** • High score on victimization[h] (6.4%) *or* • Very low peer support[i] (5%) **Delinquency/aggressiveness domain (29.4%)** • High interpersonal aggressive behavior[j] (20.1%) *or* • Rebellious or reckless behaviors[k] (14.3%) *or* • High delinquent behavior[l] (10.6%) **Family domain (20.6%)** • Very low parental supervision[m] (19.8%) *or* • Very low parental support[n] (2.6%) **Socioeconomic domain (14%)** • Neighborhood marked by high material/social poverty[o](14%)
Tier 3 4.1% ($n = 20,113$)	Red light (score ≥ 20, i.e., problematic use of AOD)		
Tier 2 5.1% ($n = 25,019$)	Yellow light (score 14–19, i.e., emerging AOD problem)		
Tier 1 89.8% ($n = 440,529$)	Green light (score 0–13, i.e., no or very low to moderate AOD use)		

Notes: EQSJS = *Enquête québécoise sur la santé des jeunes du secondaire;* AOD = alcohol and other drugs; DEP-ADO = Detection of Alcohol and Drug Problems in Adolescents. [1]Landry et al. (2004). The DEP-ADO uses traffic light symbols to illustrate severity levels in AOD use. [a]The following indicators of each domain are from Pica et al. (2013); when appropriate, modifications that were made by the authors are described below. [b]As diagnosed by a professional and reported by the adolescent. [c]Having at least one of these diagnoses; [d]The highest quintile of the IDPESQ-14, based on Pica et al. (2013), was chosen. [e]The highest quartile, based on Pica et al. (2013), was chosen. [f]The highest quintile, based on Pica et al. (2013), was chosen. [g]The lowest category, based on Pica et al. (2013), was chosen. [h]Having reported being the victim of three types (or +) of aggressive behavior. [i]The lowest level of peer support was chosen. [j]The highest category (manifesting at least two types of high interpersonal aggressive behavior) from Pica et al. (2013) was chosen. [k]Based on Pica et al. (2013), the highest category was chosen, which corresponds to positive scores on at least two rebellious or reckless behaviors in the last 12 months. [l]This category represents the youths who reported positive scores on three types of delinquent behavior. [m]This category refers to having an overall score that is equal or inferior to 1. [n]The lowest category was chosen. [o]The top quintile, based on Pica et al. (2013), was chosen.

population of Québec (cf. Table 2). Tier 3 (4.1% of the youth population) was composed of all other youths classified in the highest level of AOD use who did not satisfy the criteria for Tier 4, followed by Tier 2 (5.1%) for moderate risk, and Tier 1 (89.8%) for the majority of youths who were at low or no risk of AOD-related problems.

The task of Step 3 was to estimate the proportion of people from each tier who should access services within a fiscal year. National surveys have provided a paucity of information on this question. Indeed, reports concerning the prevalence of service use by youths focused on specialized addiction services and indicated consultation rates varying from 0.4% to 0.9% for the whole population of young people (Australian Institute of Health and Welfare [AIHW], 2014;

TABLE 3.   Estimation of the degree of response to youth population needs for addiction services as a function of AOD use severity levels

Severity of AOD use and other risk indicators	Weighing factor	Degree of response to youth population needs for services		
		Low	Medium	High
Tier 4 　DEP-ADO 20+ 　*and* 2+ mental health 　disorder indicators 　*and* 2+ psychosocial 　risk factors indicators	Tier 3 × 2.5	38%	83%	95%
Tier 3 DEP-ADO 20+	0	15%	33%	50%
Tier 2 DEP-ADO 13–19	Tier 3 ÷ 3	5%	11%	17%
Tier 1 DEP-ADO 0–12	No need for addiction services Need for health promotion and universal prevention			

Notes: AOD = alcohol and other drugs; DEP-ADO = Detection of Alcohol and Drug Problems in Adolescents.

Brand et al., 2017; Pirie et al., 2014) and 8.4% to 9.4% among youths reporting an SUD diagnosis (Pearson et al., 2013; Pirie et al., 2014; SAMHSA, 2017).

Tremblay and colleagues (2014) conducted in-depth qualitative and quantitative analyses of specialized addiction services received by youths in six regional health authorities. They identified the best service models (as identified by qualitative analysis), which corresponded to the highest penetration rates of services in the youth population. The penetration rates varied from 14.7% to 33.1%. Discussions with stakeholders and analysis of the services offered in the region with the best performance revealed that their model did not extend to all the schools and juvenile delinquency centers in the region, which means that there was still a possibility to improve them. Expanding their work into these regions would probably result in a penetration rate of close to 50%. These rates were finally retained as markers of low, medium, and high degrees of response to youth needs for specialized addiction services, which generally corresponded to Tier 3.

In their adult model, Rush and colleagues (2014) estimated that the proportion of the population who should access services from Tier 4 or its equivalent (i.e., SUD and mental health comorbidity) was 2.5 times higher than for people from Tier 3. This observation was also reported in youth studies, with the group presenting mental health comorbidity and SUD being two times more inclined to consult than the groups with no dual diagnosis (Cheng & Lo, 2010). They also estimated that people from Tier 2 would be three times less numerous to consult than people from Tier 3. Table 3 shows a synthesis of the proportions of youths who should access addiction services by degree of response to their need for services and by tier (proportions are rounded to zero decimal places).

The identification of service categories (Step 4) was first completed through a literature review of government agen-cies (e.g., United States, Australia, Europe, France, Canada, Québec, and England) describing youth addiction services that should be implemented in their respective countries. This singled out five categories of services, namely: (a) screening, first contact; (b) detoxification; (c) outpatient; (d) residential; and (e) posttreatment (AIHW, 2014; Chaim et al., 2014; European Monitoring Centre for Drugs and Drug Addiction, 2011; MILDT, 2015; Roberts, 2010; SAMHSA, 2014; Tremblay et al., 2014). These service definitions were presented to experts who had to arrive at a consensus con-cerning the categories that should be kept or added to obtain a complete and realistic organization of a youth services model. Table 4 presents service categories, titles, and defini-tions. During the discussions, experts integrated posttreat-ment services into the outpatient category. They also added acute intoxication to previously identified categories.

Experts mentioned the necessity to include family members, as they may also be clients themselves. Internet and mobile-based services were also deemed necessary to contact and inform youths, to provide treatment applica-tions, and even to talk directly with the therapist. Mutual aid groups/peer support were cited as useful. Experts also evoked many system functions that were not specific service categories but that represented large guidelines that should permeate all service categories (e.g., health promotion, prevention, harm reduction, etc.). They also mentioned many conditions that would optimize the imple-mentation, fluidity, and accessibility to services (e.g., out-reach, "no wrong door" principle, rapid access to services). These functions and service deployment conditions are in-tegrated into Figure 1 (for a full description, see Tremblay et al., 2016). Proportions to be estimated are indicated by a "*p*=" symbol (Figure 1).

At Step 5, with the help of Delphi groups with experts, we estimated the proportion of youths identified in Step 3

TABLE 4. Table of agreed-upon service categories for youths with difficulties concerning the use of alcohol and other drugs

Categories	Definitions or aims
Screening	
• Case identification	Identify youths who may have difficulties—AOD use. Very brief screening tools (e.g., CRAFFT).
• Case definition	Define or describe the difficulties—AOD use. Medium-length questionnaires (e.g., DEP-ADO).
Acute intoxication/withdrawal management (p_1)[a]	
• Acute intoxication ($p_{1.1}$)	Symptoms of an episode of heavy use that cannot be safely managed at home and that are typically managed at the hospital (<24 hours). Overdose management included here.
• Outpatient ($p_{1.2}$)	Mild withdrawal symptoms treated in many settings (e.g., visiting youths at home or in group sessions).
• Residential community ($p_{1.3}$)	Moderate withdrawal symptoms. Residential but nonhospital settings.
• Residential for complexity enhanced ($p_{1.4}$)	Severe withdrawal symptoms. Multiple co-occurring conditions: hospital with high level of medical/psychiatric support.
Outpatient services[b] (p_2)	
• Brief intervention ($p_{2.1}$)	Initiating interest in changing: short-term intervention, not always scheduled.
• General nonspecialized ($p_{2.2}$)	Youths with moderate AOD use (or severe AOD with motivation intervention only in order to guide them to other specialized services). Counselors not specialized in addiction.
• Specialized ($p_{2.3}$)	Youths with severe AOD use. Counselors specialized in addiction. Harm reduction and case management included.
• Intensive specialized/complexity enhanced ($p_{2.4}$)	Youths with severe AOD use and a complex situation in other areas. Counselors specialized in addiction. During at least four consecutive weeks, a minimum of (a) three weekly meetings (≥15 minutes) or (b) one weekly intervention (≥4 hours). Services can be provided by multiple counselors/organizations, as long as they are coordinated.
Residential services[b,c] (p_3)	
• Stabilization ($p_{3.1}$)	1–7 days of rest and stabilization in a safe setting with low therapeutic goals.
• Residential short-term (<90 days) ($p_{3.2}$)	Structured program of interventions and activities. Duration is adapted to needs.
• Residential long-term (≥90 days) ($p_{3.3}$)	Structured program of interventions and activities. Complexity in many areas necessitates a longer residential program focusing on lifestyle, therapeutic environment, and peer support. Duration is adapted to needs.
• Complexity enhanced/residential ($p_{3.4}$)	Complexity characterized by high AOD use associated with one or multiple significant problems that cannot be treated at lower levels: mental health disorder (psychiatric hospitalization), delinquency/behavior problems (young offender's residential facilities), and physical illness (hospitalization).

Notes: AOD = alcohol and other drugs; CRAFFT = Car, Relax, Alone, Forget, Friends, Trouble; DEP-ADO = Detection of Alcohol and Drug Problems in Adolescents. [a]p values in parentheses refer to proportions for each service category, as illustrated in Figure 1. [b]Most of the interventions can be provided in individual, group, and family formats. [c]All residential services are for youths with severe AOD use.

from each tier who should receive a given type of general service during a fiscal year. For example, if we mentioned that 33% of Tier 3 youths should access services (cf. Step 3), Step 5 aimed to determine how many of this 33% would need some form of detoxification, outpatient, or residential service. Choices were not exclusive, which allowed experts in the Delphi groups to decide that some youths would need access to more than one general service category. Experts then estimated once again the proportion of youths who would need each type of specific service in each general category, allowing for the possibility of more than one specific service per general category. For each service category, the median among the nine groups of experts represented the best consensus, as extreme scores unduly influenced the mean (cf. Table 5).

The experts provided their estimation of the proportion of youths who should receive a specific service. As mentioned previously, results from the actual path of youths through the services (Tremblay et al., 2014) were used to weight experts' estimates of their perceived needs. For example, Tremblay and colleagues (2014) report that, among youths who were offered residential services after a specialized assessment, 57.8% accepted and, of these, 60.8% actually accessed the residential setting. This means that of all the youths (100%) who "should" have accessed residential services for their addiction, 35.1% actually did access them (100 × 0.578 × 0.608). This rate applied to both short- and long-term residential services. They also observed that of all the youths (100%) referred by general services to specialized services, 93.5% went to a first assessment session, and if referred to

In-need population

System Functions : Health Promotion, Prevention, Harm Reduction, Stigma and Discrimination Prevention, Engagement and Linkage Supports, Individualized Treatment and Support Planning

People who spontaneously would not go to services for substance use problems

People going "by themselves" to services for substance use problems

No services required

No services required

Screening

Case Identification

Case Definition

$(p_1=)$

$(p_2=)$

Internet and Mobile-Based Services

Mutual Aid Groups and Peer Supports

Family members/supporters

Family members/supporters

Screening Assessment
Intoxication / Withdrawal Management

Acute intoxication $(p_{1.1}=)$

Non-residential $(p_{1.2}=)$

Residential community / Non-hospital-based $(p_{1.3}=)$

Residential for complexity enhanced (ex. hospital-based) $(p_{1.4}=)$

Screening Assessment
Outpatient Services
(including specific services for family)

Brief intervention $(p_{2.1}=)$

General $(p_{2.2}=)$

Specialized $(p_{2.3}=)$

Intensive specialized / Complexity enhanced $(p_{2.4}=)$

$(p_3=)$

Screening Assessment
Residential Services

Stabilization $(p_{3.1}=)$

Short-Term (< 90 days) $(p_{3.2}=)$

Long-Term (≥ 90 days) $(p_{3.3}=)$

Complexity Enhanced (Medical / Psychiatric Young offenders Behavioral disorder) $(p_{3.4}=)$

Services Deployment Conditions : outreach (being near the youth's location for screening), accept the « no wrong door » principle, rapid access to services; simplicity of procedures; geographic proximity of services; inter-professional proximity; inter-institution communications; intra/inter-institution protocols; continuity/fluidity of services (to support during waiting period/to prepare before starting services/to accompany toward different services/to support transition from youth services to adult services, etc.); professionals dedicated to substance use problems; other professionals sensitized to substance use problems; regular training; access to medical services at different steps/services; clinical supervision; flexibility in treatment duration (residential services); integration of the family when and where appropriate; integration of strategies for health promotion and prevention within the services.
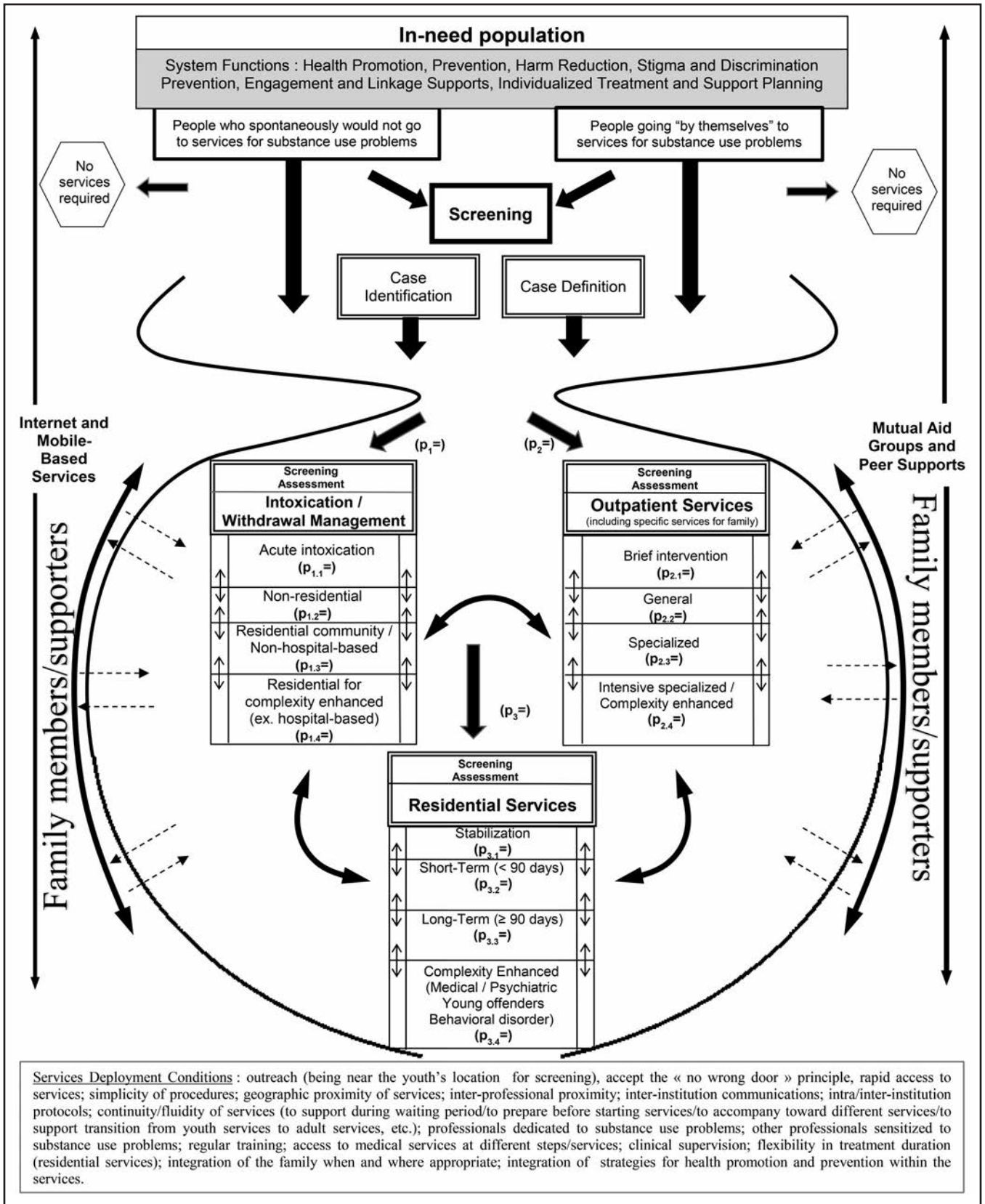
FIGURE 1. Needs-based planning model for services and supports for youth 12–17 years old

TABLE 5.　Estimation of the number of youths who should access each service as a function of level of response to the need for services (Province of Québec)

| | | General categories of services | | | Specific services | | | | | | | | | | | |
| | | | | | Acute intoxication/ withdrawal management (p1) | | | | Outpatient services (p2) | | | | Residential services (p3) | | | |
Variable		Intox./with-drawal	Out-patient	Resi-dential	Acute intox.	Out-patient	Resid. com-munity	Resid. complex-ity++	Brief inter-vention	General	Specia-lized	Intensive specia-lized	Stabili-zation	Short term	Long term	Com-plexity ++
Correction rate		–	–	–	–	–	–	–	–	.854	.798	.576	.576	.351	.651	–

Proportion from each tier who should receive each category of services (median from group consensus of nine groups of experts)

		p_1	p_2	p_3	$p_{1.1}$	$p_{1.2}$	$p_{1.3}$	$p_{1.4}$	$p_{2.1}$	$p_{2.2}$	$p_{2.3}$	$p_{2.4}$	$p_{3.1}$	$p_{3.2}$	$p_{3.3}$	$p_{3.4}$
Severity	Tier 4	.20	1.00	.70	.15	.67	.35	.01	1.00	.35	.85	.50	1.00	.50	.30	.20
of AOD	Tier 3	.15	1.00	.25	.12	.50	.30	.01	1.00	.40	.90	.15	.90	.75	.10	.05
use	Tier 2	.03	1.00	.01	1.00	.00	.00	.00	1.00	.80	.075	.00	.99	.00	.00	.00

Number of cases that should access services by three levels of response to need for services (Province of Québec)

Level of	Low	858	6,132	2,072	98	476	266	8	6,132	2,442	3,506	798	1,150	428	164	196
response	Medium	1,893	13,461	4,537	834	1,043	584	18	13,461	5,365	7,694	1,746	2,518	937	358	883
	High	2,568	18,970	5,819	1,717	1,379	779	24	18,970	7,734	10,638	2,211	3,207	1,234	432	2,404

Number of cases receiving services in a fiscal year

		–	–	–	755[a]	–	–	18[b]	–	–	5,857[c]	–	–	507[d]	369[e]	667[f]

Notes: Intox. = intoxicated; resid. = residential; AOD = alcohol and other drugs; SUD = substance use disorder. The dashes in the cells indicate that these numbers were impossible to estimate or obtain. [a]Number of emergency department admissions for acute intoxication, 2014–2015: 84% are related to alcohol. [b]Number of hospitalizations for withdrawal management, 2013. [c]Number of youths admitted into an outpatient specialized addiction service, 2012–2013. [d]Number of admissions into a short-term residential service, 2012–2013. [e]Number of admissions into a long-term residential service, 2012–2013. [f]Number of hospitalizations with a primary or secondary diagnosis of SUD, 2013.

a specialized outpatient service, 95.2% accepted; of these, 89.7% accessed the service, meaning that 79.8% (100 × 0.935 × 0.952 × 0.897) of youths who should have accessed outpatient specialized services actually did so.

For general outpatient services, Tremblay and colleagues (2014) did not have an estimate, so the same strategy as the one used for specialized outpatient services was applied (except for the first proportion of referred cases to specialized services), meaning that 85.4% (100 × 0.952 × 0.897) of youths who were offered nonspecialized/general outpatient services actually used them. Tremblay and colleagues (2014) did not give estimates of youths who started intensive specialized outpatient or residential stabilization services when offered to them. The middle score between the residential correction rate and the specialized outpatient service rate was chosen as the potential correction rate based on the idea that it is easier to accept intensive outpatient or brief stabilization residential services than short-/long-term residential treatment but more difficult to accept more than one session per week as typically offered in specialized outpatient services. Because of a lack of data, no other corrective rates were applied. Using all the previously mentioned information, a first estimation of the number of youths in need of services was calculated.

This first estimate was then compared to the number of cases observed in different Québec regional health authorities and throughout the province (Step 6). These were drawn from services for which reliable statistics are available, namely from the emergency ward for acute intoxication,

hospital withdrawal management, hospitalizations for any other difficulty with AOD, and specialized outpatient and residential addiction services. The first observation to be made concerns the appropriateness of estimations regarding hospital withdrawal management, specialized outpatient, and short- and long-term residential services. Levels of response at the provincial level varied from low to moderate. Estimations for emergency services for acute intoxication and residential services for complexity enhanced cases (hospitalization in psychiatric and medical departments and delinquency centers) largely underestimated youth needs, with numbers being below the actual service offered within the fiscal year.

For these two types of services, distribution of the proportion of cases receiving these services in the 12- to 17-year-old population of each regional health authority was used to readjust the estimations. The lowest performance was used as the criterion for a low response to the need for services, the highest performance was used as the criterion for a high response, and the mean was used as the criterion for a moderate response. For emergency acute intoxication services, the lower bound was 0.02% for the 12- to 17-year-old population, the higher bound was 0.35%, and the mean was 0.17%. Concerning residential services for complexity-enhanced cases, only the number of hospitalizations for a primary or secondary diagnosis of SUD was available. The statistics concerning the number of cases who were in a residential setting because of a combination of delinquency and SUD were not available. For this category, the lower bound

was 0.04% of the 12- to 17-year-old population, the higher bound was 0.49%, and the mean was 0.18%.

Discussion

Most planning models for addiction services propose a simple strategy to identify the proportion of cases in need of services with (a) dichotomous diagnosis criteria and (b) an assumption that 100% of cases with a diagnosis will be in need of services. Another weakness is that they do not propose definitions of service types (CBHSQ, 2016). As evoked by Ritter and colleagues (2019), we need to remedy these weaknesses by constructing complex models. The NASEM-Y is a response to this, proposing to alleviate these flaws via four improvements.

First, it is based on a tiered model that combines severity of use of AOD, indicators regarding mental health difficulties, and other domains of social functioning such as school attachment, peer and parental relationships, aggressiveness, delinquency, and poverty. Second, it integrates an estimation of the proportions of youths in need of services for each tier, with the higher tiers having higher needs. These proportions are based on observed penetration rates of specialized services, offering a nuanced three-level response to needs (low, moderate, high), giving stakeholders flexibility and avoiding an idealistic estimation. Third, the model provides a continuum of services for a complex response to youth needs. Last, tiers are interconnected with services, defining the proportion of youths from each tier in need of each category of services. The model was pre-experimented and proportions readjusted for two types of services (emergency for acute intoxication and residential for complexity enhanced cases).

The NASEM-Y can be used by health authorities to scan the diversity of services offered. Service analysis in the Province of Québec revealed an absence of intensive specialized outpatient and ambulatory detoxification services, leading authorities to set priorities and to plan for the development of intensive specialized outpatient services in the years to come. Nevertheless, the continuum of services is not understood as a "one size fits all" model. Stakeholders from a specific administrative region could plan and rearrange services to respond to the overall need, without offering each of the services included in the model. For example, in remote areas, offering residential treatment for youths is often a challenge: families want access to services in a nearby setting to facilitate contact with teenagers during the treatment phase. In light of these difficulties, more intensive outpatient services could be offered to youths in need of residential services. For others, lodging arrangements could be arranged as a complementary provision to an intensive outpatient service.

The NASEM-Y also provides the results of a gap analysis regarding the proportion of youths accessing each service compared with the desired level of response. For example,

the application of the model to the Province of Québec shows a moderate response rate to long-term residential services and a rather low response rate to short-term residential and outpatient specialized services. These analyses provide a foundation for service development and rearrangement decisions over the next few years.

The international applicability of the model is based on the assumption that the prevalence in each tier is similar in the targeted area to the prevalence observed in the Province of Québec. Ideally, users of the model would recalculate the proportion of the youth population in each tier through local surveys and insert it into the model to obtain a more reliable estimate for the population using their services. High quality surveys are crucial to ensure that planning models provide good estimates for service needs. However, the capacity to apply the model to low- or moderate-income countries where health care systems offer a paucity of mental health and addiction services is questionable. Adaptations are needed, and priority must be given to those services most likely to be implemented even with poor resources, encouraging creativity in the way services are conceptualized and delivered.

One of the model's limitations involves the experts' participation in the Delphi consensus groups. They might have underestimated or overestimated the proportion of youths from each tier in need of each type of service. Indeed, experts' knowledge is limited to the services they know, and some services may not be well known by everyone, such as acute intoxication services and residential services for complexity-enhanced cases, which may in turn introduce estimation errors. This limitation was compensated by the large number of experts from different types of services and from across four Canadian provinces. However, users of the services were not interviewed (Boryc et al., 2010), which could have been helpful in identifying their priority needs rather than relying on experts' opinions about which services they should access (Acosta & Toro, 2000). We know that patients' and professionals' opinions about the need for services can be quite different (Lasalvia et al., 2000), given that patients, contrary to professionals, generally do not prioritize mental health and substance abuse services over more basic needs (Acosta & Toro, 2000). Revisions of the model should therefore include service users as experts.

This estimation model is the first version of a process that continues to improve as we collect more accurate information about the path clients follow in services, develop better strategies to reach the youths in need of services, and increase our knowledge of optimal service categories.

References

Acosta, O., & Toro, P. A. (2000). Let's ask the homeless people themselves: A needs assessment based on a probability sample of adults. *American Journal of Community Psychology, 28,* 343–366. doi:10.1023/A:1005105421548

Aoun, S., Pennebaker, D., & Wood, C. (2004). Assessing population need for mental health care: A review of approaches and predictors. *Mental Health Services Research, 6,* 33–46. doi:10.1023/B:MHSR.0000011255.10887.59

Australian Institute of Health and Welfare. (2014). Alcohol and other drug treatment services in Australia 2012–13. *Australian Indigenous Health Bulletin, 14*(4). Retrieved from http://healthbulletin.org.au/articles/alcohol-and-other-drug-treatment-services-in-australia-2012-13

Bernard, M., Bolognini, M., Plancherel, B., Chinet, L., Laget, J., Stephan, P., & Halfon, O. (2005). French validity of two substance-use screening tests among adolescents: A comparison of the CRAFFT and DEP-ADO. *Journal of Substance Use, 10,* 386–395. doi:10.1080/14659890412331333050

Bertrand, K., Beaumont, C., Durand, G., & Massicotte, L. (2006). *Les services de réadaptation offerts par les CRPAT aux jeunes et à leur entourage dans le cadre du programme dépendances. Pratiques gagnantes et offre de services de base.* Montréal, Canada: Fédération québécoise des centres de réadaptation pour personnes alcooliques et toxicomanes (FQCRPAT).

Boak, A., Hamilton, H. A., Adlaf, E. M., & Mann, R. E. (2015). *Drug use among Ontario students. Detailed OSDUHS Findings: 1977-2015.* (CAMH Research Document Series No. 41). Toronto, ON: Centre for Addiction and Mental Health.

Boryc, K., Anastario, M. P., Dann, G., Chi, B., Cicatelli, B., Steilen, M., . . . Morris, M. (2010). A needs assessment of clients with HIV in a home-based care program in Guyana. *Public Health Nursing, 27,* 482–491. doi:10.1111/j.1525-1446.2010.00888.x

Brand, P., Li, S., & White, M. (2017). *Young people's statistics from the National Drug Treatment Monitoring System (NDTMS).* London, England: Public Health England, Department of Health.

Bruffaerts, R., Posada-Villa, J., Al-Hamzawi, A. O., Gureje, O., Huang, Y., Hu, C., . . . Kessler, R. C. (2015). Proportion of patients without mental disorders being treated in mental health services worldwide. *British Journal of Psychiatry, 206,* 101–109. doi:10.1192/bjp.bp.113.141424

Center for Behavioral Health Statistics and Quality. (2016). *Key substance use and mental health indicators in the United States: Results from the 2015 National Survey on Drug Use and Health* (HHS Publication No. SMA 16-4984, NSDUH Series H-51). Retrieved from http://www.samhsa.gov/data/

Chaim, G., Henderson, J., & Brownlie, E. B. (2014). *Youth services system review.* Retrieved from http://eenet.ca/sites/default/files/Youth-Services-System-Review-Report-Part-1-FINAL3.pdf

Cheng, T. C., & Lo, C. C. (2010). Mental health service and drug treatment utilization: Adolescents with substance use/mental disorders and dual diagnosis. *Journal of Child & Adolescent Substance Abuse, 19,* 447–460. doi:10.1080/1067828X.2010.515887

Costello, E. J., He, J. P., Sampson, N. A., Kessler, R. C., & Merikangas, K. R. (2014). Services for adolescents with psychiatric disorders: 12-month data from the National Comorbidity Survey-Adolescent. *Psychiatric Services, 65,* 359–366. doi:10.1176/appi.ps.201100518

Diamond, G., Panichelli-Mindel, S. M., Shera, D., Dennis, M., Tims, F., & Ungemack, J. (2006). Psychiatric syndromes in adolescents with marijuana abuse and dependency in outpatient treatment. *Journal of Child & Adolescent Substance Abuse, 15,* 37–54. doi:10.1300/J029v15n04_02

Druss, B. G., Wang, P. S., Sampson, N. A., Olfson, M., Pincus, H. A., Wells, K. B., & Kessler, R. C. (2007). Understanding mental health treatment in persons without mental diagnoses: Results from the National Comorbidity Survey Replication. *Archives of General Psychiatry, 64,* 1196–1203. doi:10.1001/archpsyc.64.10.1196

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2002). A multilevel analysis of neighborhood context and youth alcohol and drug problems. *Prevention Science, 3,* 125–133. doi:10.1023/A:1015483317310

European Monitoring Centre for Drugs and Drug Addiction. (2011). *Guidelines for the treatment of drug dependence: A European perspective.* Lisbon, Portugal: Author. doi:10.2810/49457

Flanzer, J. (2005). The status of health services research on adjudicated drug-abusing juveniles: Selected findings and remaining questions. *Substance Use & Misuse, 40,* 887–911. doi:10.1081/JA-200058862

Frances, A. (1998). Problems in defining clinical significance in epidemiological studies. *Archives of General Psychiatry, 55,* 119. doi:10.1001/archpsyc.55.2.119

Godley, S. H., Hunter, B. D., Fernández-Artamendi, S., Smith, J. E., Meyers, R. J., & Godley, M. D. (2014). A comparison of treatment outcomes for adolescent community reinforcement approach participants with and without co-occurring problems. *Journal of Substance Abuse Treatment, 46,* 463–471. doi:10.1016/j.jsat.2013.10.013

Green, B., Jones, M., Hughes, D., & Williams, A. (1999). Applying the Delphi technique in a study of GPs' information requirements. *Health & Social Care in the Community, 7,* 198–205. doi:10.1046/j.1365-2524.1999.00176.x

Grella, C. E., Joshi, V., & Hser, Y.-I. (2004). Effects of comorbidity on treatment processes and outcomes among adolescents in drug treatment programs. *Journal of Child & Adolescent Substance Abuse, 13,* 13–31. doi:10.1300/J029v13n04_02

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing, 32,* 1008–1015.

Haughwout, S. P., Harford, T. C., Castle, I. J. P., & Grant, B. F. (2016). Treatment utilization among adolescent substance users: Findings from the 2002 to 2013 National Survey on Drug Use and Health. *Alcoholism: Clinical and Experimental Research, 40,* 1717–1727. doi:10.1111/acer.13137

Henderson, C. E., Dakof, G. A., Greenbaum, P. E., & Liddle, H. A. (2010). Effectiveness of multidimensional family therapy with higher severity substance-abusing adolescents: Report from two randomized controlled trials. *Journal of Consulting and Clinical Psychology, 78,* 885–897. doi:10.1037/a0020620

Institut de la statistique du Québec. (2013). *Enquête québécoise sur la santé des jeunes du secondaire 2010-2011. Cahier technique: Livre de codes et définition des indices* (Fichier maître). Québec, QC, Canada: Author.

Kamis-Gould, E., & Minsky, S. (1995). Needs assessment in mental health service planning. *Administration and Policy in Mental Health, 23,* 43–58. doi:10.1007/BF02106861

Keeney, S., Hasson, F., & McKenna, H. (2006). Consulting the oracle: Ten lessons from using the Delphi technique in nursing research. *Journal of Advanced Nursing, 53,* 205–212. doi:10.1111/j.1365-2648.2006.03716.x

Landry, M., Tremblay, J., Guyon, L., Bergeron, J., & Brunelle, N. (2004). La grille de dépistage de la consommation problématique d'alcool et de drogues chez les adolescents et les adolescentes (DEP-ADO): Développement et qualités psychométriques. *Drogues, Santé et Société, 3,* 20–37. doi:10.7202/010517ar

Laprise, P., Gagnon, H., Leclerc, P., & Cazale, L. (2012). Consommation d'alcool et de drogues. In ISQ (Ed.), *L'Enquête québécoise sur la santé des jeunes du secondaire 2010-2011. Le visage des jeunes d'aujourd'hui: Leur santé physique et leurs habitudes de vie. Tome 1* (pp. 169–208). Québec, QC, Canada: Institut de la statistique du Québec.

Lasalvia, A., Ruggeri, M., Mazzi, M. A., & Dall'Agnola, R. B. (2000). The perception of needs for care in staff and patients in community-based mental health services. The South-Verona Outcome Project 3. *Acta Psychiatrica Scandinavica, 102,* 366–375. doi:10.1034/j.1600-0447.2000.102005366.x

Li, Y., Zhang, W., Liu, J., Arbeit, M. R., Schwartz, S. J., Bowers, E. P., & Lerner, R. M. (2011). The role of school engagement in preventing adolescent delinquency and substance use: A survival analysis. *Journal of Adolescence, 34,* 1181–1192. doi:10.1016/j.adolescence.2011.07.003

Merikangas, K. R., He, J. P., Burstein, M., Swendsen, J., Avenevoli, S., Case, B., . . . Olfson, M. (2011). Service utilization for lifetime mental

disorders in U.S. adolescents: Results of the National Comorbidity Survey-Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry, 50,* 32–45. doi:10.1016/j.jaac.2010.10.006

Mission interministérielle de lutte contre les drogues et les conduites addictives [MILDT]. (2015). *Plan gouvernemental de lutte contre les drogues et les conduites addictives 2013-2017.* Paris, France: Author. Retrieved from: http://www.drogues.gouv.fr/la-mildeca/le-plan-gouvernemental/priorite-2013-2017

Pearson, C., Janz, T., & Ali, J. (2013). *Mental and substance use disorders in Canada* (Catalogue no. 82-624-X). Retrieved from http://www.statcan.gc.ca/pub/82-624-x/2013001/article/11855-eng.pdf

Pettigrew, S., Jongenelis, M., Lawrence, D., & Rikkers, W. (2017). Common and differential factors associated with abstinence and poly drug use among Australian adolescents. *International Journal on Drug Policy, 50,* 41–47. doi:10.1016/j.drugpo.2017.09.011

Pica, L. A., Traoré, I., Camirand, H., Laprise, P., Bernèche, F., Berthelot, M., & Plante, N. (2012). L'Enquête québécoise sur la santé des jeunes du secondaire 2010-2011. *Le visage des jeunes d'aujourd'hui: Leur santé mentale et leur adaptation sociale, Tome 2.* Québec, QC, Canada: Institut de la statistique du Québec.

Pincus, H. A., Zarin, D. A., & First, M. (1998). "Clinical significance" and DSM-IV [Letter to the editor]. *Archives of General Psychiatry, 55,* 1145, author reply 1147–1148. doi:10.1001/archpsyc.55.12.1145

Pirie, T., Jesseman, R., & Di Gioacchino, L., & the National Treatment Indicators Working Group. (2014). *National Treatment Indicators Report: 2011–2012 data.* Ottawa, Ontario, Canada: Canadian Centre on Substance Abuse.

Procter, S., & Hunt, M. (1994). Using the Delphi survey technique to develop a professional definition of nursing for analysing nursing workload. *Journal of Advanced Nursing, 19,* 1003–1014. doi:10.1111/j.1365-2648.1994.tb01180.x

Regier, D. A., Kaelber, C. T., Rae, D. S., Farmer, M. E., Knauper, B., Kessler, R. C., & Norquist, G. S. (1998). Limitations of diagnostic criteria and assessment instruments for mental disorders. Implications for research and policy. *Archives of General Psychiatry, 55,* 109–115. doi:10.1001/archpsyc.55.2.109

Richter, S. S., Brown, S. A., & Mott, M. A. (1991). The impact of social support and self-esteem on adolescent substance abuse treatment outcome. *Journal of Substance Abuse, 3,* 371–385. doi:10.1016/S0899-3289(10)80019-7

Ritter, A., Mellor, R., Chalmers, J., Sunderland, M., & Lancaster, K. (2019). Key considerations in planning for substance use treatment: Estimating treatment need and demand. *Journal of Studies on Alcohol and Drugs, Supplement 18,* 22–30. doi:10.15288/jsads.2019.s18.22

Roberts, M. (2010). *Young people's drug and alcohol treatment at the crossroads: What it's for, where it's at and how to make it even better.* Retrieved from https://drugscopelegacysite.files.wordpress.com/2015/06/young-people-alcohol-and-drug-treatment-at-the-crossroads-report.pdf

Rovis, D., Jonkman, H., & Basic, J. (2016). A multilevel analysis of adverse family relations, school bonding and risk behaviours among adolescents. *Journal of Child and Family Studies, 25,* 647–660. doi:10.1007/s10826-015-0223-6

Rush, B. (1990). A systems approach to estimating the required capacity of alcohol treatment services. *British Journal of Addiction, 85,* 49–59. doi:10.1111/j.1360-0443.1990.tb00623.x

Rush, B., Tremblay, J., & Brown, D. (2019). Development of a needs-based planning model to estimate required capacity of a substance use treatment system. *Journal of Studies on Alcohol and Drugs, Supplement 18,* 56–63. doi:10.15288/jsads.2019.s18.51

Rush, B., Tremblay, J., Fougere, C., Behrooz, R., Perez, W., & Fineczko, J. (2014). *Development of a needs-based planning model for substance use*

services and supports in Canada: Final report 2010–2014. Retrieved from http://www.sken.ca/wp-content/uploads/2014/11/Appendix%20A%20hyperlinks/link13%20Needs-Based%20Planning%20Project%20-%20Interim%20Report_04MAY12.pdf

Samson, J. E., & Tanner-Smith, E. E. (2015). Single-session alcohol interventions for heavy drinking college students: A systematic review and meta-analysis. *Journal of Studies on Alcohol and Drugs, 76,* 530–543. doi:10.15288/jsad.2015.76.530

Sareen, J., Henriksen, C. A., Stein, M. B., Afifi, T. O., Lix, L. M., & Enns, M. W. (2013). Common mental disorder diagnosis and need for treatment are not the same: Findings from a population-based longitudinal survey. *Psychological Medicine, 43,* 1941–1951. doi:10.1017/S003329171200284X

Serafini, K., Stewart, D. G., Wendt, D. C., & Donovan, D. M. (2018). Perceived parental support and adolescent motivation for substance use change: A preliminary investigation. *Addiction Research and Theory, 26,* 187–192. doi:10.1080/16066359.2017.1342819

Shane, P. A., Jasiukaitis, P., & Green, R. S. (2003). Treatment outcomes among adolescents with substance abuse problems: The relationship between comorbidities and post-treatment substance involvement. *Evaluation and Program Planning, 26,* 393–402. doi:10.1016/S0149-7189(03)00055-7

Shepard, D. S., Strickler, G. K., McAuliffe, W. E., Beaston-Blaakman, A., Rahman, M., & Anderson, T. E. (2005). Unmet need for substance abuse treatment of adults in Massachusetts. *Administration and Policy in Mental Health, 32,* 403–426. doi:10.1007/s10488-004-1667-y

Statistics Canada. (2014). *Mental health indicators, Table 13-10-0465-04 (formerly CANSIM 105-1101), Canada and provinces.* Retrieved from https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310046501

Substance Abuse and Mental Health Services Administration. (2014). *Treatment Episode Data Set (TEDS): 2002-2012. National Admissions to Substance Abuse Treatment Services. BHSIS Series S-71.* (HHS Publication No. (SMA) 14-4850). Rockville, MD: Author.

Substance Abuse and Mental Health Services Administration. (2017). *Key substance use and mental health indicators in the United States: Results from the 2016 National Survey on Drug Use and Health* (Publication No. SMA 17-5044, NSDUH Series H-52). Rockville, MD: Author. Retrieved from https://www.samhsa.gov/data/sites/default/files/NSDUH-FFR1-2016/NSDUH-FFR1-2016.pdf

Tanner-Smith, E. E., Wilson, S. J., & Lipsey, M. W. (2013). The comparative effectiveness of outpatient treatment for adolescent substance abuse: A meta-analysis. *Journal of Substance Abuse Treatment, 44,* 145–158. doi:10.1016/j.jsat.2012.05.006

Tremblay, J., Brunelle, N., Blanchette-Martin, N., Landry, M., L'Espérance, N., Laventure, M., . . . Savard, A.-C. (2014). *Évaluation des Mécanismes d'accès jeunesse en toxicomanie (MAJT)* (FRQSC Project No. 2011-JT-139927). Retrieved from http://www.frqsc.gouv.qc.ca/documents/11326/448958/PC_TremblayJ_rapport+2014_MAJT/932ee644-8ccd-42b0-92dc-2161741be083

Tremblay, J., Rush, B., Bertrand, K., Blanchette-Martin, N., L'Espérance, N., Savard, A.-C., & Demers-Lessard, G. (2016). *Estimation des besoins de services jeunesse en dépendance au Québec-EBS-Dépendance jeunesse. Rapport final.* Quebec, QC, Canada. Unpublished report.

Wang, P. S., Aguilar-Gaxiola, S., Alonso, J., Angermeyer, M. C., Borges, G., Bromet, E. J., . . . Wells, J. E. (2007). Use of mental health services for anxiety, mood, and substance disorders in 17 countries in the WHO world mental health surveys. *The Lancet, 370,* 841–850. doi:10.1016/S0140-6736(07)61414-7

Wu, L.-T., & Ringwalt, C. L. (2006). Use of alcohol treatment and mental health services among adolescents with alcohol use disorders. *Psychiatric Services, 57,* 84–92. doi:10.1176/appi.ps.57.1.84