BEST PRACTICES FOR SCREENING, PREVENTION AND TREATMENT OF FIVE COMMON MENTAL DISORDERS IN YOUNG POPULATIONS

Review of reviews
and examples
of good practices
in Quebec

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PROJECT TEAM

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SUMMARY

Inspired by a very recent Canadian knowledge synthesis on youth suicide prevention (1), the present review of reviews aimed to bring evidence on the effective interventions for the five most common mental disorders in children and young populations: i) anxio-depressive disorders; ii) attention deficit and hyperactivity disorder; iii) oppositional and conduct disorders; iv) substance abuse disorders; v) suicide attempts. Completed with examples of good practices on youth mental health interventions in Quebec, this project is meant to support service planning of the youth program of the CIUSSS-de-l'Est-de-l'Île-de-Montréal, and potentially of other CIUSSS across the Quebec province.

The research formula used for the review allowed the identification of a various number of reviews for the five disorders investigated. With a single exception, no review supporting screening and early detection for the five disorders was identified. Prevention, however, was better covered in the literature for anxio-depressive and substance use disorders, and clear distinction was made between universal, targeted and indicated interventions. In general, targeted and indicated prevention interventions were effective in case of anxio-depressive and substance use disorders, while universal prevention strategies seemed to reduce suicide attempts and suicide ideation (1).

Effective treatments were found for the 5 common mental disorders under review, and they were grouped as nonpharmacological and pharmacological treatments. In general, psychotherapies dominated for substance use disorders and anxio-depressive disorders; parental skills dominated in oppositional disorders, whilst pharmacological treatment dominated in attention deficit and hyperactivity disorder. Evidence was limited for suicide attempts.

The examples of Quebec's best practices in youth mental health were based on the personal research experience of the researchers involved in the project. They allowed the identification of interventions, such as a detection instrument for anxio-depressive disorders, a disease management model based on family group practice for attention deficit and hyperactivity, or practices like CLSC-led parental skills training to manage the oppositional and conduct disorders, school-based detection and treatment of substance disorders or suicide attempt prevention programs. Finally, the project permitted to identify several research gaps, and therefore research recommendations were formulated.

INTRODUCTION

One Quebecer and one Canadian in five face a mental disorder in his/her lifetime (2). Over 50% of mental disorders start before age 14, and 70% before 22 years (3). The next table presents the prevalence of disorders found in Canadian and international surveys among children and adolescents (4).

TABLE 1 – Annual Prevalence of Common Mental Disorders in Children and Adolescents (4)

Disorders	Age	Prevalence	95% Confidence interval
Any anxious disorder (AD)	7 - 15	6.4%	4.2% - 9.2%
Attention Deficit and Hyperactivity Disorder (ADHD)	4 - 17	4.8%	2.7% - 7.3%
Oppositional Defiant Disorder (ODD) or Conduct disorders (CD)	4 - 17	4.2%	2.4% - 6.5%
Any depressive (mood) disorder (MDD)	5 - 17	3.5%	1.0% - 7.1%
Substance use disorder (SUD)	9 - 17	0.8%	0.5% - 1.3%
Any disorder	4 - 17	14.3%	11.4% - 17.6%

The next table presents brief definitions of the five most common disorders in children and adolescents.

TABLE 2 – Brief Definitions of Common Mental Disorders in Children and Adolescents

Anxiety-Depressive Disorder	Anxiety is characterized by the presence of exaggerated worry and tension towards daily living situations. The main symptoms are nervousness, irritability, and difficulty in concentrating and sleeping. Patients often expect the worst even when there is no reason to concern[1]. Depression is defined as the presence of feelings of discouragement, sadness, hopelessness, non-motivation, or disinterest in life in general. When these feelings are present for more than two weeks and interfere with daily living activities such as sharing time with family and friends, eating, sleeping, going to school or studying, and with self-care it is considered a major depressive episode[2&3].
Attention Deficit Hyperactivity Disorder	It is a condition that appears at early age, in preschool or early school years. Children affected by this disorder have difficulty to pay attention and to control their behaviour. According to the second Australian child and adolescent survey[4], 7 percent of children have ADHD. The principal characteristics of this disorder are inattention, hyperactivity, and impulsivity. When these symptoms affect performance at school, interfere in social relations, or the behaviour at home is hard to manage, the diagnosis of ADHD should be suspected. According to DSM-IV there are three subtype forms of this disorder. The first one shows predominantly hyperactivity and impulsivity, in the second one, inattention is the main sign and the last one is the mixed type.

1 - Anxiety and Depression Association of America (ADAA). Generalized Anxiety Disorder (GAD). Accessed September 2015; Available from: www.adaa.org/generalized-anxiety-disorder-gad

2 - Anxiety and Depression Association of America (ADAA). Depression. Accessed September 2015; Available from: www.adaa.org/understanding-anxiety/depression

3 - National Institute of Mental Health (NIMH). Depression. Accessed September 2015; Available from: www.nimh.nih.gov/health/publications/depression/depression-booklet_34625.pdf.

4 - Lawrence D, Johnson S, Hafekost J, Boterhoven De Haan K, Sawyer M, Ainley J, Zubrick SR (2015) The Mental Health of Children and Adolescents. Report on second Australian Child and Adolescent Survey of Mental Health and Wellbeing. Department of Health, Canberra.

Oppositional Defiant Disorder or Conduct disorders	It is characterized by the presence of signs of hostility and defiant conduct for at least 6 months. It can start early, even in preschool years[4]. When this disorder is not treated, it could progress to severe conduct disorder as the years pass. The main signs for this disorder are frequent anger, irritability, constant arguing and defiance towards authority figures[5].
Substance Use Disorder	It is related to the consumption of illegal drugs, alcohol, or medication. It consists in the inability to control the intake of the substance despite the harm that this one could cause to the body. It is associated to long-term consequences that affect many aspects of an individual life, as the physical and mental health, the relationships, the education, and even justice problems. Most of the substance use starts as experimental in social situations[5]. Each drug has a different risk to produce addiction and dependency. As time passes, there is a need for larger and more frequent doses, leading to overdoses and death in some cases.
Suicide Attempt	It is a pathologic reaction to stressful situations in which the individual try to take away his own life, as the only escape to reality. Is generally associated to depression, substance use disorders and other mental disorders. In Quebec, in 2008, the suicide rates in adolescents of 15 to 19 years were at 11.4 and 4.9 per 100,000 for boys and girls respectively[6].

Common and severe mental disorders in children and adolescents differ according to gender and mean age of onset. In general, psychosis can manifest from age 15 (5), but earlier onset is detected in cases of autism and spectrum disorders at ages of 2 or 3 years (6). In late adolescence, these severe disorders have a lifetime prevalence of 1%. Mood disorders and substance use disorder onset by age 13 and 15, Attention Deficit and Hyperactivity Disorders and anxiety disorders, respectively by age 6 to 11, while conduct disorders peak at 11 years. Except anxio-depressive disorders, most disorders are more common in boys, including common developmental delays disorders like dyslexia and, language development.

In adolescence, the prevalence of these mental disorders is higher than for other common chronic diseases, such as asthma or diabetes. Furthermore, these disorders are more frequent in disadvantaged areas, and are associated with greater utilisation of health services and higher social costs (7). In Great Britain, children's follow-up until adulthood showed that social costs for youth with conduct disorder were 10 times higher than for those presenting no problem (8), the most important costs being related to justice, education, residential services and social benefits.

Although children, adolescents and young populations are more likely to experience a mental disorder, their access to services is limited. Only 2 Canadian surveys of children and adolescents have been produced until now. One was conducted in Ontario, and the other one in Quebec (4, 9) in the '80s and '90s, respectively. Using standardised instruments, these surveys detected the presence of mental disorders in young populations and the access to services.

The prevalence of youth mental disorders in Quebec was found to be were similar to that presented above in table 1. The Quebec's

results for access, services utilisation and satisfaction with offered services were available for children aged 6 to 11, and adolescents aged 12 to 14 (9). Children and adolescents received mental health related services from school-based professionals, from publicly funded health and social services and from the private sector.

At school, an individual most likely met a special educator (18 and 21% for each age group), a psychologist or a social worker (7 and 13% for each age group), or a speech language specialist (6% for both age groups). The degree of satisfaction of parents with these services was very high for speech language specialist (94%) and for special educators (88%), but lower for psychologist and social workers (81%). To note that one person may have consulted more than one professional.

Outside school, children and adolescents were seen for mental health reasons mostly by pediatricians and general practitioners (4 and 5%), by psychologists (5 and 6%), special educators or psychoeducators or occupational therapists (3 and 4%), by social workers (2 and 4%), or by psychiatrists (1.3%). Similarly with school settings, one person may have consulted more than one provider. The level of satisfaction was highest for family physicians and pediatricians, special educators or psychoeducators or occupational therapist (92 to 95%), very good for psychologists (85%) and social workers (82%), but problematic for psychiatrists (60% in 6-11 years old; 75% in 12 - 14 years old).

These out-of-school providers were operating in a variety of settings in the Quebec's context. Knowing that one person may have consulted more than one setting, satisfaction was coherent with the previous results. For both age groups, service utilisation occurred most frequently in: private clinic (5.8%; satisfaction 92%); CLSC[7] (3.3%; satisfaction 85%); emergency room (2.8%; satisfaction 84%); medical outpatient (2.6%; satisfaction 85%); social services centers (2.6%; satisfaction 85%); specialist psychiatric outpatient (2.3%; satisfaction 75%).

By cross-tabulating children and adolescents experiencing a mental disorder in the past six months having met at least one school-based, a publicly funded or a privately funded provider, an indicator of unmet needs can emerge. Table 3 summarizes these unmet needs, and shows that between 19 and 39% of children and adolescents identified with a mental disorder received mental health related services at school or outside school in the last 6 months.

TABLE 3 – Any Mental Health Related Services Utilisation in the Past 6 Months In Quebec (9)

Disorder indentified by	Boys [%]	Girls [%]	Boys & Girls [%]
6 - 11 years old			
According to parent	43.7	24.6	34.7
According to teacher	43.0	27.6	38.9
12 - 14 years old			
According to adolescent	27.7	14.9	19.1
According to parent	25.9	30.4	28.4

7 - Centre local de services communautaires.

5 - Mayo Clinic. Diseases and Conditions. 2015 [cited 2015; Available from: www.mayoclinic.org/diseases-conditions

6 - Renaud J, Lesage A, St-Laurent D, et al. Suicide. In: Lalonde P, Pinard GF, editors. Psychiatrie clinique. Approche bio-psycho-sociale, 4e édition. Montréal, Québec: Chenelière Éducation; 2016. p. 1118-37.

The Quebec's survey did not offer information about treatment interventions provided, although effective treatments exist for all common mental disorders in children and adolescents. In the US in the early 2000s, it was estimated a mean delay of 8 to 10 years between the onset of symptoms and one form of intervention (3). Unidentified and untreated mental disorders are associated with higher school dropout than in any other handicapped group (7). Suicide is the second cause of death among youth aged 15 to 24, and mental disorders were present in 90% of cases, with gaps in both identification in school and primary care and coordination of specialist care services (10).

CONTEXT

The Steering committee of the Montreal University Mental Health Institute's Health Technology Assessment unit (IUSMM-UETMISM) commissioned in November 2015 a review of reviews of the effective interventions for detection, prevention and treatment of five common mental disorders in children and adolescents: i) anxio-depressive disorders; ii) attention deficit and hyperactivity disorder; iii) oppositional and conduct disorders; iv) substance abuse disorders; v) suicide attempts. The aim of the project was to inform the services planning of the youth program of CIUSSS de l'Est-de-l'Île-de-Montréal, IUSMM being also part of this institution.

This ambitious project was built on a 6-month aborted environmental scan of best practices in youth mental health, commissioned by the Quebec's health research fund, the Graham Boeckh's foundation and the Ministry of Health and Social Services to a group of researchers led by Dr Alain Lesage. The project did not meet the mid-term overall aims of an international scan of best practices to inform the creation of a youth mental health research network, and the funding was stopped. However, the researchers wished to continue the review of reviews and to complete it with examples of best practices in Quebec, and they were allowed to keep the work accomplished up to that moment. The completion into an HTA project was possible with the IUSMM mandate.

OBJECTIVES

Rational planning of services to reach more children, adolescents and youth requires the knowledge on the effective detection, prevention and treatment options, in conjunction with the knowledge of the number of people in need, and of current way of services delivery, in order to seize the amplitude of unmet needs for services and interventions. In order to address these issues and to properly inform the youth program of the CIUSSS[8] de l'Est-de-l'Île-de-Montréal, the Steering committee commissioned the UETMISM to identify and summarize evidence on the effective interventions in five common mental disorders in youth. To further support service planning in Montreal and across the province, a summary of good practices in youth mental health in Quebec became relevant.

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8 - CIUSSS: Centre intégré universitaire de santé et de services sociaux

The specific objectives of this project were therefore:

1. What are the effective interventions for detection/screening, prevention and treatment of the following mental disorders in children and young populations?

    a. Anxiety and depressive disorders (ADD);
    b. Attention Deficit and Hyperactivity Disorder (ADHD);
    c. Oppositional Defiant Disorder (ODD) or Conduct disorder (CD)
    d. Substance Use Disorder (SUD);
    e. Suicide / Suicide Attempt (SSA).

2. What are the best practices in mental health services offered for children and young populations in Quebec province?

Given the time and budget constraints, these objectives were answered by a systematic review of reviews, completed with examples of good practices of effective interventions for young populations in Quebec.

METHODOLOGY

A. Review of Reviews

Article Selection
A literature search was performed on six electronic databases: PubMed (National Library of Medecine), MEDLINE (OVID), EBM Reviews (OVID), EMBASE (OVID), PsycINFO (OVID), CINAHL Complete (EBSCO), according to the search strategy presented in the appendix.

To be included in the review, the articles were required to meet the following criteria:
    (a) The articles were either meta-analyses or systematic reviews;
    (b) The language of the articles was English and/or French;
    (c) The publication date was in 1980 or later;
    (d) The article focused on a human population aged 6 - 25 years;
    (e) The population met ICM-10/DSM-IV criteria for: Anxiety and depressive disorders, Attention Deficit and Hyperactivity Disorder, Oppositional Defiant Disorder or Conduct disorder, Substance abuse disorders, Suicide / Suicide Attempt;
    (f) The articles report mild or moderate levels of mental disorders/behaviour severity;
    (g) The articles focus on detection, prevention or treatment;
    (h) The geographic points were in North America, Europe (in particular United Kingdom), Australia and New Zealand.

The literature search focused mainly on evidence from these countries taking into consideration the feasibility, as well as the implementation of the retrieved practices into the Quebec's health system.

The excluded articles were therefore:
    (a) Other types of publications (e.g. reports, editorials, comments, websites);
    (b) Articles in languages other than English or French;
    (c) Specific populations or diagnoses (e.g. pregnancy, elderly, intellectual disability);
    (d) Severe mental disorders or behavior;
    (e) Any geographic location other than those mentioned above.

Data Extraction

All the references identified in the databases mentioned above were first selected by title, then by abstract, and finally the chosen articles were read in full text. The peer-reviewed articles reporting reviews of at least two randomized controlled trials were considered for this synthesis. Articles were selected by two independent investigators, one of the researchers involved in the project and one research assistant. In order to complete the review, data was validated and additional information extracted by the UETMISM's coordinator. Data was synthesized in tables, and a summary of the extracted information is presented at the end of each section of the project:

1. Authors and year of publication, study type (meta-analysis, systematic review), and period searched
2. Number of studies (N) and of RCT included, overall number of individuals (n)
3. AMSTAR score
4. Population addressed and age
5. Intervention type
6. Comparator
7. Outcomes
8. Main results

Quality Assessment

The quality of the included studies was assessed using AMSTAR evaluation tool, which is a measurement tool to assess the methodological quality of systematic reviews (11). Two independent investigators rated the studies using the AMSTAR checklist, assigning a score from 0 to 11 for each article. An article with an AMSTAR score of 8 to 11 was considered of high quality, a score of 4 to 7 denoted a medium quality article, while a score of 0 to 3 refer to a low quality article.

Data Synthesis

A narrative synthesis was preferred to present the results of the review of reviews and of the summary of examples of best practices in youth mental health in Quebec.

B. Examples of Best Practices in Quebec

The researchers collaborating to this project, part of a group led by Dr Alain Lesage, were initially invited by the Quebec's research fund, the Ministère de la santé et des services sociaux and by the Graham Boeckh foundation to conduct a scan of best practices in youth mental health. Due to their field research experience, the researchers were also able to provide examples of mental health interventions used for youth population in Quebec province. Dr Ben Amor synthesized information about the best practices in Oppositional Defiant Disorder, and together with Dr Alain Lesage, about Attention Deficit and Hyperactivity Disorder and Anxiety and depressive disorders. Information about best practices in youth Substance Use Disorder were provided by Dr Patricia Conrod, while Dr Johanne Renaud and Dr Marie-Claude Geoffroy informed on Suicide / Suicide Attempts interventions.

C. Research Recommendations Production

Based on the results of the review of reviews, seven research recommendations were elaborated by a deliberative process by the researchers involved in the project. These were then presented to the representatives of the following organisations, and their suggestions taken into consideration:

- Mental health directorate (Direction de la santé mentale) and the Directorate of first-line integrated services organisation (Direction de l'organisation des services de première ligne intégrée) of Quebec's Ministry of Health and Social Work[9] (Ministère de la santé et des services sociaux)

- AMI-Quebec[10]

- Programme International de Recherche-Action Participative (PIRAP)[11]

- Graham Boeckh foundation[12]

- Le Fonds de recherche du Québec Santé[13]

The latter was a half-day meeting in person or by teleconference, preceded by draft reading. The researchers held monthly teleconferences and weekly e-mail exchanges where the seven recommendations were also discussed and agreed upon.

RESULTS

Anxiety-Depressive Disorder

Introduction

Anxiety-depressive disorder (ADD) and mood disorders are the most common disorders in children and adolescents. Anxiety has a prevalence of about 6.5%. Its comorbid conditions, known as mood disorders, could reach a prevalence of 3.5%. Together, these conditions may affect as much as 10% of children and adolescent populations (4).

The most common anxiety disorders are generalized anxiety disorder, social anxiety disorder, and separation anxiety disorder. These common anxiety disorders may co-occur and are often known as 'internalized disorders'. Generalized anxiety disorders are characterised by excessive worries about various situations. In children and adolescents, these worries often concern the quality of school or sport performance, the punctuality or catastrophic events. Social anxiety disorder or social phobia is characterized by an excessive anxiety about social or performance situations, in which the individual fear to expose to unfamiliar persons. Onset of social anxiety is most common in adolescents. Adolescents suffering of social anxiety disorder may have fewer friends, may have difficulty to establish and maintain relationships, and /or develop substances abuse. Finally, the separation anxiety disorder refers to an excessive worry concerning separation from home or from those to whom the person is attached.

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9 - http://publications.msss.gouv.qc.ca/msss/fichiers/organigramme/Visio-MSSS.pdf

10 - AMI-Quebec Action Mental Illness helps families manage the effects of mental illness through support, education, guidance, and advocacy: http://amiquebec.org/you-are-not-alone/

11 - www.pirap.org/

12 - www.grahamboeckhfoundation.org/fr/a-propos/

13 - www.frqs.gouv.qc.ca/

Literature Review

The literature search yielded 21 reviews on ADD interventions in children and adolescents, of which a single review was on screening, 9 on prevention and 11 reviews focused on ADD treatment (figure 1 - PRISMA Diagram (12). Details on these reviews, as well as of the individual included studies are offered in table 5 at the end of the section.

Screening

One medium quality meta-analysis on screening and psychological interventions was identified (13). It is based on eight RCTs of children and adolescents screened for depression at school. Those identified with depressive symptoms were treated with psychological interventions. The analysis showed that around 30 children needed to be screened in order to identify and treat one case of depression.

Prevention

Prevention studies can be classified as universal, targeted or selective, and indicated (14). Universal interventions address the whole population, including youth with no indication of anxiety or depression. Targeted or selective prevention interventions address a subgroup of a population considered having a risk above average. Indicated preventive interventions are provided to individuals already having certain symptoms of depression or anxiety, although not at the clinical level (14).

Seven meta-analysis, one of medium (14) and six of high quality (15) (16) (17) (18) (19) (20), as well as two systematic reviews (21) (22) have reported randomized clinical trials of prevention programs for anxiety and depressive disorders in children and adolescents. Meta-analysis done by Horowitz's et al. (14), Van Zoonen et al. (20) and Jane-Llopis et al. (16) focused on universal, selective and indicated prevention programs for depression, and were based on 30 RCTs (14), 32 RCTs, 14 of which looked specifically at young populations (20), and 69 programs of which 16 programs were for children, and 9 for adolescents (16). Educational and/or psychological interventions to also prevent depressive disorders were meta-analysed by Hetrick et al. (15) (43 RCTs) and Merry et al. (18) (16 RCTs), while Teubert et al. analysed 65 interventions for anxiety prevention in children and adolescents (19). Finally, a Cochrane meta-analysis of 16 RCTs examined the effects of exercise in reducing or preventing anxiety and depression among children and young people (17).

Some meta-analysis found targeted and indicated interventions more effective than the universal programs. The meta-analysis focusing on the three types of prevention programs for depression (14) showed that at post-intervention, the universal programs were less effective than the selective, and with a nonsignificant tendency, the indicated prevention programs. In addition, both selective and indicated prevention programs were significantly more effective than universal interventions at an average 6 months follow-up. In general, the effect sizes of these prevention interventions at post-intervention and at 6 months follow-up were small to moderate. Another meta-analysis looking on prevention programs specifically for anxiety (19) found small but significant effects on anxiety at post-intervention, with indicated and selective prevention programs having larger effect sizes than universal interventions.

A recent meta-analysis (15) found that CBT prevention programs seem to be effective in reducing the risk of developing a depressive disorder, particularly in targeted children and adolescent populations. This effect was noticed at post-intervention, as well as at 3 - 9 month and 12 month follow-up. Four of the studies analysed in this review looked at Interpersonal Psychotherapy (IPT) intervention alone or in combination with elements of CBT. Results show that interventions including elements of IPT reduced the risk of depressive disorders at 3 - 9 months follow-up, but not at post-intervention.

Other meta-analysis found no difference among the three types of interventions. A Cochrane meta-analysis (18) showed that targeted and universal depression prevention interventions seem to prevent the onset of depressive disorders of children and adolescents when compared to no intervention. Although the included studies have some methodological limitations, the findings suggest that the effect is real, and not due to placebo.

Van Zoonen et al. (20) found that 'prevention of depression seems feasible and may, in addition to treatment, be an effective way to delay or prevent the onset of depressive disorders'. This conclusion is based on the meta-analysis of studies including also young populations, such as adolescents and students. The authors found no differences between types of prevention, i.e universal, selective or indicated, nor between types of intervention, i.e. CBT, IPT or other. Similarly, Jane-Llopis et al. (16) found an overall improvement of 11% in depressive symptoms through prevention programs, but did not find a significant difference between universal, selective or targeted interventions, nor between different age groups analysed.

Finally, a Cochrane meta-analysis examined the effects of exercise in reducing or preventing anxiety and depression among children and young people (17). The exercise interventions included walking, running, aerobics or weight lifting. When vigorous exercise was compared to no intervention in a general population, a non-significant trend on anxiety scores, but significant on depression scores in favor of the exercise group was noticed. When vigorous exercise was compared to low intensity exercise or to psychological interventions in the general population of children, no statistically difference was observed in depression and anxiety scores.

The two systematic reviews identified (21, 22) reached similar conclusions as the meta-analysis presented above, therefore they are no further described in the present section. However, details on these reviews are presented in the table 5.

Treatments

1. Nonpharmacological Interventions[14]

Cognitive behavioral therapy (CBT) is a psychological treatment for a wide range of mental health condition in youth, including anxiety (23). For the present project, five meta-analysis examining this therapy were identified. Of these, three meta-analysis of high quality (24 - 26) were looking specifically at computer-based CBT therapy for children and adolescents with anxiety and depression

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14 - Referring to therapy that does not involve drugs, according to:
http://medical-dictionary.thefreedictionary.com/Nonpharmacological

symptoms, and were based on 4, 13, and 7 RCTs respectively. One meta-analysis of high quality (27) analysed 20 RCTs to determine the efficacy of transdiagnostic CBT for children and young people with anxiety disorders. Finally, Gearing et al. (23) sought to investigate the effects of booster sessions in CBT therapy for children and adolescents with mood and anxiety disorders. This meta-analysis was of low quality and included 53 RCTs.

Computer-based CBT (cCBT) interventions were sought in order to increase the access to such treatments of patients for whom face-to-face treatment is not feasible.

Computer-based treatments provide time-limited CBT interventions, via Internet or computer software, with various levels of therapist involvement (24). The meta-analysis conducted by Adelman et al. (24) on children and adolescents with anxiety disorders demonstrated the efficacy of these interventions when compared with wait-list controls, showing however, significantly smaller benefits than in adult samples. Another meta-analysis looking into the effectiveness of cCBT for treating symptoms of anxiety and depression in youth (25) showed that this intervention had significant and moderate to large effects on these symptoms, comparable to face-to-face CBT interventions. The heterogeneity of the included studies was low, suggesting a robustness of these findings. Finally, Ye et al. (26) showed that internet-based interventions such as CBT were able to reduce anxiety symptoms and increase remission rate of children and adolescents.

Transdiagnostic CBT addresses the common elements of all anxiety disorders, such as avoidance, anxiogenic cognition, and in certain cases anxiogenic parenting. Ewing et al. (27) showed that children offered transdiagnostic CBT were nine times more likely to recover from their anxiety than those in the control group. When analysis was repeated for the intention-to-treat sample, children benefiting of this therapy were four times more likely to remit from their anxiety by posttreatment when compared to control group. Therefore, transdiagnostic CBT seems to be an effective treatment for reducing symptoms of anxiety in children and young people.

Despite the effectiveness of CBT interventions, it has been shown that up to 50% of adolescents responding to CBT treatment could relapse between 6 to 24 months after the treatment (23). Among the maintenance treatments for youth with depressive disorders, the use of post-treatment follow-up booster sessions has been considered for years as a core maintenance strategy. The results of the meta-analysis looking at the long-term effects of CBT interventions using booster sessions on children and adolescents with mood and anxiety disorders found that these interventions were more effective, and that the treatments effects were more sustainable, then CBT interventions without booster sessions (23).

2. Pharmacological Interventions

Six meta-analysis of medium (28) and high quality (29-33) looking at pharmacotherapy in the treatment of anxiety and depressive disorders in children and adolescents were identified. Three reviews analysed the effectiveness of Selective serotonin reuptake inhibitors (SSRIs) and Serotonin nor-epinephrine reuptake inhibitors (SNRIs) medication as a group (30, 31), and individually (28) on

the treatment of anxiety. They were based on 22, 22 and 16 RCTs, respectively. The other three meta-analysis looked particularly at antidepressant medication and its effectiveness in treating depressive symptoms and depression remission. They included 3 (29), 9 (32) and 5 (33) RCTs, respectively.

The most trials included in the analysis done by Walkup et al. (31) and Ipser et al. (30) have assessed the effects of SSRIs medication on obsessive-compulsive disorders (OCD). These analysis showed that medication treatment using SSRIs can be effective in reducing symptoms of anxiety and OCD in children and adolescents, being more efficacious than placebo. However, drug-related adverse events were significantly more frequent following SSRIs medication treatment than placebo.

While the Cochrane meta-analysis by Ipser et al. (30) concluded that no evidence shows that any class of SSRIs medication is more effective or better tolerated than the other, Utman et al. (28) found clinically important differences among these agents. Comparing individual SSRIs agents, namely fluoxetine, fluvoxamine, paroxetine, sertraline, and one SNRIs, i.e venlafaxine, to placebo and to each other, the authors found that fluvoxamine has the most favorable balance between benefits and acceptability. They concluded that fluvoxamine may qualify as the best option for treating anxiety disorders of children and adolescents.

Finally, the use of benzodiazepines is not recommended for the treatment of anxiety in children and adolescents, given the concerns of dependency and treatment-related emergent adverse events (30, 31).

Looking at the efficacy of SSRIs treatment on depression in children and adolescents when compared to placebo, Williams et al. found higher response rates, and reduction of depressive symptoms in those treated with SSRIs. A small increase in risk of suicidality (i.e. suicidal ideation, preparatory acts) associated with the SSRIs treatment was revealed by this meta-analysis (32). In young patients with substance use co-morbidity SSRIs antidepressant medication showed a small overall effect in reducing depression, without improving the substance use outcomes (33).

A recent Cochrane meta-analysis (29) looked at the efficacy of early interventions, including three studies on pharmacological interventions to prevent relapse of depressive disorders in children and adolescents. Results showed that, compared to placebo, antidepressant medication such as SSRIs, SNRIs, tricyclic antidepressants, norepinephrine reuptake inhibitors, mood stabilisers and others prevented the next episode of depression, as measured by relapse-recurrence rates. Adverse events associated to the antidepressant medication, including suicide-related behaviors, were reported by the majority of trials included in this meta-analysis.

Examples of Best Practices in Quebec

Dominic Interactive[15] is a computerized, DSM-based screening test designed to give tendencies towards the diagnostic for the seven most common mental disorders in children[16] by using the combination of different modalities such as pictures, text and voice-over, in order to display symptoms associated to the disorders (34 - 36). This instrument is available in two versions, one for children from 6 to 11 years and the other for adolescents between 12 and 16 years. The adolescent version can also screen for substance use, personality disorders and suicidal ideation.

The test encourages children and adolescents to identify themselves with Dominic, who is a cartoon character represented in different daily-living situations. The test shows pictures of Dominic at home, at school, with friends or with family members in situations that exemplify symptoms and signs that characterize the seven disorders. Every staging has a written question that is read aloud by a voice-over asking the child if he or she has ever thought, act or felt like Dominic. The child will have to answer YES or NO. This procedure is repeated with 91 illustrations in a randomized order to avoid a halo or a response set effect with the given pictures. The test takes 10 to 20 minutes to complete, and in the end, the software provides results showing the diagnostic tendencies towards the mentioned disorders.

Dominic Interactive has been evaluated by numerous validation and epidemiological studies performed in Canada and internationally over the past 25 years. These studies demonstrated its validity, reliability and psychometric properties, and showed its applicability as a screening tool for several mental health disorders in children and youth. As an example, this tool was used in 1993 for the Santé Québec child mental health survey (9). This tool is appropriate in diverse settings as clinical practice, screening at schools, and for evaluative and epidemiological research. However, no implementation studies evaluating the value of this screening instrument for better detecting, better treating and better outcomes have been conducted yet. Taking into account that Dominic Interactive only gives dimensional-based diagnostic tendencies, a qualified clinician should always interpret the results before establishing a final diagnosis and the treatment plan.

Zak and Zoé is an ongoing research project at the Intervention clinic for young people with anxiety disorders[17] of the Hospital Riviere-des-Prairies, Quebec. Based on the cognitive and behavioral comprehension of generalized anxiety of the adult, this project is an experimental adaptation of the adult model for children between 8 and 12 years old. This program offers psychologists a tool to manage generalized anxiety in children. The intervention involves around twenty individual sessions with the child and parents using an illustrated book with accessible exercises for children of this age. This project is focused on developing new tools for psychotherapists in order to allow a standardised

application throughout the province, to facilitate the psychotherapists' continuing education, and to ease the accessibility to this therapy at the primary care level. To note that this is registered as a continuing education course by the Quebec's Order of Psychologists.

Research Gaps Recommendations
Screening
There is a need for studies on children and adolescents to show whether screening and earlier detection of ADD would lead to better outcomes in this population. Great opportunity exist in Quebec to conduct such studies given the availability of Dominic Interactive instrument.

Prevention
More studies should be conducted in order to determine the value of universal prevention programs. Moreover, there is a need to explore targeted or indicated interventions, especially those using known effective psychotherapy modalities like CBT, in the Canadian context. Priority should be given to internet-based psychotherapy, since it has higher cost effectiveness potential for children and adolescents populations, alongside the implementation studies to assess effectiveness, reach, context, side effects, ethical concerns and costs.

Treatment
Antidepressant medication is universally accessible. Its utilisation in adolescent population has been increasing in the past 2 decades, reaching 15.4 per 1000 population in 2007 of those between 0 and 19 years old who received an anti-depressant medication at least once, according to population-based data from Saskatchewan province (37). Currently, in Quebec, psychotherapy is not easily accessible and is not insured by publicly funded services, whilst there is a mandatory universal medication insurance. The United Kingdom has recently introduced more equitable access to psychotherapy for adolescents, after having increased adults access in the past years[18].

Research is needed to establish the role of medication in relation to psychotherapy in a stepped care approach for the treatment of anxiety and depressive disorders among children and adolescents. Moreover, the collaborative model and the protocols based on primary health care like in the UK (NICE guidelines for adults psychotherapy) need to be explored in Quebec and Canadian health care system context. This model would resemble the primary health care model of chronic disease management, with a role for physician, nurse, psychologist, school, patient and family. Finally, implementation and cost effectiveness studies need to be conducted to insure the best utilization of the effective interventions available for medication, psychotherapy and e-CBT therapy for anxiety and mood disorders.

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15 - This test was developed in Québec by Dr Jean-Pierre Valla and the research team from the Rivière-des-Prairies Hospital since 1981.

16 - Attention-Deficit Hyperactivity Disorder, Conduct Disorder, Generalized Anxiety Disorder, Separation Anxiety Disorder, Oppositional Defiant Disorder, Specific Phobia and Major depressive Disorder.

17 - This clinic offers services, such as pedopsychiatric and multidisciplinary evaluation, pharmacotherapy, individual psychotherapy, cognitive behavioral therapy, psychoeducation, and others, to young people below 18 years of age.

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18 - DOH, Department of Health. Talking therapies: A four-year plan of action. A supporting document to No health without mental health: A cross-government mental health outcomes strategy for people of all ages. © Crown copyright 2011; 402471b 1p 0K Feb 11. Produced by COI for the Department of Health www.dh.gov.uk/publicat

TABLE 4 – KEY FINDINGS - Anxiety-Depressive Disorder

Screening	• Limited evidence shows that screening and early detection at schools may be effective in reducing depression disease burden. More research is needed.
Prevention	• Universal, targeted and indicated interventions are effective to prevent anxiety and depressive disorders in children and adolescents, with targeted and indicated interventions being more effective than universal ones • CBT prevention programs are effective interventions in reducing the risk of developing anxiety and mood disorders
Treatment	**Nonpharmacological interventions** • CBT and computer-based CBT interventions are effective in treating symptoms of anxiety and depression in children and youth populations **Pharmacological interventions** • Medication for anxiety and depressive disorders showed a light to moderate clinical effectiveness in randomized clinical trials • SSRIs medication treatment is associated with some drug-related adverse events

FIGURE 1 – PRISMA Flow Diagram - Anxiety-Depressive Disorder

Identification

Records identified through database searching
(n = 3934)
PubMed, n = 961
Medline, n = 846
EBM Reviews, n = 72
Embase, n = 1655
PsycINFO, n = 183
CINAHL, n = 217

Records excluded because of format:
i.e. comment, editorials
(n = 377)

Screening

Records after duplicates removed
(n = 2402)

Records excluded
(n = 1968), with reasons:
• did not respond to inclusion criteria (n = 1544)
• target other mental diseases (n = 312)
• not pertinent following abstract analysis
(n = 112)

Records screened
(n = 2025)

Eligibility

Full-text articles assessed for eligibility
(n = 57)

Full-text articles excluded (n = 36), with reasons:
• did not respond to inclusion criteria (n = 4)
• not a systematic review nor a meta-analysis
(n = 16)
• no RCTs included (n = 7)
• no quantitative data
(n = 2)
• adult sample (n = 4)
• out-dated version (n = 3)

Included

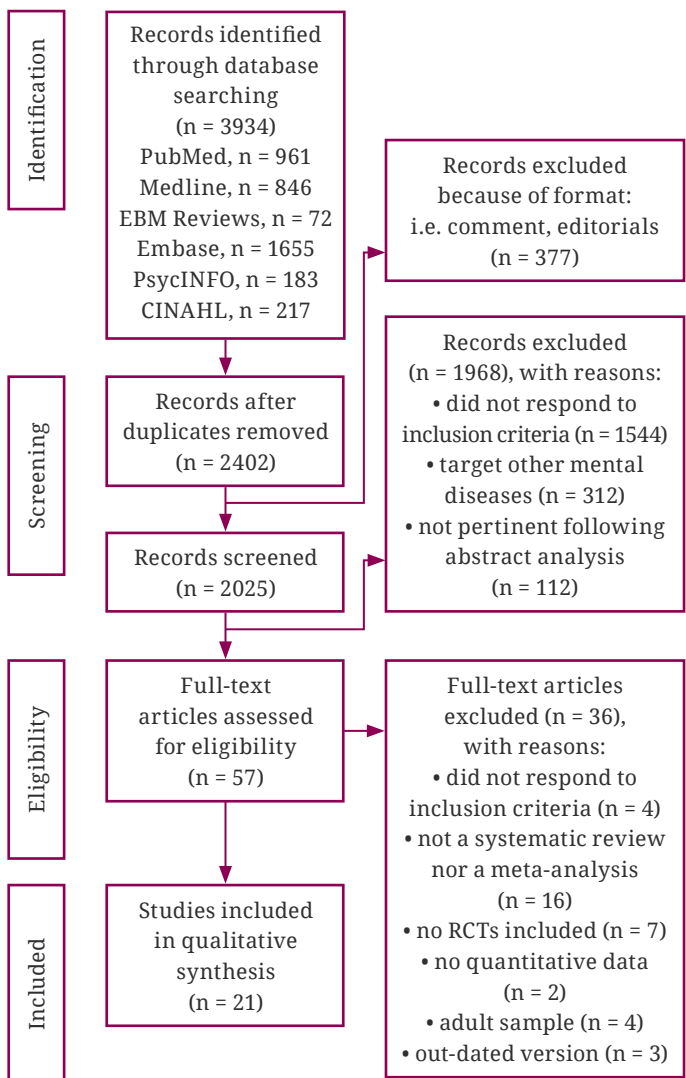Studies included in qualitative synthesis
(n = 21)

TABLE 5 – SUMMARY OF FINDINGS - Anxiety-Depressive Disorder

	Author (year) (reference #) Study type Period Searched	# of Studies (N) / # RCTs # overall individuals (n)	AMSTAR Score	Population / Age	Intervention / Type	Comparator	Outcomes	Main Results
Screening	Cuijpers et al. (2006) (13) Meta-analysis 1987 - 2004	8/8 n = 413	Medium (7)	Children and adolescents / 7 - 19 years	Systematic Screening Procedure	Various control conditions: i.e. no treatment, waiting list, usual care, placebo etc.	Mean effect of the interventions; Numbers-needed-to-screen	Mean ES = 0.55 (95% CI 0.35 to 0.76) Mean NNS = 31 (95% CI 27 to 32)
Prevention	Corrieri et al. (2014) (21) Systematic review 2000 - 2010	**Depression:** 24/24 PI: 11 (n = 1401) ST: 5 (n = 624) LT: 8 (n = 796)	Medium (5)	Children and adolescents / **Depression:** 8 - 16 years **Anxiety:** 7 - 19 years	School-based interventions on depression and anxiety disorders / Universal and indicated	NR	Depression; anxiety	Prevention program for depression*: PI ES = -0.12 (95% CI -0.57 to 0.30; universal -0.14; indicated -0.08) ST follow-up ES = 0.06 (95% CI -0.07 to 0.12; universal 0.06; indicated 0.04) LT follow-up ES = -0.05 (95% CI -0.35 to 0.14; universal -0.05; indicated -0.13)
		Anxiety: 15/15 PI: 6 (n = 1004) ST: 3 (n = 376) LT: 3 (n = 298)						Prevention program for anxiety**: PI ES = -0.29 (95% CI -0.67 to 0.19) ST follow-up ES = -0.10 (95% CI 0 to -0.25) LT follow-up ES = -0.05 (95% CI -0.42 to 0.17; universal: 0.15, indicated: -0.42)
	Hetrick et al. (2015) (15) Meta-analysis 1993 - 2009	43/43 CBT PI: 14 (n = 1776) ST: 14 (n = 2254) LT: 9 (n = 1149)	High (8)	Children and adolescents / 5 - 19 years	Educational interventions to prevent depression: CBT, IPT / universal and targeted	No intervention	Number of people meeting criteria for depressive disorder	CBT PI: RD = -0.11 (95% CI -0.17 to -0.05) ST follow-up: RD = -0.11 (95% CI -0.15 to -0.06) LT follow-up: RD = -0.08 (95% CI -0.16 to 0.00)
		IPT PI: 2 (n = 265) ST: 2 (n = 252) LT: NA						IPT PI: RD = 0.09 (95% CI -0.35 to 0.17) ST follow-up: RD = -0.11 (95% CI -0.19 to -0.04)
	Horowitz et al. (2006) (14) Meta-analysis 1987 - 2005	**Universal:** 12/12 (n = 5535) **Selective:** 9/9 (n = 796) **Indicated:** 9/9 (n = 1201)	Medium (7)	Children and adolescents / under 21 years	Interventions to prevent depressive symptoms and/or disorders / universal, selective and indicated	NR	Depressive symptoms and/or disorders	Universal programs: PI: Mean weighted ES = 0.12 At 6-month follow-up = 0.02 Selective programs: PI: Mean weighted ES = 0.30 At 6-month follow-up = 0.34 Indicated programs: PI: Mean weighted ES = 0.23 At 6-month follow-up = 0.31
	Jane-Llopis et al. (2003) (16) Meta-analysis 1985 - 2000	**69 programs:** 16 for children (n = 669) 9 for adolescents (n = 474)	High (8)	Children / 0 - 14 years Adolescents / 15 - 18 years	Behavior, cognition, competence, education and social support / universal, selective and indicated	Comparison groups NR	Depressive symptoms or incidence of depression	Children: Mean weighted ES = 0.21 (95% CI 0.09 to 0.32) Adolescents: Mean weighted ES = 0.19 (95% CI 0.007 to 0.38)

Prevention	Kavanagh et al. (2009) (22) Systematic review 1998 - 2007	17/17 **CBT impact:** 13 (n = 3677) **Universal:** 9 (n = 3281) **Indicated:** 4 (n = 356)	Medium (5)	Children and adolescents / 11 - 19 years	School-based CBT / universal and indicated	Control groups NR; one study was placebo controlled	Depression and anxiety	Impact of CBT PI, up to 4 weeks: SMD = -0.16 (CI -0.26 to -0.05) Universal interventions PI, up to 4 weeks: SMD = -0.15 (CI -0.25 to -0.05) Indicated interventions PI, up to 4 weeks: SMD = -0.27 (CI -0.48 to -0.06) 6 months follow-up: SMD = -0.25 (CI -0.42 to -0.08)
	Larun et al. (2006) (17) Meta-analysis 1982 - 1994	16/16 n = 1191	High (10)	Children and adolescents / 11 - 19 years	Vigorous exercise / universal	No intervention: no treatment, waiting list or regular physical activity	Depression and anxiety	Anxiety (N= 6) SMD = -0.48 (95% CI -0.97 to 0.01) Depression (N= 5) SMD = -0.66 (95% CI -1.25 to -0.08)
					Vigorous exercise / universal	Low intensity exercise, relaxation or yoga		Anxiety (N = 3) SMD = -0.14 (95% CI -0.41 to 0.13) Depression (N= 2) SMD = -0.15 (95% CI -0.44 to 0.14)
					Exercise / universal	Psychological interventions: discussion group or group counselling		Anxiety (N = 2) SMD = -0.13 (95% CI -0.43 to 0.17) Depression (N = 2) SMD = 0.10 (95% CI -0.21 to 0.41)
	Merry et al. (2004) (18) Meta-analysis 2005 - 2009	16/16 n = 3240	High (10)	Children and adolescents / 5 - 19 years	Psychological or educational interventions or both / universal and targeted	Placebo, any comparison intervention or no intervention	Prevalence of depressive disorder and depressive symptoms	Post-intervention (N = 15, n = 3115) RD = -0.09 (95% CI -0.14 to -0.05) 3 to 9 months follow-up (N= 14, n = 1842) RD = -0.11 (95% CI -0.16 to -0.06) 12 months follow-up (N= 10, n = 1750) RD = -0.06 (95% CI -0.11 to -0.01) 36 months follow-up (N = 2, n = 464) RD= -0.10 (95% CI -0.19 to -0.02)
	Teubert et al. (2011) (19) Meta-analysis 1971 - NR	65/65 Universal: 29 Selective: 21 Indicated: 15 n = 15713	High (9)	Children and adolescents / 3 - 19 years	Interventions for prevention of anxiety / universal, selective and targeted	Waiting list or active control (such as attention control and / or placebo interventions)	Anxiety symptoms, anxiety diagnosis	Anxiety symptoms PI: Mean weighted ES = 0.22 (95% CI 0.14 to 0.29) Follow-up: Mean weighted ES = 0.19 (95% CI 0.11 to 0.26) Anxiety disorder diagnosis PI: Mean weighted ES = 0.23 (95% CI 0.10 to 0.36) Follow-up: Mean weighted ES = 0.32 (95% CI 0.17 to 0.48)
	Van Zoonen et al. (2014) (20) Meta-analysis 1995 - 2010	14/14 n = 3377	High (8)	Adolescents and students / various age groups	CBT, problem-solving therapy or interpersonal group therapy / universal, selective and targeted	NR	Incidence of new cases of depressive disorders	IRR = 0.81 (95% CI 0.67 to 0.97) NNT = 22 (95% CI 13 to 17)
Treatment	NONPHARMACOLOGICAL INTERVENTIONS							
	Adelman et al. (2014) (24) Meta-analysis 2001 - 2012	4/4 n = 108	High (9)	Children and adolescents / 7 - 18 years	Computer-based CBT	Wait-list	Anxiety endpoint score on a rating scale	Children and adolescents: SMD = 0.51 (95% CI 0.20 to 0.82) Adults: SMD = 0.97 (95% CI 0.87 to 1.07)

Treatment	Ebert et al. (2015) (25) Meta-analysis 2009 - 2012	13/13 Anxiety: 7 Depression: 4 Both: 2 n = 796	High (10)	Children and adolescents / up to age of 25 years	Computer, internet or mobile-based CBT	Wait-list, placebo	Anxiety, depression	Computer CBT: Anxiety and depression (post-test) Overall mean ES = 0.72 (95%CI 0.55 to 0.90); NNT = 2.56 Anxiety ES = 0.68 (95% CI 0.45 to 0.92); NNT = 2.70 Depression ES = 0.76 (95% CI 0.41 to 0.12); NNT = 2.44 Both anxiety and depression ES = 0.94 (95% CI 0.23 to 1.66); NNT = 2.60
	Ewing et al. (2013) (27) Meta-analysis 1994 - 2012	20/20 n = 2099	High (10)	Children and adolescents / up to age of 18 years	Transdiagnostic CBT	No treatment or wait list	Anxiety diagnosis at post-treatment	Mean weighted ES (completer sample) LOR = 2.21 (95% CI 1.80 to 2.63) Mean weighted ES (intent-to-treat sample) LOR = 1.39 (95% CI 0.98 to 1.79)
	Gearing et al. (2013) (23) Meta-analysis 2000 - 2009	53/53 n = 1937	Low (3)	Children and adolescents / Mean age: 11.9 years	CBT booster sessions	NR	Pre-post and pre-follow-up effects sizes of booster sessions on individuals with mood and anxiety disorders	Average ES Post-test (N = 53): r = 0.48 (95% CI 0.44 to 0.51) Follow-up (N = 30): r = 0.53 (95% CI 0.48 to 0.57) Pre-post studies with booster sessions (N = 15): r = 0.58 (95% CI 0.52 to 0.65) Pre-post studies without booster sessions (N = 38): r = 0.45 (95% CI 0.41 to 0.49) Post-test studies with booster sessions (N = 10): r = 0.64 (95% CI = 0.57 to 0.70) Post-test studies without booster sessions (N = 20): r = 0.48 (95% CI = 0.42 to 0.53)
	Ye et al. (2014) (26) Meta-analysis 1990 - 2012	7/7 n = 569	High (10)	Children and adolescents / 7 - 25 years	Internet-based interventions (CBT in 6 studies)	Waitlist, face-to-face intervention or usual care	Anxiety and depression symptoms	Anxiety symptoms vs waitlist: SMD = -0.52 (95% CI -0.90 to -0.14) Remission rate ratio = 3.63 (95% CI 1.59 to 8.27) Depressive symptoms: Not statistically significant Anxiety and depression symptoms vs face-to-face: Not statistically significant
	PHARMACOLOGICAL INTERVENTIONS							
	Cox et al. (2014) (29) Meta-analysis 2004 - 2008	3/3 n = 164	High (11)	Children and adolescents / up to age of 25 years	Antidepressant medication: SSRIs, SNRIs, TCA, NRIs, NDDIs, TeCAs, mood stabilisers, anxiolytic medications	Placebo	Number of participants with depressive disorder who relapsed or were readmitted to a service for treatment	OR = 0.34 (95% CI 0.18 to 0.64)
	Ipser et al. (2009) (30) Meta-analysis 1966 - 2008	22/22 n = 2519	High (10)	Children and adolescents / Mean age: 12 years	Medication: SSRIs (N = 15) SNRIs (N = 5) Benzodiazepine (N = 2) TCA (N = 1)	Placebo	Anxiety treatment response***	Treatment response (N = 14, n = 2102) RR = 1.9 (95% CI 1.6 to 2.26) Symptom severity (N = 9, n = 810) SMD = -0.69 (95% CI -0.94 to -0.44) Dropout due to adverse events: 4.9%

Uthman et al. (2010) (28) Meta-analysis 1992 - 2008	16/16 n = 2092	Medium (6)	Children and adolescents / Mean age: 8.5 - 13.6 years	Fluoxetine, fluvoxamine, paroxetine, sertraline, venlafaxine	Placebo	Anxiety: Efficacy: improvement of CGI-I Acceptability: withdrawal due to adverse events	Efficacy (compared with placebo): Fluoxetine (N = 5, n = 314) RR = 3.35 (95% CrI 2.11 to 5.07) Fluvoxamine (N = 2, n = 248) RR = 3.61 (95% CrI 2.25 to 5.47) Paroxetine (N = 2, n = 516) RR = 3.23 (95% CrI 2.40 to 4.26) Sertraline (N = 3, n = 418) RR = 2.79 (95% CrI 1.95 to 3.88) Venlafaxine (N = 2, n = 596) RR = 2.06 (95% CrI 1.54 to 2.69)
Walkup et al. (2010) (31) Meta-analysis 1966 - 2008	22/22 n = 2519	High (10)	Children and adolescents / up to age of 18 years	SSRIs, SNRIs, benzodiazepines and TCA medication	Placebo	Anxiety response score on CGI-I; Symptom severity	SSRIs Response score (N = 14, n = 2102): RR = 1.9 (95% CI 1.6 to 2.26) Response in OCD (N=5, n=654): RR: = 1.65 (95% CI 1.32 to 2.06) Response in non-OCD (N = 9, n = 1448) RR = 2.01 (95% CI 1.59 to 2.55) Symptom severity reduction (N = 9, n = 810): SMD: -0.69 (95% CI -0.94 to -0.44) Dropouts due to adverse events (N = 12, n = 1997): RR = 1.91 (95% CI 1.2 to 3.05)
Williams et al. (2009) (32) Meta-analysis 1997 - 2006	9/9 n = 1972	High (10)	Children and adolescents / 7 - 18 years	SSRIs and / or psychotherapy	Placebo, various control conditions for psychotherapy	Depression remission, improved depressive symptoms, suicidality, death etc.	SSRIs trials: Pooled RD = 0.12 (95% CI 0.07 to 0.16) Psychotherapy: Higher short-term response rates or greater reduction in depression symptoms than control conditions. Suicidal ideation or behavior rate: RD = 0.01 (95% CI 0.00 to 0.02)
Zhou et al. (2015) (33) Meta-analysis 1970 - 2013	5/5 n = 290	High (10)	Adolescents up to age of 25 years	SSRIs antidepressant medication	Placebo	Depression outcomes (dichotomous and continuous) and substance-use	Dichotomous depression RR = 1.21 (95% CI 1.01 to 1.45) Continuous depression: no significant difference Substance-use outcomes: no significant difference

(Left margin label: Treatment)

AMSTAR = a measurement tool to assess the quality of systematic reviews

CBT = Cognitive Behavioral Therapy;

CI = confidence intervals

CrI = credible intervals

ES = effect size

Esw = weighted effect size;

IPT = Interpersonal Therapy

IRR = incidence rate ratio

LOR = log odds ratio

LT = long term follow-up

k = number of studies

MA = meta-analysis

MD = Mean Difference

MPH = Methylphenidate

N = Number of Studies

n = number of participants

NA = not applicable

NDDIs = norepinephrine dopamine disinhibitors

NNS = Numbers-needed-to-screen

NR = not reported

NRIs = norepinephrine reuptake inhibitors

PI = post-intervention

OR = Odds ratio

r = correlation coeficient

RCT = Randomised Control trial

RD = risk difference

RR = relative risk

SMD = Standardized mean difference

SNRIs = serotonin-norepinephrine reuptake inhibitors

SR = Systematic Reviews

SSRIs = selective serotonin reuptake inhibitors

ST = short-term follow-up

TCA = tricyclic antidepressants

TeCA = tetracyclic antidepressants.

* According to questionnaires for depression (CDI: Children's depressive Inventory)

** According to questionnaires for anxiety (RCMAS)

*** According to Clinical Global Impression scale (CGI-I), Paediatric Anxiety Scale (PARS) and the Child Yale-Brown Obsessive-Compulsive Scale CYBOCS)

ST: 6 months follow-up (21), 3 - 9 months follow-up (15)

LT: median of 18 months (21), 12 months follow-up (15)

Attention Deficit Hyperactivity Disorder

Introduction
Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder in children, characterized by inattention, hyperactivity, and impulsivity. It has a prevalence of 3 to 5%, boys having 3 times higher risks than girls. At adult age, the prevalence is 2 - 4%, men and women being equally at risk (4, 38).

The diagnostic and the treatment are generally initiated by the pediatrician or by the general practitioner. In the last ten years in Quebec, the treatment of ADHD has multiplied by three, to reach almost 10% of the 10 years-old boys (39). This number corresponds to the prevalence revealed by the provincial survey conducted at the beginning of 1990s (40).

Literature Review
The literature search yielded five meta-analysis and two systematic reviews (figure 2). They focus on treatment of ADHD, and no review looking at screening tools or prevention interventions was identified. Table 7 at the end of the section offers details on these reviews, as well as of the individual studies included.

Screening
No review to show a better detection and treatment of ADHD when using screening tools was identified. However, American Academy of Pediatrics recommends[19] to use screening tools and confirmatory diagnostic tests when ADHD is suspected.

Prevention
No evidence that prevention interventions would be effective in decreasing the incidence of ADHD was identified.

Treatments
1. Nonpharmacological Interventions
The American Academy of Pediatrics' clinical guideline[20] recommends primarily treating the ADHD of young children, i.e. less than 6 years, with nonpharmacological interventions, and to use medication when these interventions cannot be used. In the case of school-aged children or teenagers it is recommended to start with the medication in conjunction or not with nonpharmacological interventions.

Three high (41 - 43) and one medium quality (44) meta-analysis looked at nonpharmacological interventions for children and adolescents with ADHD, in addition to Sibley et al. (45) and Van der Oord et al. (46) reviews mentioned later on. The behavioral therapy was analysed in two systematic reviews of 15 RCTs (43) and 22 studies (45), 3 of them being RCTs, and a meta-analysis of 12 RCTs (46). Cognitive training was examined by a meta-analysis of 16 RCTs (41) and two systematic reviews of 1 (45) and 6 RCTs (43), respectively. One meta-analysis of 7 RCTs examined the effects of physical exercise in children and adolescents with ADHD (44), while another one including 5 RCTs (42) and a systematic review of 8 RCTs (43) looked at neurofeedback interventions.

2.1 Behavioural interventions are used to learn and strengthen positive behaviors and eliminate unwanted or problem behaviors associated with ADHD[21]. Reviews show that behavioral interventions are effective in reducing ADHD symptoms, producing similar therapeutic effects as medication in adolescents (45), but being significantly less effective than their combination with methylphenidate in children (46). However, Sonuga-Barke et al. (43) found a limited value of these interventions in children and adolescents.

2.2 Cognitive training approaches, using controlled exposure to information processing tasks, help strengthening brain networks involved in ADHD, and improving the cognitive processes (41). However, the evidence gathered for the present review showed limited effects on ADHD symptoms when the assessments were based on blinded measures, as shown by a meta-analysis (41), and a systematic review based on children and adolescents studies (43). Sibley et al. (45) found no evidence that cognitive enhancement training improved the functioning of adolescents with ADHD.

2.3 Neurofeedback is a technique through which a patient is trained to control particular brainwave patterns using electroencephalographic technology (42). Based on a parent-assessment scale, one meta-analysis (42) reported that this technique improved children's ADHD score, the inattention and hyperactivity/impulsivity dimensions with a medium effect size. However, according to a teacher-assessment scale, the effect size of inattention dimension was smaller. To note that between 0 and 50% of children from the 5 included studies of this meta-analysis were taking methylphenidate. Neurofeedback treatment showed significant effects which, however, dropped and became non-statistically significant when the analysis was based on probably blinded assessments, as shown by a systematic review (43).

2.4 Aerobic programs, analysed in a recent meta-analysis (44) showed to be effective for improving symptoms as attention, hyperactivity, impulsivity, anxiety, executive function and social disorders in children and adolescents with ADHD and regular medication. The short-term aerobic exercises (6 - 10 weeks) were based on several aerobic interventions, such as walking, jogging, swimming and dancing. Yoga exercises related to the wellness of mind and body may also provide some improvements on core symptoms of ADHD, as shown by one RCT included in this meta-analysis.

2. Pharmacological Interventions
Three medium quality reviews on pharmacological interventions in ADHD, two meta-analysis (38, 46) and one systematic review (45), were identified. Prasad et al. (38) were looking at the effects of methylphenidate, dexamfetamine, mixed amphetamine salts and atomoxetine on children and adolescents' behaviour and their academic performance. This review is based on 43 randomised controlled studies (RCT), 14 of which were included in the meta-analysis. Van der Oord et al. (46) were interested to analyse the effect-sizes of methylphenidate and psychosocial treatments, as well as their combination on ADHD in children. Fifteen,

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19 - According to: www.cdc.gov/ncbddd/adhd/guidelines.html

20 - www.cdc.gov/ncbddd/adhd/guidelines.html

21 - According to: www.cdc.gov/ncbddd/adhd/guidelines.html

twelve and respectively six individual RCTs were included in this meta-analysis for each of these conditions. In their systematic review, Sibley et al. (45) looked at the available pharmacological, behavioral and cognitive training therapies for the adolescent populations with ADHD. Eleven of the included studies looked at the pharmacological interventions and analysed primarily Central Nervous System stimulants.

These analyses show that methylphenidate have beneficial effects on children and adolescents' on-task behavior, academic work completion, and ADHD symptoms (38, 46). The results showed elevated weighted effect-size and mean-difference measures for methylphenidate treatment when compared to placebo. Dexamfetamine and mixed amphetamine formulations also showed beneficial effects on children and adolescents' learning and academic achievements, while atomoxetine had no significant effect (38). Methylphenidate alone or in combination with behavioral therapy showed very large improvements on children's ADHD symptoms and were equally effective in symptom reduction. However, psychosocial interventions showed smaller effects than both of these treatment conditions (46).

Sibley et al. also showed that medication and behavioral therapy produced similar range of therapeutic effects on adolescents' ADHD symptoms. These authors reported some adverse events associated with the use of methylphenidate and amphetamine by adolescents, such as appetite loss, irritability, nausea, headache and insomnia (45).

Examples Of Best Practices In Quebec

ADHD Therapeutic Management by the Nurse in the GP Office

A general practitioner (GP) based model for the management of ADHD was developed by Chantal Boivin[22], Lanaudiere, Quebec. According to this model, patients and their parents presenting to a GP office possibly for ADHD are asked by the clinical nurse to fill the Canadian ADHD Resource Alliance[23] (CADDRA) standardized questionnaires, and a medical treatment is discussed. Teachers are also asked to fill these questionnaires. Once the ADHD diagnosis is confirmed by the GP, treatment is initiated. Weekly follow-up is offered, and standardized questionnaires are used to verify the disease evolution. When the disease progresses well, a three-month follow-up is offered to patients and family, alternatively by the nurse and by the GP. In addition, patients and their parents are provided with information material on ADHD, and are referred to PANDA[24] group for further support[25].

The nurse and the senior GP were invited by the regional health and social services authority to write the protocol of this management model, and to inform other GP offices. This protocol follows the

American Academy of Pediatrics clinical guidelines[26] for evaluation and treatment of ADHD by primary care practitioners. However, this management model has not been yet evaluated, nor we did find literature to that effect. This indicates a research gap for implementation of primary care based disease management of ADHD, to show the role of primary care nurse, the GP, and the community organisations, in collaboration with the young patient and his family.

Combination of Physical Activity and ADHD
Two studies exploring the effect of physical activity on ADHD were conducted in Quebec, in a clinic and a school environment (47). They show that physical activity has a positive impact on certain behaviors of school-children with ADHD.

Research Gaps Recommendations
In Quebec, the ADHD is well detected and treatment access is simple (40). However, certain issues need to be clarified.

1. Currently, there are no studies to allow optimizing the ADHD treatment in primary care settings. Therefore, future studies should define the evaluation, treatment and follow-up protocols, the possible reference to specialist care, and the information for parents, as well as the alternatives to pharmacological therapies or the prescription of school or extra school physical activity.

2. A long-term follow-up, i.e. 3 to 5 years, of the possible negative effects of the pharmacological treatment of ADHD should be conducted. Therefore, prospective cohort studies, as well as studies based on the health administrative databases and on the monitoring system of chronic diseases of the Institut national de santé publique du Quebec could be sought. The monitoring system allow following children, teenagers and young adults medically treated for ADHD and for other current mental disorders (39).

3. The research on the psychosocial interventions must be pursued, in order to identify the determining factors of these interventions, the effects of their combination on the ADHD and the co-morbidities, as well as the suited methodology of their implantation into the Quebec's health system.

4. Clinical research should be conducted on the promising interventions, such as physical activity and neurofeedback.

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22 - Clinical nurse at Centre intégré de santé et services sociaux Sud de Lanaudière. For this contribution to the management of children with ADHD she received in 2011 the Florence award offered by the Quebec's Nurses Association for community care development.

23 - www.caddra.ca

24 - www.associationpanda.qc.ca

25 - CISSS de Lanaudiere – Protocole de suivi de la clintele TDAH. Document inedit, juin 2015. www.santelanaudiere.qc.ca/asss/Pages/default.aspx

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26 - www.cdc.gov/ncbddd/adhd/guidelines.html

TABLE 6 – KEY FINDINGS - Attention Deficit Hyperactivity Disorder

Screening	No evidence identified
Prevention	No evidence identified
Treatment	**Nonpharmacological interventions** • Although at a smaller extent than medication, behavioral interventions are effective in reducing ADHD symptoms of children and adolescents • Cognitive training and neurofeedback have limited effects on ADHD symptoms of children and adolescents • Aerobic programs are effective for improving ADHD symptoms in children and adolescents under regular medication **Pharmacological interventions** • Methylphenidate alone or in combination with behavioral therapy showed large improvements on children and adolescents' ADHD symptoms

FIGURE 2 – PRISMA Flow Diagram - Attention Deficit Hyperactivity Disorder

Identification

Records identified through database searching
(n = 3934)
PubMed, n = 961
Medline, n = 846
EBM Reviews, n = 72
Embase, n = 1655
PsycINFO, n = 183
CINAHL, n = 217

Records excluded because of format:
i.e. comment, editorials
(n = 377)

Screening

Records after duplicates removed
(n = 2402)

Records excluded
(n = 2009), with reasons:
• did not respond to inclusion criteria (n = 1544)
• target other mental diseases (n = 389)
• not pertinent following abstract analysis
(n = 76)

Records screened
(n = 2025)

Eligibility

Full-text articles assessed for eligibility
(n = 16)

Full-text articles excluded (n = 9), with reasons:
• not a systematic review nor a meta-analysis
(n = 5)
• no RCTs included
(n = 2)
• no quantitative data
(n = 2)

Included

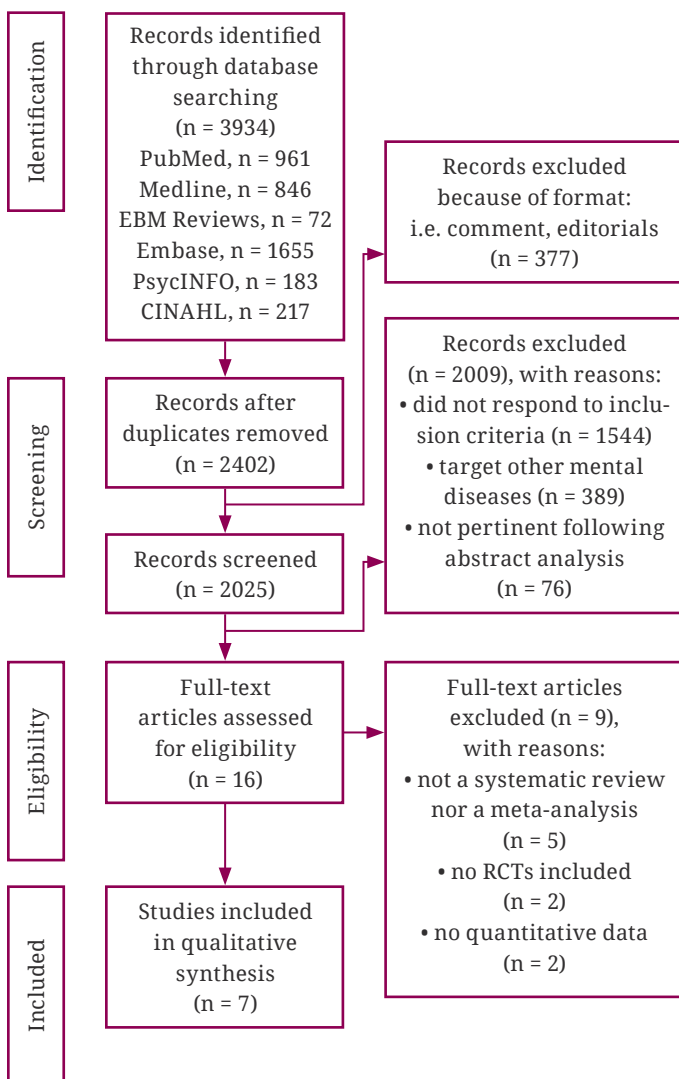Studies included in qualitative synthesis
(n = 7)

TABLE 7 – SUMMARY OF FINDINGS - Anxiety-Depressive Disorder

	Author (year) (reference #) Study type Period Searched	# of Studies (N) / # RCTs # overall individuals (n)	AMSTAR Score	Population / Age	Intervention / Type	Comparator	Outcomes	Main Results
Treatment	NONPHARMACOLOGICAL INTERVENTIONS							
	Cerrillo-Urbina et al. (2015) (44) Meta-analysis 2002 - 2015	8/8 n = 249	Medium (7)	Children and adolescents / 6 - 18 years	Aerobic programs and yoga exercise	No exercise	Primary: inattention, hyperactivity, impulsivity Secondary: anxiety, executive function, social disorders, cognitive performance	Aerobic exercise improved: Attention: SMD = 0.84 (95% CI 0.48 to 1.20) Hyperactivity: SMD = 0.56 (95% CI 0.04 to 1.08) Impulsivity: SMD = 0.56 (95% CI 0.04 to 1.08) Anxiety: SMD = 0.66 (95% CI 0.13 to 1.18) Executive function: SMD = 0.58 (95% CI 0.15 to 1.00)
	Cortese et al. (2015) (41) Meta-analysis 2005 - 2014	16/16 n = 759	High (11)	Children and adolescents / 3 - 18 years	Cognitive training	Treatment as usual (including medication), wait list, active / placebo / sham	Total ADHD, inattention, hyperactivity / impulsivity symptoms	Reports by raters proximal to the treatment setting ADHD total: SMD = 0.37 (95% CI 0.09 to 0.66) Inattention: SMD = 0.47 (95% CI 0.14 to 0.80) Hyperactivity/impulsivity: SMD = 0.14 (95% CI -0.07 to 0.35) Reports by blinded raters ADHD total: SMD = 0.20 (95% CI 0.01 to 0.40) Inattention: SMD = 0.32 (95% CI -0.01 to 0.66) Hyperactivity/impulsivity: SMD = 0.18 (95% CI -0.01 to 0.37)
	Micoulaud-Franchi et al. (2014) (42) Meta-analysis 2009 - 2014	5/5 n = 263	High (9)	Children 8.4 - 10.6 years	Neurofeedback + MPH (0 - 50% of children)	Semi-active or sham-neurofeedback	ADHD total score Inattention and hyperactivity / impulsivity dimensions	**Parent assessment:** Overall ADHD: SMD = −0.49 (95% CI -0.74 to -0.24) Inattention: SMD = −0.46 (95% CI -0.76 to -0.15) Hyperactivity / impulsivity: SMD = -0.34 (95% CI -0.59 to -0.09) **Teacher assessment:** Inattention: SMD = -0.30 (95% CI -0.58 to -0.03)
	Sonuga-Barke et al. (2014) (43) Systematic review 2005 - 2012	6/6 n = 247	High (10)	Children and adolescents 3 - 18 years	Cognitive training	Treatment as usual (including medication), sham / placebo, attention / active control, waiting list	Pre- to posttreatment change in total ADHD symptom severity	Using Most Proximal Assessment Overall SMD = 0.64 (95% CI 0.33 to 0.95) Using Probably Blinded Assessments Overall SMD = 0.24 (95% CI -0.24 to 0.72)
	Sibley et al. (2014) (45) Systematic review 2000 - 2012	28/11 n = 1943	Medium (7)	Adolescents 10.0 - 19.9 years	Medication	NR	ADHD symptom severity	Mean ES = 0.64 (80% CI 0.47 to 0.81)
		22/3 n = 263			Behavior therapy			Mean ES = 0.49 (80% CI 0.45 to 0.52)
		3/1 n = 142			Cognitive training			Mean ES = 0.06

	Study	N studies/n	AMSTAR	Population	Intervention	Comparison	Outcome	Results
Treatment	Van der Oord et al. (2008) (46) Meta-analysis 1985 - 2007	24/ Parent: 15 (n = 705) Teacher: 13 (n = 588)	Medium (6)	Children 6 - 12 years	Medication (short-acting MPH)	Intervetion, attention or waitlist controls	ADHD symptoms	ADHD – parent: ES = 1.53 (1.23 - 1.82) ADHD – teacher: ES = 1.83 (1.43 - 2.12)
		24/ Parent: 12 (n = 402) Teacher: 11 (n = 381)			Behavioral interventions			ADHD – parent: ES = 0.87 (0.73 - 1.01) ADHD – teacher: ES = 0.75 (0.49 - 1.01)
		24/ Parent: 6 (n = 242) Teacher: 6 (n = 240)			Combination short-acting MPH + behavioral interventions			ADHD – parent: ES = 1.89 (1.39 - 2.40) ADHD – teacher: ES = 1.77 (1.08 - 2.46)
	PHARMACOLOGICAL INTERVENTIONS							
	Prasad et al. (2013) (38) Meta-analysis 1987 - 2007	43/43 n = 2110	Medium (7)	Children and adolescents 4 - 16 years	Medication	No drug treatment, baseline, placebo	Measures of educational achievement and learning abilities including school grades, classroom observation, measures of academic performance, participants own rating of academic performance	MPH low dose on-task behaviour: MD = 9.72 (CI 5.69 to 13.76) MPH high dose on-task behaviour: MD = 14.0 (CI 8.63 to 19.44) Mixed amfetamine salts on task-behaviour: MD = 9.19 (CI 5.59 to 12.80)

ADHD = Attention deficit hyperactivity disorder
AMSTAR = a measurement tool to assess the quality of systematic reviews
ES = effect size
MD = Mean Difference
MPH = Methylphenidate

N = number of studies
NR = not reported
RCT = Randomised Control Trial
SMD = Standardized mean difference

Oppositional Defiant Disorder or Conduct Disorder

Introduction

Oppositional defiant disorder (ODD) in children is manifested by severe and persistent defiant, hostile and oppositional behavior, while Conduct disorder (CD) refers to violations of socials norms and negative actions toward others, including behaviours of fighting, stealing, lying (48, 49). Between 1 and 6% of Canadian school-aged children are diagnosed with ODD, and 0.2% to 2% with CD, while 40% of children with Attention deficit hyperactivity disorder (ADHD) also have ODD symptoms (49).

For the management of children with oppositional defiant disorder National Institute for Health and Clinical Excellence (NICE) guidelines[27] propose several recommendations:

- General principles of care, such as working safely and effectively with children and young people, establishing relationships with children and young people and parents or carers, working with parents and carers, and others.

- Identifying effective treatment and care options.

- Psychosocial interventions – treatment and indicated prevention. These include: parent training programs, parent and child training programs for children with complex needs, foster carer / guardian training programs, child-focused programs, and multimodal interventions.

- Pharmacological interventions.

- Improving access to services and developing local care pathways.

Literature Review

The literature search conducted for the present project allowed to identify only four reviews on treatments of ODD (Figure 3). Table 9 offers details on these studies.

27 - www.nice.org.uk/guidance/cg158/ chapter/1-Recommendations#identification-and-assessment

Screening
No systematic reviews on screening for ODD was identified by this comprehensive search. However, there are recommendations to use screening tools and confirmatory diagnostic tests when ODD is suspected. These recommendations are endorsed by ADHD guidelines[28].

Prevention
No research evidence (i.e. systematic reviews) was found on prevention interventions for ODD.

Treatments
1. Nonpharmacological Interventions
A medium quality meta-analysis on psychosocial interventions, such as behaviour, family, cognitive behavioural or psychodynamic therapies, in reducing aggressive behaviours in children and adolescents was identified (48). It is based on 65 studies, most of them being RCTs. Of these studies, 33 applied design 1, meaning that they involved an untreated control group such as waitlist, while 32 individual studies used design 2 that involved either a treated control or no control group. Results showed an overall moderate change in participants' aggression in studies with untreated control groups, and large treatment effects on studies without untreated control groups. In addition, in studies with or without untreated controls teachers reported moderate effects of these treatments on aggression, and moderate effects were observed on changes in social functioning. The moderator analysis showed that studies based on younger children had larger effect sizes than those which involved older children, and studies using behavioural interventions led to significantly larger effect sizes than those applying family interventions.

The Cochrane review by Furlong et al. (50) assessed interventions addressing parents and focused on effectiveness of behavioural and cognitive-behavioural group-based parenting programs for parents of children between 3 and 12 years. These programs sought to improve child conduct problems, as well as parental mental health and parenting skills. This systematic review showed that parental training leads to statistically significant reductions in child conduct problems, and to improvements of parental mental health and positive parenting skills.

2. Pharmacological Interventions
Two high quality systematic reviews on pharmacological interventions for treating ODD (49, 51) were identified. These interventions addressing children and adolescents were based on a fairly high number of placebo-controlled trials (i.e. 40 for psychostimulants) in Gorman's review, and 18 RCTs in Pringsheim's review.

The systematic review by Gorman et al. (51) found that psychostimulants such as methylphetamine and amphetamines are recommended for use in children and adolescents with ADHD, ODD and CD, whereas atomoxetine and alpha-2 agonists have a conditional recommendation for use. Given its major adverse effects, risperidone also have a conditional recommendation for use for the treatment of disruptive and aggressive behaviour in the absence of ADHD. The other medications analysed – quetiapine, haloperidol, lithium, carbamazepine – are not recommended for treatment of the above mentioned symptoms because of their major adverse events and low quality evidence to support their use.

The systematic review by Pringsheim (49) focused on antipsychotics and mood stabilizers for aggression and conduct problems in youth with ODD, CD and ADHD and found that risperidone has a moderate-to-large effect on these symptoms in children and adolescents with subaverage IQ and ODD, CD. In addition, risperidone was found to have a moderate effect on disruptive and aggressive behaviour in youth with average IQ and ODD or CD, with or without ADHD. The authors advised, however, that the adverse effects related to its use should be strongly considered prior to prescribing this medication to children. Finally, the evidence supporting the use of other antipsychotics and mood stabiliser in the case of aggression and conduct disorders was of low and very low quality.

Examples Of Best Practices In Quebec
EQUIPE is a psycho-education program for parents of children aged 3 to 12 years with conduct problems such as ADHD, ODD and CD. The French version of this program, adapted to Quebec context, was translated from parental interventions already in use in English-speaking[29] and Spanish-speaking populations[30]. The purpose of this program is to improve child conduct problems, to improve parenting skills, and to reduce the waiting lists of mental health services.

EQUIPE is a group-based program that involves an interactive and collaborative learning format which allows participants to acquire key behavioural principles and parental skills. Given at a rate of 2 hours / week for 10 weeks, the program addresses weekly a new theme. Following video presentations, parents are encouraged to find their own solutions to errors in the management of their child behaviour, and to apply them. This active parental training, based on home and group works, favors discussions about consequences of the presented errors, and various solutions.

EQUIPE program has the particularity to address a wide group (20 to 25) of parents, to minimize barriers hindering participation by offering geographical closeness and schedule flexibility, to involve the community resources, and to utilise an intervention model based on active participation of parents. Between 2010 and 2014, groups of parents of pre-school children (n = 340) participated in the evaluation of this program in four CSSS[31] in Quebec province[32]. Preliminary results of this observational study show improvements of children behaviours, both internalized (anxiety, sleep troubles) and externalized (aggression, opposition), improvements maintained up to six months post-intervention. Results also show a significant improvement of the index of parental stress, as well as of the total stress score between the beginning and the end of intervention. In addition, the implementation analysis based on focus groups showed a high level of satisfaction among parents and program facilitators.

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28 - www.cdc.gov/ncbddd/adhd/guidelines.html

29 - In Ontario: Community Parents Education program (COPE)

30 - In California: CHOC-UCI Initiative for the Development of Attention and Readiness (CUIDAR)

31 - CSSS: Centre de santé et de services sociaux

32 - Project led by Dr Leila Ben Amor

Research Gaps Recommendations

The limited evidence gathered in this section suggests that psychosocial interventions for children with ODD appear to be effective at reducing disruptive child behaviours. However, some aspects of these interventions need to be clarified by future research.

We concur with recent guidelines based mainly on RCTs (52) showing that multicomponent psychosocial interventions including a parent component seems to be more effective at reducing disruptive child behaviour than those including only a child component or control conditions. In order to consolidate these findings it would be of interest to analyse the long-term impact on ODD of multimodal psychosocial interventions that include parental skills training. Of great interest would also be to study the optimal length and the developmental timing of these interventions.

Evidence of pharmacological interventions used in ODD is of limited quality. This medication could be complementary to psychosocial interventions when these prove not effective enough. A pragmatic clinical trial could be attempted in order to define the real-life sequence of such interventions by severity and developmental age in combination with potentially effective psychosocial interventions.

FIGURE 3 – PRISMA Flow Diagram - Oppositional Defiant Disorder or Conduct Disorder
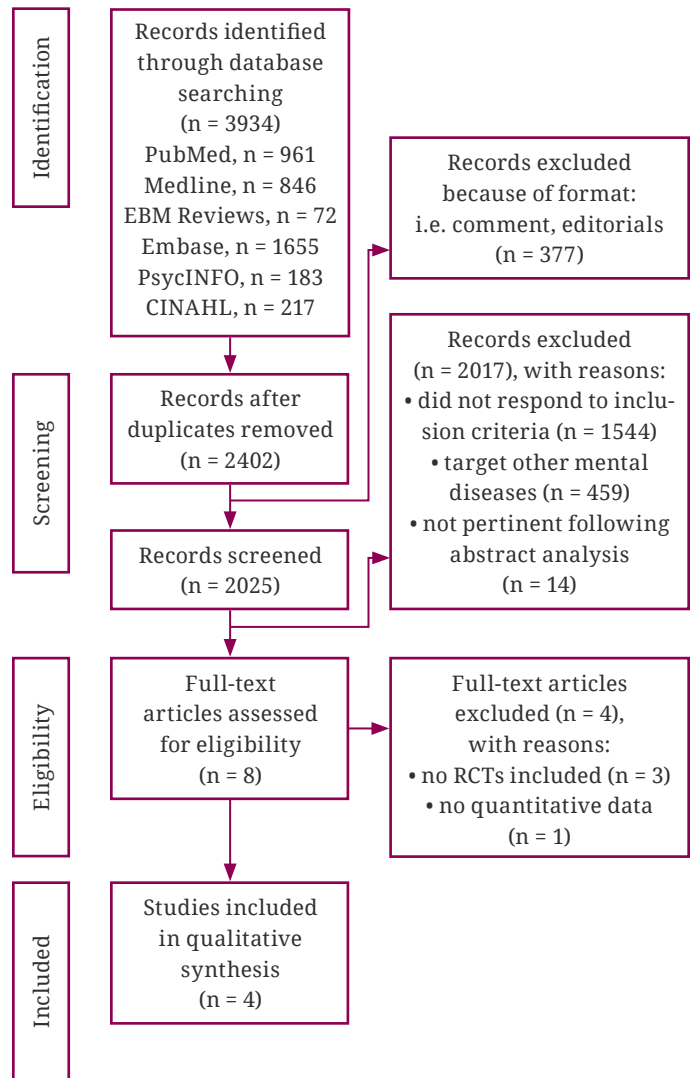

Identification

Records identified through database searching
(n = 3934)
PubMed, n = 961
Medline, n = 846
EBM Reviews, n = 72
Embase, n = 1655
PsycINFO, n = 183
CINAHL, n = 217

Records excluded because of format:
i.e. comment, editorials
(n = 377)

Screening

Records after duplicates removed
(n = 2402)

Records excluded (n = 2017), with reasons:
• did not respond to inclusion criteria (n = 1544)
• target other mental diseases (n = 459)
• not pertinent following abstract analysis
(n = 14)

Records screened
(n = 2025)

Eligibility

Full-text articles assessed for eligibility
(n = 8)

Full-text articles excluded (n = 4), with reasons:
• no RCTs included (n = 3)
• no quantitative data
(n = 1)

Included

Studies included in qualitative synthesis
(n = 4)

TABLE 8 – KEY FINDINGS - Oppositional Defiant Disorder or Conduct Disorder

Screening	No evidence identified
Prevention	No evidence identified
Treatment	**Nonpharmacological interventions** • Psychosocial interventions, particularly those developing parental skills in groups, have positive and moderate effects to reduce aggressive behaviours in children **Pharmacological interventions** • Moderate-quality evidence supports risperidone for the treatment of disruptive and aggressive behaviour; however, its adverse effects should be taken into consideration prior to prescribing it to children • Adverse events of antipsychotics and mood stabilizers often exceeds the evidence for efficacy • In the presence of ADHD, the pharmacological treatment of ADHD also significantly reduces oppositional and conduct disorder symptoms

TABLE 9 – Summary of Findings - Oppositional Defiant Disorder or Conduct Disorder

	Author (year) (reference #) Study type Period Searched	# of Studies (N) / # RCTs # overall individuals (n)	AMSTAR Score	Population / Age	Intervention / Type	Comparator	Outcomes	Main Results
Treatment	NONPHARMACOLOGICAL TREATMENT							
	Fossum et al. (2008) (48) Meta-analysis 1987 - 2008	65/53 Design 1: 33 n = 2512 Design 2: 32 n = 2457	Medium (7)	Children and adolescents / Design 1: 4 - 13.5 years Design 2: 4 - 16 years	Behaviour, family, cognitive behavioural or psychodynamic therapies	Untreated control: waitlist (design 1) No untreated control: treated or no control (design 2)	Change in disruptive and aggressive behaviours	Overall change in aggression: design 1: mean ES = 0.62 (95% CI 0.49 to 0.76) design 2: mean ES = 0.95 (95% CI 0.77 to 1.14) Teacher reports of aggression: design 1: ES = 0.41 (95% CI 0.30 to 0.52, N = 20, n = 1593) design 2: ES = 0.63 (95% CI 0.39 to 0.86, N = 7, n = 653) Changes of social skills: design 1: ES = 0.42 (95% CI 0.27 to 0.57, N = 13, n = 1017) design 2: ES = 0.49 (95% CI 0.24 to 0.73, N = 10, n = 670)
	Furlong et al. (2013) (50) Systematic review 1950 - 2011	10/10 n = 1078	High (11)	Parents of children 3 - 12 years	Behavioural and cognitive-behavioural group-based parenting programs	Waiting list, no treatment or standard treatment	Child outcomes: conduct problems Parent outcomes: mental health, appropriate parenting skills and knowledge, positive and negative parenting practices	Child conduct problems: Parents assessment: SMD = -0.53 (95% CI -0.72 to -0.34) Independent assessment: SMD = -0.44 (95% CI -0.77 to 0.11) Parental mental health and positive parental skills: SMD = -0.36 (95% CI -0.52 to -0.20) Parents reports: SMD = -0.53 (95% CI -0.90 to -0.16) Independent reports: SMD = -0.47 (95% CI -0.65 to -0.29) Negative parenting practices: Parents reports: SMD = -0.77 (95% CI -0.96 to -0.59) Independent reports: SMD = -0.42 (95% CI -0.67 to -0.16)

Treatment	PHARMACOLOGICAL TREATMENT						
	Gorman et al. (2015) (51) Systematic review 1970 - 2013	81/81 n = various (see main results)	High (11)	Children and adolescents / 6 - 18 years	Psychostimulant (methylphetamine and amphetamines) atomoxetine, guanfacine, clonidine, risperidone, quetiapine, haloperidol, lithium, valproate and carbamazepine	Placebo	Disruptive behavior: oppositionality, conduct problems or aggression	Psychostimulants (N = 40, n = 2364, ADHD +/- ODD or CD) Studies from 1970 to 2001: Clinician ES = 0.77 (95% CI 0.63 to 0.88) Parent ES = 0.71 (95% CI 0.42 to 1.15) Teacher ES = 1.04 (95% CI 0.79 to 1.32) Studies from 2002 to 2013: Parent SMD: 0.55 (95% CI 0.36 to 0.73) Teacher SMD: 0.84 (95% CI 0.59 to 1.10) Atomoxetine (N = 15, n = 1907, ADHD, +/- ODD or CD) SMD = 0.33 (95% CI 0.24 to 0.43) Risperidone (N = 4, n = 429, average IQ and ODD or CD +/- ADHD, disruptive and aggressive behaviour) SMD = 0.60 (95% CI 0.31 to 0.89) Risperidone (N = 5, n = 398, low IQ and ODD or CD, +/- ADHD, conduct problems and aggression) SMD = 0.72 (95% CI 0.47 to 0.97)
	Pringsheim et al. (2015) Part II (49) Systematic review 1995 - 2002	18/18 11 on antipsychotics 7 on mood stabilizers n = various (see main results)	High (11)	Children and adolescents / 4 - 18 years	Antipsychotics: risperidone, quetiapine, haloperidol, thioridazine Traditional mood stabilizers: lithium, divalproex, carbamazepine	Placebo	Aggression, conduct problems; Adverse effects and adverse event-related drop outs	Antipsychotics Risperidone (youth with subaverage IQ and ODD or CD, +/- ADHD) Conduct problems and aggression (N = 5; n = 398) SMD = 0.72 (95% CI 0.47 to 0.97) Risperidone (youth with ODD or CD, +/- ADHD) Disruptive and aggressive behaviour (N = 4; n = 429) SMD = 0.60 (95% CI 0.31 to 0.89) Mood Stabilizers Valproic acid (youth with ODD and CD, +/- ADHD) Aggression (N = 2; n = 50) OR = 14.6 (95% CI 3.25 to 65.61) Lithium (youth with CD) Aggression (N = 4; n = 184) OR = 4.56 (95% CI 1.97 to 10.56)

ADHD = Attention deficit hyperactivity disorder

AMSTAR = a measurement tool to assess the quality of systematic reviews

CD = conduct disorder

ES = effect size

N = number of studies

n = number of participants

ODD = Oppositional defiant disorder

OR = odds ration

RCT = Randomised Control Trial

SMD = Standardized mean difference

SUBSTANCE USE DISORDER

Introduction

Substance misuse by adolescents severely impacts their physical and mental health, is often associated with behavioral problems (53), and has immediate and long-term consequences, such as suicide behaviours (54), poor school results and school dropout (55), risky sexual behaviours (56). In Quebec province, more than 10% of young students have used substances by the end of their secondary degree studies (57).

Being one of the major risk factors for morbidity and mortality worldwide (58), alcohol consumption increased among adolescents[33]. Children and adolescents consuming alcohol before age 14 are at a higher risk for impaired health, given that earlier alcohol use is related to higher risk of dependence and abuse later in life (59). According to a 2008's survey (57) in Quebec almost 27% of adolescents between 12 and 13 years and 47% of those between 13 and 14 years declared having been drunk in the last year, and almost half of them (48.3%) were involved in binge drinking.

Literature Review

The literature search yielded one review on brief interventions as part of a screening, referral and treatment model, 18 reviews on prevention and 4 on treatment of Substance Use Disorder (SUD) in children and adolescents (figure 4). Details on these reviews, as well as of the individual included studies are offered in table 11 at the end of the section.

Screening

No systematic review on the practice of screening for reducing substance use disorders in primary care or schools and impact on substance use outcomes in youth was identified. However, one high quality systematic review examining the effectiveness of brief interventions[34] (BIs) as part of Screening, Brief Intervention, and Referral to Treatment (SBIRT) model for reducing illicit substances use was identified (60). Two of the 5 included RCTs reported not statistically significant results (i.e. reduction of substance use) at 3 months and other two had mixed results when BIs were compared to written information. Based on this data, the authors could not establish the effectiveness of BIs interventions when they are administered to nontreatment-seeking population detected using screening procedures. To note that these interventions addressed adolescents, young adults, as well as adults above 25 years old.

Prevention

Prevention can be defined as 'any activity designed to avoid substance abuse and reduce its health and social consequences'. As substance abuse is a chronic and relapsing disorder, effective prevention interventions are necessary before and after symptoms become apparent (61). These interventions aim to prevent substance use, to delay initiation, to reduce its intensification or

to prevent escalation into problem use[35]. Primary prevention, the prevention before the onset of symptoms, can be classified as universal, in which psychoeducation, generic psychosocial skills and drug refusal skills are provided to all youth or families; selective, in which only high risk youth are targeted; or indicated, in which only youth with early indicators of problem substance use are targeted.

Eight meta-analysis, 2 of low (62, 63), 5 of medium (64-68) and one of high quality (69) examined the effects of various interventions to prevent and reduce alcohol and drug consumption by children and adolescents. In addition, ten systematic reviews, 3 of medium quality (58, 70, 71) and 7 of high quality (53, 72-77) reporting results of prevention programs for alcohol and substance misuse were identified. The majority of the described interventions were universal, school-based programs, being mostly analysed by randomized control trials (RCTs).

Among the interventions that seem to be most effective in preventing adolescent substance misuse are those based on cognitive-behavioural skills building. Scott-Sheldon's (68) meta-analysis based on 41 RCTs showed that behavioural interventions for first-years college students reduce alcohol consumption and alcohol-related problems. Furthermore, interventions including personalized feed-back, moderation strategies, expectancy challenges, identification of risky situations, and goal settings seemed to optimize the efficacy.

Carey et al. looked at the efficacy of Computer-delivered interventions (CDIs) to reduce alcohol use among college students (64), and whether these type of interventions produce similar benefits to face-to-face interventions (FTFIs) (65). The 2009's review (64) was based on 35 studies, most of them RCTs. The authors found that CDIs lead to a reduction of quantity and frequency of drinking among college students. These interventions were equivalent to alternative alcohol-related comparison interventions, and were preferred to no interventions. The 2012's review (65) showed that, when compared to controls, both CDIs and FTFIs reduce alcohol consumption at short-term follow-up. Direct comparison of these two interventions seems to favor FTFIs on alcohol quantity and alcohol-related problems measures. The authors concluded that FTFIs provide the most effective and enduring effects.

A commonly used universal intervention method is psychoeducation, which increases children and adolescents' substance use knowledge. Two systematic reviews by Faggiano and collaborators (72, 73) assessed school-based interventions in preventing or reducing drug use in adolescents of 6th and 7th grade. Supported by 29 RCTs, the 2008's review (72) showed that skills-based interventions reduce marijuana and hard drug use when compared to usual curricula, improving in the same time decision-making, self-esteem, peer resistance and drug knowledge. In addition, affective interventions improve decision-making skills, enhancing also drug knowledge alongside the knowledge-based programs. The 2014 review (73) was based on 51 RCTs analysing social competence, social influence and the combination of these two types of interventions versus usual curricula or no interventions.

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33 - Calling time on young people's alcohol consumption. Lancet. 2008; 371(9616); available from:
www.thelancet.com/journals/lancet/article/PIIS0140-6736(08)60386-4

34 - 'In general, BIs are in-person, time-limited efforts to provide information or advice, increase motivation to avoid substance use, or to teach behavior change skills with the aim of reducing substance use and the likelihood of experiencing negative consequences' (Young et al. 2014).

35 - www.emcdda.europa.eu/topics/prevention

The results show that the combination of the two approaches have small but protective effects in drug use prevention. Some social competence-based programs also proved protective effects on certain outcomes, such as marijuana use and any drug use.

Foxcroft and collaborators conducted two Cochrane systematic reviews looking at the effectiveness of psychosocial and education interventions (74), and family-based programs (75) in prevention alcohol misuse in young people up to 25 years old. These reviews were based on 41 and 12 RCTs, respectively. The 2002's review (74) did not offer a solid conclusion on the effectiveness of psychosocial and education prevention programs in the short- and medium-term, as about half of the identified studies showed to be ineffective. However, the review suggested that Strengthening Families Program could potentially be an effective intervention over the longer-term for the primary prevention of alcohol misuse. The 2011's review (75) found small but consistent effects of family-based prevention interventions[36], effects that proved to be persistent into the medium- to longer-term.

Effectiveness of a prevention program seems to be influenced by several factors[37], the leader of the program being one of them. Cuijpers (66) compared the peer-led prevention programs to the same programs led by adults in 12 RCTs, and found that those led by peers were to some extent more effective than adult-led programs. Similarly, Gottfredson et al. (69) found that school-based prevention activities have an increased effectiveness if they are delivered primarily by peer leaders and target middle school aged children. This later meta-analysis was based on 94 RCTs analysing 136 school-based interventions.

The assessment of other universal school-based interventions for substance misuse showed various degree of effectiveness. Based on 15 studies, Porath-Waller et al. (67) showed positive effects of these type of interventions on reducing the cannabis use among adolescents when compared to alternative or no-program controls. Programs longer than 15 sessions, delivered in an interactive way by individuals other than teachers, and those targeting high schools students produced stronger effects. Teesson et al. (76) analysed 7 school-based prevention programs for alcohol and other drugs, and found that five of them led to reductions in alcohol, cannabis and tobacco use at follow up, although the effect sizes were modest.

Drug Abuse Resistance Education (DARE) is a school-based drug use prevention program extensively use in the United States (63) focusing primarily on teaching students the skills to recognize and resist social pressures to use drugs. Eight DARE evaluations were meta-analysed by Ennett et al. (63). This analysis showed that these programs had substantially smaller effect size means than the interactive prevention programs emphasizing social and general competencies. Brown et al. (62) sought to analyse the prevention effects of school-based drug prevention programs on rural youth populations. Their meta-analysis included 22 RCTs showing some effects following these interventions, such as a small reduction on new use of substances, and a little impact on those already using substances.

Agabio et al. (58) conducted a systematic review that included 12 RCTs and one meta-analysis based on 53 RCTs analysing school-based interventions to prevent and reduce alcohol and other substances use. The authors found mixed results, some studies showing some evidence of effectiveness, some others finding no differences between interventions and control groups.

Targeted approaches were analysed by few authors. Reviewing 25 RCTs, Norberg et al. (70) found that primary prevention interventions can be effective in reducing cannabis use in youth populations, universal multi-modal programs surpassing other program types. When these programs targeted young adolescents between 10 to 13 years of age, used non-teacher or multiple facilitators, were offered for maximum 10 weeks, and used booster sessions in addition to the core program sessions, they were associated with large median effect sizes.

A systematic review of prevention programs targeting children from substance-affected families revealed the effectiveness of these interventions when they are offered for more than ten weeks and involved children's, parenting and family skills training components (53). Finally, looking at mentoring[38] in preventing / reducing adolescents' alcohol and drug use, Thomas found a small number of RCTs showing evidence that mentoring could reduce the rate of initiation - 3 RCTs (77) and alcohol and drug use - 4 RCTs (71).

Treatments
1. Nonpharmacological Interventions
Two meta-analysis (78, 79) and one systematic review (80) of medium quality, analysing nonpharmacological interventions for alcohol and drug use, were identified. Austin and collaborators (80) looked specifically at family-based interventions addressing adolescents' substance use problems. The analysis of the 5 included RCTs found that Multidimensional Family Therapy (MDFT) and Brief Strategic Family Therapy seemed to be efficacious treatments when compared to control interventions, with MDFT presenting clinically significant changes in substance use and large effect sizes at post treatment, and 6 and 12 months follow-up.

Motivational interviewing (MI) combines aspects of client-centered therapy with cognitive-behavioural strategies in order to elicit behavioural change (78). Twenty-one studies (including 3 RCTs) meta-analysing MI interventions for adolescents' substance use support the effectiveness of these interventions, as showed by small but significant post treatment and follow-up effect sizes. Finally, Tripodi et al. (79) meta-analysed a variety of individual and family-based interventions to reduce alcohol use, such as motivational interviewing, cognitive behaviour therapy,

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36 - Family-based prevention programs analysed in Foxcroft's 2011 review refer to interventions designed to support the development of parental skills including, among others, parental support, nurturing behaviours, establishing clear boundaries or rules, parental monitoring, social and peer resistance skills.

37 - According to Cuijpers (2002) other factors such as content of the programs, the number of sessions, the use of booster sessions, the age group, would also influence the effectiveness of the prevention programs.

38 - Mentoring refers to a 'supportive relationship in which one person offers support, guidance and concrete assistance to the partner, based on the sharing of experience and expertise without expectation of personal gain by the mentor' (definition of the Center for Substance Abuse Prevention 2000, Thomas 2011).

behaviour therapy, multisystemic family therapy. The analysis showed that these interventions significantly reduced adolescent alcohol use, individual treatments showing larger effects than family-based interventions. These results were based on 16 RCTs.

2. Pharmacological Interventions
Our search identified one systematic review of medium quality analysing naltrexone, an opioid receptor antagonist that reduces heavy drinking by diminishing the rewarding neuro-biological effect of alcohol (81). The review is based on 29 RCTs examining this medication for alcohol dependence treatment of young adults and adults of 18 years or more. According to this analysis, 70% of trials measuring 'heavy or excessive drinking', and 36% of those measuring abstinence or 'any drinking' showed an advantage of naltrexone use compared to placebo. The side effects associated with the use of naltrexone are low (< 15%), and consist mainly of nausea and vomiting. Less common side effects such as headache, low energy, anxiety, depression, rashes, and decrease alertness have also been reported.

Examples Of Best Practices In Quebec
Personality-Targeted Interventions for Adolescent Substance Misuse or **PreVenture Programme**[39] is a school-based program designed to prevent alcohol and drug misuse among 12 to 15-year-old students. This program provides tailored interventions based on screening results for four personality dimensions that have been linked to increased risk for excessive alcohol and drug use: anxiety-sensitivity, hopelessness, impulsivity, and sensation seeking[40].

The programme has as primary objective to teach young people to differentiate between adaptive and maladaptive coping strategies for their risk profile, and cognitive and behavioural strategies relevant to their personality profile. The programme is designed to help youth delay the onset of substance use, and secondarily to reduce the risk of developing emotional and behavioural problems, as well as to protect normal cognitive and social developments.

Students scoring one standard deviation above the school mean on any of the four subscales of the Substance Use Risk Profile Scale – SURPS - (82), namely anxiety-sensitivity, hopelessness, impulsivity, and sensation seeking, are invited to participate in two 90-minute group workshops focusing on developing adaptive coping skills for their personality profile. The intervention combines therapeutic strategies and exercises from the motivational interviewing and cognitive behavioural therapy fields.

PreVenture was first implemented in high schools in 2001 in Nova Scotia Province and Vancouver, British Columbia, Canada. To date, approximately 4,000 high-risk youth from ethnically diverse communities in Canada, United Kingdom, Netherlands, Czech Republic and Australia have participated in the intervention

through randomized clinical trials. PreVenture is currently implemented in over 50 high schools across Quebec province.

PreVenture has been evaluated in 4 randomized controlled trials published in peer-reviewed journals, using highly validated screening, treatment fidelity, and outcome measures. The outcome measures of PreVenture include the onset of drinking, the onset of alcohol problems, illicit drug use, the frequency of cannabis use, and mental health outcomes. The programme has been shown to consistently delay onset of alcohol and illicit drug use, onset and progression to heavy and problematic alcohol misuse (83-86) and reduce risks of onset of clinically significant depression, anxiety and conduct problems in high risk youth (87). A current randomized trial in Montreal will evaluate the impact of the programme on adolescent cognitive development[41]. However, some research is needed around the implementation and training model in order to facilitate larger scale-up of this programme.

Research Gaps Recommendations
Screening
Future research on screening should further contribute to a reliable screening method, with an acceptable sensitivity and specificity profile for adolescent that is brief and easily implemented in a variety of youth-oriented settings (60). Furthermore, studies need to establish the efficacy of computer-based screening, which can aid the process of referrals or brief interventions after screening (88). There is an urgent need for studies to examine the benefits of systematic screening for adolescent samples.

Prevention
The literature on prevention stresses the need to explore different settings, age groups, and culture-specific interventions in RCTs in order to increase the generalizability of the results (53, 74). With respect to evidence-based prevention and indicated programmes, more information is needed on intervention components to improve implementation, such as specific and active programme characteristics (70), the impact of computer- and distance-delivered methods relative to face-to-face strategies (65), and teacher-led programmes versus another adult or a peer (63).

Treatment
More rigorous studies on SUD treatments are needed to evaluate the efficacy of pharmacotherapy for adolescent substance misuse, which include longer-term follow-up, and samples of girls and young women. In pharmacotherapy treatment, researchers should look at the effects of medications in patients with comorbid disorders of alcohol and depression, for both short and long term outcomes (81), and for populations with lighter versus heavier substance use profiles. With respect to psychotherapies, more comparative effectiveness studies are needed to establish the degree to which parental involvement is beneficial to the adolescent when receiving individual interventions (80).

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39 - PreVenture programme was developed in Canada by Dr Patricia Conrod and colleagues in 2001.

40 - Intervention Summary – The Preventure programme: Personality-targeted interventions for adolescent substance misuse. (2014) SAMHSA's National Registry of Evidence-Based Programs and Practices. Retrieved September, 2015 from: www.nrepp.samhsa.gov/ViewIntervention.aspx?id=264

41 - www.co-venture.ca

TABLE 10 – KEY FINDINGS - Substance Use Disorder

Screening	No evidence identified
Prevention	• The most effective programs for adolescents involve cognitive-behavioural skill building, such as decision making, peer pressure resistance, goal setting • Psychoeducation without skill building does not change substance use behaviour • Targeted intervention and mentoring programs are effective in substance use prevention in youth populations • Family-based interventions have small but consistent effects, that are persistent at medium and longer-term
Treatment	**Nonpharmacological interventions** • Multidimentional Family Therapy and motivational interviewing are effective in treating substance misuse in adolescents **Pharmacological interventions** • One review showed that naltrexone was more effective than placebo to reduce heavy alcohol drinking

FIGURE 4 – PRISMA Flow Diagram - Substance Use Disorder

Identification

Records identified through database searching
(n = 3934)
PubMed, n = 961
Medline, n = 846
EBM Reviews, n = 72
Embase, n = 1655
PsycINFO, n = 183
CINAHL, n = 217

Records excluded because of format:
i.e. comment, editorials
(n = 377)

Screening

Records after duplicates removed
(n = 2402)

Records excluded
(n = 1979), with reasons:
• did not respond to inclusion criteria (n = 1544)
• target other mental diseases (n = 337)
• not pertinent following abstract analysis
(n = 98)

Records screened
(n = 2025)

Eligibility

Full-text articles assessed for eligibility
(n = 46)

Full-text articles excluded (n = 23), with reasons:
• did not respond to inclusion criteria (n = 5)
• not a systematic review nor a meta-analysis
(n = 10)
• no RCTs included (n = 3)
• no quantitative data (n = 1)
• adult sample (n = 4)

Included

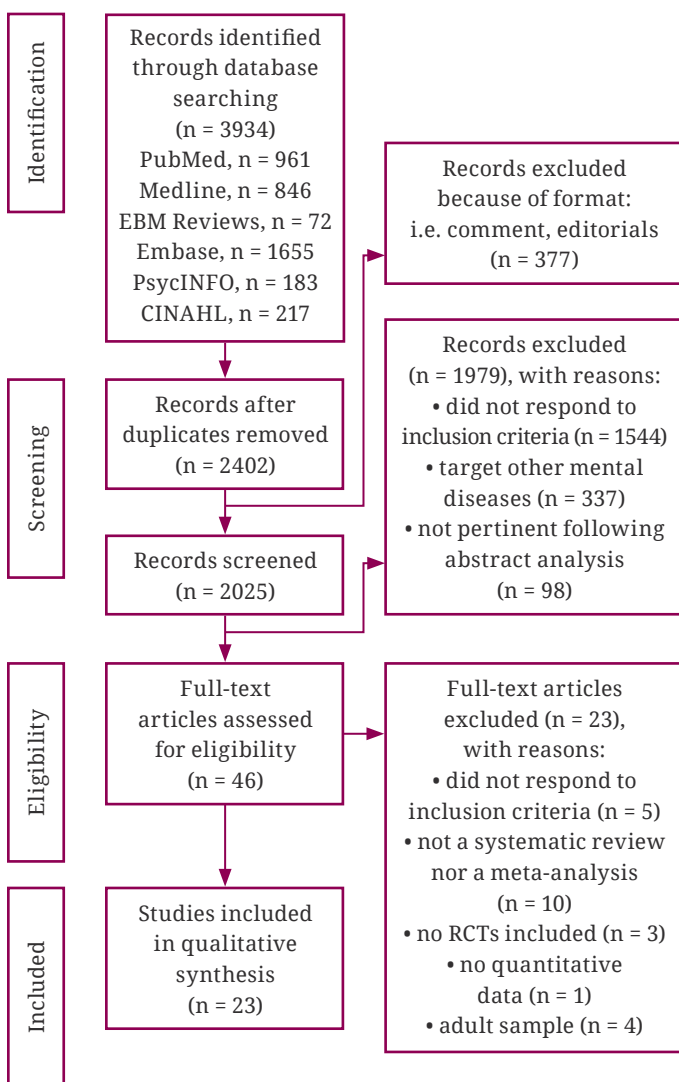Studies included in qualitative synthesis
(n = 23)

TABLE 11 – Summary of Findings - Substance Use Disorder

	Author (year) (reference #) Study type Period Searched	# of Studies (N) / # RCTs # overall individuals (n)	AMSTAR Score	Population / Age	Intervention / Type	Comparator	Outcomes	Main Results
Screening	Fossum et al. (2008) (48) Meta-analysis 1987 - 2008	5/5 n = 2365	High (10)	Adolescents / 12 - 18 years; Young adults / 19 - 24 years; Adults / 25 years and older	Brief interventions (BIs) for reducing nonmedical use of psychoactive substances / Targeted	No / delayed intervention or information only	Substance use, frequency of use, quantity of use, use-related harms or negative consequences of use etc.	BIs versus written information: Abstinence – all substances at 3 months follow-up (N = 2, n = 223): RR = 1.12 (95% CI 0.41 to 3.09) Abstinence – all substances at 12 months follow-up (N = 2, n = 228): RR = 2.05 (95% CI 1.13 to 3.70)
Prevention	Agabio et al. (2015) (58) Systematic review 2010 - 2014	12/12 n = 40930 One meta-analysis of 53 RCTs	Medium (5)	Children and adolescents / 0 - 19 years	School-based interventions to prevent/ reduce alcohol consumption or alcohol and other substance use or change the attitudes, knowledge, harms and intentions to consume alcohol or other substances / Universal	Usual health education; waiting list for prevention program; standard care	Reduction of alcohol and /or other substances use and their related problems; increase of the perception of harms related to alcohol or other substance use	RCTs • 7 studies (58.3%) achieved positive results • 5 studies (41.7%) did not find significant differences or produced mixed pattern results Meta-analysis • 23 RCTs (43.4%) showed some evidence of effectiveness • 30 RCTs (56.6%) did not find significant difference between the groups
	Broning et al. (2012) (53) Systematic review 1995 - 2008	13/7 9 programs: 4 school-based (n = 683) 4 family-based (n = 829) 1 community-based (n = 23)	High (8)	Children and adolescents / 0 - 17 years or families of children of this age	Preventive interventions for children and adolescent from substance-using homes / Targeted	Wait-list	Program-related knowledge, coping-skills, family relations	School based interventions (Effect Size) Knowledge (n = 2): r = 0.54 and r = 0.37 Coping (n = 2): r = 0.24 and r = 0.54 Family-based interventions (Effect Size) Family functioning (n = 3): r = 0.22, r = 0.29 and r = 0.44 Social behavior (n = 2): r = 0.11 and r = 0.44
	Brown et al. (2007) (62) Meta-analysis 1987 - 1995	22/22 n = NR	Low (1)	Children and adoslescents Age NR	Substance abuse / misuse prevention, intensive in-school health promotion / Universal	NR control	342 dichotomous outcomes	Overall mean effect size for all drug use outcomes MES = 0.11 (SE = 0.045, p<0.05)

Prevention	Carey et al. (2009) (64) Meta-analysis 1993 - 2008	35/32 n = 28621	Medium (6)	Adolescents and young adults / 18 - 22 years	Computer-delivered interventions (CDIs) / targeted	Wait-list/no treatment, relevant content time-matched, or not matched, education-only, irrelevant content time-matched	Alcohol consumption; alcohol-related problems	CDIs vs. relevant controls Short-term follow-up (≤ 5 weeks) Quantity: WMD = 0.01 (95% CI -0.14 to 0.16) Frequency of drinking days: WMD = 0.06 (95% CI -0.10 to 0.21) Long-term follow-up (≥ 6 weeks) Quantity: WMD = 0.02 (95% CI -0.18 to 0.22) Frequency of drinking days: WMD = 0.04 (95% CI -0.18 to 0.26) CDIs vs. non-relevant controls (waitlist) Short-term follow-up (≤ 5 weeks) Quantity: WMD = 0.19 (95% CI -0.01 to 0.38) Frequency of drinking days: WMD = 0.22 (95% CI −0.08 to 0.51) Long-term follow-up (≥ 6 weeks) Quantity: WMD = 0.20 (95% CI 0.08 to 0.31) Frequency of drinking days: WMD = 0.28 (95% CI 0.10 to 0.46)
	Carey et al. (2012) (65) Meta-analysis 1998 - 2011	26/25 n = 32243	Medium (5)	Young adults / Mean 19 - 22 years	Computer-delivered interventions / Universal	Assessment-only; wait-list; no-treatment	Alcohol consumption; alcohol-related problems	Computer-delivered interventions Short-term follow-up (≤13 weeks): Quantity per week/month (k = 28): d+ = 0.14 (95% CI 0.03 to 0.24) Intermediate follow-up (14 - 26 weeks): Quantity per week/month (k = 8): d+ = 0.13 (95% CI -0.01 to 0.27) Long-term follow-up (≥ 27 weeks): Quantity per week/month (k = 5): d+ = 0.08 (95% CI -0.09 to 0.26)
		22/22 n = 5237			Face-to-face interventions / Universal			Face-to-face interventions Short-term follow-up (≤13 weeks): Quantity per week/month (k = 21): d+ = 0.19 (95% CI 0.11 to 0.27) Intermediate follow-up (14 - 26 weeks): Quantity per week/month (k = 11): d+ = 0.15 (95% CI -0.01 to 0.30) Long-term follow-up (≥ 27 weeks) Quantity per week/month (k = 11): d+= 0.08 (95% CI -0.02 to 0.19)
	Cuijpers (2002) (66) Meta-analysis 1983 - 1995	12/12 n = 5250	Medium (7)	Adolescents / Age NR	Peer-led school-based drug prevention program / Universal	Adult-led school-based drug prevention program	Pre-test, post-test substance use (tobacco, alcohol, marijuana)	All Substances Post-test: SMD = 0.24 (95% CI 0.06 to 0.41) 1 year follow up: SMD = 0.16 (95% CI -0.06 to 0.37) 2 year follow up: SMD = 0.08 (95% CI -0.05 to 0.21)

Prevention	Ennett et al. (1994) (63) Systematic review 1986 - 1993	8/2 n = 9317	Low (2)	Adolescents / Age NR	Drug Abuse resistance Education (DARE) – school-based drug prevention program / Universal	Control schools with no DARE classes	Knowledge about drugs, attitudes about drug use, social skills, self-esteem, attitude toward police and drug use	(95% CI NR) Knowledge about drugs: mean ES = 0.42 Social skills: mean ES = 0.19 Attitude toward police: mean ES = 0.13 Attitude about drug use: mean ES = 0.11 Self-esteem: mean ES = 0.06 Drug behaviour: mean ES = 0.06
	Faggiano et al. (2008) (72) Systematic review 1963 - 2004	29/29 n = 12119	High (9)	Adolescents 6th and 7th grade students (in 18 studies)	School-based interventions: skills-based, affective-based and knowledge-based interventions / Universal	Usual curricula	Drug knowledge, drug attitudes, acquirement of personal skills, peers/ adults drug use, intention to use drugs, use of drugs	Skills-based interventions (N = 11, n = 11718) Drug knowledge: WMD = 2.60 (95% CI 1.17 to 4.03) Decision making skills: SMD = 0.78 (95% CI 0.46 to 1.09) Drug use: RR = 0.81 (95% CI 0.64 to 1.02) Marijuana use: RR = 0.82 (95% CI 0.73 to 0.92) Hard drugs use: RR = 0.45 (95% CI 0.24 to 0.85) Affective-based interventions (N = 4, n = 126) Drug knowledge: SMD = 1.88 (95% CI 1.27 to 2.50) Decision making skills: SMD = 1.35 (95% CI 0.79 to 1.91) Knowledge-based interventions (N = 5, n = 275) Drug knowledge: SMD = 0.91 (95% CI 0.42 to 1.39) Decision making skills: SMD = −0.06 (95% CI −0.60 to 0.47)
	Faggiano et al. (2014) (73) Systematic review 1966 - 2013	51/51 n = 127146	High (10)	Adolescents / 6th and 7th grade students (most studies)	School-based social competence approach, social influence approach, combined approach / Universal	Usual curricula or no intervention	Primary outcomes: use of drugs - marijuana, hard drugs (heroin, cocaine, crack), other drugs, any drug	Social Competence Marijuana use < 12 months (N = 4, n = 9456): RR = 0.90 (95% CI 0.81 to 1.01) Marijuana use ≥ 12 months (N = 1, n = 2678): RR = 0.86 (95% CI 0.74 to 1.00) Hard Drug use < 12 months (N = 1, n = 2090): RR = 0.69 (95% CI 0.4 to 1.18) Hard Drug use > 12 months (N = 1, n = 1075): MD = -0.01 (95% CI -0.06 to 0.04) Any drug use < 12 months (N = 2, n = 2512): RR = 0.27 (95% CI 0.14 to 0.51) Social Influence Marijuana use < 12 months (N = 3, n = 10716): RR = 0.88 (95% CI 0.72 to 1.07) Marijuana use ≥ 12 months (N = 1, n = 5862): RR = 0.95 (95% CI 0.81 to 1.13) Combined Programs Marijuana use < 12 months (N = 3, n = 8701): RR = 0.79 (95% CI 0.59 to 1.05) Marijuana use ≥ 12 months (N = 6, n = 26850): RR = 0.83 (95% CI 0.69 to 0.99) Hard Drug use < 12 months (N = 1, n = 693): RR = 0.85 (95% CI 0.63 to 1.14) Hard Drug Use ≥ 12 months (N = 2, n = 1066): RR = 0.86 (95% CI 0.39 to 1.90) Any drug use < 12 months (N = 1, n = 6362): RR = 0.76 (95% CI 0.64 to 0.89)

Prevention	Foxcroft et al. (2002) (74) Systematic review 1983 - 2000	56/41 n = 67951	High (9)	Children, adolescents and young adults / Age up to 25 years	Psychosocial or educational primary interventions to prevent onset of alcohol use or alcohol misuse / Universal	Placebo, information only, no intervention etc.	Alcohol use, age of initiation, drinking 5+ drinks on any one occasion, drunkenness, alcohol related violence etc.	Strengthening Families Program (N = 1) Long-term: NNT = 9 over 4 years for three alcohol initiation behaviours (alcohol use, alcohol use without permission and first drunkenness) Culturally focused skills training (N = 1) Long-term: NNT = 17 over three-and-a-half years for 4+ drinks in the last week
	Foxcroft et al. (2011) (75) Systematic review 2002 - 2010	12/12 n = > 5000	High (11)	Children and adolescents / Age up to 18 years	Family-based prevention programs in preventing alcohol misuse / Universal	Any alternative prevention program or no program	Any direct self-reported or objective measures of alcohol consumption, alcohol use, drinking 5+ drinks at any one occasion, incidence of drunkenness	Statistically significant effects in 9 of the 12 included studies across a range of outcomes measures for the prevention of alcohol misuse in young people, at short and long-term
	Gottfredson et al. (2003) (69) Meta-analysis NR	94/94 n = NR	High (8)	Children and adolescents / Age up to 18 years	School-based substance abuse prevention programs / Universal	No treatment or minimal treatment condition	Alcohol and other drug use	Late elementary school (k = 40) Mean ES = 0.05 (95% CI 0.00 to 0.10) Middle / junior school (k = 67) Mean ES = 0.09 (95% CI 0.05 to 0.14) Senior (k = 14) Mean ES = 0.04 (95% CI 0.05 to 0.14)
	Norberg et al. (2013) (70) Systematic review 1987 - 2011	25/25 n = 42612	Medium (7)	Children and adolescents / Age up to 18 years	Primary prevention programs for cannabis use / Universal and targeted	No treatment, treatment as usual, delayed intervention, minimal contact control	Frequency of cannabis use	Universal programs (N = 9): d = 0.08 to 5.26, Mdn = 0.36 Universal uni-modal (N = 4): d = 0.09 to 0.22, Mdn = 0.13 Universal multi-modal (N = 5): d = 0.08 to 5.26, Mdn = 0.90 Targeted programs (N = 6): d = 0.07 to 0.74, Mdn = 0.20 Targeted multi-modal (N = 5): d = 0.14 to 0.74, Mdn = 0.20
	Porath-Waller et al. (2010) (67) Meta-analysis 1999 - 2007	15/NR n = 15571	Medium (5)	Children and adolescents / 12 - 19 years	School-based program to prevent cannabis use / Universal	Alternative program or no program	Self-reported cannabis use	School Based programs: d = 0.58 (95% CI 0.55 to 0.62) Program ≥ 15 sessions (N = 8): d = 1.40 (95% CI 1.33 to 1.47) Program < 15 sessions (N = 7): d = 0.10 (95% CI 0.06 to 0.14) Delivered by other than teacher (N = 5): d = 0.74 (95% CI 0.61 to 0.87) Delivered by teacher (N = 10): d = 0.57 (95% CI 054 to 0.61) Interactive programs (N = 10): d = 0.57 (95% CI 0.54 to 0.61) Didactic programs (N = 4): d = 0.02 (95% CI -0.15 to 0.19) Younger, < 14 years old (N = 6): d = 0.17 (95% CI 0.13 to 0.21) Older, ≥ 14 years old (N = 8): d = 0.39 (95% CI 0.30 to 0.49)

Prevention	Scott-Sheldon et al. (2012) (68) Meta-analysis NR	41/41 n = 24294	Medium (6)	Adolescents / first year college students, average age 19 years	Group-level interventions to reduce alcohol use / Universal	Active comparison or assessment only	Alcohol consumption: quantity consumed over a period of time, during specific intervals, frequency of drinking days, frequency of heavy drinking	Alcohol Consumption Quantity, per week/month: Fixed d+ = 0.12 (95% CI 0.08 to 0.16) Random d+ = 0.13 (95% CI 0.07 to 0.19) Quantity, specific intervals/ drinking day: Fixed d+ = 0.11 (95% CI 0.07 to 0.16) Random d+ = 0.14 (95% CI 0.07 to 0.21) Frequency of drinking days: Fixed d+ = 0.07 (95% CI 0.03 to 0.12) Random d+ = 0.07 (95% CI 0.02 to 0.13) Alcohol-related problems: Fixed d+ = 0.07 (95% CI 0.03 to 0.10) Random d+ = 0.06 (95% CI -0.03 to 0.15)
	Teesson et al. (2012) (76) Systematic review 1995 - 2010	8/7 n = NR	High (9)	Children and adolescents / 13 - 14 years	School-based prevention programs for alcohol and other drugs (i.e. cannabis and tobacco) / Universal	NR	Knowledge, use of alcohol or drugs, frequency of alcohol/ drug use at post-test or follow-up	Effect sizes range: 0.16 to 0.34 Odds ratios range: 0.83 to 1.02
	Thomas et al. (2011) (77) Systematic review 1998 - 2005	4/4 n = 1194	High (10)	Adolescents / 13 - 18 years	Mentoring programs to prevent alcohol / drug use / Universal	Standard health education curriculum, individual counselling or support group	Abstinence, use of alcohol or drugs, reduction in consumption, not progressing in use of drugs / alcohol, not being involved in alcohol or drug-related aggression or accidents	Monitoring vs. no intervention (N = 2) RR = 0.71 (95% CI 0.57 to 0.90)
	Thomas et al. (2013) (71) Systematic review 1999 - 2012	6/6 n = 2423	Medium (7)	Children / 6 - 12 years; Adolescents / 13 - 18 years	Mentoring programs to prevent alcohol or drug use / Targeted	Control or another intervention	Abstinence, number of individuals using alcohol or drugs at least once monthly, reduction in alcohol or drug consumption	Alcohol use (N = 2, n = 2266): OR = 0.72 (95% CI 0.58 to 0.90) Drug use (N = 2, n = 157): OR = 0.64 (95% CI 0.04 to 9.97)

Treatment							
NONPHARMACOLOGICAL INTERVENTIONS							
Austin et al. (2005) (80) Systematic review 1994 - 2004	5/5 n = 545	Medium (4)	Adolescents / 12 - 18 years	Family-based interventions for adolescents substance use problems: Brief Strategic Family Therapy, Family Behaviour Therapy, Functional Family Therapy, Multidimensional Family Therapy, Multisystemic Treatment	Group treatment control, supportive counseling, cognitive behavioural therapy, Functional Family Therapy, Multifamily Educational Intervention etc.	Decreased drug and alcohol use, decreased behaviour problems, improved family functioning, improved school attendance, parent satisfaction etc.	Brief Strategic Family Therapy (n = 126): Post treatment alcohol: ES = 0.21 Post treatment drug: ES = 0.25 Family Behaviour Therapy (n = 29): Post treatment alcohol: ES = 0.30 Post treatment drug: ES = 0.84 Functional Family Therapy (n = 120): Post treatment marijuana: ES = 1.00 3 months follow-up marijuana: ES = 0.41 Multidimensional Family therapy (n = 152): Post treatment AOD: ES = 1.46 6 months follow-up AOD: ES = 1.28 12 months follow-up AOD: ES = 1.66 Multisystemic Treatment (118): Post treatment alcohol and marijuana: ES = 0.38 6 months follow-up alcohol and marijuana: ES = 0.34 Post treatment other drugs: ES = 0.22 6 months follow-up other drugs: ES = 0.19
Jensen et al. (2011) (78) Meta-analysis 1998 - 2008	21/3 n = 5471	Medium (5)	Adolescents and young adults / 12 - 23 years	Motivational interviewing interventions / Universal	NR	Marijuana use, alcohol use, tobacco use, street drugs use and multiple restricted substances	Post-treatment (N = 21): d = 0.16 (95% CI 0.08 to 0.25) < 6 months follow-up (N = 4): d = 0.32 (95% CI 0.04 to 0.61) > 6 months follow-up (N = 7): d = 0.13 (95% CI 0.02 to 0.24)
Tripodi et al. (2010) (79) Meta-analysis 1960 - 2008	16/16 n = NR	Medium (6)	Adolescents / 12 - 19 years	Interventions to reduce alcohol use: behavioural therapy, cognitive-behavioural therapy, motivational interviewing, multisystemic family therapy	Control group, wait-list control, contrasting treatment group	Abstinence, frequency of alcohol use, quantity of alcohol use	Overall: g = −0.61 (95% CI −0.83 to −0.39) < 6 months follow-up: g = −0.66 (95% CI −0.94 to −0.37) > 6 months follow-up: g = −0.49 (95% CI −0.67 to −0.32) Individual based Interventions: g = −0.75 (95% CI −1.05 to −0.40) Family based Interventions: g = −0.46 (95% CI −0.66 to −0.26)
PHARMACOLOGICAL INTERVENTIONS							
Pettinati et al. (2006) (81) Systematic review 1990 - 2006	29/29 n = 5997	Medium (5)	Young adults and adults / ≥ 18 years	Naltrexone (opioid receptor antagonist)	Placebo	Two outcomes related to 'any drinking' and two related to 'excessive or heavy drinking'	19 (70%) of 27 clinical trials that measured reductions in 'heavy or excessive drinking' demonstrated an advantage for prescribing naltrexone over placebo. 9 (36%) of 25 clinical trials that measured abstinence or 'any drinking' found an advantage for medication over placebo.

AMSTAR = a measurement tool to assess the quality of systematic reviews

AOD = alcohol and other drug use

CI = confidence intervals

d, d+ = weighted mean effect size

ES = effect size

g = Hedges g effect size*

k = number of interventions

MD = mean difference

Mdn = median

MES = mean effect size

N = Number of studies

n = number of participants

NNT = Numbers needed to treat

NR = not reported

r = correlation coefficient

RCT = Randomised Control trial

RR = risk ratio

SE = standard error

SMD = Standardized mean difference

WMD = weighted mean difference

* Hedges adjusted g effect sizes were used in order to correct for sample size bias (Tripodi 2010)

Suicide / Suicide Attempt

Introduction

Although significant effort has been made worldwide to better understand and prevent suicide, it remains a major public health concern[42], and is among the most significant causes of death internationally according to the World Health Organization. In fact, suicide is the second leading cause of death for people aged 15 to 29 years worldwide (89). Similarly to international trends, in Canada, suicide is the second leading cause of death for individuals aged 10 to 34 years[43]. Importantly, in Canada, suicide accounted for 10% of deaths in youths aged 10 to 14 years, and for 23% of deaths in adolescents aged 15 to 19 years over the last 30 years (90). In Quebec, in 2008, the suicide rates in adolescents of 15 to 19 years were at 11.4 and 4.9 per 100,000, for boys and girls respectively (91). Suicide among these young age groups, and among all age groups in general can thus have significant impact upon many families and communities.

According to recent U.S. data, 12.1% of adolescents experienced serious suicidal ideation and 4.1% have attempted suicide before reaching adulthood (92). Similarly, in Quebec, 5.9% of 15 years old adolescents seriously considered suicide, while 2.8% have made an attempt in the past year (93). Importantly, adolescents who have attempted suicide or who self-injured are at high risk of suicide mortality (94, 95) and of psychological and social adjustment problems in adulthood (96), indicating that efforts need to be made on preventing the onset of, and the suicide behaviors in adolescence, and treating them effectively if they occur.

Literature Review

The literature search yielded 5 reviews on prevention and treatment of Suicide / Suicide Attempts (SSA) (figure 5). Details are provided in table 13 at the end of the section.

Screening

No published review on screening for SSA was identified by the comprehensive literature search.

Prevention

Prevention interventions refer to measures to reduce the likelihood of suicide and other suicide-related behaviours. As shown in previous sections, they can be universal, targeted and indicated, depending on the suicide risk level of individuals or populations (97).

The research strategy employed for this project did not yield any review on universal school-based interventions. However, a recent systematic review of reviews on youth suicide prevention plan for Canada (1) synthesized knowledge on school- and non-school-based interventions for youth suicide prevention. This review was based on systematic reviews and meta-analysis of various studies, majority being RCTs and controlled cohort studies. As opposed to our review, Bennett et al. (1) identified 10 school-based suicide prevention reviews, 7 of which were of high quality and were included in their analysis. These 7 reviews examined 26 universal and 5 targeted programs and reported no decrease in suicide death rates, but reduced suicide attempts, suicidal ideation, and proxy measures of suicide risk.

42 - Mental Health Commission of Canada, 2014: www.mentalhealthcommission.ca
43 - Public Health Agency of Canada, 2012: www.phac-aspc.gc.ca

Targeted Prevention and Treatments

Treatment refers to those interventions targeting individuals currently suffering from a disorder, and are intended to cure a mental disorder or reduce the symptoms or effects of the disorder (97). Our present search identified four reviews analysing non-school-based interventions relevant to children and adolescents who have attempted suicide at least once. Two of them are systematic reviews of medium quality focusing on psychosocial interventions to prevent suicide in youth populations (98, 99). The other two are meta-analysis, one of medium quality assessing whether CBTs would reduce suicide behaviour (100), and one of high quality reporting the efficacy of specific therapeutic interventions in reducing suicidal and nonsuicidal self-harm in children and adolescents presenting self-harm problems (101). In addition, one high quality systematic review assessing the efficacy and safety of suicide risk treatment following screening in primary care was identified (102).

The meta-analysis of 19 RCTs conducted by Ougrin et al. (101) showed the value of psychological interventions in reducing the self-harm in adolescents receiving them, as compared to controls. The dialectical behaviour, cognitive behavioural and mentalization-based therapies had the largest effect sizes. Systematically reviewing 17 studies, Corcoran et al. (98) also found that psychological interventions seemed to slightly decrease the suicidal and self-harm events in adolescents at post-test, but not at 6 - 7 months follow-up. Furthermore, suicidal ideation was found to be slightly lower in the intervention group than in controls both at post-test and at follow-up. The authors found a homogeneity in the characteristics of the included studies regarding their contribution to the effect size.

The 28 studies of adolescent and adult populations meta-analysed by Tarrier et al. (100) revealed that CBT was effective in reducing suicide behaviours in adults, but not in adolescents. From the 21 RCTs analysed, Robinson et al. (99) found a single study showing significant fewer self-harm incidents in adolescents receiving individual CBT compared to those on usual treatment. The rest of studies found no differences between the other interventions examined and the control groups. Although CBT showed some promise, the authors suggested further investigations in order to establish the ability of these type if interventions to reduce suicide risks among young people.

The review by O'Connor et al. (102) included studies mainly on adult or mixed-age populations, with 13 of them specifically addressing adolescents. The authors found that psychotherapy did not lead to a reduction of suicide attempts in adolescents, and did not have beneficial effects on suicidal ideation apart from usual care. As opposed to adolescents, this intervention reduced suicide attempts in high-risk adults.

Bennett's et al. (1) review mentioned above also included 14 high quality reviews - out of 23 identified - relevant to youth with at least one suicide attempt. Four of the five reviews identified for our project (98-101) are actually among the 14 analysed by Bennett. The analysis of these reviews made the authors conclude that emergency department transition programs may reduce suicide deaths, hospitalization, and treatment nonadherence, and that

training primary care providers in depression treatment may decrease repeated attempts. They also found that antidepressants may increase short-term suicide risk in some patients, increase counterbalanced by the overall population-based reductions in suicide associated with this treatment. Regarding the psychological interventions the authors concluded that prevention using this type of interventions requires further research (1).

Examples Of Best Practices In Quebec

A recent promising initiative in Europe – the SELYE program (Saving and Empowering Young lives in Europe) - aimed to investigate the efficacy of school-based preventive interventions of suicidal behaviours (103). This multisite cluster-randomised controlled trial involving more than 11,000 adolescents showed that Youth Aware of Mental Health Programme (YAM), a mental health literacy program, was associated with a significant reduction of incident suicide attempts and severe suicidal ideation. However, the other arms of the trial, namely teachers as gatekeepers and high risk youth screening by school professionals, did not show efficacy in reducing suicide attempts.

Partners for Life is a program developed in Quebec province that includes the YAM component of SELYE's program (i.e. awareness). It is an outreach intervention delivered in classrooms, aiming to raise awareness in students 14 years and older, parents and school staff about signs and symptoms of depression, recognizing it as an illness that can lead to academic failure and even suicide. At the same time it provides pertinent identification tools to assist others in distress and to help them find appropriate counselling resources. The team in charge of offering this all-inclusive, easily available and free of charge program in schools is formed by two coordinators, one manager and ten well trained facilitators. Each presentation has a sensitive and non-judgemental content, lasts 50 to 75 minutes, and is divided in three parts depending on the audience.

Since its establishment in 1997 by La fondation des maladies mentales[44], Partners for Life program was offered to around 50,000 adolescents and adults each year. Until now, it has reached approximately one million adolescents, more than 10,000 parents and 30,000 school staff in 762 schools across Quebec and two other Canadian provinces, New Brunswick and Ontario. The exposure of Quebec's adolescents to this suicide prevention program was associated with a decrease of about 50% of suicides between 1997 and 2012, and by nearly 20% in those aged 20 to 34 years old (91).

Although no peer reviewed publications on Partners for Life program are yet available, two studies[45] were conducted around the year 2000 and then reported by Lesage and Moubarac in 2011. One of them showed a high rate of student appreciation of the relevance of the program information, and of the manner in which the content was presented. The other study found that, following this program, the knowledge about depression among the youth had significantly increased and positively switched their attitude about resources consultation. Furthermore, the Réseau québécois de recherche sur le suicide (RQRS) considers that the program

encounters all the criteria of a good health promotion program (104), and underlined the importance of such an approach in the Quebec health network[46].

In terms of treatment, another best practice in suicide prevention in Quebec includes the Dialectical Behaviour Therapy Multi-Family Skills Training Group (DBT-MFSTG) adapted for adolescents aged 14 years and up and their families that takes place at the Douglas Mental Health University Institute for almost 15 years. This program, based on Linehan (105) and Miller et al. (106), includes 3 phases: (1) individual or family sessions for alliance-building; (2) individual and multi-family group sessions for 20 weeks based on a manualised approach (107); (3) individual consolidation follow-up and family sessions for 6 months. Although not formally tested in Quebec population, the DBT-MFSTG has been implemented in tertiary outpatient child psychiatry, and has treated suicidal ideation, suicide attempts and self-harming behaviours in hundreds of adolescents.

Research Gaps Recommendations

Currently there is a lack of randomised controlled trial studies in children and adolescents in terms of suicide screening, and a need for more precise trials testing the relative value of mental health literacy, gatekeepers or evaluations of youth at risk by professionals' prevention programs. Therefore, well designed pragmatic randomised trials need to be conducted in order to address these issues. Regarding the treatment, the best evidence resides on dialectical behaviour, cognitive behavioural and mentalization-based therapies, with family involvement. In Quebec province, the DBT-MFSTG program offers some promise, although has not been yet tested. Medication has also shown some promise, as treatment of depression, a clear risk factor for suicide, but there are potential deleterious effects on suicidal ideation and suicide attempts in adolescence that need to be better understood from a public health perspective (108).

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44 - These studies were conducted by Dr Richard Boyer, a researcher affiliated with the Fernand-Seguin research centre, Montreal.

45 - www.fondationdesmaladiesmentales.org

46 - Lesage, A. and Moubarac, J-C. (2011) Partners for life, an effective mental health literacy program: analysis and recommendations. In Quebec Suicide Research Network (RQRS) (Ed.). Montreal: Réseau Québécois de recherché sur le suicide. http://reseausuicide.qc.ca/documents/Partners_for_Life-an_effective_mental_health_literacy_program.pdf

TABLE 12 – KEY FINDINGS - Suicide / Suicide Attempts

Screening	No evidence identified
Prevention	No evidence on school-based interventions identified by our search strategy However, Bennett's more comprehensive review of reviews (1) supports universal school-based interventions, while recent study (103) points towards mental health literacy as being a key ingredient in reducing the number of suicide attempts and severe suicidal ideation in school adolescents
Treatment	Limited evidence show that psychological interventions may decrease suicidal behaviours in adolescents with previous suicide attempts

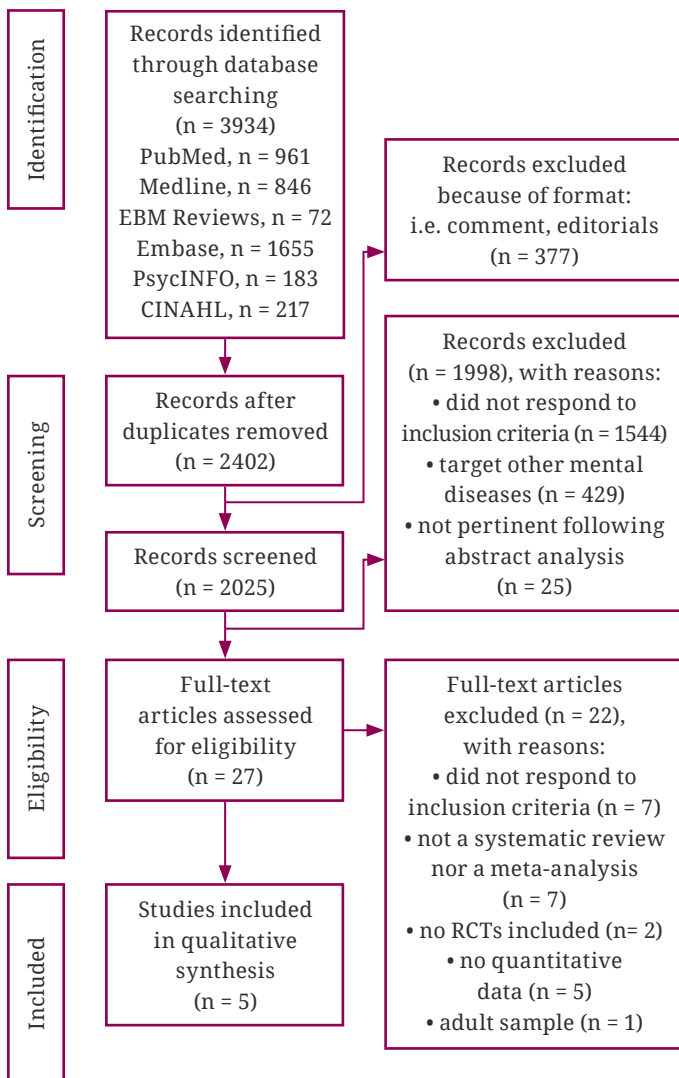**FIGURE 5** – PRISMA Flow Diagram - Suicide / Suicide Attempts

Identification

Records identified through database searching
(n = 3934)
PubMed, n = 961
Medline, n = 846
EBM Reviews, n = 72
Embase, n = 1655
PsycINFO, n = 183
CINAHL, n = 217

Records excluded because of format:
i.e. comment, editorials
(n = 377)

Screening

Records after duplicates removed
(n = 2402)

Records excluded
(n = 1998), with reasons:
• did not respond to inclusion criteria (n = 1544)
• target other mental diseases (n = 429)
• not pertinent following abstract analysis
(n = 25)

Records screened
(n = 2025)

Eligibility

Full-text articles assessed for eligibility
(n = 27)

Full-text articles excluded (n = 22), with reasons:
• did not respond to inclusion criteria (n = 7)
• not a systematic review nor a meta-analysis
(n = 7)
• no RCTs included (n= 2)
• no quantitative data (n = 5)
• adult sample (n = 1)

Included

Studies included in qualitative synthesis
(n = 5)

TABLE 13 – Summary of Findings - Suicide / Suicide Attempts

	Author (year) (reference #) Study type Period Searched	# of Studies (N) / # RCTs # overall individuals (n)	AMSTAR Score	Population / Age	Intervention / Type	Comparator	Outcomes	Main Results
Treatment	Corcoran et al. (2011) (98) Systematic review NR - 2010	17/10 n = various (see main results)	Medium (7)	Children and adolescents / 10 - 18 years	Psychosocial interventions with participants identified as suicidal	NR	Self-report, standardized measures of suicidality, self-harm and suicidal events, including attempts	Suicide and self-harm Posttest (N = 6, n = 1200) Total OR (fixed effects): 1.49 (95% CI 1.001 to 2.22) Total OR (random effects): 1.51 (95% CI 1.008 to 2.274) 6 - 7 months follow-up (N = 5, n = 252) Total OR (fixed effects): 0.68 (95% CI 0.38 to.1.22) Total OR (random effects): 0.59 (95% CI 0.14 to 2.44) Suicidal ideation Posttest (N = 9, n = 685) Total Cohen's d (fixed effects): -0.25 (95% CI -0.41 to 0.10) Total Cohen's d (random effects): -0.27 (95% CI -0.50 to 0.05)
	O'Connor et al. (2013) (102) Systematic review 2002 - 2012	13/13 n = various (see main results)	High (8)	Adolescents / NR	Psychotherapy	Usual care	Suicide attempts, suicide ideation	Suicide attempts (N = 9, n = 1331): RR = 0.99 (95% ci 0.75 to 1.31) Suicide ideation (N = 6, n = 629): SMD = -0.22 (95% CI -0.46 to 0.02)
	Ougrin et al. (2015) (101) Meta-analysis NR - 2014	19/19 n = 2176	High (10)	Children and adolescents / 0 - 18 years	Therapeutic interventions (TIs): psychological and social interventions (dialectical behaviour, cognitive-behavioural and mentalization-based therapies)	Treatment as usual or placebo	Self-harm, including suicide attempts, non-suicidal self-injury, and/or self-harm with undetermined intent	Self-harm TIs versus TAU: Pooled RD = -0.07 (95% CI -0.01 to -0.13); NNT = 14 (95% CI 7.7 to 100) Risk of self-harm: TIs arm: 28.3% TAU arm: 33.2% Absolute risk reduction: 4.99% (95% CI 1.01% to 8.97%); NNT = 21 (95% CI 11.2 to 98.5) over an average of 10 months
	Robinson et al. (2011) (99) Systematic review 1980 - 2010	21/21 (of which 6 ongoing studies) n = 1853	Medium (7)	Children and adolescents / 12 - 25 years	Individual psychological therapy Group psychological therapy	Treatment as usual, routine care etc.	Suicide behaviours: suicide, risk of suicidal ideation, deliberate self-harm	Individual CBT versus TAU (N = 1, n = 77) Number of self-harm incidents at 9 months follow-up: MD = -3.4 (95% CI -6.54 to -0.26) Group psychological therapy versus TAU Suicidal ideation: Post intervention (N = 2, n = 374): SMD = -0.03 (95% CI -0.26 to 0.21) 6 - 7 months follow-up (N = 3, n = 437): SMD = -0.08 (95% CI -0.32 to 0.17) 12 months follow-up (N = 2, n = 374): SMD = -0.09 (95% CI -0.43 to 0.25)
	Tarrier et al. (2008) (100) Meta-analysis 1980 - NR	28/NR n = 3461	Medium (7)	Adolescents (N = 7) Adults (N = 21) / NR	Cognitive-behavioural therapy (CBT) or therapies that include CBT components	TAU, no treatment, wait list, other form of treatment	Self-harm, suicide behaviour	Adults versus adolescents (0-3 months after treatment completion) Adolescent sample ES (N = NR): Combined Hedge's g = -0.26 (95% CI -0.63 to 0.12), p = 0.175 Adults sample ES (N = 18): Combined Hedge's g = -0.77 (95% CI -1.05 to -0.50), p<0.0001

SSA = Suicide / Suicide Attempt

AMSTAR = a measurement tool to assess the quality of systematic reviews

CBT = Cognitive-behavioural therapy

ES = effect size

MD = mean difference

N = number of studies

n = number of participants

NNT = number needed to treat

NR = not reported

OR = odds ratio

RCT = Randomised Control Trial

RD = risk difference

RR = risk ratio

SMD = Standardized mean difference

TAU = treatment as usual.

LIMITS

Given the amplitude of the project and the limited time allowed to its completion the present review of reviews has several limits. Being based on systematic reviews and meta-analysis, this work relies on the interpretation and reporting of primary studies carried out by the individual reviews included. In addition, the level of proof of an individual review was set to at least two randomised controlled trial. However, this level was considered appropriate in order to persuade managers of public care programs to implement or pursue implementation of these interventions in a systematic manner. This allows to point out the interventions that clearly dominate, and should have priority over interventions not supported by this level of evidence.

The literature search for this review was conducted using a general research strategy for all the five mental disorders studied. Therefore, we are less confident that all the pertinent reviews for each of the five disorders were identified. Indeed, we were surprised to find out that our research strategy failed to identify the universal and targeted suicide prevention strategies summarised by the recent review of Bennett et al. (1). Luckily, this review was available to us at the beginning of the project, serving actually as a model for our own review. Despite this limitation of the research strategy, the findings are in concordance with recommendations of distinguished HTA agencies, such as the National Institute for Health and Care Excellence (NICE) for anxio-depressive disorders or Center for Disease Control and American Pediatric Association for attention deficit hyperactivity disorders, and were endorsed by the researchers involved in the project, such as the international recognized researcher in the substance use disorders, Dr Patrica Conrod, or the Quebec's clinical leader in case of oppositional defiant disorder, Dr Leila Ben Amor.

The time constraints did not allow us to validate the findings and final recommendations of this review with a larger group of national and international researchers. The recommendations were developed by a group of researchers of different backgrounds, not necessarily mental health specialists. However, the recommendations were presented to a panel formed by family and patients' representatives, the mental health and primary care directorates of MSSS, and by representatives of the Graham Boeckh foundation and the Fonds de recherche Santé Québec (FRSQ). Although it does not amount to an endorsement by any of the panel members, their suggestions were considered and included in the final version of the recommendations.

Finally, the premature termination of financing of the project by the conglomerate of FRQS/Boeckh Foundation/MSSS did allow to obtain only one or two examples of best practices for each disorder. These were drawn from the innovation and research experience of the researchers involved in the project. However, these represent effective prevention and treatment interventions in the Quebec's context, and may be very useful for any provincial or regional planner wishing to implement evidence-based interventions identified here.

CONCLUSION

The present project aimed to bring some light in regards to effective interventions in five most common mental disorders in children and young populations. In order to support service planning of the youth program of the CIUSSS de l'Est-de-l'Île-de-Montréal, and potentially of other CIUSSS across the province, a review of reviews and a summary of examples of best practices in Quebec were conducted.

The research strategy used revealed no review supporting screening and early detection for any disorder, except a single review for the anxio-depressive disorders. Although detection questionnaires exist[47], implementation studies to demonstrate that systematically detecting mental disorders using such instruments that would facilitate the access to effective treatments and lead to better outcomes are missing.

Regarding the prevention, a distinction was made between universal interventions, addressing the whole population, targeted interventions, addressing a population at risk, and indicated interventions, for those having certain symptoms. For anxio-depressive disorders, better outcomes were obtained with targeted and indicated prevention interventions that were actually quite similar to the effective nonpharmacological treatment interventions for this disorder. Similarly, for substance use disorders, targeted and indicated interventions using cognitive skills building for example, were found effective. Suicide universal prevention strategies were evidenced in Bennett's review (1), while school-based mental health literacy seems to be a key ingredient in reducing the number of suicide attempts and severe suicidal ideation in school adolescents, as found in Wasserman's study (103). No effective prevention interventions were found, however, for ADHD and oppositional/conduct disorders.

Effective treatments were found for the 5 common mental disorders under review: they consist of nonpharmacological treatments (essentially, psychotherapies and parental skills building) and pharmacological treatments (anti-depressants; ADHD medication; major tranquilizers for severe behavioural manifestations). Psychotherapies dominated for substance use disorders and anxio-depressive disorders; parental skills dominated in oppositional disorders, whilst pharmacological treatment dominated in ADHD, and as alternative in anxio-depressive disorders. Evidence was limited for suicide attempts.

Examples of Quebec's best practices in youth mental health summarized in the present project were based on the personal research experience of the researchers involved in the project. Among these examples, one will find out about a valid detection instrument for ADHD disease management in primary care practice, of psychotherapies offered by psychologists to children and parents for generalised anxiety disorders, of a parental skills training to manage the oppositional and conduct disorders, of a secondary school-based detection and treatment of youth at risk for substance use disorders, or of a specialist hospital outpatient program for youth with high suicidal risk.

47 - Such as Dominique interactive developed in Quebec.

Research gaps were signaled in many reviews for the development of new interventions. However, the most urgently required research is the implementation studies supported by pragmatic randomized trials of targeted or indicated prevention or treatment interventions and disease management, in real-life context of the existing primary care, school and specialist mental health and addictions public care systems like in Quebec.

More specifically, for each of the five disorders we found the following:

1. Anxio-Depressive Disorders

Firstly, limited evidence showed that screening and early detection at schools may be effective in reducing depression disease burden. However, more research is needed to clarify and consolidate these aspects. Secondly, universal, targeted and indicated interventions are effective to prevent anxiety and depressive disorders in children and adolescents, with targeted and indicated interventions being more effective than universal ones. Cognitive Behavioural Treatment (CBT) prevention programs are effective interventions in reducing the risk of developing anxiety and mood disorders. Thirdly, for full-blown disorders nonpharmacological interventions, such as CBT and computer-based CBT interventions are effective in treating symptoms of anxiety and depression in children and youth populations. In addition, medication for anxiety and depressive disorders showed a light to moderate clinical effectiveness in randomized clinical trials. However, it must be noted that SSRIs medication treatment has been associated with some drug-related adverse events.

Further research is needed in order to establish the value of universal prevention programs, and to explore targeted and indicated interventions such as CBT in the Canadian context. Moreover, the role of medication in relation to psychotherapy in a stepped care approach for the treatment of anxiety and depressive disorders among children and adolescents should also be demonstrated. Finally, implementation and cost effectiveness studies need to be conducted to insure the best utilization of the effective interventions available for medication, psychotherapy and e-CBT therapy for anxiety and mood disorders.

2. Attention Deficit Hyperactivity Disorder

No evidence was identified supporting the screening or the prevention interventions for this disorder. Among the nonpharmacological interventions, the behavioural interventions were found effective in reducing ADHD symptoms of children and adolescents but to a smaller extent than medication. Cognitive training and neurofeedback have limited effects on ADHD symptoms, while aerobic programs were effective for improving ADHD symptoms in children and adolescents under regular medication. The pharmacological interventions remain dominant in effectiveness, methylphenidate alone or in combination with behavioral therapy showing large improvements on children and adolescents' ADHD symptoms.

As for other mental disorders, certain issues need to be clarified by future research. Studies to allow optimizing the ADHD treatment in primary care settings, as well a long-term follow-up of the possible negative effects of the pharmacological treatment of ADHD need to be conducted. The research on the psychosocial interventions must also be pursued in order to identify the determining factors of these interventions, the effects of their combination on the ADHD and the co-morbidities, as well as the suited methodology of their implantation into the Quebec's health system.

3. Oppositional defiant disorder (ODD) or conduct disorder (CD)

As for ADHD, no evidence was identified supporting screening or prevention for this disorder. The limited evidence gathered in this section suggests that psychosocial interventions for children with ODD appear to be effective at reducing disruptive child behaviours. Particularly interesting are those interventions developing parental skills in groups. For the pharmacological interventions, moderate-quality evidence supports risperidone for the treatment of very disruptive and aggressive behaviour, but its adverse effects should be taken into consideration prior to prescribing it to children. Adverse events of antipsychotics and mood stabilizers often exceeds the evidence for efficacy. In the presence of ADHD however, the pharmacological treatment of ADHD also significantly reduces oppositional and conduct disorder symptoms.

Future research would need to analyse the long-term impact on ODD and CD of multimodal psychosocial interventions that include parental skills training. Of great interest would also be to study the optimal length and the developmental timing of these interventions. Evidence of pharmacological interventions used in ODD and CD is of limited quality. This medication could be complementary to psychosocial interventions when these prove not effective enough. A pragmatic clinical trial could be attempted in order to define the real-life sequence of such interventions by severity and developmental age in combination with potentially effective psychosocial interventions.

4. Substance Use Disorders

First, no evidence supported systematic universal screening. Secondly, for prevention, the most effective programs for adolescents involve cognitive-behavioural skill building, such as decision making, peer pressure resistance, and goal setting. It is the targeted intervention and mentoring programs that are effective in substance use prevention in youth populations, while family-based interventions have small but consistent effects persistent at medium and longer-term. Thirdly, effective interventions for treatment of full-blown disorders include nonpharmacological interventions such as Multidimentional Family Therapy and motivational interviewing. As for pharmacological interventions single review showed that naltrexone was more effective than placebo to reduce heavy alcohol drinking.

Future research on screening should further contribute to a reliable screening method, to establish the efficacy of computer-based screening and to examine the benefits of systematic screening for adolescent samples. The literature on prevention stresses the need to explore different settings, age groups, and culture-specific interventions in Randomized Clinical Trials in order to increase the generalizability of the results. In addition, more rigorous studies on SUD treatments are needed to evaluate the efficacy of pharmacotherapy for adolescent substance misuse. With respect to psychotherapies, more comparative effectiveness studies are needed to establish the degree to which parental involvement is beneficial to the adolescent when receiving individual interventions.

5. Suicide Attempts

Firstly, no evidence supported universal screening for suicide attempts prevention. Secondly, our search did not find evidence for prevention. However, Bennett's more comprehensive review of reviews (1) supports universal school-based interventions, while a recent study (103) points towards mental health literacy as being a key ingredient in reducing the number of suicide attempts and severe suicidal ideation in school adolescents. Thirdly, limited evidence identified showed that psychological interventions may decrease suicidal behaviours in adolescents with previous suicide attempts, generally treated in specialist mental health care settings.

Well-designed pragmatic randomised trials are needed to address issues such as suicide screening in children and adolescents, and to test the relative value of mental health literacy, gatekeepers or evaluations of youth at risk by professionals' prevention programs.

Medication has also shown some promise, as treatment of depression, a clear risk factor for suicide, but there are potential deleterious effects on suicidal ideation and suicide attempts in adolescence that need to be better understood from a public health perspective.

RESEARCH RECOMMANDATIONS

The essay published in 2008 by Alberta HTA agency (IHE) and Alberta Heritage Foundation for Medical Research stressed the value of HTA's products to identify research gaps (109). The essay also stressed that research commissioning that values such evidence to establish the expected health benefits of additional evidence would favour targeted research commissioned to a research network or a collective of researchers, to investigator-initiated research. However, this would represent a challenge to existing health research grant agencies that have been functioning from a researcher-initiated project paradigm. In the UK, the National Health Services (NHS) public managed care system funded a new agency, separate from the Medical Research Council, to accommodate the creation of a health services research network[48] devoted to fill the gap of implementation studies. In Canada, the CIHR Strategy for Patient Oriented Research (SPOR)[49] for primary care is structured in the latter manner. However, the CIHR SPOR for youth mental health network was adjudicated in a classic investigator-led proposal. The research recommendations presented in the following section fall in the model of a collectively run services research, informed by literature, comparing the expected health benefits of additional evidence in order to choose the most relevant project to run next to support the implementation of one intervention or program over existing ones, or the absence of intervention (110).

Recommendation nº 1

A replication of the 1990's 'Enquête sur la santé mentale des jeunes aged 6 to 18' should be conducted, in order to assess the presence of common mental disorders, the utilisation of school-based, public primary and specialist health and social services, and of private and community organisations. The study should also measure the parents' satisfaction, their own needs for care and support, and the obstacles to access services in their community. The survey

should be repeated every 5 years in order to monitor improvements or deterioration, and to identify services gaps in regions or at the provincial level.

Recommendation nº 2

To properly complete this survey on services utilisation, and for a closely and precisely monitoring of medical services for children and adolescents, the health administrative databases could be better exploited and more accessible to stakeholders in all regions of Quebec. As an example, data exploitation of the chronic disease surveillance system (SISMACQ) of the Quebec public health agency (INSPQ) led in the last 10 years to the production of brochures treating prevalence, utilisation of specialist and primary care physicians, life expectancy outcomes for all age groups, and all mental disorders, anxio-depressive disorders, ADHD, schizophrenia, personality disorders and autism spectrum disorders. The use of these databases would therefore allow the systematic and interactive examination of: I. incidence, treated prevalence and lifetime prevalence of common and severe mental disorders, and their physical co-morbidities; II. trajectories and profiles of medical primary care and specialist care utilisation, of hospitalisation, emergency departments and outpatient services; III. disorder distribution and patterns of services utilisation among health administrative regions of Quebec (CISSS) or metropolitan, urban, semi-urban and rural areas of Quebec; IV. indicators of services' quality for the common mental disorders among children, adolescents and youth.

Recommendation nº 3

Effective treatments exist for the majority of common and severe mental disorders in children and adolescents, but there is a lack of disease management protocols in real life situations in Quebec. Such protocols would generally involve primary care physicians' group practices or schools, and would combine effective treatments in a stepped care approach, occasional consultation or reference to specialist services, within a chronic disease management model. Therefore, pragmatic cluster randomized trials should be conducted to answer these issues, in combination with implementation and cost-benefits studies.

Recommendation nº 4

Prevention interventions can be universal aiming the whole population, targeted, for those with risk factors, or indicated for those already presenting some symptoms. Quebec's researchers should participate in Canadian or international studies on universal prevention programs. Meanwhile, the prevention interventions for groups at risk identified in this project, particularly for anxio-depressive disorders and substance use disorders, could be the object of pragmatic cluster randomized trials, combined also with implementation and cost-benefits studies.

Recommendation nº 5

In order to facilitate knowledge dissemination and implementation in the real continuum of health and social services in Quebec, a research network should also support: i) rigorous literature reviews for other disorders or treatments; ii) consensus conferences; iii) annual symposium highlighting best practices in Quebec for the most common or costly disorders (i.e. anxio-depressive disorders; ADHD; conduct disorders; substance use disorders; suicide prevention; psychoses; autism spectrum disorder), involving a

coordination of the main four actors of a balanced mental health care system for children and adolescents: a) primary care physicians; b) school services; c) private sector (i.e. psychologists practice); d) medical (i.e. pediatricians) and mental health (i.e. child psychiatrists) specialists, and addiction services.

Recommendation n⁰ 6

Common mental disorders in children and adolescents are chronic diseases. The chronic disease management model is well recognized in primary care, and it relies on 3 actors: the family physician, the nurse based in the primary care practice and the community pharmacist. As invited professionals, we would add to this list the private psychologists and other professionals working in schools, and the mental health specialists or addiction consultants. But, the most important in the management of chronic disease model is the partnership with and the participation of patient and his family. Therefore, the research agenda and conduct, knowledge dissemination, the planning and delivery of services should be governed in partnership with family and youth representatives.

Recommendation n⁰ 7

Quebec's National Mental Health Excellence Center (CNESM)[50] is nested within the mental health directorate of the MSSS, financed and operated in collaboration by the MSSS and its three university mental health institutes. The CNESM is equivalent to some USA's states technical assistance centers (TAC) that successfully support and monitor the implementation of best practices (111). The CNESM and TAC ensure the training, dissemination, supervision and quality control of systemic or individual psychosocial interventions. Currently, the CNESM supports assertive community treatment teams and intensive case management teams for severely mentally ill patients. It also started to support the implementation of primary mental health teams in CLSC, however this model may be reviewed following the health system reorganization imposed by the law 10 from April 2014.

A youth mental health research network for young populations aged 6 to 25 should act as a scientific counsellor for the CNESM, in order to support it in the deployment of effective, socially acceptable and affordable mental health services that would ensure optimal care of youth and their families within the community. The Social Services Directorates for Addiction and Youth, as well as the Primary care Directorate of MSSS should also be involved and collaborate with the CNESM. Under constant collaboration with these directorates, with family and youth representatives, and with the CNESM, the research network would ensure the implementation of detection, prevention and effective treatments, and the training and quality monitoring across the regions of Quebec. The research network would be particularly helpful in identifying trainers and supervisors for psycho-social interventions, and by contributing to the development of quality tools and indicators for the interventions, in a spirit of continuous quality improvement.

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50 - www.douglas.qc.ca/section/cnesm-298?locale=en

APPENDIX — RESEARCH STRATEGY

Mental Health for Youth between 6 - 25 years

PUBMED (19 JUNE 2015) **Results: 961**
1   **Mental health (text word searching and subject headings)**
anxiety disorder*[TI] OR depressive disorder*[TI] OR depression disorder*[TI] OR "Anxiety Disorders"[MH] OR "Depressive Disorder"[MH:NOEXP] OR "Depressive Disorder, Major"[MH] OR ((drug[TI] OR drugs[TI] OR alcohol*[TI] OR substance*[TI] OR cannabis[TI] OR cocaine[TI] OR heroin[TI] OR crack[TI]) AND (dependen*[TI] OR use[TI] OR uses[TI] OR used[TI] OR user[TI] OR users[TI] OR abuse*[TI] OR addict*[TI] OR disorder*[TI] OR toxicoman*[TI])) OR Drug Users[MH] OR Behavior, Addictive[MH] OR Substance-Related Disorders[MH] OR Attention Deficit Disorder with Hyperactivity[TI] OR Attention Deficit Disorders with Hyperactivity[TI] OR Attention Deficit Hyperactivity Disorder[TI] OR Attention Deficit Hyperactivity Disorders[TI] OR ADHD[TI] OR ADHDs[TI] OR hyperactivity[TI] OR Oppositional Defiant Disorder[TI] OR Oppositional Defiant Disorders[TI] OR oppositional disorder*[TI] OR Disruptive Behavior Disorder[TI] OR Disruptive Behavior Disorders[TI] OR impulsive behavior*[TI] OR temper dysregulation[TI] OR conduct disorder[TI] OR "Attention Deficit and Disruptive Behavior Disorders"[MH] OR suicid*[TI] OR self kill*[TI] OR Suicide[MH]
2   **Youth (text word searching and subject headings)**
child[TI] OR child's[TI] OR children[TI] OR childhood[TI] OR childcare[TI] OR kid[TI] OR kid's[TI] OR kids[TI] OR juvenil*[TI] OR prepube*[TI] OR pre-pube*[TI] OR puber[TI] OR pubert*[TI] OR pubescen*[TI] OR preadolesc*[TI] OR pre-adolesc*[TI] OR ado[TI] OR ados[TI] OR adolescen*[TI] OR teen[TI] OR teens[TI] OR teenage*[TI] OR youth[TI] OR youths[TI] OR youth's[TI] OR youngster*[TI] OR young adult*[TI] OR early adulthood[TI] OR emerging adulthood[TI] OR "Child"[MH:NOEXP] OR "Child Development"[MH:NOEXP] OR "Child Behavior"[MH:NOEXP] OR Child Health Services[MH:NOEXP] OR Child Care[MH:NOEXP] OR "Minors"[MH] OR Puberty[MH] OR "Adolescent"[MH] OR "Adolescent Development"[MH] OR "Adolescent Behavior"[MH] OR Adolescent Health Services[MH]
3   **Intervention models**
prevent*[TI] OR control*[TI] OR manag*[TI] OR reduc*[TI] OR improv*[TI] OR screen[TI] OR screens[TI] OR screening*[TI] OR treat[TI] OR treatment*[TI] OR cure[TI] OR model[TI] OR models[TI] OR program[TI] OR programs[TI] OR programme*[TI] OR plan[TI] OR plans[TI] OR planning[TI] OR intervene[TI] OR intervention*[TI] OR framework*[TI] OR project*[TI] OR campaign*[TI] OR tool[TI] OR tools[TI] OR tooling*[TI] OR template*[TI] OR Prevention and Control[SH] OR Preventive Health Services[MH:NOEXP] OR Diagnostic Services[MH] OR Preventive Medicine[MH:NOEXP] OR Primary Prevention[MH]
4   **Study type (text word searching and subject headings)**
(systematic*[TI] AND review*[TI]) OR systematic review*[TIAB] OR metaanaly*[TIAB] OR meta-analy*[TIAB] OR Cochrane Database Syst Rev[TA] OR "Evid Rep Technol Assess (Summ)"[TA] OR "Evid Rep Technol Assess (Full Rep)"[TA] OR "Meta-Analysis"[PT] OR (Review[PT] AND systematic*[TIAB]) OR guideline[TI] OR guidelines[TI] OR best practice[TI] OR best practices[TI] OR good practice [TI] OR good practices[TI] OR "Practice Guideline"[PT] OR "Practice Guidelines as Topic"[MH]
5   **Combinations and limits**
(#1 AND #2 AND #3 AND #4) AND (1980:2016[DP] AND (english[LA] OR french[LA]))

MEDLINE (OVID) AND EBM REVIEWS (19 JUNE 2015) EBM Reviews: Cochrane Database of Systematic Reviews, ACP Journal Club, Database of Abstracts of Reviews of Effects, Cochrane Central Register of Controlled Trials, Cochrane Methodology Register, Health Technology Assessment, NHS Economic Evaluation Database) **Results: 846 and 72**
1   **Mental health (text word searching and subject headings)**
(anxiety disorder* OR depressive disorder* OR depression disorder* OR ((drug OR drugs OR alcohol* OR substance* OR cannabis OR cocaine OR heroin OR crack) ADJ3 (dependen* OR "use" OR uses OR used OR user OR users OR abuse* OR addict* OR disorder* OR toxicoman*)) OR "Attention Deficit Disorder with Hyperactivity" OR "Attention Deficit Disorders with Hyperactivity" OR "Attention Deficit Hyperactivity Disorder" OR "Attention Deficit Hyperactivity Disorders" OR ADHD OR ADHDs OR hyperactivity OR "Oppositional Defiant Disorder" OR "Oppositional Defiant Disorders" OR oppositional disorder* OR "Disruptive Behavior Disorder" OR "Disruptive Behavior Disorders" OR impulsive behavior* OR temper dysregulation OR conduct disorder).ti OR EXP "Anxiety Disorders"/ OR "Depressive Disorder"/ OR "Depressive Disorder, Major"/ OR Drug Users/ OR Behavior, Addictive/ OR EXP Substance-Related Disorders/ OR EXP "Attention Deficit and Disruptive Behavior Disorders"/ OR (suicid* OR "self kill*").ti OR EXP Suicide/
2   **Youth (text word searching and subject headings)**
(child OR child's OR children OR childhood OR childcare OR kid OR kid's OR kids OR juvenil* OR prepube* OR pre-pube* OR puber OR pubert* OR pubescen* OR preadolesc* OR pre-adolesc* OR ado OR ados OR adolescen* OR teen OR teens OR teenage* OR youth OR youths OR youth's OR youngster* OR young adult* OR early adulthood OR emerging adulthood).ti OR "Child"/ OR "Child Development"/ OR "Child Behavior"/ OR Child Health Services/ OR Child Care/ OR "Minors"/ OR EXP Puberty/ OR "Adolescent"/ OR "Adolescent Development"/ OR "Adolescent Behavior"/ OR Adolescent Health Services/
3   **Intervention models**
(prevent* OR control* OR manag* OR reduc* OR improv* OR screen OR screens OR screening* OR treat OR treatment* OR cure OR model OR models OR program OR programs OR programme* OR plan OR plans OR planning OR intervene OR intervention* OR framework* OR project* OR campaign* OR tool OR tools OR tooling* OR template*).ti OR Preventive Health Services/ OR exp Diagnostic Services/ OR Preventive Medicine/ OR Primary Prevention/
4   **Study type (text word searching and subject headings)**
(systematic* ADJ2 review*).ti OR (systematic review* OR metaanaly* OR meta-analy*).ti,ab OR (Cochrane Database of Systematic Reviews OR "Evidence Report: Technology Assessment (Summary)" OR "Evidence Report/Technology Assessment").jn OR meta-analysis/ OR ("Review"/ AND (systematic*)).ti,ab OR (guideline OR guidelines OR best practice OR best practices OR good practice OR good practices).ti OR "Practice Guideline"/ OR "Practice Guidelines as Topic"/
5   **Combinations and limits**
1 AND 2 AND 3 AND 4 ..l/ 5 yr=1980-2016 6 AND (english OR french).lg

EMBASE (19 JUNE 2015)
Results: 1655

| 1 | Mental health (text word searching and subject headings) |

(anxiety disorder* OR depressive disorder* OR depression disorder* OR ((drug OR drugs OR alcohol* OR substance* OR cannabis OR cocaine OR heroin OR crack) ADJ3 (dependen* OR "use" OR uses OR used OR user OR users OR abuse* OR addict* OR disorder* OR toxicoman*)) OR "Attention Deficit Disorder with Hyperactivity" OR "Attention Deficit Disorders with Hyperactivity" OR "Attention Deficit Hyperactivity Disorder" OR "Attention Deficit Hyperactivity Disorders" OR ADHD OR ADHDs OR hyperactivity OR "Oppositional Defiant Disorder" OR "Oppositional Defiant Disorders" OR oppositional disorder* OR "Disruptive Behavior Disorder" OR "Disruptive Behavior Disorders" OR impulsive behavior* OR temper dysregulation OR conduct disorder).ti OR EXP Anxiety Disorder/ OR EXP depression/ OR "drug use"/ OR EXP addiction/ OR attention deficit disorder/ OR oppositional defiant disorder/ OR (suicid* OR "self kill*").ti OR EXP suicidal behavior/

| 2 | Youth (text word searching and subject headings) |

(child OR child's OR children OR childhood OR childcare OR kid OR kid's OR kids OR juvenil* OR prepube* OR pre-pube* OR puber OR pubert* OR pubescen* OR preadolesc* OR pre-adolesc* OR ado OR ados OR adolescen* OR teen OR teens OR teenage* OR youth OR youths OR youth's OR youngster* OR young adult* OR early adulthood OR emerging adulthood).ti OR Child/ OR Child Development/ OR Child Behavior/ OR child health care/ OR Child Care/ OR "minor (person)"/ OR EXP Puberty/ OR Adolescent/ OR "Adolescent Development"/ OR Adolescent Behavior/

| 3 | Intervention models |

(prevent* OR control* OR manag* OR reduc* OR improv* OR screen OR screens OR screening* OR treat OR treatment* OR cure OR model OR models OR program OR programs OR programme* OR plan OR plans OR planning OR intervene OR intervention* OR framework* OR project* OR campaign* OR tool OR tools OR tooling* OR template*).ti OR "prevention and control"/ OR prevention/ OR control/ OR control strategy/ OR Preventive Health Services/ OR Preventive Medicine/ OR Primary prevention/

| 4 | Study type (text word searching and subject headings) |

(systematic* ADJ2 review*).ti OR (systematic review* OR metaanaly* OR meta-analy*).ti,ab OR (Cochrane Database of Systematic Reviews OR "Evidence Report: Technology Assessment (Summary)" OR "Evidence Report/Technology Assessment").jn OR meta-analysis/ OR "systematic review"/ OR (guideline OR guidelines OR best practice OR best practices OR good practice OR good practices).ti OR EXP "Practice Guideline"/

| 5 | Combinations and limits |

1 AND 2 AND 3 AND 4
..l/ 5 yr=1980-2016
6 AND (english OR french).lg

PsycINFO (19 JUNE 2015)
Results: 183

| 1 | Mental health (text word searching and subject headings) |

(anxiety disorder* OR depressive disorder* OR depression disorder* OR ((drug OR drugs OR alcohol* OR substance* OR cannabis OR cocaine OR heroin OR crack) ADJ3 (dependen* OR "use" OR uses OR used OR user OR users OR abuse* OR addict* OR disorder* OR toxicoman*)) OR "Attention Deficit Disorder with Hyperactivity" OR "Attention Deficit Disorders with Hyperactivity" OR "Attention Deficit Hyperactivity Disorder" OR "Attention Deficit Hyperactivity Disorders" OR ADHD OR ADHDs OR hyperactivity OR "Oppositional Defiant Disorder" OR "Oppositional Defiant Disorders" OR oppositional disorder* OR "Disruptive Behavior Disorder" OR "Disruptive Behavior Disorders" OR impulsive behavior* OR temper dysregulation OR conduct disorder).ti OR EXP Anxiety Disorders/ OR EXP depression/ OR "Depression (Emotion)"/ OR EXP Drug Abuse/ OR EXP addiction/ OR attention deficit disorder/ OR oppositional defiant disorder/ OR (suicid* OR "self kill*").ti OR EXP Suicide/ OR Suicidal Ideation/ OR Attempted Suicide/ OR Suicide Prevention/ OR Suicide Prevention Centers/ OR Suicidology/

| 2 | Youth (text word searching and subject headings) |

(child OR child's OR children OR childhood OR childcare OR kid OR kid's OR kids OR juvenil* OR prepube* OR pre-pube* OR puber OR pubert* OR pubescen* OR preadolesc* OR pre-adolesc* OR ado OR ados OR adolescen* OR teen OR teens OR teenage* OR youth OR youths OR youth's OR youngster* OR young adult* OR early adulthood OR emerging adulthood).ti OR Child/ OR Childhood Development/ OR EXP Puberty/ OR Adolescent/ OR Adolescent Development/

| 3 | Intervention models |

(prevent* OR control* OR manag* OR reduc* OR improv* OR screen OR screens OR screening* OR treat OR treatment* OR cure OR model OR models OR program OR programs OR programme* OR plan OR plans OR planning OR intervene OR intervention* OR framework* OR project* OR campaign* OR tool OR tools OR tooling* OR template*).ti OR Prevention/ OR Diagnosis/ OR Preventive Medicine/

| 4 | Study type (text word searching and subject headings) |

(systematic* ADJ2 review*).ti OR (systematic review* OR metaanaly* OR meta-analy*).ti,ab OR Meta Analysis/ OR (Literature Review/ AND (systematic*)).ti,ab OR (guideline OR guidelines OR best practice OR best practices OR good practice OR good practices).ti OR Best Practices/

| 5 | Combinations and limits |

1 AND 2 AND 3 AND 4
..l/ 5 yr=1980-2016
6 AND (english OR french).lg

CINAHL (19 JUNE 2015)
Results: 217

1	Mental health (text word searching and subject headings)

TI("anxiety disorder*" OR "depressive disorder*" OR "depression disorder*" OR ((drug OR drugs OR alcohol* OR substance* OR cannabis OR cocaine OR heroin OR crack) ADJ3 (dependen* OR "use" OR uses OR used OR user OR users OR abuse* OR addict* OR disorder* OR toxicoman*)) OR "Attention Deficit Disorder with Hyperactivity" OR "Attention Deficit Disorders with Hyperactivity" OR "Attention Deficit Hyperactivity Disorder" OR "Attention Deficit Hyperactivity Disorders" OR ADHD OR ADHDs OR hyperactivity OR "Oppositional Defiant Disorder" OR "Oppositional Defiant Disorders" OR "oppositional disorder*" OR "Disruptive Behavior Disorder" OR "Disruptive Behavior Disorders" OR "impulsive behavior*" OR "temper dysregulation" OR "conduct disorder") OR MH("Anxiety Disorders"+ OR Depression+ OR "Substance Abusers"+ OR "Behavior, Addictive"+ OR "Substance Use Disorders"+ OR "Attention Deficit Hyperactivity Disorder") OR TI(suicid* OR "self kill*") OR MH(Suicide+ OR "Suicide Risk (Saba CCC)" OR "Suicide Self-Restraint (Iowa NOC)" OR "Suicide Prevention (Iowa NIC)")

2	Youth (text word searching and subject headings)

(child OR child's OR children OR childhood OR childcare OR kid OR kid's OR kids OR juvenil* OR prepube* OR "pre-pube*" OR puber OR pubert* OR pubescen* OR preadolesc* OR "pre-adolesc*" OR ado OR ados OR adolescen* OR teen OR teens OR teenage* OR youth OR youths OR youth's OR youngster* OR "young adult*" OR "early adulthood" OR "emerging adulthood").ti OR MH(Child OR "Child Development" OR "Child Behavior" OR "Child Health Services" OR "Minors (Legal)" OR Puberty+ OR "Adolescent Development" OR "Adolescent Behavior" OR "Adolescent Health Services")

3	Intervention models

TI(prevent* OR control* OR manag* OR reduc* OR improv* OR screen OR screens OR screening* OR treat OR treatment* OR cure OR model OR models OR program OR programs OR programme* OR plan OR plans OR planning OR intervene OR intervention* OR framework* OR project* OR campaign* OR tool OR tools OR tooling* OR template*) OR MW "PC" OR MH("Preventive Health Care" OR "Diagnostic Services"+)

4	Study type (text word searching and subject headings)

TI((systematic* n2 review*) OR systematic review* OR metaanaly* OR meta-analy*) OR AB(systematic review* OR metaanaly* OR meta-analy*) OR MH("Meta Analysis" OR "Systematic Review") OR TI(guideline OR guidelines OR "best practice" OR "best practices" OR "good practice" OR "good practices") OR "Practice Guidelines"

5	Combinations and limits

(S1 AND S2 AND S3 AND S4) AND (DT 198001- AND LA(english OR french))

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