Concurrent Substance Use and Mental Disorders in Adolescents: A Review of the Literature on Current Science and Practice

submitted to

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"There is now adequate research to warrant viewing certain childhood psychological disorders as reliable signals of greater than average susceptibility to substance abuse…this is a prevention approach that should be considered and evaluated for implementation". (Glantz 2002)

"An increasing understanding of the high prevalence and longer-term effects of youth onset mental disorders has not yet been adequately matched by intervention research or the evaluation of different models of mental health service delivery". (Patton et al. 2007)

"Investments in children's mental health are surely among the most important investments that any society can make". (McEwan, Waddell & Barker 2007)

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Table of Contents

Executive Summary

Concurrence of mental disorders and substance use disorders in youth increasingly recognized as an important health concern by stakeholders in many jurisdictions. Though significant research advances have been made, especially in the past 10 years, the knowledge base is diverse, fragmented and hard to access. The purpose of this review was to capture and synthesize current knowledge and practice to inform policy-making, services and research planning, and practice. The report was designed to be a comprehensive overview of the topic and a pointer to other detailed resources.

'Co-occurring disorders' is being promoted as the standard term in the adult literature, but there is no consistency as yet in the adolescent literature, and the term 'concurrent disorders' is frequently used. The prevalence of concurrent disorders in adolescence varies widely according to several variables, most importantly the setting, with the highest percentages found in substance use treatment settings and in populations of youth with multiple risk behaviors. In these settings the evidence is consistent that co-occurrence is the rule rather than the exception. The mental disorders with the strongest associations with substance use disorders in teens are disruptive behavior disorders, mood disorders, post-traumatic stress disorder, eating disorders, and borderline personality disorder. Gender and ethnic differences in concurrent disorders can be found in larger samples and finer grained analysis but they are not large.

Pathways of risk from childhood disorders to adolescent disorders through to adult disorders have been well described as a result of high quality longitudinal research in recent years. Disorders that present in childhood and preadolescence, especially disruptive behavior disorders, elevate risk for substance misuse, mood disorders and other disorders in adolescence which in turn increase risk for substance use disorders, mood and personality disorders in young adulthood. While the specific concurrent disorder can vary over time, broadly defined, they are quite persistent from childhood through adulthood. Research on the causes of concurrent disorders is becoming increasingly sophisticated in examining multiple biological, psychological, social and environmental factors. While there has been minimal research on shared risk or protective factors, it is likely that there is substantial overlap and this has implications for prevention.

Concurrent disorders in youth are associated with a range of consequences including suicide and premature mortality, symptom severity a more difficult course of illness, more physical health problems and health risk behavior and poorer functioning and quality of life. Estimates of societal costs are high; and probably underestimated. The proportion of adolescents that receive care for a substance use disorder, a mental disorder or both is below 50%. The course of treatment is typically rocky and treatment outcome findngs are discouraging, with high rates of relapse and drop-out and sustained improvement hard to achieve. However treatment outcome studies to date are typically not very rigorous and their findings are difficult to interpret and generalize.

There are numerous calls for more prevention and early intervention. While most prevention approaches to date have been separate, the evidence base for optimal content and delivery of prevention programs within more comprehensive models is building. For both mental health and substance use treatment settings, screening is considered a 'best practice', and promising screening tools are in development. The evidence for the effectiveness of a range of therapies including pharmacotherapy and psychosocial treatments is limited for adolescent concurrent disorders, but new studies are beginning to appear. Integration of services is indicated for settings where frequency is high. Some broad, comprehensive population health approaches to concurrent disorders are being tried in some jurisdictions, and there may be much to learn from these initiatives. Effectiveness research and knowledge translation and exchange approaches are needed to support policy and practice change.

Introduction

At no other time in history has the journey between childhood and adulthood been more challenging. Eilish Gilvarry provides an apt summary: "*the post-modern adolescent must navigate through genuinely novel terrain, characterized by the fracture of traditional moral authority, the impact of international communications and transportation, (and) the emphasis on consumption rather than production"* [1 p.56.] It is noteworthy that the results of a successful adolescence - recognizing one's abilities, coping with the normal stresses of life, working productively and fruitfully, and making a contribution to one's community are also the elements of one widely accepted definition of mental health[2].

Alarm about the mental health of youth has never been greater; widely noted are concerns about increases in the prevalence of some mental disorders as well as more alcohol and drug use at an earlier age[3-6]. The co-occurrence of mental health and substance-related problems is increasingly recognized by practitioners, researchers and policy-makers[3,7]. The personal and family tragedy of adolescent concurrent disorders is poignantly presented in the recently published story of Noah Seidenberg – a young American man who died in 2006 from an overdose of methadone and cocaine at age 24, after multiple attempts by his family to find an effective intervention in a highly fragmented service system[8].

The (U.S.) **President's New Freedom Commission on Mental Health** (2003) called for a major transformation of the children's mental health system (including schools, courts, primary and specialty care) in order to avoid "*a downward spiral of school failure, poor employment opportunities, and poverty in adulthood"* and stressed that "*No other illnesses damage so many children so seriously."* [9, 10 p.312]. Co-occurrence of mental disorders and substance use disorders is also noted as a major challenge. In the Canadian Senate Committee Report **Out of the Shadows at Last: Transforming Mental Health, Mental Illness, and Addictions Services in Canada** great concern about unmet needs for child and adolescent mental health is expressed and significant new funding for concurrent disorders generally is recommended[11]. There is unprecedented pressure for social and health system change to address these serious concerns. However, the service structures for substance use disorders and mental disorders treatment have largely been separate, for reasons such as different treatment philosophies, professional training, funding, and governance structures. The research literature on substance use disorders and mental disorders (SUD/MD) and their remedies have also had little overlap, contributing to even greater challenge in applying evidence in a comprehensive way to concurrent disorders practice and policy.

The purpose of this review was to capture and synthesize current knowledge and practice on the topic of concurrent SUD/MD in adolescents to inform policy-making, services and research planning, and practice. The review was requested based on the observation that there was no single and current source of comprehensive information on adolescent concurrent disorders available to Alberta stakeholders. The review was broad by design, covering a range of sub-topics on concurrent disorders from definitions, through frequency in general and clinical populations; risk and protective factors and causal models; health impact for individuals and family and societal burden; and current approaches to intervention at the policy and program levels (covering the range from prevention through tertiary care). Both peer-reviewed and grey materials were included. Relevant recommendations for practice, policy and research were also extracted from articles and reports and listed.

Methods in Brief

The review methods were adapted from systematic methods for broad health services or policy questions used by the author in other reviews[12-14]. In short, they involved four steps. ***First***, in consultation with professional librarians, comprehensive searches were designed and conducted of nine databases of peer-reviewed literature for English language abstracts on the topic of concurrent disorders in adolescents

using a range of related terms. The searches covered a 10-year period from March 1997 to July 2008. The searches yielded 1448 abstracts (after removal of duplicates). In the ***second step***, the abstracts were independently rated for relevance to the review using standard pre-tested criteria by the primary author and two graduate level psychology students. Abstracts rated as relevant by the primary author were included based on very good agreement with the other raters. In ***step three*** – 372 selected articles were downloaded and read in date order by the primary author. In this step articles were classified as empirical (reporting on a study with primary data collected) and non-empirical (review article or commentary), and country of author, and rated for quality using pre-tested scales for each major article type. In the ***fourth step*** key points were extracted from each 'first round' article; this stage produced about 180 pages of notes. 86 'second round' papers that were referenced in the initial articles and were central to the topic were also procured; and notes added. Finally, notes on specific sub-topics from all articles were inserted into relevant sections of the draft report, and the report was written section by section. Greater emphasis was put on quality articles in the report; some lower quality materials were not used in the write-up. Where gaps in information were obvious, focused searches drew in 63 additional articles. Grey literature was found in searches of government report, textbook databases and the internet and integrated after the peer-reviewed materials were written up. The final report has 403 peer-reviewed and grey literature citations. More details about methods are available from the author.

Several important caveats apply to the review. ***First,*** while the interest from the outset was in concurrence between SUDs and MDs, other types of concurrence were considered in the initial searches. Only a small proportion (~5%) of peer-reviewed material on other types of concurrence was found as follows: developmental/intellectual disabilities and MDs (N=13); other neuropsychiatric disorders (e.g. epilepsy, developmental coordination disorder, Tourette's syndrome) and MDs (N = 5); perceptual or sleep disorders and MDs (N = 5); medical (e.g. metabolic, infectious, nutritional, immunologic, toxic) and MDs (N = 6) and developmental/intellectual disorders and SUDs (N = 1 article on adults). None of these topics had a sufficient volume of material to include in any meaningful way; for the sake of coherence of the report they were set aside. Aside from initial comments about the use of terms across fields, these topics are not covered.

Second, the review was meant to be a broad, comprehensive scan of the current knowledge and opinion on adolescent concurrent disorders; it did not include separate focused searches of each of the sub-topics that would be necessary for full depth in each one. ***Third,*** the review does not define or describe the *separate* disorders or treatments; it starts from an assumption that readers either have that background or can refer to any standard textbook. ***Fourth,*** this literature contained so much variation in research traditions; populations studied, conceptual terms used, operational definitions (e.g. distinctions between syndromes and disorders), and measures used that it was not possible to note these differences in every discussion. They were taken into account wherever reasonable, but in order to extract useable information from all the diversity, some generalizations were necessary. ***Finally,*** not every study or finding described specifically addressed concurrent disorders as the *primary* topic – many articles from relevant fields or *secondary* topics were included to provide perspectives or context that was deemed relevant. This is appropriate on topics where largely separate literatures are just beginning to converge. In fact limiting the review to *pure* articles directly on topic would have left substantial gaps in the information.

In terms of characteristics of the first round articles sampled and selected, though the search spanned 10 years; approximately 40% most of the articles were from the past two and a half years. Nearly 77% of the literature was generated by American investigators, with 6% from the UK and about 4% each Australia and Canada, with the remainder distributed among 15 other countries. The average quality of the first round articles was moderate to good with empirical articles average quality scores 8 (on a scale of 15) and non-empirical articles average quality scores 7 (on a scale of 10).

CHAPTER ONE

Concurrent Disorders in Adolescents: Concept, Terms, and Definitions

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In the literature, many related terms are used in reference to the co-existence of more than one disorder. To capture relevant literature, we used all of *comorbidity, comorbid disorders, co-occurring disorders, concurrent disorders, dual disorders,* and *dual diagnosis*[i] as search terms. In the resulting articles, instances of both the use of a *single* term for *different* implied meanings, and the use of *different* terms for a *single* implied meaning were prevalent. In a few cases up to four different terms were used in a single article to refer to the same concept. A very diverse mix of terms and definitions for the central concepts was found, making the scientific discourse complex and confusing. Several authors have called for more standardized terminology for the field[15-17], but at least one has argued for retaining some diversity to allow for subtle differences in meaning[15]. For example, Piotrowski (2007) suggests that there is a need for *"careful examination of the language we are using as we discuss, explore, treat, and train on comorbidity"* [15 p.6].

Major Terms for the Concept of Concurrent Disorders

Comorbidity

The earliest used and most generic term for the topic of this review is ***comorbidity***, which is attributed by several authors to Feinstein (circa 1970)[18,19]. Angold et al. (1999) note that comorbidity was recognized in clinical practice as far back as the 1960s, but that it didn't have substantial attention in the academic literature until the 1990s[20]. General definitions of comorbidity found in the review include *"the joint occurrence of somatic or psychiatric disorders with different pathophysiology in a single person"* [19 p.186]; *"the presence of at least two distinct and separate disabilities (pathologies) within the same person"* [21 p.2] or *"the concurrent or successive co-occurrence of two supposedly separate conditions"*[22 p.664]. These are clearly applicable across any type of health problem. Burger and Neeleman (2007) also list the types of comorbidity as episodic (vs. lifetime) coincidental (occurring by chance) and associative comorbidity (disorders that elevate risk for each other or share underlying risk)[19].

In the early 1990s, concern about the observed degree of comorbidity among mental disorders contributed to the initiation of the 'National Comorbidity Study' (NCS), which, in baseline and follow-up panels has contributed much to the understanding of general overlap among MDs, largely among adults, ever since[20]. Many review articles published in the 1990s on the topic stressed the need to take comorbidity into account in understanding etiology, treatment and course[20]. The earliest publication on the topic of psychiatric comorbidity that was specific to children and adolescents is reported to have appeared in 1987[23].

The term 'comorbidity' was common in the reviewed literature for the current topic even to the current year, despite the objections of a few authors. In this review, these objections were most comprehensively articulated in two articles about developmental disorder comorbidity[24,25], but the general sentiment was also found in other articles on co-occurring SUDs and MDs. The medical connotation of separate diseases and separate causes does not fit neuropsychiatric disorders, it is argued; because syndromes/symptoms do not present as independent processes, and often may reflect the same underlying impairment.

Recently, the term ***'syndemic'***, (which refers to the co-presentation of health problems which are potentiated by social risk *at the population level*) has entered the epidemiologic lexicon. While no article on concurrent disorders in adults or adolescents in the review used this term, it is a concept that fits well with the clustering of health and behavioral risk in segments of the youth population and may be used in

[i] Combined with terms for specific disorders and the adolescent age group.

the future to conceptualize new comprehensive public health/population health approaches[ii] to these problems[26].

Contemporary Terms for Substance Use Disorders and Mental Disorders

In addition to the broader term 'comorbidity', ***dual diagnosis*** (or ***dual disorders*****)** is also used in reference to SUD/MD**.** This term has two noted limitations. First it connotes two disorders when it is not uncommon for individuals to have three or more (necessitating the addition of the term 'triple disorders'). Second it has been taken up in the literature and practice to refer to both developmental/intellectual disorders with MDs as well as SUD/MD (e.g. Fuller 1998)[21]. The terms ***co-occurring disorders*** and ***concurrent*** disorders are also being used in the literature with increasing frequency. 'Concurrent disorders' was used in the document **Best Practices for Concurrent Mental Health and Substance Use Disorders** published by Health Canada in 2002[27]. The Center for Substance Abuse Treatment (CSAT) in the U.S. adopted 'co-occurring disorders' as the preferred term in 2005[15]. This decision seems to have had influence on the adult literature as indicated by, for example, the use of the term in two recent special topic journal issues. But generally the diversity in terminology persists in the adolescent literature.

The grey literature, including web documents and program descriptions indicate that the term 'dual diagnosis' is still used for both types of co-occurrence (developmental and mental disorders/substance abuse and mental disorders) in British Columbia and Alberta, although in B.C. official policy documents use the term 'concurrent disorders' for SUD/MD and 'dual diagnosis' for developmental and mental disorders[28]. In Alberta, both terms are used for inpatient psychiatric/substance abuse treatment services for adults (the former at Alberta Hospital Ponoka and the latter at the Claresholm Care Centre). Ontario, and in particular the Centre for Addiction and Mental Health (CAMH), uses the term 'concurrent disorders' for mental disorders and addictions more broadly (gambling is included) and the term 'dual diagnosis' for mental health problems among those with developmental disabilities. On its website, Health Canada also uses the term 'concurrent disorders' to refer to mental health and substance use issues and the Alberta Alcohol and Drug Abuse Commission (AADAC) has also adopted that usage. The term 'dual diagnosis' still appears frequently on U.K. websites in reference to mental disorders and substance misuse although key documents including an information manual published by the Royal College of Psychiatrists also used the term 'co-existing problems' in 2002[29, 30].

Dimensions of the Concept

Beyond the simple use of terms, the concept as currently used includes two dimensions. The first dimension is the ***temporal*** relationship of the disorders or the time frame across which they are expressed. This dimension ranges from more than one disorder at any time across the life span through to having the disorders sequentially to having the disorders simultaneously in any specified time period. The terms concurrent disorders and co-occurring disorders imply that the conditions are present at the same time, which is the circumstance which seems to be of greatest concern for intervention. However, the literature captured covers all variants of temporal relationships and even the use of these terms is not consistent on this dimension[15]. Angold (1999) has proposed the term 'sequential comorbidity' to assist with this distinction, but this specifier is not widely used[20]. For disorders presenting together, some authors have also used the terms primary and secondary disorders, fueling debates about the difficulty of establishing primacy[20]. For some disorders longitudinal research has shed significant light on the temporal sequences, which will be discussed later in the report. For sequential disorders, the terms heterotypic continuity (change over time from one disorder to another) and homotypic continuity (consistency of disorder over time) have also been used[31].

[ii] See Appendix A for definitions of key terms in the document such as 'public health/population health approach'

The second dimension of the concept has to do with ***which disorders*** "count". On this dimension the term (in the SUD/MD literature alone) is used to mean anything from any two or more of a generic list of MDs and SUDs (e.g. Costello 2003[31]; Johnson 2005[32]; Whitbeck 2004[33]) to specific disorder pairs or clusters (e.g. cannabis dependence with depression) or even a MD, SUD *and* a medical condition[15]. In another use more than one of *any* alcohol, drug or mental disorder counts [34]; and yet another specifies either Axis I or Axis II in the DSM[35]. A question that has arisen in the adolescent literature regarding which conditions count as concurrent are those circumstances where the second disorder does not meet strict diagnostic criteria. It is argued that even *subclinical* symptoms or behaviors are important for treatment planning and studies are increasingly showing that conditions that do not quite meet diagnostic criteria (especially for substance use) yet are still clinically quite serious are very prevalent in adolescent populations[15,36].

Common Definitions

The most common definition in the literature reviewed was simply *any SUD with any psychiatric disorder* (not further specified)[17,37-39], but most articles had no definition at all. Variation within this overall definition is great; examples from SUD clinical practice provided by Piotrowski (2007) are: a SUD plus a substance-induced MD; a SUD with a personality disorder; or SUD with an Axis I disorder. Some authors (e.g. Bender et al. 2006) argue for more specific definitions because the general definitions obscure the unique needs for intervention that specific pairs or clusters of disorders have. In another variant, Shane (2003) defines 'single comorbidity' as a SUD with *either* an externalizing or an internalizing disorder and 'mixed comorbidity' as a SUD with at least one internalizing and one externalizing disorder[40]. A few authors use the terms homotypic disorders to connote two or more disorders in the same diagnostic group and heterotypic disorders as those that cross diagnostic groups[20,23,41]. By definition SUDS and MDs which present together, are heterotypic disorders. There have been some attempts to standardize at least the overall terms and definitions for co-occurring SUDS and MDs broadly. A U.S. Department of Health and Human Services expert panel definition (2002) was *"at least one mental disorder as well as an alcohol or drug use disorder"* [1,38]. Health Canada's definition of concurrent disorders is *"a combination of mental, emotional and psychiatric problems with the use of alcohol and/or other psychoactive drugs"* (either Axis I or II of DSM-IV)[27]. There is no consensus definition specific to adolescents[16].

Acronyms and Other Terms

If the terms themselves are not confusing enough, this literature was full of acronyms with very little consistency in use. Over 30 acronyms were found for disorders under discussion including some used for two (e.g. AD = anxiety disorders and alcohol disorders) and even three concepts (CD = concurrent disorders, conduct disorders and chemical dependence). Seven acronyms were found for persons with the disorders and at least a dozen for types of treatments.

The term 'adolescence' was operationalized as ages 13 through 18 in this review because the search parameter for age used this range. However, it is well recognized that there are varying definitions that extend this age range on both ends. In a discussion of related policy in the U.K., Bushell et al. (2002) note that 'young people' are considered those under age 25[42]. On the lower end of the range, preadolescence is defined as ages 9 to 12 by Mason et al. (2004) while Goldstein et al. (2007) consider age 10 and over to be adolescence and Bender et al. (2006) specifies ages 12 to 18 as the defined range for their review article[17,43,44]. In Australia, Hodges (2007) considers 'young people' to be those aged 12 to 25[45] and in a major U.S. Commission **'Treating and Preventing Adolescent Mental Health Disorders'** the age range of interest was noted to be 10 to 22 years[5]. Despite the age specifier in our search, articles emerged in the review with wide variation in age definitions, and they were accepted as such. A few articles that addressed younger ages were also included in second round searches because they addressed issues of relevance to risk trajectories or prevention.

Terms and Acronyms Used in this Report

For the remainder of this report, the terms concurrence, concurrent disorders and co-occurring disorders are used wherever the discussion is about SUD/MD being present in the same individual. Herein the term 'comorbidity' is used for the more general concept of more than one of *any* kind of disorder occurring in one individual at *any* time. 'Substance use disorders'(SUDs) refers to alcohol and/or drug use as distinct from the broader term 'addictive disorders' which includes other compulsive behaviors (e.g. gambling, video game misuse, binge eating). In quotations, synonyms were replaced in a few instances to retain flow. The terms *youth*, *adolescence*, *young people* and *teens* are used interchangeably in the report. Only relatively well-known acronyms are used; and only after the first instance of each is spelled out. Longer lists of definitions and acronyms found in the materials reviewed and relevant to the topic (though not necessarily used in the report) can be found in Appendix A.

KEY POINTS: Concurrent Disorders: Concept, Terms, and Definitions

- The more general and less favored term 'comorbidity' is gradually being supplanted by the terms 'concurrent' or 'co-occurring disorders' to describe an SUD and MD in the same person.
- 'Co-occurring disorders' is being promoted as the standard term in the adult literature, but there is no consistency as yet in the adolescent literature.
- A frequently referenced Canadian definition is *"a combination of mental, emotional and psychiatric problems with the use of alcohol and/or other psychoactive drugs"* (Health Canada 2002).

CHAPTER TWO

Epidemiology of Concurrent Disorders in Adolescents

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This section will cover the epidemiology of concurrent disorders, including their frequency in community, clinical and diagnostic samples; the most commonly co-occurring disorders; how they vary by demographic variables such as age, sex and ethnic status and how they manifest in high risk groups.

Accepted General Facts about Adolescent Concurrent Disorders

Observations of the co-occurrence of many disorders (including SUDs and MDs) in clinical settings have been made for several decades in both adult and adolescent age groups. In the early thinking about this phenomenon, some authors proposed reasons why concurrence might be an artifact of observation or measurement rather than a real phenomenon[18,20]. The reasons included the greater likelihood of an individuals with a given disorder to be referred for treatment for a second disorder, a bias in assessment due to overlapping criteria for some diagnoses, and confounding – where a third factor exists that increases the frequency of both conditions[18,20,23,46,47]. Population-based studies in the 1990s ruled out many of these explanations, and in a 1999 review, Angold et al. concluded that "*this review of methodological and nosological explanations for comorbidity leads us to the conclusion that one of the major achievements of research on comorbidity over the last decade has been its demonstration that we are dealing with a real phenomenon*"[20 p.70].

Not only is there consensus in the literature that co-occurrence is real, but also that it occurs at a relatively high frequency. The frequency *varies widely* depending on the sample or setting examined, but it has generally been accepted that in many treatment contexts co-occurrence is "the rule rather than the exception". This conclusion has been firm for adult populations and settings for many years[47,48]. For example, in a major review article published in 2002, Armstrong et al. noted that 50 to 80% of adults with SUD have at least one other lifetime disorder (most commonly antisocial personality disorder, depression and/or anxiety disorders)[47]. The most widely sources of prevalence estimates for adult comorbidity come from the Epidemiologic Catchment Area (ECA) Surveys the National Comorbidity Study (NCS) Surveys and the National Epidemiologic Survey on Alcohol and Related Conditions (NSARC) in the United States[48,49], but relevant surveys also come from other countries. Concurrence is now reasonably well described in both community and treatment/service populations of adolescents as well [24,47,48,50-53]. That "*the majority of adolescents seeking services today are thus likely to have substance-use problems ,mental health diagnoses, as well as myriad social, behavioral, and familial problems*" has clear implications for intervention[17 p.178].

Advancements in Adolescent Psychiatric Epidemiology

The conclusion of a major review published in 1999 was that there was not as much research on the epidemiology of concurrent disorders in adolescents as in adults[20]. Since that time there have been dozens of studies published, and strong consensus that concurrence is as serious a problem in youth as in adults. The adolescent literature is now quite large. Most studies have examined specific *pairs* of disorders (e.g. depression and alcohol use disorder) which give only a partial picture[18] and recently at least one author has examined the co-occurrence of one or more disorders *and* subthreshold conditions in youth[36]. The studies with most emphasis in this review are those which have examined the co-occurrence of SUDs and MDs, and have focused on more than one disorder in each group. This literature has advanced in rigor, from studies showing associations among individual symptoms on a variety of symptoms scales, to studies using diagnostic interviews. Another advancement has been the shift from convenience samples, to selected samples to representative clinical samples and finally representative community-based samples. Progress has also been made in the use of more sophisticated analysis with careful adjustment for confounding variables[54]. Costello et al. published companion articles representing 10-year reviews on the field in late 2005 and early 2006. The authors suggest that child and adolescent psychiatric disorders

have been one of the *"final frontiers of epidemiology"* [54 p. 973]. but that in the last decade there has been a paradigm shift wherein epidemiologic researchers have begun to incorporate developmental psychopathology, resulting in a new field - developmental epidemiology[54,55].

Reasons for Variation in Prevalence Estimates

Even though science on this topic has clearly made enormous strides in the past 10 or 15 years, there is still considerable variation in estimates of the prevalence of concurrent disorders. The variation is partly attributed to real differences in the frequency of the conditions in different groups according to variables like age, geography or setting, gender and ethnic mix, but many of the differences are also due to study design and measurement methods. These include:

- different symptom/diagnostic scales used;
- different time frames for diagnosis (e.g. lifetime vs. past year)
- whether impairment criteria are applied in addition to symptoms for diagnosis;
- different administration methods (e.g. self-report vs. clinician or parent report and how information from multiple sources is combined, and skill of administrator);
- differences in participants' interpretation of items, ability to recall or willingness to report;
- different participation rates;
- different sets of individual disorders chosen for study;
- different definitions for what are counted as concurrent disorders, over what time period, and how they are grouped;
- different study sizes (which impacts power to show associations, especially for less common disorders); and,
- different statistical methods[18,23,43,56,57].

Frequency Estimates of Concurrent Disorders in Adolescent Populations

Estimates of the frequency of concurrence of SUD and MDs (generally) come from three types of studies: a) those measuring concurrence in community or general population samples (which also include "healthy" participants); b) those measuring concurrence in individuals who have presented for care in treatment settings (most commonly SUD treatment settings but also MD treatment settings as well as primary and acute care settings) and c) samples selected for a specific diagnosis (e.g. depression). About two dozen primary studies reporting prevalence estimates were found in the review along with several review or commentary articles that also reported aggregate estimates across studies. A brief discussion, including the estimate *ranges* for each of the three study types is provided here; details of the individual primary studies are provided in Appendix B.

<u>Studies of Samples from the General Population/Community</u>

Many high quality population-based studies from around the world have been conducted on child and youth mental health issues and substance use. Like most other aspects of this topic, most of these studies have had either a mental health *or* a substance use focus, so the opportunity to examine overlap is not there. In other cases, at least indicator variables of both appear to have been measured, but overlap has not been reported out to date. More and finer grained analysis is probably possible on at least some of these datasets.

Fortunately several population-based studies have, by design or good fortune, been able to examine concurrence in this age group. To keep the estimates in perspective, it is useful to have the context of the prevalence of *any* disorder in the total population of children and adolescents. Across 17 epidemiologic surveys from 1987 to 2004 using varying age ranges within the span of age 4 through 18 years is about 10 to 20%[58] for any MD. Because SUDs are often not included, one can safely assume that adding those in moves the estimate to the higher end of the range. A similar figure is reported by Costello (2003) at 3 to 18% of children and youth with a disorder producing functional impairment. Waddell (2002) pegs this general prevalence estimate at 14% for at least one clinically important disorder and Rush (2008) at 15 to 20%[4,31,59]. Few studies report concurrent disorders as a proportion of the total population, but that

prevalence figure is important for planning interventions with a total population perspective. Rush et al. report the 12-month prevalence for all ages recent analysis of the Canadian Community Health Survey (CCHS) as 1.7%, and though still a relatively small value, the comparable proportion was double for the 15 to 24 year age group at 3.4%[60]. These estimates were considered by the authors to be conservative, and at the low end of rates reported internationally. Other relevant Canadian population-based data come from a survey of more than 36,000 Ontario students[61]. In that survey one in 25 (4%) of respondents had hazardous drinking combined with elevated psychological distress (anxiety or depression symptoms), with both sexes having similar likelihood. Among those reporting alcohol problems, nearly half also had psychological distress.

The frequency of concurrent disorders is variably reported as a percentage of the sample with two or more disorders, the percentage of those with one disorder having a second (or more) or as an odds ratio (a way of comparing the probability of a certain event between groups). This variation in estimate formats makes it difficult to combine estimates across studies. The most frequently reported estimate in review/commentary articles in the review was the percentage of at least one other lifetime or current MD *in those with a SUD;* reports for this estimate for the adolescent age group ranged from 60 to 80%[47, 58,62-66,190]. Armstrong et al. published the most comprehensive review of population-based studies in 2002[47] which provides estimates for all studies to that date in other formats. Our searches also yielded six primary studies published since the review; they were insufficiently comparable to report a cross-study prevalence estimate (without contacting authors for primary data) but details including estimates from individual studies are tabulated in Appendix B.

Studies of Samples from Treatment Settings

Studies of concurrent disorder prevalence in youth in treatment settings are highly variable in the characteristics noted above, and generally of lower quality than population-based studies. In review or commentary articles, prevalence estimates for at least one other lifetime or current MD *in those in SUD treatment settings* are reported as 25 to 90% (with most estimates at the higher end 70-80%[17,40,52,59,64 66-70] and for those *in mental health treatment settings with a SUD* were reported as 11 to 55%[59,64,66,71]. Within care systems, as expected, higher proportions are seen for inpatient care (including residential programs for SUDs, and on inpatient psychiatric units) in comparison with outpatient or primary care settings[59,71]. Reported prevalence is very high for juvenile justice and correctional settings[59,66,71]. Estimates also vary according to the particular concurrent diagnosis of interest. For example in SUD treatment, estimates for the prevalence of concurrent CD range from 32 to 59%, 19 to 61% for concurrent mood disorders, 15 to 43% for AD, and as high as 80% for concurrent psychotic disorders[60,63,66]. Other authors cite concurrence in clinical populations of youth to be as high as 90% for externalizing disorders[66]. Recently estimates have also begun to be calculated for the type of SUD (e.g. problem use, abuse, dependence)[60,72]. Concurrence is typically higher for those meeting dependence criteria than other types of problem use.

Fourteen primary studies that produced estimates for treatment samples that included adolescents from a broad range of settings were identified in our searches. Most of these estimates come from highly localized and selected samples (many with relatively low quality ratings) so they are hard to fully interpret and even harder to generalize, but they do illustrate the huge variation in concurrence according by population and setting. Study details, prevalence estimates and quality ratings are provided in the Table in Appendix B. Rates of concurrent disorders provided for mixed treatment populations were around 64%[69]; between 12 and 45% for outpatient mental health settings[38,41,71,73]; between 55 and 67% for inpatient mental health settings[5,71,74]; between 55 and 85% for outpatient SUD settings[75-77]; about 64% for inpatient SUD settings[63]; and 66% for juvenile justice services[78]. Notably there were only one study each reporting this latter estimate, and previous studies have suggested much higher prevalence for inpatient SUD treatment and juvenile justice settings. As examples of settings where concurrent disorders are in the minority or even rare, one study of outpatient primary care which included preadolescents found a 7% prevalence of concurrent disorder[79,80], and in specialist private psychiatric clinics in New York which

included ages birth to age 18 the prevalence of SUDs alone was less than 1%[81]. The authors in this latter study suggested that this low rate may have been at least partly attributable to under detection but there was probably also considerable bias introduced by the dynamics of access to this type of expensive and specialized care.

Studies of Samples Selected by Diagnosis

Three studies also came up in the review that selected participants *by diagnosis* from different settings and then reported on the prevalence of SUDs in those samples. Rohde et al. (2001) reported one or more lifetime SUD in about 11% of teens with depression recruited to a treatment trial[82]. Karlsson et al. (2006) reported that 16.5% of consecutive outpatients with depression aged 13 to 19 years from two clinics in Finland also had SUDs; while qualifying that in their system SUDs are usually treated in other settings[83]. Finally, Diamond et al. (2006) found that more than 72% of 600 adolescents aged 12 to 18 years with marijuana abuse and depression in outpatient treatment in four cities in the U.S. endorsed acute levels of symptoms of both internalizing and externalizing syndromes[84].

Current Knowledge on Concurrent Disorders by Type and in Sub-Populations

Pairs or Groups of Disorders

The literature on the MDs that are most strongly or commonly associated with SUDs in adolescence is also relatively well developed and consistent, despite the fact that the typical approach to estimating co-occurrence frequency often starts with a sample with one disorder and counts the prevalence of a second disorder rather than starting with all youth with any disorder or in the total population and measuring overlap[85]. Several authors also warn that unique risk associations and temporal patterns underlie pairs of disorders that can be masked when examining broader groupings[86]. In this section, information found on each pair/group of disorders is summarized. Several authors list the classes of MDs that are most commonly concurrent with SUDS to be ***disruptive behavioral disorders, mood disorders, anxiety disorders, eating disorders*** and ***personality disorders***[7,87]. Many investigators also describe concurrence of SUDS with disorders further grouped as ***externalizing*** or ***internalizing*** disorders. This reduces clarity and comparability of very specific findings, but the general findings are reasonably consistent in spite of this. A few authors also discuss concurrence of SUDs and ***psychotic disorders*** (e.g. Milin 2008)[88] and ***learning disorders*** (e.g. Fagan 2006)[89], but the number of articles on these topics was insufficient for generalizations to be made. The most current and recommended source for more detailed information on most of these pairs of concurrent disorders is Kaminer and Bukstein (2008)[87].

Disruptive Behavioral Disorders: (Conduct Disorder (CD), Oppositional Defiant Disorder (ODD) and Attention Deficit Hyperactivity Disorder (ADHD)

Comorbidities are prevalent among the specific disorders in this class even before concurrence with SUDS is considered. For example, a recent chapter on ADHD in children and youth notes that half of clinical samples have ODD or CD[58]. Disruptive behavior disorders (DBDs) are also strongly and consistently associated with SUDS (both specific and grouped disorders) in both community and clinical populations of adolescents in the U.S., Europe, South America and New Zealand[47, 90-100]. Estimates of co- or pre-occurring CDs range from 50 to 80% of adolescents with SUDS[90,101,102]. In studies published in 1999 and 2002 on a sample of junior high school students in the American mid-west, Molina et al. found that ADHD alone was not associated (cross-sectionally) with substance use but that the ADHD/CD combination was strongly associated[101,103]. Among youth aged 14 to 19 in inpatient and outpatient SUD treatment, 30% had high ADHD symptom counts and 73% had three or more CD symptoms. In this clinical population, the ADHD/CD/SUD cluster was associated with illicit drug use, higher levels of alcohol use and higher clinical severity. In a large sample community study of 15- year-olds in Scotland, CD and ODD were strongly associated with all categories of substance (both alcohol and cannabis) abuse and dependence[104]. ADHD was also associated, but less strongly. In a general population sample screened for ADHD symptoms in Finland, Hurtig et al. (2007) found a strong clustering of ADHD with CD, ODD,

SUD and mild depression[105]. Wilson and Levin reviewed the relevant literature in 2005, and concluded that those with ADHD are more likely to have ODD and CD as well as other concurrent disorders, and to have earlier onset of alcohol use disorders, to abuse multiple substances and to receive treatment for a SUD[106]. Weis (2008) also reports that approximately 15% of those with ADHD will go on to develop at least one SUD[85]. Wilens et al. (2008) provide a very recent and detailed review of ADHD and its overlap with SUDs[107]. Others have also documented earlier, more frequent substance use and greater likelihood of multiple substance use among those with CDs[85]. Riggs (1998) also concurs that youth with both CD and ADHD have earlier onset of SUD, more severe SUD and worse prognosis[108]. In longitudinal studies, Sartor and colleagues have found that CD is a "*most potent predictor of early alcohol initiation*" [109 p.216].

There was an intensity of research on this topic unlike any other in the review, with many studies examining both frequency and etiology and continuing to the present day. Flory et al. published a review article of 27 studies in 2003, and at least 10 studies were identified in our search for 2007 and early 2008 alone[110]. Most studies are focused on examining the associations of SUDs with CD and ADHD separately. Many authors contend that the association with ADHD is mostly attributable to the CD association when these are grouped[47, 91,106,110,111] yet others have found that the association with ADHD persists after adjusting for CD[95,98,99,104,110,112]. Conduct problems were found to be significantly related to substance use, abuse and dependence in youth and young adults even after controlling for attention problems in a large birth cohort in New Zealand, but attention problems were only weakly associated after adjustment for CD[99]. A study of male adolescents in Brazil that compared those with ADHD to community controls found that ADHD was associated with illicit SUD even after adjusting for CD and other confounders. In the Pittsburgh Youth Study (PYS), Pardini et al (2007) followed over 500 boys from mid-adolescence to their mid-20s. Early CD symptoms consistently predicted SUD symptoms and alcohol dependence, and in combination with depression elevated risk for higher severity of SUDS. ADHD symptoms, however, were not found to predict SUD symptoms or diagnosis after controlling for other psychopathology[112]. One serious problem with the literature on separate disorder associations, and in the literature on DBDs in particular, is the general tendency of researchers to examine one disorder while "controlling" for others. Because these disorders are so highly correlated, and there is increasingly evidence of some common pathophysiologic mechanisms or causal pathways, this type of analysis may not be appropriate.

While the subtleties continue to be debated, this line of research is beginning to bear fruit in teasing out specific patterns among these disorders and even their causal relationships[113,114]. In a very recent article, Button et al. (2007) conclude that "*CD in adolescents explains, in part, the co-occurrence of alcohol and illicit drug dependence. Specifically, the genetic contribution to their covariation is explained partially by the genetic contribution in common with CD*"[114p.46]. One caution is that many of these studies have focused on adolescent boys so gender patterns are not so well explained.

Mood Disorders – Depression, Bipolar and Related Disorders

Depression is thought by some to be on the rise among adolescents. Even without an increase, their separate and combined frequencies have huge public health significance[115]. In terms of concurrence, most studies or reviews report a significant association between depression and SUDs although it is not nearly as strong as the association with DBDs[1,5,47], and there are a few dissenting studies. Zeitlin (1999) and Weis et al. (2008) suggest that rates of 24 to 50% of adolescents with SUDs have depression[85,90]. Substance abuse was also found to be very prevalent among the adolescents in a sample of 900 children adolescents with depression in Pittsburgh areas clinics[116]. However a recent study by Gau et al (2007), in Taiwan found no association between depression and SUDs in 428 12-year-olds followed three years[95]. The authors speculated that this finding may have been due to the relatively young age and short follow-up of participants. In a German longitudinal cohort of adolescents aged 14 to 17 at inception and followed 10 years, depression also associated with cannabis use disorder[97]. West et al. (2003) found moderate associations between depression and any of alcohol abuse, nicotine and marijuana dependence in Scottish

adolescents[104]. Depression has also been seen as a third disorder which exacerbates severity when SUDs and CDs are already concurrent[112]. In a recent summary on this topic, Cornelius et al. (2008) concludes that the association between depression and SUDS is established in large surveys and clinical samples with a doubling of likelihood of depression among adolescents with alcohol use disorders and nearly five times the risk for adolescents with cannabis use disorders[117]. These authors also note that depression is more likely to be found if the onset of the SUD is in adolescence versus adulthood.

On the topic of temporal relationships between depression and SUD, the evidence indicates that either disorder can develop first or both can develop simultaneously. In one scenario (the theory of self-medication) individuals use substances to alleviate symptoms of depression. In another scenario, substance use (particularly alcohol) results in low mood biochemically or through social consequences such as job loss or relationship problems[91,118]. The evidence that SUDs can induce mood disorders has accumulated in adults and is now well accepted[35,57]. In some natural history studies the disorders also have been shown to develop at virtually the same time. Chinet and colleagues, reporting on a longitudinal study of Swiss substance users aged 14 to 19 years and published in 2006, observed that *"depressive states and substance use in adolescence appear to be closely, but rather synchronically related"*[119 p.153] . These, along with findings for other disorder pairs underscore "*the heterogeneous nature of comorbidity."*

There was less information found in the review on the association between bipolar disorder and SUDs in adolescents, but strong co-occurrence in adults has been documented in both the ECA and NCS surveys[120]. In 1999, Wilens et al. found that the risk for a subsequent SUD was higher if bipolar disorder onset was in adolescence rather than childhood and that the increased risk for SUDs in those with a history of mania was independent of CD[121]. Evans et al. (2005) indicate that the literature to that date supported an *"extensive and bidirectional overlap between mania and SUDs in youth"* [5p.23] based on research including a prospective study of children and adolescents with and without ADHD, and mania has also been found to be prevalent in samples of youth with SUDs. In a recent general review article on bipolar disorder, Birmaher and Axelson (2006) report that evidence is good for high rates of SUD in bipolar spectrum disorder in adolescents and that those with concurrence have worse outcomes[122]. The most comprehensive material found on this topic, (including prevalence of overlap in all studies to 2004) was Goldstein (2008) where the authors declare *"Of all major psychiatric diagnoses, bipolar disorder arguably shares the strongest association with SUDs."* [123p. 243], and that this combination of disorders is particularly burdensome with respect to chronicity, cyclicity, health, service use, morbidity and mortality. These authors also note that there is significant risk for SUDs even among those with subclinical bipolar symptoms.

Anxiety Disorders (ADs)

Associations between ADs and SUDs are not as strong or consistent as those for DBD and mood disorders[1,47,128]. In an analysis of data from the Methods for Epidemiology of Child and Adolescent Disorders (MECA) study, Goodwin and Gotlib (2004) found no relationship between panic attacks and SUDs, even though panic attacks are associated with a range of anxiety and mood disorders[124]. Zeitlin (1999) reports that the proportion of adolescents with SUDs that have ADs ranges from 7 to 40% across studies, which are only greater than base rates in the population at the higher end[90]. Essau (2008) provides a summary of literature from the 1990s that shows higher rates of ADs in SUDS [125]. For example, in one study 50% of adolescents with alcohol use disorder had at least one lifetime AD[125]. This author also suggests that social phobia and agoraphobia usually precede alcohol abuse, while panic disorder and generalized anxiety disorder tend to follow. Primary studies found in this review gave a variable picture. In a retrospective community-based study Giaconia et al. (2000) found that nearly 20% of 384 18-year-olds (from one school district in the northeastern U.S.) with a lifetime SUD had experienced at least one DSM-defined trauma suggesting an association with post-traumatic stress disorder (PTSD)[126]. In a German cohort study published in 2007, Wittchen et al. found symptoms of panic and anxiety to be associated with cannabis use disorder but effects were much weaker than for other disorders[97]. West et al.

(2003) found associations between ADs and SUDs to be present but weak in a large population-based sample of 15-year-olds in Scotland[104]. In a study based in Taiwan, Gau et al (2007) found no association between ADs and SUDS in a school-based sample of young adolescents from average age 12 to 15[95]. Longitudinal studies have similar contradictory results. In the PYS, boys with high levels of anxiety and withdrawal were actually *less* likely to develop SUDs over time[112]; in contrast with a follow-up study of the offspring of male twins from the Vietnam Era Twin Registry, wherein generalized anxiety disorder did predict progression to alcohol dependence after first use[109]. Cornelius et al. (2006), in a more recent review of the evidence, concludes that anxiety disorders are common presentations in clinical populations with SUDs, with social phobia and PTSD being most common[120].

There are several possible reasons for these mixed results. First, to date there have been many fewer and less rigorous studies of the association, including studies which may be underpowered to detect associations in these less frequent conditions. Several authors suggest that the association with ADs may differ by specific diagnosis within the class with strongest associations found for PTSD[111,125,127]. Data from the Greater Smoky Mountains Study (GSMS), recently reanalyzed, suggests that the risk of substance use initiation varies according to the specific type of AD; with children with generalized anxiety disorder symptoms initiating earlier and children with separation anxiety disorder symptoms initiating later than others[127]. Other research suggests that associations may also be specific to type of substance used[97]. Effects may also be vary by gender, as they are with single mood and anxiety disorders, showing up in studies of only one gender but masked in mixed gender studies if analyses are not gender-specific. With respect to etiology, several authors (2000) conclude that there is as yet no confirmed causal mechanism for SUDs and ADs, although hypotheses have been put forth for both causal directions [126, 128]. The most thorough and recent material on the AD/SUD association found in the review was Clark et al. (2008)[128].

Eating Disorders (EDs)

Despite a smaller volume of research on the association between EDs and SUDS, the studies have been high quality and nicely sequenced on this topic. Clinical observations of MDs comorbidity in EDs disorders (including dysthymia, panic disorder and major depression) that are the same disorders that frequently co-occur with SUDS have been made for many years (e.g. Zaider 2000[129]). The lifetime prevalence of SUD is estimated to be 12 to 21% for those with EDs compared to 11% in the general population[5]. According to several authors, up to 37% of individuals with EDs present with concurrent SUDs[5,85,130] with a higher frequency of SUDS among those with bingeing symptoms[85,130]. In a review of research on the specific association between EDs and SUDS published in 2002, Glantz noted that two types of disorders commonly co-occur but that temporal order was not yet established[111]. Other informative studies from that time include a population-based study by von Ranson and colleagues (2002) that found that disordered eating *attitudes* were associated with substance *use* in adolescent and adult women, but that the associations (in both cases disorders themselves were not measured) were present but not strong[131]. In 2004, Stice et al. published a very sophisticated study that confirmed the concurrence of bulimia nervosa, depression and SUD and examined the temporal process. The findings suggested that bulimia nervosa and depression emerge together because each increases the risk for onset of the other (reciprocal risk); and that in EDs, substance use increases the risk for subsequent depression rather than vice versa. It was also speculated that bulimia and substance use may share a common risk factor such as impulse control dysfunction; other causal hypotheses have also been tabled[132,133]. The abuse of other substances (e.g. diet pills, laxatives, diuretics and emetics) are notably present in EDs as well[130]. Very recently, in 2007, Piran and Gadalla published an analysis of Canadian Community Health Survey (CCHS) on a very large cross-sectional sample (20,211; women only) and found significant associations between risk for EDs and alcohol dependence, alcohol interference, lifetime and past year illicit drug abuse and dependence across age groups including youth aged 15 to 24 years[134].

Personality Disorders

An association between the personality disorders on DSM Axis II (especially antisocial personality disorder) and SUDs is well-established in adults[86,135]. In a sample of German adolescents, Barnow and colleagues (2002) found an increased likelihood of an anti-social personality disorder diagnosis among youth aged 12 to 18 years with alcohol problems[92]. Most other empirical or commentary articles addressed the sequential association of SUDS in adolescents and *later* risk for personality disorders in adulthood. For example, Thatcher et al. followed 355 adolescents from clinical and community sources from average age 16 to average age 22 and found that adolescent alcohol use disorder was significantly associated with increased borderline personality disorder symptoms in young adulthood[136]. Glantz (2002) speculated that borderline personality disorders is assumed to precede SUDS because its symptoms start in childhood whereas antisocial personality disorders tends to be diagnosed more in adults[111]. There are studies that provide contradictory information, however. Johnson and colleagues published a longitudinal study in 1999 that showed the opposite course; a community sample in New York state of 717 adolescents with personality disorders had elevated risk for SUDS as well as major mental disorders and suicidality in adulthood[137]. In analysis of a later wave of follow-up of the same sample, Cohen et al. confirmed that personality disorders (especially borderline personality disorders) and related symptoms in adolescence were associated with SUDS in young to mid-adulthood, even after adjustment for other factors including CD[96]. So it seems that in personality disorders there are also complex relationships with SUDS according to type of disorder and presentation, with some confusion in the temporal relationships attributed to assumptions about typical ages that personality disorders manifest.

Concurrent Disorders by Demographic Variables – Age, Gender, Ethnic Status

Age

In 1999, Angold and co-authors identified a need for better understanding of age and gender effects in concurrent disorders. Since that time dozens of studies have directly or indirectly examined demographic variables so there is much more now known. With respect to age, the bulk of the literature addresses the sequence of disorders across the *full age range* i.e. transitions from disorders in childhood and preadolescence and to disorders in young adulthood through middle adulthood, which will be outlined in a later section on Natural History. Since the focus of this review is the adolescent age group, only findings that address age and concurrent disorders *within* the adolescence age band will be discussed in this section.

The literature is quite detailed with respect to age of onset of SUDs and MDs, but there are very few studies that specifically examine age variation in concurrent disorders *within* the teen years. For example, there is consensus that earlier initiation of substance use increases the risk for SUDS compared with later onset (see for example Winters 2008)[138]. In a broad population sample of 1269 American adolescents, Sartor and co-investigators documented the age of peak hazard for developing alcohol dependence was age 15 to 19 years and contend that this risk period is robust even with variation in period of prior use. Further, the typical age of first drink of alcohol was found to be 15.7 and alcohol dependence onset to be 19.1 years[109]. Once concurrent disorders are factored in, the picture becomes much more dynamic. Libby and colleagues (2005) showed that patterns of development of concurrent depression and SUDs can vary even in the narrow age range between age 13 and 19, with depressive symptoms followed by substance use in some youth and the reverse in others[139]. In the mid 2000s, longitudinal studies began to include genetic variables and information sources in addition to self-report. For example, Silberg et al. reported on a very high quality analysis of prospective data from the Virginia Twin Study, which covered the period of age 12 to 17. These authors also found the same pattern of CD preceding substance use in adolescence and depression following[22]. But other studies, including one using path analysis in a large (N = 1028) Swiss sample of youth aged 11 to 20 continued to show negative mood as a preceding SUD[140]. Tubman et al. (2004) followed a large community sample of 5045 grade six and seven students in South Florida for three years[141]. Substance use and disruptive behavior increased separately as well as jointly

across this age span – each being a risk factor for the other, with slightly greater likelihood for substance use to follow DBD. Sung and colleagues reported on dynamic age transitions in relation to sequential concurrent disorders in and analysis of longitudinal data from the GSMS: "*the risk of transition to SUD increased with age at onset for onsets before age 13, but began to fall for onset at 14. Among users, use alone, without early conduct problems, led to an 11% prevalence of SUD by age 16. Past conduct disorder (CD) had a strong additive effect at ages 13–15, but at age 16, when substance use and abuse became more normative, the excess risk from prior CD decreased"* [142 p.287].

The risk of concurrent disorders generally is shown to increase with age during the teen years, as would be expected [72,133,141]. However in cross-sectional samples in treatment settings this expected age pattern does not always hold. Among 1734 consecutive admissions of youth aged 11 to 18 years to 23 SUD treatment programs in four American cities (the Drug Abuse Treatment Outcomes Studies for Adolescents (DATOS-A)) about 64% had at least one lifetime concurrent disorder, and those with concurrent disorders were *younger* than those without[69], likely as a result of a higher index of concern for early substance misuse and related problems increasing the probability of referral for treatment.

Gender

Differences between the genders in *single* disorders in adolescence are quite well known. While males are at higher risk for alcohol dependence, females are at higher risk for depression and eating disorders [109,133]. Externalizing disorders are more common among both teenage boys but are also quite common in girls; though they decrease with age during adolescence in girls[133].

Gender patterns are much more obscured and seem to be inconsistent once concurrence is present[18]. Measelle et al. (2006) report that rates of co-occurring psychopathology are high in girls and that the frequency of concurrence can be higher than that of single disorders[133]. Findings from population-based studies have generally not found large differences between the sexes in concurrent disorders overall. In the GSMS, Costello and colleagues found girls and boys to be more similar than different in the course of substance use and abuse and its association with psychopathology[143]. Other early studies have found no strong gender differences in the presence or pathway of the most common concurrent disorders[62]. Since the mid 2000s larger studies with more detailed examination of gender patterns have been published. In a more in-depth analysis of the GSMS, Sung and colleagues reported that among those with a history of depression, only the boys were at increased risk for developing an SUD[142]. In girls, anxiety was associated with SUDs at age 16 but did not predate the SUD. In 2003, Costello and co-authors reported more recent findings from the same study indicating that girls did have more marked comorbidity (both homotypic and heterotypic) than boys overall and that while boys were at higher risk of SUDs alone, girls with ADs or CDs had higher risk of subsequent SUDs than boys[31]. These detailed analyses indicate that comorbidity patterns can be complex when analyzed by age, gender and disorder. Females were also found to have a higher frequency of *any* comorbid disorder than males in a population-based sample of 15 year olds in Scotland, but in this case, the difference was not statistically significant even in a fairly large sample[104] and SUD/MD risk per se was not parsed out by gender. In the most recent population-based study found, 4175 youths aged 11 to 17 years were surveyed in the 'Teen Health 2000 Survey', and among teens with SUDs, girls were more likely to have a concurrent disorder[72].

The inconsistencies in findings on gender are also evident in studies of SUD treatment populations, including studies of very high risk populations. Complex gender differences in prior psychiatric disorders are tabled by the researchers in a study 149 adolescents seeking help for substance use problems in a Swedish clinic[77]. In a large national sample of SUD treatment clients aged 14 to 17 years in the U.S., similar frequencies of ADHD, overanxious symptoms, CD and panic disorder were found for the genders but girls had more concurrent symptoms of depression and more formal diagnoses of clinical depression. The authors proposed that, in a treatment sample where males were in the majority overall, the girls may have had to be more impaired to receive treatment. In another study, no strong overall gender differences

were found among adolescents in inpatient and outpatient SUD treatment but minor differences including more ADHD/CD in males and more concurrent mood disorders in females were found[144].

Findings are similar for adolescents in mental health treatment settings. In a small clinically referred sample of adolescents with depression, Kovacs et al. (2003) found more concurrence with EDs in girls and more concurrence with SUDs and externalizing disorders in boys[145]. Depressive symptoms tended to manifest at the same time as other disorder symptoms in girls but not so in boys, indicating that even short-term temporal patterns may be nuanced by gender. Studies of high risk populations such as youths in juvenile justice services or even incarcerated youth have similar contradictory findings – that there are no large differences by gender, but where differences are found they point to females having higher risk on nearly all measures mental health impairment and of overall with minor gender differences by type and severity of disorder or clinical history[34,78,146-148].

In 2004, authors of two reviews concluded that once adolescents reach care, there are few differences in prevalence of concurrent disorders by gender[75,102]. However, in a very recent study of adolescents aged 12 to 18, in 59 treatment programs *specifically* designed for concurrent disorders, Deas (2006) found DBD to be the most prevalent concurrent disorder in both males and females but females were more likely to meet substance dependence criteria, to have anxiety disorders, to have a history of suicide attempt, and to have experienced sexual abuse[50]. The author concluded that there are some very real and specific gender differences in the concurrent disorders population[50]. Similarly, Rowe et al. (2003) in an examination of youth in SUD treatment, found that more boys were identified as having concurrent disorders, girls were more severely affected and had the least favorable treatment outcomes[149].

In summary, research to date on sex differences in concurrent disorders suggests that sex differences do exist which may be masked by general analyses. Once disorders are present, girls seem to be at higher risk for concurrence overall and a greater range and severity of psychopathology. There is room for more methodologic refinement in this literature, for example Armstrong and Costello (2002) express a concern that few studies control for differences in base rates of single disorders by gender in different samples[47]. There seems to be very little exploration of gender-based measurement effects in this literature such as gender differences in *willingness to report* symptoms and general distress.

Ethnicity

Ethnicity is a relatively understudied topic in relation to concurrent disorders in adolescents. In this review only a few studies emerged on the topic. It is important to note that in the abstract selection process emphasis was put on studies that reported on ethnic populations that were relevant to the Canadian context – to ensure relevance to the audience of this review. It was our impression that few focused studies on the topic were available and that the selection process did not eliminate many, but even so our conclusions should not be generalized beyond the parameters of the review.

Only one population-based study reporting on ethnic differences in comorbidity for the age group of interest (other than simple sample descriptions) was found in the review. A study of (mostly) adults was added to supplement the information. This latter study was a comparison of a clinical sample of women with depression, compared to 4000 women aged 15 to 54 years from the NCS[150]. Over half of both samples were found to have at least one comorbid disorder. There were no differences across samples in relation to comorbid SUDs and depression, and the authors concluded that there are very few ethnic differences in comorbidity. Armstrong and Costello (2002) comment:

> "*With regard to ethnicity, very few studies had sufficiently diverse samples to detect group differences. Although Kandel et al. (1997) reported that Hispanics were less likely to develop psychiatric comorbidity and African Americans were more likely to develop psychiatric comorbidity compared with Whites, none of the current studies controlled for poverty status in*

> *analyses linking ethnicity to psychiatric comorbidity. Also, the lower rates of psychiatric comorbidity in Chong et al.'s (1999) Taiwanese sample suggest that the differences may be somewhat attributable to cultural influences such as perceptions of drug use and attitudes toward symptoms of anxiety and depression"* [47 p.1235].

A large population-based study of adolescents was conducted by Roberts et al. and published in 2007. In this analysis, which addressed many such study weaknesses, no significant differences in concurrent disorders were found by ethnic group[72].

A few studies were also found which examined ethnic status in adolescent treatment samples. Among 1734 consecutive admissions to 23 SUD treatment programs in four US cites, two-thirds were found to have concurrent disorders, and those with concurrent disorders were more likely to be Caucasian than those without[69]. This finding could be attributed to biases resulting from unequal referral patterns, which were not well described in the article. In a similar study reported by Robbins et al., of 167 youth aged 12 to 17 in outpatient SUD treatment, overall proportions with comorbidity were very similar for Hispanic youth compared with African Americans[151]. There were only slight differences in expressed symptoms.

With respect to First Nations/Aboriginal groups, Whitbeck and co-investigators (2006) conducted a survey of reservation-residing early adolescents (age 10-12) on four U.S. and five Canadian reservations in the Midwest[152]. Culturally sensitive research methods were used and a high participation rate was achieved. Even at this young age, nearly one quarter of the participants met criteria for at least one of a list of disorders which included SUDs and MDs. Nine percent met criteria for two or more. Externalizing disorders (ADHD and CD) were more common than internalizing or SUDs at this age, with ADHD and CD common. The authors noted that the rates they found were *three times* more than those found among Cherokee children in the GSMS for comorbidity of any type and two times for SA, behavioral and depressive disorders. ADHD was several times higher.

Patrick Abbott published a review of the literature on concurrent disorders in American Indian and Alaska Natives in 2007, nothing at that time that the literature was sparse [Abbott 2007[49]]. He described several tribal-specific, small area or special settings (e.g. boarding school) studies published in the 1990s and for ages 9 to 18; all reporting concerning rates of comorbidity. Comorbid disorders were depression, suicidal ideation, alcohol and marijuana use, DBDs, generalized anxiety disorder and PTSD. Rates of service use for these problems were very low, where reported, even where there was healthcare coverage.

Concurrent Disorders in High Risk Groups or Settings

Our searches yielded many articles on the topic of concurrent disorders in high risk groups or special settings. These included youth in foster care or child welfare, homeless or runaway youth; and youth in youth in juvenile justice settings. There is clearly overlap among these groups of high needs youth.

Child Welfare/Foster Care

Two studies came up in the search that shed light on multiple disorders in child welfare or foster care populations. Although neither reported on the frequency of concurrent disorders *per se* the high prevalence of many disorders that are commonly concurrent in higher risk populations has obvious implications for these youth. In a study of all cases aged 12 to 18 years in the New York Child Abuse Registry from mid-1989 to mid-1993, Pelcovitz et al (2000) found all of depression, anxiety disorders, PTSDs, CDs and substance use to be very prevalent[153]. The so called 'double jeopardy' group (exposed to both interparental violence and physical abuse) had much higher rates of disorders. Youth aged 12 to 17 years in foster care were compared to those not in foster care in data from the National Household Survey on Drug Abuse, a large nationally representative survey in the U.S.[154]. Those in foster care had a much higher prevalence of psychiatric symptoms in the past year, five times the risk of drug dependence and four times as many suicide attempts than those not in care. The coassociation of child maltreatment,

poverty, domestic violence and caregiver substance abuse, as well as intergenerational transmission of these problems is well documented[58].

Homeless/Runaway Youth

Not surprisingly, all studies in the review for this 10-year period that examined concurrent disorders among homeless or runaway youth found very high proportions of concurrence[32,33,155,156]. McCaskill et al. found these high risk youth to have more DBD, more alcohol use (but not necessarily abuse) and worst psychopathology symptoms, though no more affective disorders or psychotic disorders[155]. Three reports on concurrent disorders from a baseline and later wave of a sample of 428 homeless youth aged 16 to 19 years in eight U.S. midwestern cities were published in 2004 and 2005[32,33,156]. At baseline single disorders were 2 to 17 times more prevalent in these youth; most common were CD, and PTSD. Two-thirds had at least two of five lifetime MDs, two thirds had at least one lifetime SUD, half had a past year SUD and 93% of those with an SUD had at least one MD. Older males, those who had been victimized and those engaging in deviant subsistence behaviors were more likely to have concurrent disorders. In another analysis of the same sample, Chen et al. reported that those with SA, CDs and multiple internalizing and externalizing disorders were more likely to have conflict with the law[156].

Juvenile Justice Services

Similar and consistent findings are reported for youth involved with the justice system from studies found for the full date range of the review. Randall et al. (1999) reported that among a sample of juvenile offenders aged 12 to 17 years in South Carolina, SUDs were frequently comorbid with both externalizing and internalizing disorders and those with externalizing disorders had worse outcomes[157]. In similar studies, Thomas and Penn (2002) and Garland et al. (2003) reported high rates of concurrence across psychiatric disorders (CD, ADHD, mood and anxiety disorders and PTSD)[39,158]. Even this very specialized literature mirrors the concurrent disorders literature generally in the past 10 years with trends toward larger, more rigorous studies and even longitudinal research in recent years. Abram and Domalanta et al. both published studies in 2003 with large samples of youth – 1829 aged 10 to 18 years in juvenile detention in the Chicago area and 1024 aged 11 to 18 years in Houston, Texas, respectively. Both studies found concurrent disorders to be a major problem in these youth. In the Abram study nearly 57% of females and 46% of males had two or more disorders; 30% of females and more than 20% of males with SUDs had a major MD[34]. Very high frequencies of both single and concurrent disorders were also found in the study of incarcerated youth, in both genders and all ethnic groups. Sadly, even in this very high service population, most of the disorders were undiagnosed[146]. McClelland et al. found homotypic comorbidity to be very common in a sample of juvenile detainees aged 10 to 18 years from a temporary detention centre in Chicago in that half of those with SUDs used multiple substances[159]. Of those with alcohol use disorder, 80% had at least one other drug use disorder. Course and outcomes of concurrent disorders are very serious among these youth as well. Hussey et al. (2007) found that among 211 juvenile detainees with substance use problems in treatment in a detention center in Ohio, those with a concurrent MDs had a higher prevalence of violent offenses, polydrug use, use of harder drugs, more severe consequences and poor treatment outcomes including higher rates of relapse[78].

KEY POINTS: Epidemiology of Concurrent Disorders in Adolescents

- Although absolute precision in estimates is unlikely to be achieved, evidence is consistent with respect to general ranges of the frequency of concurrent disorders in community and treatment samples; with the highest percentages of concurrent disorders found in SUD treatment settings and populations with multiple risk history or behaviors.
- The mental disorders with the strongest associations with SUDs in teens are DBDs, mood disorders (in particular bipolar disorder), PTSD, EDs and borderline personality disorder.
- Gender differences in concurrent disorders are not large in general analyses, although girls seem to have moderately higher risk and poorer course and more subtle differences do emerge in finer grained analyses.
- Ethnic differences are also not marked, and where they are found they are often confounded by social disadvantage.

CHAPTER THREE

Natural History/Longitudinal Course of Concurrent Disorders

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Natural History/Longitudinal Course of Concurrent Disorders

A really impressive amount of longitudinal research has been done in the past couple of decades that gives a relatively comprehensive picture of *normal development* from birth to adulthood (see for example Stroufe 2005)[160] as well as *problematic development* including comorbidity, broadly defined, and how it manifests across the lifespan. Most studies have examined the sequence of disorders, not the more bounded course of concurrent SUDS/MDs per se, but the composite set of information was retained for contextual relevance for the narrower topic.

The first set of studies discussed in this section are those with the greatest scope, that is, with relevance to the whole age range. One very recently published article by Kessler et al. (2007) reports on age-of-onset findings from the representative, large sample multiple country World Health Organization mental health surveys[161]. This research is limited by measurement based on recall of symptoms and some circularity (i.e. if a disorder occurs at a certain age it tends to be labeled a certain way) but it does provide some benchmarks for interpreting more circumscribed studies. The authors provide median and interquartile range for age of onset in years for the following disorders: phobias (7-14); impulse-control disorders (7-15); other anxiety disorders (25-53); mood disorders (25-45); and SUDs (18-29). ODD, ADHD and CD (along with intermittent explosive disorder) were grouped under impulse-control disorders. As would be expected severe disorders follow less severe disorders and conditions with later onset are usually considered to be secondary. Most disorders are not detected at the time of onset and treatment typically follows onset of most conditions by several years. Other authors have highlighted some key findings from this research relevant to the disorders commonly co-occurring in adolescence[115], including the observation that about half of mental and behavioral disorders begin between the ages of 7 and 24 years, with typical onset of DBDs and anxiety in the prepubertal years, and typical onset of SUDs and mood disorders in the teen and young adult years.

One of earliest longitudinal studies found in the review to document the course of concurrent disorders per se was also one of the longest. It was the 'Caring for Children in the Community' study which followed a large population-based sample of children from two New York counties from the mid 1970s through the mid 1990s (about age 9 through age 28). Brook et al. (1998) analyzed data for 698 of this sample from childhood to young adulthood and reported[162] patterns of depression, anxiety and DBD with marijuana, drug and tobacco use over time. Substantial comorbidity was found among the disorders assessed and SUDS (for a range of substances and including quantity/frequency measures). Earlier adolescent drug use was associated with later depression and DBDs in young adulthood, but earlier psychiatric disorders did not predict changes in young adult drug use. Specific analyses on temporal patterns for personality disorders were also published by others as discussed in the previous chapter[96,137]. The pattern reported by Brook et al. for drug use and DBDs in 1998 was contradicted by later research, including another study that spanned the full age range[99]. This study was a large sample (N = 1265) New Zealand birth cohort followed for 25 years, which documented a pattern of early conduct problems leading to all of substance use, abuse and dependence in young adulthood, even after adjustment for attention problems and other confounders[99].

Most longitudinal studies span shorter time frames, giving information on either the transition from childhood to adolescence or adolescence to adulthood but not both. These studies are discussed in the next two sections, respectively.

Disorder Transitions from Childhood/Preadolescence to Adolescence

Some influential population-based cross-sectional studies were published in the late 1990s that documented associations between depression, ADHD, DBDs and SUDs among adolescents[48,103]. The

authors called for examination of longitudinal patterns of these disorders, which were suggested in the cross-sectional samples. In 2000, Merikangas and Avenevoli (2000) reported on the 'Yale High Risk Study of Comorbidity of Substance Use and Affective Disorders' (YHRS), which had followed 340 probands, 1626 first degree relatives, and 203 offspring aged 7 to 17 in New Hampshire and Connecticut families for eight years to that point. These authors found depression, anxiety, CD and ODD in children to be predictive of substance dependence at follow-up, and also noted familial factors to be very strong in the development of SUDs[163]. In a 2002 review of the literature on *externalizing disorders* (CD, ODD, ADHD) specifically, Farmer and colleagues noted that evidence was mounting that large proportions of adolescents with SUDs had either or both of pre-occurring or concurrent externalizing disorders[93]. While SUDs meeting diagnostic criteria were acknowledged to be rare in preadolescence, these authors noted that externalizing disorders manifest early, with onset in 25% before age 13 (antisocial behavior as early as age nine and ADHD as early as age five). Compton et al. (2002) provided a parallel review of the evidence for the risk of *internalizing disorders* developing into SUDS, and noted that although most of the data to that date was based on recall of onset, there was reasonably good evidence for ADs preceding SUDs, and in females, depression preceding SUDS[164].

In two primary articles, Costello and various colleagues reported on data from the longitudinal GSMS which followed more than 1400 children from the general population from age 9 to age 16[31,143]. The study was specifically designed to examine trajectories of the most common comorbid disorders by gender and age over the seven year follow-up:

> "*Some disorders (social anxiety, panic, depression, and substance abuse) increased in prevalence, whereas others, including separation anxiety disorder ADHD, decreased. Lagged analyses showed that children with a history of psychiatric disorder were 3 times more likely than those with no previous disorder to have a diagnosis at any subsequent wave (odds ratio, 3.7; 95% CI, 2.9- 4.9; P<.001). Continuity of the same disorder (homotypic) was significant for all disorders except specific phobias. Continuity from one diagnosis to another (heterotypic) was significant from depression to anxiety and anxiety to depression, from ADHD to ODD, and from anxiety and CD disorder to substance abuse. Almost all the heterotypic continuity was seen in girls. The risk of having at least one psychiatric disorder by age 16 years is much higher than point estimates would suggest"* [31p.837] .

Another of the many major findings from this study was that DBDs and depression at earlier stages were associated with more severe and earlier onset substance use and abuse in adolescence[31]. A commentary on this study published in the Lancet underscored its importance in revealing the shifts in how disorders manifest in a short period during adolescence and in elucidating dynamics by gender[165]. It emphasized the findings of more symptoms in boys at younger ages (9 to 10 years) but similar presenting disorders, followed by big changes, such that even by age 13 to 14 years , and the greater risk for girls for concurrence if they have any disorder. Most importantly, having a psychiatric disorder in childhood was found to nearly quadruple the risk of having a psychiatric disorder in adolescence. The authors note that this study clearly grounds the roots of adolescent disorders in earlier life. In subsequent comprehensive review articles Costello and colleagues have summarized the broader related evidence and offered many important insights and recommendations [54,55].

Similar, though not as monumental findings are reported for treatment samples followed over time, whether the treatment is for SUD or for MDs generally. In 2003, Mutale et al. published their findings from a sample of recipients of a child psychiatry service that CD and antisocial behaviors in children predated substance misuse in adolescence; noting that *even children in treatment* often went on to develop SUDs[166]. Similarly, MDs, particularly anxiety and CDs were found to predate substance misuse in a single urban clinical sample in Sweden but depression tended to present at the same time or after SUDs[77].

Not only is there extensive evidence of the association between early symptoms and later disorders, this line of research is also underscoring the reality that psychopathology is a much more dynamic process than originally thought, and that emotional and behavioral problems also predict patterns of substance use, including clinical severity and transition to dependence[43]. These studies have also allowed authors to estimate that about 75% proportion of cases of alcohol and other drug abuse are preceded by some type of psychopathology[89] an important statistic for prevention planning. The evidence also continues to mount that the earlier childhood disorders (especially CD) present, the more serious the long-term course. In a very large nationally representative sample of adults in the (U.S.) National Epidemiologic Survey on Alcohol and Related Conditions, those who reported onset of CD before age 10 had significantly elevated likelihood of a range of psychiatric disorders: social phobia, generalized anxiety disorder, drug dependence, and several personality disorders. The authors concluded that "C*hildhood-onset CD appears to identify a more polysymptomatic and violent form of antisocial personality disorder, associated with greater lifetime comorbidity for selected Axis I and Axis II disorders, in nonclinical populations"* [44p.667]. The heterogeneity of trajectories is also beginning to be elucidated. Jester et al. analyzed data from an ongoing prospective study (in Michigan) of 335 children of alcoholic and non-alcoholic parents across ages 7 to 16 years and identified three trajectories of risk for SUD in adolescence. The highest risk was associated with increased aggressive and inattentive/hyperactivity problems throughout childhood; moderate risk with *only* increased inattention/hyperactivity and the lowest risk with neither problem[167].

Disorder Transitions from Adolescence to Adulthood

The story is very similar in terms of adolescent disorders predicting disorders in adulthood. In the Oregon Adolescent Depression Project (AODP), researchers followed a community sample of adolescents aged 14 to 18 for a subsequent seven years, and found that 80% of adolescents with alcohol use disorder had at least one other MD or SUD (depression, DBD, drug use disorder or tobacco use). They also confirmed that other disorders (especially CD and ODD) typically had their onset before AUDs and that concurrency was associated with earlier onset AUDs. Disorders that tended to follow AUDs were other substance disorders, depression and personality disorder (especially antisocial personality disorder) symptoms in young adulthood[62].

Rowe et al. (2004) noted the mounting evidence that adolescents with concurrent disorders were at elevated risk for antisocial and other personality disorders in adulthood[168]. Alcohol use disorder and other psychopathology at age 15 to 17 was found, after adjustment for childhood abuse history, to predict borderline personality disorder symptoms at age 20 to 24 years in 524 adolescents recruited from clinical and community settings in the Pittsburgh area[136]. The authors speculated that the underlying mechanism was emotional dysregulation, with more severe forms leading to diagnosed borderline personality disorder in young adults. In an analysis from the same study focused on the 256 boys with CD symptoms compared to 247 without from mid-adolescence through mid-20s, Pardini et al. found that CD symptoms consistently predicted SUD symptoms and alcohol dependence[112]. Depression was also associated with later SUDs; but boys with high levels of anxiety and withdrawal had a lower likelihood of SUD development. Concurrent CD and depression was associated with more severe SUDs. However, ADHD did not predict alcohol use disorders in young adulthood after adjustment for other psychopathology. Cohen and Wittchen both published studies in 2007 in population-based samples in New York and Germany that showed similar relationships between adolescent disorders (CD, depressive, bipolar and anxiety disorders), though less consistently, and incident and progression to SUDs (and specifically cannabis use disorder) in young adulthood [96,97]. Transitions from late adolescence to young adulthood have also been studied longitudinally for young women[169]. In a sample of 155 young women aged 17 to 19 followed five years, 9.6% of participants developed a SUD. Depression frequently co-occurred with SUDs during the post-high school transition with SUDS being predictive of depression over time but not the reverse. Significant problems with functioning, especially school functioning, were present in the young women with concurrent disorders in this study.

In a comprehensive summary of the literature that prefaced their primary study article Pardini et al (2007) write that:

> "*longitudinal research indicates that behaviors consistent with conduct disorder (CD) symptoms (e.g., aggression, deceitfulness/theft, destruction of property, serious rule violations) are associated with more frequent and intense alcohol use across time, as well as early-onset SUD. Given the robustness of this relation, some investigators have postulated that early CD symptoms represent the phenotypic expression of a genetically inherited liability for SUDs. However, there remains substantial heterogeneity among youth with elevated CD symptoms, and evidence indicates that early internalizing problems (e.g., depression, anxiety/withdrawal) and ADHD symptoms may also predict later alcohol use outcomes. In addition, the co-occurrence of CD symptoms with other forms of early psychopathology may actually identify those adolescents who are at highest risk for later substance use problems"*[112 p.S38.]

This literature is also aptly summed up by Armstrong and Costello:

> (most studies) "…*concluded that childhood psychopathology was associated with earlier onset of substance use and SUD in later adolescence. CD, in particular, was implicated in this process. The MECA study indicated that a current or lifetime SUD diagnosis placed adolescents at risk for psychiatric comorbidity into adulthood. Such findings suggest the long-term debilitating consequences of adolescent SUD; however, finer-grained analyses are needed to determine whether this trend is specific to age of onset, abuse of specific substances, or development of specific types of symptomatology* [47 p.1235.]

Despite the call for studies for greater elucidation of the process, the current literature is unequivocal on several points. ***First,*** the pathways between most of the common psychopathologies or mental disorders and various SUDs from childhood to adolescence and from adolescence to young adulthood are reasonably well described[18]. ***Second,*** although different disorders manifest at different times concurrently and sequentially, there is a large degree of stability through these decades of life, in the persistence or stability over time. That is those with any disorder early on (including subthreshold disorders) are at very high risk for disorders later on (even relatively intractable disorders), even if the specific disorder or set of symptoms changes and those without early problems tend to continue to be healthy through the later ages [18,52,77,116141,170]. Mason et al. (2004) underscored the persistence of disorders, and suggested that the preadolescence (ages 9 to 12) was a particularly*"risky period for development of these problems"*.[43 p.62]

Despite this grim picture of developmental persistence of disorders and disorder transitions, researchers are increasingly interested in the exceptions. Rohde (2001) notes that for substance use alone, different courses are seen including those in which SU problems are a) developmentally limited (i.e. resolve by young adulthood); b) chronic (across adolescence and young adulthood) and c) late onset (first become problematic in young adulthood)[62]. Analogies for concurrent disorders are likely although the seriousness of the latter would suggest that fewer resolve without intense intervention. Schulenberg et al. (2004) express increasing interest in what they call 'off diagonal' trajectories. These are described as the troubled adolescents who *"turn their lives around and become well-functioning young adults"* and those who do well as adolescents and then *"fall apart during the transition"*[171 p.800]. Predictors of these paths are becoming increasingly understood and this information has great potential to inform intervention efforts.

KEY POINTS: Natural History/Longitudinal Course of Concurrent Disorders

- Pathways of risk from childhood disorders to adolescent disorders through to adult disorders have been well described as a result of high quality longitudinal research in recent years.
- Disorders that present in childhood and preadolescence, especially DBDs, elevate risk for substance misuse, mood disorders and other disorders in adolescence which in turn increase risk for SUDs, mood and personality disorders and related disorders in young adulthood.
- While the type of disorder, single and concurrent, varies over time, mental health issues, broadly defined, are quite persistent from childhood through adulthood.
- This knowledge has important implications for prevention and early intervention.

CHAPTER FOUR

Findings on Concurrent Disorders from Etiologic Research

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Findings on Concurrent Disorders from Etiologic Research

Etiologic research (i.e. research on the causes or origins of disorders) includes three closely related and increasingly merging lines of investigation. They are studies that test theories about causes of disorders in groups of individuals, studies that describe risk and protective factors for disorders (also in groups of individuals), and studies that examine causal mechanisms at the cellular level within individuals. Much of the third type of research is also conducted using animal models and even cell lines; only the findings from human studies are presented here.

Ten years ago Angold and co-authors (1999) recognized limitations in etiologic studies in humans and called for more sophisticated research including longitudinal population-based studies, studies that could examine genetic factors (e.g. family and twin studies) and more psychobiological research[20]. Judging from the volume and quality of etiologic research found in this review, there has been a substantial response. In addition, historical separations between environmental, genetic and neurobiological literatures that have created gaps in understanding[139] appear to be resolving.

Causal Hypotheses/Theories

Many causal theories for concurrent disorders in adults have been outlined in great detail. A recent example is Schuckit (2006)[57], and several authors discuss these in context of adolescence[20,90,172]. The ***first*** mechanism is that SUD is a direct response to psychopathology via self-medication of symptoms. The ***second*** is that there is a common underlying factor for both (this view has been vigorously pursued by those studying SUDs/DBDs). The ***third*** mechanism is that SUD *"precipitates and probably exacerbates"* mental disorders and then becomes established [111p.1203]. Stice (2004) presents a similar model in more generic language: that one disorder may increase risk of the other (unidirectional effects); each elevates risk for each other (reciprocal effects); or a third underlying factor increases risk for both[132]. Hilarski (2004) provides a similar but more detailed set of hypotheses:

- *Psychopathology may serve as a risk factor for addictive disorders.*
- *Psychopathology may modify the course of an addictive disorder in terms of rapidity of course, response to treatment, symptom picture, and long-term outcome.*
- *Psychiatric symptoms may develop in the course of chronic intoxications.*
- *Some psychiatric disorders emerge as a consequence of use and persist into the period of remission.*
- *Substance using behavior and psychopathological symptoms (whether antecedent or consequent) will become meaningfully linked over the course of time*[173 p.84].

Glantz and Leshner (2000) note the advancement of thinking about etiology that has emerged in the past 10 years in developmental psychopathology. First, heterogeneity, or the recognition that different people can have different paths to concurrent disorders is increasingly acknowledged. Related concepts are 'equifinality' (multiple risk circumstances or paths resulting in a single outcome) and 'multifinality' (the same risk conditions resulting in different outcomes)[172,174]. Causal models are increasingly multi-level (from genetics through social and cultural context), recognizing normal and pathological processes, recognizing both risk and protective factors (pathology and impairment as well as strength and reliance) examining discontinuity and continuity, using multi-disciplinary perspectives. The incorporation of all of this complexity produces complex causal models that are reciprocal, transactional, dynamic, and nonlinear. Factors for initiation or onset, escalation, relapse and spontaneous recovery may all vary across individuals, as well as by disorder. Increasingly, a developmental/life span perspective is taken which includes considerations of earlier effects affecting later development (e.g. substance use effects on the brain at early stages of use).

In a recent, very thorough review of the literature on depression and SUDS, Rao (2006) summarizes three lines of evidence for a causal link between depression and SUDs in adolescents[46]. Both depressed mood and substance dependence are thought to involve processes in the brain's reward and motivational system. Second, intervention research has shown that treatment with antidepressant drugs in individuals with SUDs can both reduce use and alleviate depressive symptoms. Third, familial aggregation seen in family and twin studies suggests a genetic relationship between depression and SUDs. Findings on clinical course in a treatment trial for depression for youth aged 13 to 19 years support the bidirectional causal pathway[175]. Both patterns of depression leading to SUD (supporting the self-medication hypothesis) and SUD resulting in neurobiological changes leading to low mood and depression have been documented.

Pathophysiologic Mechanisms

Studies contributing to the advancement of knowledge in this area include those that study neuropsychological and neurochemical variables as well as those that examine brain waves, and brain morphology and function, and genetic markers. In one of the earliest articles in the review, Wills et al. (1998) noted that studies of adolescents suggested that poor self-regulation of cognition and emotion (***neuropsychological processes***) seemed to contribute to the association between substance use and mood/anxiety disorders[176]. A subsequent study published in 2001[177] provides a good example of a study examining biological (***brainwaves***) *and* psychosocial causal mechanisms in a community-based longitudinal sample from the Minnesota Twin Registry. The authors found an association between amplitude of a specific type of brainwaves (p3) that increased the risk of disinhibitory behavior:

> *"Our findings indicated that age at first drink is not specifically associated with alcoholism but rather is correlated with a broad range of indicators of disinhibited behavior and psychopathology. Moreover, individuals who first drink at a relatively early age manifest elevated rates of disinhibitory behavior and psychopathology before they first try alcohol. Taken together, these findings suggest that the association of age at first drink with alcoholism reflects, at least in part, a common underlying vulnerability to disinhibitory behavior"* [177 p.1156].

Similarly, Iacono et al (2002) also found an association between p3 event-related potential amplitude and disinhibitory behavior which itself was related to all of SUDS, ADHD, ODD, CD, antisocial PD and nicotine dependence, based on early evidence from factor analysis studies that indicated a common underlying factor[178].

Rao (2006) provides a comprehensive discussion of ***neurochemical mechanisms*** that have been studied to explain concurrence of addictions check and depression (dopaminergic, 5-HT, cholinergic, and LHPA systems), other neurotransmitters (including GABA, glutamate, norepinephrine, neuropeptide Y, opioids, and somatostatin) and also refers to other reviews but emphasizes that this line of research is limited with respect to adolescent samples. The author cautions that in many studies it is still difficult to determine if the brain changes were present before the disorders or resulted from illness process[46].

Brain morphology has been examined in a brain imaging study by De Bellis et al. (2005) reported that adolescents and young adults in SUD treatment programs that had diagnosed concurrent disorders and early onset alcohol use had differences in brain structure with smaller prefrontal cortex volumes. The authors echoed the sentiments of Rao et al. (2006) that, because of cross-sectional measurement, it was not known whether this difference was a vulnerability factor which existed prior to onset of the disorders or was a consequence of the disorders[179].

Genetics and Family-related Risk

Myriad studies have observed elevated frequencies of MDs and SUDs in the immediate and extended families of individuals with the disorders. In earlier studies it was impossible to determine the relative

contribution of genetic inheritance and environmental exposures. Research into these factors has advanced considerably and sophisticated designs which include biologic and psychosocial measures and innovative analyses are now the norm, rapidly increasing our understanding of causal processes. In this section the studies of genetic and/or family-related risk found in the review are described, as examples of this very large body of research.

Merikangas and Avenenvoli (2000) review the research progress on genetics and family risk research, noting the great potential of family, twin, adoption and high risk studies underway by that date [163,180]. They also describe their own research in the YHRS, which investigated the familial factors in the development of concurrent disorders and had an eight-year follow-up to that point. Results indicated a very strong role for familial factors (e.g. a doubling of risk for SUD among offspring of individuals with SUD):

> *"Familial factors more strongly associated with substance dependence than abuse…premorbid psychiatric disorders - social phobia and bipolar affective disorder in adults, and depression, AD, CD, and ODD in children were strongly associated with the subsequent development of substance dependence. A family history of substance abuse and premobid psychopathology strongly associated with the development of SUDs. As specific genetic vulnerability markers for SUDs become identified, application of the tools of genetic epidemiology may be employed to identify specific environmental risk factors that may serve as targets for prevention"* [163 p.807.]

Silberg et al. (2003), in a prospective study of youth aged 12 to 17 from the 'Virginia Twin Study', looked specifically at patterns of risk in CD, substance use and depression[22]. Concurrence was found to be partly attributable to shared genetic risk for the disorders, although the authors also found the genetic risks to be more strongly predictive for girls and environmental factors important for both genders but more strongly predictive for boys. In a longitudinal 'high risk' study of over 500 adolescents from a Colorado Juvenile Diversion program, aged 8 to 18 followed for two years, a parental history of externalizing behavior was associated with levels of substance use but not a parental history of internalizing behavior[148]. Genetic factors are also being studied directly. Stallings et al. (2005) compared 249 sibling pairs with substance dependence vulnerability and CD symptoms with a large community sample (N = 4493) in an attempt to identify trait loci as markers for SUDs and externalizing problem behavior in adolescents[181]. The authors found evidence for linkage on some chromosomal regions and claim that they have reported the first evidence for a potential molecular genetic basis for this type of concurrence[181]. In 2006, Kirisci et al. published findings from a longitudinal study of sons with fathers with SUDs which also found that neurobehavioral disinhibition (measured using behavioral reports and neuropsychiatric tests) at average age 10 years was associated with greater drug consumption during adolescence and a diagnosis of SUD at age 19 years[182]. Biometric analysis (an advanced statistical procedure) of another large longitudinal dataset of twins in Minnesota, McGue et al (2006) used found that *"(1) early adolescent problem behavior is weakly heritable (approximately 20%) (2) the common factor underlying disinhibitory psychopathology is strongly heritable (approximately 75%), and (3) the phenotypic correlation between early adolescent problem behavior and disinhibitory psychopathology was strong (approximately 0.60) and accounted for primarily by genetic factors common to the two domains"* [183 p.591]. In a very recent and innovative study, all of diagnostic, genetic and parenting measures were used in a longitudinal study of 148 boys aged 11 to 17 with DBDs and early onset SUDS. Gene-environment interactions were found wherein the likelihood of a genotype (the "MAOA polymorphism") being associated with SUDs depended on perceived parenting (behavior toward the respondent, emotional distance, and involvement)[184]. Recent research of this type is also examining specific concurrent disorder pairs; an example is Biederman et al. (2008) who examined familial risk for concurrent ADHD and drug dependence vs. alcohol dependence[113].

These studies exemplify the type of etiologic research conducted during the review period; and are typical but by no means exhaustive. Several other recent review articles were also found, which highlight some of the advancements in the field[46,114]. For example, Button et al. (2007) discusses the whole body of research on the hypothesis of a single latent heritable variable characterized as behavioral disinhibition underlying the co-occurrence of conduct and related disorders and alcohol and illicit drug dependence[114]. An important finding across this literature to date is that effects of parental MDs are diagnostically nonspecific; that is that family risk of certain diagnosis does not confer certainty that that will be the diagnosis manifest in offspring[180,185]. For example, parental depression has can result in range of emotional and behavioral disorders in children[163]. However, other researchers suggest that there is stronger specificity of familial transmission for SUDs[113].

It is clear that research is elucidating these types of mechanisms with greater precision and sophistication in recent years. However, one important and typical omission in these studies is a discussion of their clinical implications. Many authors caution that not enough is yet known to use this type of information for the identification of at-risk youth[111,180]. In addition, McGue (2006) underscores that biological findings about the hypothesized inherited vulnerability toward disinhibitory psychopathology does not mean that early intervention is not warranted since interactions with the environment that may mitigate expression are not currently understood, and that early intervention can also potentially impact other adverse outcomes such as sexual victimization and alcohol-related injuries/fatalities[183].

Chambers et al. (2003) make a great contribution in bringing the broader research on adolescent brain development to the discussion. They note that although concurrent disorders are often thought of as reflecting deficiency or pathology, normal brain development is taking place in the same regions associated with motivation, impulsivity, novelty seeking and addictive tendencies. "*Adolescent impulsivity and/or novelty seeking as a transitional trait behavior can be explained in part by maturational changes in frontal cortical and subcortical monoaminergic systems. These developmental processes may advantageously promote learning drives for adaptation to adult roles but may also confer greater vulnerability to the addictive actions of drugs*" [186 p.1041]. In other words, the vulnerability may also be seen as being attributable to *adaptive* processes.

Risk and Protective Factors

The body of research on risk and protective factors was very challenging to review. It sits in the general adolescent psychopathology literature which itself has two separate dominant traditions (psychiatry and psychology) but other disciplines including social work and sociology have made contributions as well. Historically, and to a large degree currently, the literature on risk factors for SUDS is quite separate from the literature on risk factors for MDs more generally. Most of the risk factor studies in both literatures do not mention concurrent disorders as an important issue.

Risk factors are those variables that, if present, make it more likely that a given individual, compared to someone selected at random from the general population will develop a disorder. Protective factors are those variables that improve an individual's response to an environmental hazard and result in an adaptive outcome[5 p. xxxv]. Several authors underscored the importance of researchers and practitioners remaining cognizant of the probabilistic nature of risk factors[43,160,172]. That is a risk, or predisposition to a disorder suggests a likelihood or potential for the outcome but does not mean that the outcome is certain or inevitable.

Even in the earlier years of the review, several authors (e.g. Monti 2001) contended that most of the risk factors for disorders (especially SUDS) had been identified[43]. Brown et al. (2001) and Mason (2004) charge that prior research had focused too much on factors at the individual level[43,187]. "*The exclusive focus on psychological vulnerability factors reflects American psychology's historical focus on individualism; to assume that most, if not all, etiological factors stem from intrapsychic characteristics.*

The strong genetic, familial, and environmental evidence has significantly weakened this perspective" [43 p.70]. These and other authors call for more multi-level, socioenvironmental risk research and Mason (2004) suggests the 'Ecodevelopmental Model' as a framework for conceptual advancement of the field[43].

Risk and protective factors have been studied in relation to a range of outcomes including behavior (e.g. first use of a substance), early signs or symptoms, progression to diagnosable disorders (individually or grouped), as well as course of illness events such as relapse. Researchers are also beginning to specify risk and protective factors more precisely in individuals at specific developmental stages, for specific disorders, and within contexts[109,185,188]. A very high quality review of risk and protective factors, research on their interactions and implications for prevention by Brook et al. can be found in Liddle (2006)[189, 190], which gives examples of how specific protective factors can buffer the effects of specific risk factors. This is the type of information that will be critical to the design of effective preventive interventions.

Because of the focus on concurrent disorders, the review captured a sampling, but not all of these types of studies. Most discussed risk factors for substance use, abuse or dependence or mental disorders separately[1,91]. Review articles listed risk factors using many different typologies. Even with careful selection it was challenging to find studies that specifically examined risk or protective factors *for concurrent disorders per se.* An important advance for the field of adolescent concurrent disorders would be studies that more systematically study *shared* risk and protective factors. For the following tabulation, the *most recent and authoritative* review articles were used to produce composite lists of risk and protective factors for each disorder type separately (first two columns), and factors that appeared across the two sets of literature or that were listed in the few articles that discussed risk and protective factors for concurrent disorders per se (third column). The purpose of this exercise was to illustrate possible shared risk factors; though more empirical research is needed to confirm common *shared* risk and protective factors. Several other risk factor tabulations for SUDs and MDs separately are available; the only other tabulation that was found for concurrent disorders in youth was found in the grey literature in a commercially available manual for health professionals (see Youth & Drugs and Mental Health, Appendix E).

Table 1 – Risk Factors for MDs, SUDS and Concurrent Disorders in Adolescents

MDS	SUDS	Concurrent Disorders
Environmental Factors		
	availability of substances	
	regulations about substances	
	cultural + social norms about use	
poverty/low SES*/deprivation	poverty/low SES/deprivation	poverty/low SES/deprivation
lack of economic opportunity	lack of economic opportunity	lack of economic opportunity
neighborhood disorganization	neighborhood disorganization	neighborhood disorganization
low neighborhood attachment	low neighborhood attachment	low neighborhood attachment
many major life change events	residential mobility	many major life change events
	high population density	
	high crime rates	
	media depiction or promotion of use	
Interpersonal/Social Factors		
	FAMILY:	
family conflict/divorce	family conflict/divorce	family conflict/divorce
poor parent-child bonding	poor parent-child bonding	poor parent-child bonding
family communication problems	poor family management practices	poor family management practices
family hx or current substance use	family communication problems	family communication problems
parental antisocial behavior	family hx or current substance use	family hx or current substance use
parental psychiatric disorder/stress	parental antisocial behavior	parental antisocial behavior
	parental psychiatric disorder/stress	parental psychiatric disorder/stress
		maternal life dissatisfaction
		parental disinterest
foster care		
exposure to trauma, violence, abuse	exposure to trauma, violence, abuse	exposure to trauma, violence, abuse
	SCHOOL:	
school failure	school failure	low academic functioning
aggressive behavior at school	aggressive behavior at school	school failure
social problems at school	social problems at school	low educational expectations
	low commitment to school	
	PEER:	
	rejection by peers	
	social isolation	social isolation
association with deviant peers	association with using peers	association with deviant peers
Individual Factors		
gender	gender	gender
genetics	genetics	genetics
early developmental delay	adolescent developmental dynamics	
	attitudes/beliefs toward delinquency	attitudes/beliefs toward delinquency
	attitudes/beliefs toward substance use	attitudes/beliefs toward substance use
	sensation-seeking personality	
	poor impulse control	poor impulse control
	attention deficits	attention deficits
	hyperactivity	poor emotional regulation
	poor emotional regulation	greater neuroticism
		self-blame, self-criticism
		low conscientiousness
low self-esteem	low self-esteem	low self esteem
acute or chronic stress	acute or chronic stress	acute or chronic stress

* SES = socioeconomic status

Based on the typology from Jenson (2004)[191] and compiled from [5,7, 32, 43, 58,105, 170,180,190-199]

Table 2 – Protective Factors for MDs and SUDS in Adolescents

MDS	SUDS	Concurrent Disorders
Environmental Factors		
community connection/cohesion community involvement	community connection/cohesion	community connection/cohesion
Interpersonal/Social Factors		
	FAMILY: being first born	
parenting style parental harmony attachment to parents caring sibling relationships good relationships extended family social support from positive adults	parenting style parental harmony attachment to parents caring sibling relationships good relationships extended family social support from positive adults good supervision	parenting style parental harmony attachment to parents caring sibling relationships good relationships extended family social support from positive adults good supervision
	SCHOOL:	
commitment to school connectedness to school	commitment to school involvement conventional activities connectedness to school	commitment to school involvement conventional activities connectedness to school
	PEER:	
positive peer relationships strong social orientation	positive peer relationships	positive peer relationships
Individual		
	anti-substance beliefs health values	
verbal communication skills intelligence easy temperament social and problem solving skills low childhood stress positive self-esteem good affect regulation good impulse regulation perceived control over events sense of mastery altruism	belief in prosocial norms and values positive attitude intelligence easy temperament social and problem solving skills low childhood stress positive self-esteem good affect regulation good impulse regulation perceived control over events sense of mastery	 intelligence easy temperament social and problem solving skills low childhood stress positive self-esteem good affect regulation good impulse regulation perceived control over events sense of mastery

Compiled from [5,91,190,192,196]

A strong message across the etiologic and risk factor research is certainly the importance of early life and family factors. Brook et al. (2006) emphasize *"the centrality of the parent-child relationship, especially the non-conflictual mutual attachment between parents and child"* [189 p.25]. Other strong, consistent and long-known predictors are socioeconomic conditions and social and school success. While there is clearly room for further elucidation of pathophysiologic and genetic mechanisms there is already a significant accumulation of knowledge to guide intervention.

KEY POINTS: Findings Relevant to Concurrent Disorders from Etiologic Research

- Etiologic research has shown that causal pathways are very complex and causal theory continues to advance.
- Pathophysiologic mechanisms are also being elucidated through cellular level research and the use of more advanced investigational methods.
- Relevant etiologic research is becoming increasingly sophisticated in examining causes on multiple levels, including biological, psychological, social and environmental.
- Risk factors have been well described for both SUDS and MDs, but largely separately.
- While there has been minimal research on shared risk or protective factors, the separate research suggests substantial overlap and this has implications for prevention and early intervention.

CHAPTER FIVE

Individual, Family and Societal Burden of Adolescent Concurrent Disorders

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In an article published in 2004, Hoffmann et al. wrote "*In addition to the high prevalence rates of co-occurring disorders among adolescent populations, concomitant psychopathology has been associated with significant negative consequences*"[66 p.42]. Our impression of the literature reviewed also concurs with these conclusions and those of others that consider the consequences of concurrent disorders in adolescents to be well documented[16,53]. In this section we summarize findings on individual impact as well as family and societal burden.

Individual Impact

The individual impact of concurrent disorders is reported here for each of mortality, direct morbidity (the illness itself terms of symptoms and their severity), indirect morbidity (other associated or consequent health problems/conditions); functioning (effects of the illness on participation in broader life activities) and quality of life (the person's perception of and satisfaction with broader components of his/her life). The majority of studies focus on direct morbidity; with relatively few attending to functioning and quality of life, despite the recognition by many health services researchers that functioning and quality of life are the measurement domains that are of greatest importance to patients/clients themselves. However this literature is not unlike most others in this respect.

Mortality

Possible causes of premature mortality for adolescents with concurrent disorders include suicide, homicide, accidental overdose and traumatic injury. Death by suicide or accident is still a relatively rare event in this age group, and few studies *directly* quantify the risk of these outcomes for those with concurrent disorders relative to those without, or to general population rates; however there is much indirect evidence on the topic. For example, Wunderlich et al. (1998) found that risks increased significantly for suicide attempts in a population-based study of more than 3000 German youth aged 14 to 24 years as the number of (any) disorders went up[199a]. In particular, risks were double to 49 times higher for various disorders and disorder combinations. Similarly, in a massive Danish birth cohort of nearly 85,000 children, significantly elevated risk for suicide was found among adolescents and young adults with psychiatric disorders (30 times the risk) and drug abuse (66 times the risk) of those without these factors[200].

Studies that have compared cases of completed suicides with controls (psychological autopsy studies) in youth have consistently found high rates of subclinical or full criteria SUDs and MDs in cases as well as circumstantial factors associated with psychological distress such as social isolation, relationship dysfunction, legal and employment difficulties[201,202]. In Canadian studies published in 2005 and 2008, adolescents aged 10 to 19 years from youth centers who had suicidal behavior were more likely to have depression and/or a SUD concurrent with CD as well as adverse life events than those who did not[203]; and children and adolescents aged 11 to 18 who had completed suicide had 48 times the risk of depression, 13 times the risk of DBDs and five times the risk of an SUD compared to community controls[204].

Review or commentary articles on the topic also underscore the relationship between comorbidity and suicide in young people[1,47,62,66,140,205-207] including the additional risk that SUDS and other psychiatric syndromes confer beyond depression alone. Also noted are the acute effects of alcohol intoxication which can increase both negative mood and impulsivity; which are both risk factors for suicide attempts in adolescents[47,205,206]. Among samples with specific diagnoses, children with bipolar disorder aged 7 to 17 years who had attempted suicide were found to have more psychosis, panic disorder and SUD than those who had not[208].

Very recent review articles on the topic also confirm the association of suicidality with concurrent disorders. Spirito et al. (2006) lists comorbidity as a major risk factor for all of serious suicidal behavior, attempts, and completions in adolescents. Depression and SUDs (especially cannabis and alcohol) and DBDs were implicated: *"There is evidence that a pattern of heterotypic comorbidity (internalizing and externalizing diagnoses) is particularly risky for completed and attempted suicide"…"Comorbidity has also been shown to increase the risk for attempted suicide"*[209p.245]. Risk levels estimated across multiple studies were 3 to 17 times for those with comorbid disorders compared with single disorders; the article also discusses possible neurobiological mechanisms that mirror those discussed previously for concurrent disorders. Galaif et al. (2007) also review the evidence overall and reports on a startling statistic from suicide research in New Zealand: that 90% of suicidal youth were depressed and/or had an SUD[210].

Direct Morbidity

Much evidence has accumulated that sheds a grim light on the relative severity of symptoms and course of illness among youth with concurrent disorders; adolescents with concurrent disorders typically have worse symptoms on each of their single disorders than those with only single disorders. For example, teens with SUDs who have an additional MD have more severe substance involvement, greater number of substances used and earlier age of initiation and are more likely to have been treated in hospital[51,64-66,69,211]. Armstrong and Costello (2002) report on the flip side of this association – that the greater the severity of substance abuse, the greater the degree of comorbidity[47]. In terms of substance use history, adolescents with concurrent SUD/MD have earlier onset of substance use, greater frequency of use and more chronic use[168]. Further, those with MDs have greater severity of psychiatric symptoms if they also have a SUD[18].

Indirect Morbidity

Other, less recognized, physical or medical conditions, as well as some other social problems and risk behaviors are also being found to be associated with concurrent disorders[16]. Three studies came up in our searches, including one large longitudinal study that found that sleep disturbance, sleep disorders and sleep-related endocrine dysfunction to be associated with concurrent SUD/MD (depression or psychological distress) in adolescents aged between 12 and 17[118,212,213]. With respect to other medical conditions Husler and colleagues (2005) examined physical health problems in 1028 Swiss adolescents aged 11 to 20 years in 12 sites of a secondary prevention program for youth at high risk of school-drop out, substance use or deviant behavior[140]. The types of illnesses reported to be associated with depression and risk status included frequent headaches, stomach aches and injuries. In another population-based study, Mertens et al. (2007) found that adolescents enrolled in a large U.S. health plan who were receiving alcohol and drug treatment had greater frequencies of several conditions (asthma, injury and pain-related conditions (including headaches and abdominal pain)) compared to adolescents not receiving those services[214]. Unfortunately neither of these studies examined physical conditions for those with concurrent vs. single disorders, but the primary disorders are the most common presentations in concurrence, so it is likely that these relationships with other conditions would at least be similar if not worse in concurrent disorders.

A few authors also pointed to evidence of clustering of other risk behaviors or experiences with concurrent SUD/MD including sexual victimization and sexual risk taking, traumatic injuries/accidents, violence perpetration, illegal acts and victimization[66,215,216]. For example, in a six-year follow-up study of 212 youth from mid-adolescence to early adulthood, Aarons et al (2003) found increased risk for traumatic injury related health problems (e.g. contusions, puncture wounds, neurologic injuries and bone damage) for youth with CD behaviors and substance involvement, although specific patterns were complex and varied by gender [216]. In another longitudinal cohort study conducted in Oregon and California, youth with a combination of drug-related problems and multiple psychosocial problems were involved in more violence, experienced more victimization and more general and sexual risk taking[215]. In an apt summary for this section, Mun et al. (2008) provide a snapshot of what they call the 'multiproblem

high risk adolescent' as having problems with illicit substance use, depressive symptoms, delinquency and sexual behavior problems, and poorer physical health[170].

Functioning and Quality of Life

Functioning in several domains has also documented by numerous authors as being impaired by concurrent conditions. These include general psychosocial functioning[46,52,62,64], school functioning (including dropout and poor achievement[1,46,66], relationship functioning (both peers and family)[46,66,69] and community functioning[52]. Rao (2006) describes the "further compromise" of adaptive function that is found among adolescents with concurrent SUDs and depression[46]. Few articles were found that reviewed or empirically examined quality of life specific to SUDs/MDs, but those with closely related findings also documented the expected reduction in quality of life[52,65,156]. For example Chen and colleagues (2006) studied the impact of mental disorders including major depression, anxiety disorders, DBDs and SUDs, personality disorders and physical illnesses among a community sample of youth and their quality of life at an average age of 16 years. Those with comorbid physical illness and mental disorder had poorer quality of life in all five domains, and MDs had a greater impact on quality of life than physical illnesses[217]. Lubman et al. (2007) also found poorer quality of life among 100 adolescents aged 16 to 22 in treatment for SUDS and those with concurrent depression and/or anxiety disorders (particularly PTSD) had poorer quality of life than those without concurrent disorders[65].

Future Impact

In a previous section on longitudinal course of concurrent disorders, the current knowledge on transitions from single and multiple disorders from childhood and adolescence though single and multiple disorders in adulthood was outlined. In this section, the consequences of concurrent disorders during the teen years for adult outcomes in terms of *functioning* are discussed. There were no articles found that examined adult outcomes in terms of quality of life and only a few that addressed functioning. Hoffmann et al (2004) reviewed literature on the consequences of adolescent CD and SUD and reported evidence for greater alcohol and drug use as well as poorer psychosocial functioning in general in young adulthood[66]. More specific findings come from a study published in 2007, in which Rohde and co-investigators examined adult functioning for 773 youth diagnosed with SUDs before age 19 and followed to age 30 [218]. Negative impacts on functioning were found in all of education, employment, income, risky sexual behavior, suicide attempts, coping, stressful life events and global adjustment. Adjustment for comorbidity (which as previously explained may not have been completely appropriate) attenuated the effects except for the domains of education and employment. The authors concluded that causal pathways were not fully explainable in the study but that "*given that the adolescent SUD episode preceded the measurement of functioning in this study, the pattern of findings is consistent with the possibility that some or all of these effects are related to the SUD experienced during adolescence, either directly or, more often, through SUD recurrence, prior functioning, or psychiatric comorbidity*"[218 p.162]. Clark et al. (2008) also demonstrated a significant increased risk for early adult death in 870 adolescents aged 12 to 18 years with SUDs and related problems from clinical programs and the community and followed an average of eight years[219]. The deaths in this sample were from homicide, suicide and accidents. The deaths occurred at an average age of 23 years.

Family and Societal Burden

Given the nature of the problems associated with concurrent disorders, we were surprised that our searches yielded no studies on family burden. A quick focused search on the topic was also fruitless. We were able to locate one article that was published in 2007 which used qualitative methods to document parent experiences with adolescent SUDs, but concurrent disorders were not mentioned[220]. In grey literature searches, information directed at families was found that mentioned impacts and provided suggestions for coping, but no references to direct empirical studies were made.

A few articles were found that addressed societal burden, mostly in the form of costs. The first published cost information came from a (now) widely cited article by King et al. published in 2000. Using data from the Fort Bragg service system evaluation, the authors found that adolescents with comorbidity had per person treatment costs that averaged more than twice as much as those with single disorders over a six-month period in the 1990s (29,000 USD vs. 13,000 USD). A more recent Canadian study examined expenditures for a sample of 180 youth aged 10 to 18 years in primary care practices in Ontario, and found that costs for health and social service use were four times higher among those with two or more disorders (anxiety, mood, DBDs, SUDs or EDs) than for those without comorbidity[79,80]. Costs included primary care visits as well as use of 911, ambulance, lab, hospital, and emergency room services. Costs ranged from 760 to 2800 CAD compared to about 490 CAD. Patton et al. (2007) observe that the highest service system costs are attributed to adolescents with persistent disorders, with two-thirds of mental healthcare costs going to care in inpatient or juvenile justice settings[115].

Rao (2006), in a comprehensive article on societal burden for co-occurring depression and SUDs, note that while there is no specific population-wide cost data for adolescents, the estimated cost for all ages is believed to exceed 500 billion USD. Given the known persistence of disorders into adulthood, the implications for continuing costs are obvious. Merikangas and Kalaydjian (2007) also use broader age cost data in an article on adolescent concurrent disorders to make the point: "*Both the direct and indirect costs of mental disorders are exponentially increased by comorbidity. A recent report showed that the cost attributed to care of a chronic condition, such as depression, increased rapidly when patients had two, three or four comorbid conditions, with a small percentage of patients (26%) with two or more comorbid conditions accounting for half the total costs*"[18p.357].

In a very recently published study, Kessler and co-investigators (2008) used results from the National Comorbidity Study-Replication (NCS-R) to calculate the effects of MDs on earnings in the U.S. which also give a sense of future impact for adolescent disorders[221]. Respondents with serious mental illnesses were found to have past year earnings that were on average about $16,000 (USD) less (about $26,000 less for men and $9,000 less for women) than those without serious mental illness which represented a total societal burden of $193.2 billion for lost/reduced earnings alone. These findings stimulated an immediate editorial response in the American Journal of Psychiatry in which the author declared them to be underestimates because the survey did not include institutionalized, incarcerated or homeless people, and did not count costs for lost productivity due to premature death and cost to families "*who bear much of the emotional and financial burden*"[222 p.664]. Most importantly for the topic at hand, the authors also mention that costs *for those under age 18 and costs associated with comorbid* illnesses were not included and estimate that these additions would elevate the cost burden substantially. Ruchkin and Schwab-Stone (2003) also express the concern that costs may be underestimated in studies that use cross-sectional prevalence disorder estimates because they fail to account for burden across time. They note that unless persistence is considered, the family and societal burden of disease will be seriously underestimated[165].

KEY POINTS: Individual, Family and Social Burden of Adolescent Concurrent Disorders

- Concurrent disorders in youth are associated with a range of consequences including:
  - suicide and other causes of premature mortality;
  - morbidity in terms of severity of symptoms and more problematic course of illness;
  - elevated physical health problems and health risk behavior; and
  - poorer functioning and quality of life; which often continue into adulthood.
- Family burden is poorly documented.
- Estimates of societal burden in terms of costs are high; and probably underestimated.

CHAPTER SIX

Pathways to Care, Service Use, Treatment Engagement, Response and Outcomes

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A backdrop to any discussion about service use among adolescents with concurrent disorders is the undisputed recognition of very low levels of service use for either MDs or SUDs as single disorders. Many authors (e.g. Dennis et al. 2006) cite a statistic that only one in ten adolescents with a SUD receives care (compared with one in five adults), and that one-third to two-thirds of those with *serious* disorders do not access treatment. It is noted that young males with poor educational attainment have the lowest treatment rates[52]. For MDs, similar low treatment rates are cited with only about 16 to 33% of children and youth with disorders, in population-based studies in developed countries, receiving relevant treatment[4,31,115]. In this section, findings from the review on pathways to care that were *specific to or highly relevant for* concurrent disorders are summarized, followed by a section on treatment engagement and treatment response.

Pathways to Care and Service Use

More than a dozen articles were found that addressed, either through empirical study or commentary, the issue of whether and how youth with concurrent disorders interface with the service delivery system. Once again, the research did not always examine the topic directly for concurrent disorders, but the findings were relevant nevertheless. The articles covered three aspects of this topic; whether care was sought or received *at all*, whether services specific to concurrent disorders were received once the adolescent was in contact with *any health or social service,* and whether adequate or appropriate services were provided once the adolescent was in contact with *the MD or SUD service system*.

Several authors (e.g. Compton et al. 2007) note that in adults treatment seeking and receipt of treatment are generally quite low among those with SUDs, but that a concomitant psychiatric disorder or symptoms increases the likelihood of contact[86]. There were contradictory findings on this point for adolescents, in the studies reviewed. Data from the previously described OADP study, showed that, among adolescents with alcohol use disorders, the presence of at least one other psychiatric disorder increased the likelihood of contact with treatment services[82]. Similarly, data from the GSMS indicated that having more than one disorder (not only SUD/MD) increases the likelihood of service use (from 33% to about half making contact with services) but a substantial amount of unmet need remains for these youth with more complex needs[31]. In 2006, Wu and Ringwalt published the results of an analysis of data for nearly 37,000 American youth aged 12 to 17 years from the National Survey on Drug Use and Health (NSDUH)[223]. While the focus of the study was on service use for alcohol use disorders, a high prevalence of other psychiatric problems was found in the sample. The encouraging news was that alcohol use disorders were more prevalent among those who had used any health service in the past year vs. those who hadn't (10% vs. 4%) which suggests that symptoms and consequences do result in some care seeking, but an astounding 91% of those who had recent alcohol use disorders did not receive any related treatment, and of those who had no treatment, 97% did not perceive the need for treatment.

Bukstein and co-authors (2005) contend that very little is known about which adolescents enter treatment and why and that clinical status may not be associated with receipt of specialized treatment[51]. They studied predictors of treatment in a one-year follow-up study of 393 adolescents aged 13 to 18 years with SUDs from both treatment programs and the general community. Virtually no *clinical* predictors were associated with receipt of SUD treatment while depression, CDs and ADHD were associated with receipt of mental health treatment. The authors speculated that contact with care for those with substance use issues is probably related to environmental factors (that they did not study) such as family factors, adolescent and parent motivation and access to specialized treatment. "*Despite substantial proportions of adolescents with continued substance use and psychiatric disorders during the follow-up period, only a*

minority reported receiving treatment of any kind. Even among those adolescents having received treatment at baseline, only a minority reported subsequent treatment" [51 p.1671]. In observations about a study of 15 year-olds in Scotland, West et al. (2003) concludes that the evidence is strong that adolescents rarely seek treatment on their own from conventional mental health services and that alternative models and settings for care that are developmentally appropriate, accessible and integrated with other healthcare services[104].

Wu and Ringwalt (2006) also examined issues in seeking care in adolescents[223]. The reasons youth gave for not seeking care were similar to those found in surveys of adults with diagnosable MDs who have not accessed care, such as wishing to handle the issue on one's own, not knowing what help is available and where to find it, inability to access due to time or cost of treatment, skepticism about the effectiveness of treatment, and stigma. The likelihood of receipt of care was frequently found to depend on parents' or other adults' recognition of the problem or a precipitating event, such as contact with the legal system. A long lag time between the onset of problems and service contact was identified; services were typically only sought after the substance use had created major life problems. The authors of this study also noted that adolescents with concurrent disorders may be receiving services in programs or by providers that are unable to either treat or identify and refer for the substance use part of their disorder, resulting in lower probability of receiving appropriate care.

Among those in health or service settings where identification of concurrent disorders is possible, there are similar discouraging findings. Johnson et al. (2001) studied 792 youth aged 14 to 17 in public mental health care settings in St. Louis over a two-year period[212]. Only about 15% of those identified as having a need at the first time point had discussed substance use problems with a provider at the second time point. Reasons given by adolescents for not seeking this specific care were similar to Wu and Ringwalt (2006). For the minority who did receive SUD treatment, predictors were a family history of substance dependence and environmental stressors (traumatic events, family dysfunction, adverse neighborhood, peer and school factors). Two studies of adolescents in primary care were found. In one (Logan and King 2002) focused on parental identification among 44 adolescents with depression, aged 12 to 18 years, screened from 662 in general pediatric clinics in Michigan. Most parents were unable to identify the presence of depression in their adolescents, but identification was more likely where parental perceptions of family burden were higher *but less likely among those with concurrent SUD*. Many of these adolescents were also in a position to be identified by primary care providers and school staff but were not. In a Canadian study, Byrne et al. (2004) found high rates of emotional or behavioral disturbance in primary care patients and that, once identified by the researchers, 97% of those with two or more of anxiety, mood, DBD, SUD or ED (as measured on the Diagnostic Interview Schedule for Children (DISC)) declined an invitation to speak with their primary care provider about their symptoms[79, 80].

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Articles that raised issues related to service seeking or use in special populations (important in terms of early intervention) were also found in the review. In a study of U.S. and Canadian First Nations preadolescents residing on reserves, Whitbeck et al (2006) documented enormous reluctance among parents to seek care for their children for emotional and behavioral concerns, with was most acute for on or off reservation physicians[152]. Finally, in a study of 947 youths in San Diego County receiving any of child welfare, juvenile justice, special education, substance use or mental health services "*use of professional services was most likely for youths with non substance use psychiatric disorders, those with comorbid disorders, and those for whom high caregiver strain was reported. Use of informal services, such as peer support groups, was most likely for youths with SUDs, those with comorbid disorders, and those who had had police contact. Unmet need for mental health services was greatest among youth with SUDs only"*[39p.562]. This study partly contradicts that of Bukstein et al. (above) in finding more service use among those with comorbid disorders, however it is implied that the service use was among those with non-substance use comorbidity. It may also be explained by the inclusion of those in systems serving more serious problems in the youth (child welfare and juvenile justice).

Adequacy or appropriateness of care received from either mental health or substance providers in general was also the topic of a few articles. In articles published in 2003 and 2005, service use by teens aged 12 to 18 years during and after discharge from either mental health or SUD treatment programs in a rural context in three Iowa Counties was examined[38,224]. Prevalence of concurrent disorders was high and similar to reported values for adults. Obstacles to continuing care for the adolescents were fear of stigma, lack of insurance, unavailability of services. All of these problems were considered to be exacerbated in rural areas.

Three studies were found which are more pertinent to early identification because of their focus on pathways to care for younger children with mental health problems. Sayal (2006) reviewed the current literature on care access and concluded that despite the regular attendance of most children with mental health concerns in primary care, parents tend not to raise such concerns, resulting in less than half being identified[225]. Among those identified only half are referred for specialist care. Pediatricians' perspectives on barriers and facilitators of access to mental healthcare were examined by Pfefferle (2007) in qualitative analysis of responses from a subset of survey respondents from six states[226]. Issues were identified relating to funding, availability of providers, system disconnects and actions by pediatricians to improve access. In another recently published primary study, Shanley et al. (2008) studied parental treatment seeking and experiences for children and youth (aged 4 to 17 years) with any of aggression/defiance problems; family functioning problems, anxiety/depression symptoms, learning and attention concerns, and social functioning problems in one clinic in three children's mental health centers in London, Ontario[227]. On average parents sought help for two problems, contacted five different agencies or professionals and received two different interventions. Interestingly one in five received treatment that they did not want, and nearly all had been in contact with more than one agency. Recommendations for redress of these disappointing circumstances include public education, improved provider training in settings where children with needs present (primary care in particular), use of telemental health, other modalities for treatment and changes to reimbursement [225,226].

Treatment Engagement, Response and Outcomes

A litany of challenges in treating youth with concurrent disorders was found in this literature. Problems documented include difficulty with engagement, adherence with both treatment and medication, suboptimal response to treatment, earlier and more frequent relapse, treatment drop-out, a more difficult and protracted clinical course, and poorer short and long-term outcomes[17,40,46,52,64-66,82,207].

Earlier studies in the set of articles found in the review provided some naturalistic, descriptive information of predictors of treatment outcome in selected settings. That is, these studies did not describe or test as specific intervention. For example Wise et al (2001) reviewed a sample of admissions of youth aged 13 to 17 years to residential treatment programs in South Carolina and found a lower likelihood of treatment success for males and for those with co-occurring ADHD and CD[63]. Among juvenile offenders in juvenile justice services in Charleston, South Carolina aged 12 to 17 years, Randall and colleagues (1999) reported that those with concurrence involving externalizing disorders had poorer outcomes than those with internalizing disorders[157].

Relevant findings from the U.S. DATOS-A study are reported by Grella et al. (2001) and Hser et al. (2001)[69,228]. Outcomes for over 1100 adolescent recipients of SUD treatment (residential, short-term inpatient, or outpatient) in four U.S. cities were tracked two years after admission. Two-thirds of the youth had concurrent disorders. Reductions in the proportion of youth reporting substance use and related behaviors (~14% in heavy drinking; ~50% in weekly marijuana use, ~6% in other drug use; ~23% in criminal behavior), but up to 40% of those using hallucinogens, cocaine or other stimulants showed no reduction in use and those with concurrent disorders reported more illegal activity and had more arrests. The study had relatively poor follow-up (~57%) which likely biased results in a positive direction.

In a study of a community system of care in Connecticut for children and adolescents with serious emotional disturbance (again many with concurrent disorders) Dierker et al. (2001) conducted retrospective case reviews for 117 children and adolescents whose files were closed between 1992 and 1999[229]. Risk factors for attrition (refusal and drop-out) were depressive symptoms, substance abuse, number of reasons for referral (with was considered an indicator of comorbidity), urgency status at intake and parental disinterest. In short, the youth with greatest need were most likely to drop out of care. The authors commented that…

> *"In general, treatment programs aimed at adolescents have typically included program components that target only one type of symptom or problem and have not been adequately designed to address the common occurrence of comorbid symptom types. Notably, those youth in the present study exhibiting depressed/isolated symptoms and SUD problems indeed represent the most complex cases referred to the system. In every case, depression and/or substance abuse represent referral reasons that were indicated along with aggressive/oppositional problems. The greater likelihood of youth with these conditions dropping out after the creation of an individualized service plan may in fact reflect the difficulty of maintaining children and adolescents with comorbid diagnoses in treatment"* [229 p.378].

Even very recent studies report similar findings. Hamilton et al. (2006) examined five-year outcomes of a sample of adolescents with depression (many with comorbid obsessive compulsive disorders and/or marijuana use) [230]. The authors found a very high recurrence rate (78%), despite the availability of newer antidepressants and episodic supportive psychotherapy. They concluded that short-term thinking is insufficient and that longer term treatment in the context of a durable therapeutic alliance is necessary.

Outcomes for inpatient settings were also reported by a handful of authors. Shane et al. report on findings from a multi-site longitudinal prospective study of 419 adolescents in residential SUD treatment in the U.S.[40] Those with concurrent disorders had higher levels of substance-related problems and poly-drug use, as well as poorer outcomes such as relapse, but there was no association between concurrent disorder status and planned or actual length of stay. Those using substances other than alcohol or cannabis were more likely to relapse. In a similar study in short-term (five days to three weeks) inpatient SUD treatment centers in San Diego, treatment outcomes were compared for youth aged 13 to 17 years, with and without concurrent disorders (N=126 and 81 respectively)[231-234]. Those with concurrent disorders received more treatment, and relapse within six months was high in both groups but both sooner and higher in the concurrent disorders group (87% vs. 74%). Nearly all of those with concurrent externalizing disorders relapsed. Risk factors for relapse were exacerbation of psychiatric symptoms among those with concurrent disorders whereas those with simple SUDs seemed to be more affected by availability, peer use and environmental circumstances. The authors concluded that relapse is a very dynamic process which includes factors such as history of hard drug use, direct social pressure, increase in conflict/life stress, boredom, negative emotional states, poor coping ability, negative life events, social situations, low self-efficacy, desire to use, and attitudes toward use. Weis et al. (2008) suggest that reasons for relapse are different for adolescents who are more affected by substance-using peers or the desire to enhance mood or pleasurable effects, whereas adults tend to relapse in response to distress[85]. Adolescents with low self-efficacy and those who don't see use as problem are also more likely to relapse.

Hoffmann (2004) considers that the evidence has only recently begun to be accumulated and Rao (2006) claims that (at least for depression and SUDs) there is not yet sufficient understanding of the course of treatment for adolescents[46, 66]. Studies that examine treatment outcomes more systematically are needed.

KEY POINTS: Pathways to Care, Service Use, Treatment Engagement, Response and Outcomes

- The proportion of adolescents that receives care for either a SUD, MD or both is below 50%.
- Several studies suggest that having more than one disorder increases the chance of receiving treatment but findings are not completely consistent on this point.
- Youth offer many reasons for not seeking care.
- Once treatment is initiated, its course is more challenging than single disorders.
- Outcome information is discouraging, with high rates of relapse and drop-out and with sustained symptom and/or functioning improvement achieved in a minority of patients, however studies to date are typically are naturalistic studies from highly selected programs, and lack comparison groups, so their findings are very difficult to interpret and generalize.
- More systematic and rigorous research on course and outcome of existing and new treatments is badly needed.

CHAPTER SEVEN

Interventions for Adolescent Concurrent Disorders

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The literature on intervention has expanded dramatically. It is vast and heterogeneous in its coverage of topics. Articles were drawn in to the review from the still relatively distinct SUD and MDs treatment literatures. Within each of these different traditions, disciplines, approaches and philosophies are expressed. Topics range from screening and diagnostic issues through treatment modalities ranging from psychopharmacology, to individual and group therapy to interventions implemented across multiple systems and from prevention through tertiary care. Settings are numerous, from home to school and primary care to inpatient and detention. Studies vary widely in terms of pairs of concurrent disorders discussed and levels of severity of those conditions. Recipients of care vary widely in terms of geography and ethnicity. In this section, the findings of the review will be presented in the subsections: Prevention, Early Intervention, Identification (screening and diagnosis), and Treatment.

Prevention

On the topic of prevention the literature on programs was found to be quite separate according to whether SUDS or MDs were the target of prevention. Many more articles were found that addressed prevention of SUDs than MDs. Very comprehensive and current information on the state of prevention science and practice for separate MDs can be found in Evans (2005)[5]. Specific prevention programs named in the peer-reviewed and grey literature are detailed in Appendix C.

General trends in prevention

Despite being an older article (1997) Dulmus et al. outlines the status of the literature on the prevention of childhood mental disorders to the late 1990s which serves as a useful summary for post year 2000 developments which follow[192]. ***First,*** the authors highlight the emerging general trend toward greater emphasis in mental health on prevention vs. treatment/rehabilitation that was in part attributed to an Institute of Medicine report **Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research** which was published in 1994[235]. Gullotta (2005) provides a general definition of prevention: "*prevention involves universal, selective, and indicated actions that protect existing states of health… promote psychosocial wellness and prevent… problems*"[236 p.18]. Definitions for the types of prevention and other related terms can be found in Appendix A.

On the more specific topic of prevention of MDs and SUDs in young people, too many authors outline the justification for increased prevention to cite them all. Illustrative points come from Munoz-Solomando and Williams (2007) who suggest that the imperative for prevention and early detection of problem substance use comes from the relatively poor course and long-term outcomes once misuse has begun[237], and from Glantz (2002) who underscores the strong direction that accumulated etiologic research has pointed for prevention and early intervention[111].

The ***second*** trend discussed by Dulmus (1997) and others is the recognition of the need to focus preventive programs on reducing risk factors *as well as* enhancing protective factors. This trend represents a shift from a focus on pathology to wellness/resiliency. A related notion is that risk and protective factors are not specific to single disorders, which was noted to imply that programs could be aimed at multiple factors to prevent multiple disorders[1,192]. A ***third*** trend identified is the shift toward multi-level prevention. The authors attribute this development to early findings from family systems research which has been extended to broader systems such as peers, schools and the broader community. Bushell et al. (2002) go further in discussing the emergence of holistic ecologic multi-level community-based approaches which reflect the growth of the broader mental health promotion field. This literature stresses the need to address the social determinants of mental disorders, such as unemployment, low income, poor housing, crime, substance use and misuse, family breakdown etc.[42]. An additional relevant

concept has emerged in the more recent literature is the concept of 'prevention-minded treatment'. This approach involves conscious incorporation of strategies to prevent the development of subsequent disorders in children or youth already in care[58] and represents a trend toward more integrated thinking at any point in a continuum of care.

Current thinking about types of prevention

With respect to types of prevention for MDs and SUDs, most authors present arguments in favor of broad-based approaches. For example, Glantz (2002) emphasizes that understanding of how problem behaviors and subsequent co-occurring disorders develop and how aspects of each can elevate risk for the other is needed in the context of a broad-based approach. Reasons given for broad approaches include the lack of specificity of risk factors noted by Dulmus (1997), but also concerns that targeted approaches can be both stigmatizing and even have detrimental effects if they involve grouping of youth with problem behaviors in any way[111,144]. Latimer (2002) cites a study by Dishion et al. (1999) that presented evidence that in high-risk youth, negative effects from peers were seen in study of group treatment. In the context of SUD prevention, Munoz-Solomando and Williams (2007) present the alternative view, that early recognition/early intervention for those at elevated risk and very specific and focused interventions may be more effective than primary prevention. There are also concerns that broad-based approaches may not be as effective or cost-effective "*Given how expensive intervention programs can be, our results suggest that the most economical and effective approach to intervention is likely to involve targeted prevention programs for adolescents demonstrating only one problem behavior and more intensive intervention for adolescents demonstrating co-occurring problem behaviors*"[141p.484]. However other evidence is accumulating that broad-based programs that build coping skills and positive social connections for all adolescents can have positive benefits[1]. It is becoming increasingly clear that the most effective approach to prevention of both single and concurrent disorders will likely include multiple complementary strategies.

Current thinking about the content of prevention programs.

Beyond a simple recognition that risk and protective factors are both needed to design prevention programs, several authors also presented specific evidence or views on the content of programs. In a 1998 survey of 1,942 youth (in junior and senior high schools randomly sampled from nine school districts) in Alberta, Barber et al. found unique differences in risk by age and gender as well as both environmental and individual factors, supporting the general observation that prevention programs need to consider variation in risk and risk at multiple levels[238]. The much criticized Drug Abuse Resistance Education (DARE) program was noted by several authors to have failed because it did not address the complex of factors known to predict future drug use[197]. Similarly, single risk factors may interact to increase risk among only those with other risk factors – such as early substance use in those with weak parent-child attachment, underscoring the need to understand complex causal pathways when designing programs[162].

Brook et al. (1998) suggest that *early* use of *any* substance, even tobacco, has been found to be related to later MDs, implying that prevention at early ages might include risk behaviors ordinarily considered relatively benign in later adolescence. Both Brown (2001) and Tubman (2004) argue that the evidence for continuity of problem substance use and its association with other problems including MDs underscores the importance of preventing or delaying *first use* of any substance of potential abuse. Brown (2001) in a longitudinal population-based study in the U.S. from 1976 to 1997 found that some predictors of future problem substance use (such as religiosity, political beliefs, truancy and frequent evenings out) were stable over 20 years. Others such as parental education and college plans varied over time. Based on their findings, the authors suggested that bonding to school and enhancing academic success were good indirect strategies to prevent problem substance use and SUDS over the long term. In partial contrast to the focus on any use, Merikangas and Avenevoli (2000) write that efforts should be focused on "*delaying or preventing the transition from use to harmful use and dependence rather than preventing*

experimentation. Since only a minority of those who experiment with drugs proceed to harmful use, prevention programs may not only need to focus on drug use behavior in general, but on individual risk factors underlying dependence on specific drugs as well[163 p.815]. Williams (2004), provides evidence for a more nuanced approach. In a large (N>2000) Alberta sample of 12 to 19 year olds in nine school districts, mental health status for *infrequent* alcohol and cannabis use (once a month or less) was no different than that for no use. However, more frequent and even single use of hallucinogens or other illicit drugs was associated with emotional distress[238a].

The notion of resiliency and positive mental health as a foundation for prevention was also expressed by several authors. For example, Mann (2004) discusses the protective/promotive factor 'self-esteem' (and closely related concepts self-concept, self-image, self-perception, self-regard, self worth, self estimation). The authors outline the increasing evidence for self-esteem as a strong protective factor against many negative outcomes in youth and the correlation of its improvement with improved behavior, personal and academic functioning. These authors make the case for self-esteem (along with social support and coping skills) as an important component of broad-based preventive approaches. Several mental health-promoting school programs that have focused on self-esteem have been effective in prevention of disordered eating, risk behaviors including SUDs, antisocial behavior and anxiety[239]. More recently, however, other authors have begun to question this assumption and caution against interventions that might be 'artificially' boosting self-esteem; even going so far as suggesting that in some circumstances it may undermine regard for others and even promote narcissism[240, 241]. These debates suggest that the relationship between self-esteem and mental health/prosocial behavior is probably more complex than originally thought, and that programs need to be designed based on thoughtfully considered new knowledge as it becomes available.

Several authors discuss developments in the theory of resilience and related protective factors at length[160,242-244]. The concept of resilience has advanced from early ideas that it was an inherent trait of invulnerability in the child to a more sophisticated understanding that it is a process which includes internal assets and external resources[160]. This theoretical development holds much promise for further refinement of prevention approaches, and models for practice have also been recently developed based on these ideas[243, 244].

An entire movement toward positive youth development more generally has arisen in the past two decades, which includes a range of concepts including promoting bonding, fostering resiliency, promoting competencies (emotional, behavioral, moral), encouraging self-determination, fostering spirituality, self-efficacy, positive identity, fostering belief in the future, recognizing positive behavior and providing opportunities for prosocial involvement[5]. Evans et al. (2005) provide an extensive review of the movement as well details on major reviews and model youth development programs[5]. In a related but broader article Keyes (2007) introduces the concepts of 'flourishing' and 'floundering' as an alternative view to mental health/illness, noting that some individuals with MDs can be flourishing and some without can be floundering[245]. The article provides factors and dimensions of flourishing and Keyes suggests that progressive mental health promotion programs could incorporate these ideas.

Settings for prevention

Settings for prevention of SUDs and/or MDs include the family, the school and the broader community. Schools have been the first choice for obvious reasons, but there is increasing interest in ages such the preschool period (for even earlier intervention) in other settings (such as juvenile justice services) to reach those at very high risk who are frequently truant or have dropped out and in broader contexts (total communities). In this section, *general* themes arising from the review on school-based prevention will be presented first, followed by family and other settings.

Two general reviews of adolescent SUD published up to 2000, reported on the status of ***school-based prevention programs*** to that time[1,91]. The authors noted that the theory and evidence base for programs was improving. The most successful school-based programs were those based on risk and protective factors, which were skill-based, interactive rather than simply didactic, were of sufficient length, included boosters and which emphasized program fidelity. *"There is now much interest in the understanding of risk and protective influences, including multi-focused prevention programmes among vulnerable young people. Some positive effects of universal prevention programmes are reported, although too often they lack thoroughness in programme implementation, data collection and follow up"*[1,p.55]. In a similar, but more recent article, Munoz-Solomando and Williams (2007) reported on several more recent developments in the field, including the overall trend toward prevention of early substance use in vulnerable youth[237], and Milne (2007) outlines developments in substance use prevention (mostly school-based) in Australia[3]. While most articles on this topic were about SUD prevention, Mann (2004) describes several broad-based programs to promote mental health and prevent MDs[239]. A couple of authors mentioned the 'whole school approach' to prevention, which is a broad spectrum approach which originated in Australia that does not specify the target or the content of prevention[3]. Instead the school community including students, staff and parents identify the health topics of priority for them, and then promotion activities are designed around those issues. This approach has been disseminated to other jurisdictions including Alberta, and in this context is used for mental health promotion. However other than the two passing mentions, few articles on it were found about it in the review. This may be because it is founded on a philosophy that does not take a disease orientation and makes no reference to prevention of specific diagnoses (so would not come up in searches based on specific disorder terms). Despite this, there are indications that the approach can have impact on mental health and substance use outcomes[3]. Other articles that discussed school-based prevention programs[7,197,246,247;270] also concurred that they had promise yet needed further development.

In an early article in the review on the topic of prevention of SUDs, Merikangas and Avenevoli (2000) stress the importance of ***family-based programs*** in the context of increasing evidence of the strength of familial risk in SUD[163], which was noted to be greater than 50%. Most of the discussion concerns targeted prevention programs, specifically secondary prevention interventions for children of parents with SUDs, but the authors stress that other individual and environmental risk factors should be included to enhance these interventions. To that date, however, the authors could not identify a prevention program in the field that met such a description. By 2006, the expressed imperative for family-based prevention has increased as the evidence for family-related risk has accumulated. Avenevoli and Merikangas (2006) discuss the prevention implications of high risk family studies such as the YHRS[180]. The authors note that offspring of parents with disorders (especially depression, anxiety and SUDS and by implication CDs) and families where multigenerational disorders are manifest are reasonable targets for prevention. They go on to stress that children in these families that are already manifesting behavioral or emotional problems are an urgent priority. However they also caution that there is *"not sufficient evidence to apply genetic or biologic risk factors for identifying youth at risk"*[180 p. S132]. Finally, they note the lack of specificity of effects (i.e. a specific disorder in a parent does not increase risk for a specific disorder in the child), suggesting instead that parental disorders may result in generalized dysfunction in the family environment, which in turn can result in a range of outcomes. The implication for prevention is that interventions can target multiple risk and protective factor pathways to prevent multiple possible outcomes.

Other recent review articles on SUD prevention which include discussions of family-based and/or parenting programs are those by Milne et al. (2007), Toumbourou et al. (2007), Komro et al. (2006) and Zucker and Wong (2006)[3,248-250]. These authors discuss the challenges of targeting social determinants such as socioeconomic status (SES) to prevent MD and SUD outcomes, of combining school, parent and community interventions in multi-component programs, and in reaching the children of parents with SUDs for targeted prevention, respectively. As an example, Milne et al. describes a program targeted at teens with a parent who has a SUD in Sydney, Australia called "TeenLink"[3]. The program is aimed at

building family resilience to prevent substance use of teens through variety of supportive, educational and psychosocial interventions in the context of a parent treatment program.

With respect to current practice in the prevention of MDs or SUDs for children and youth generally in Canada, McLennan and colleagues published an article in the CMAJ in 2004 that discussed the current state of prevention[251]. The article focused on family-based (mostly early life and parenting) programs but some important points about school-based programs are also made. In particular the author emphasized the need for evidence to drive implementation decisions, and a need for more comprehensive planning for prevention programs. In a more recent Canadian article published in 2007, current prevention programs for children's mental health (including early development programs) were described by Waddell et al.[252]. The authors expressed concern with a lack of such programs overall in Canada, identifying no mental health programs and only 17 early child development programs. Only one program ("Better Beginnings, Better Futures" in Ontario) was found to include mental health as a major program goal, to have features consistent with effective prevention programs and to have rigorously demonstrated positive outcomes.

Prevention programs are increasingly being conceptualized to be more broadly delivered rather than just in single settings. Such initiatives or models have been described as being ***community-based*** or as using a ***public health*** or ***population health approach.*** It was interesting to note that the articles found in our search along these lines were all published in the last two years. In an article about targeting whole communities (typically disadvantaged communities) Toumbourou et al. discuss programming targeted at the broad social determinants of health and review a range of such programs[248]. The authors suggest that such approaches can decrease adolescent crime and violence and can also improve child health outcomes. No evidence is presented for specific outcomes on SUDs and MDs but such programs are typically grounded in theory that supposes closely related outcomes.

Early community-based approaches for substance use/abuse prevention typically involved general media campaigns. Most of these general approaches were found to be at best ineffective, and in some instances had unintended effects (e.g. youth reporting increased intention to use substances)[85,253]. Media-based preventive approaches for youth are now going in the direction of more sophisticated social marketing approaches, including careful testing and the assessment of effects, including unintended effects. Several jurisdictions have also begun to take community literacy approaches to mental health, also often through media campaigns (see for example Patton et al. 2007)[115]. Though most of these are aimed at increasing self and community identification of existing disorders to reduce stigma and improve help-seeking in relation to adult disorders, they are increasingly mentioned as a potential community backdrop for approaches as well and will likely also inform school and workplace literacy initiatives for adolescents and young adults.

Rowling et al (2007) describe a set of initiatives that relate to a broad public or population health approach to MDs and SUDs in Australia, called the Promotion/Prevention and Early Intervention (PPEI) partnership[254]. The initiative is a partnership between mental health and public health professionals. The article makes mention of components such as the school-based "Mind Matters" which includes curricula for various grade levels and literacy aspects in a broader whole school approach. The authors suggest that the program reflects a shift in policy toward integration of mental health and substance misuse services that considers the population of a school and its community as well as traditional mental health service delivery, and a policy focus on children of parents with mental illness, on suicide and on early detection of young people in need. It notes that the initiative has had some criticism for not going far enough with respect to the broader community; it is reasonable to say that these are early days for such approaches.

Munoz-Solomando and Williams (2007) describe a nation-wide strategy in the United States for alcohol use prevention which attempts to delay early use, reduce underage drinking and facilitate early recognition of those at risk[237]. These authors also review developments in prevention in context of

broader interventions (i.e. public or population health approaches) and include a discussion of recently released guidelines from the National Institute for Health and Clinical Excellence (NICE) in the U.K. that cover community-based interventions to reduce substance misuse among vulnerable youth[255]. The guidelines emphasize identifying vulnerable young people in all of healthcare, education, social care, the voluntary sector and the criminal justice system and for multiple components of intervention to be planned together.

Increasing evidence for both the presence of risk for developmental and behavioral problems in early life and the detectability of that risk (see for example Tough et al. (2008)) is one driver of a renewed emphasis on very early prevention[256]. In a population/public health approach with a family focus aimed at earlier ages, Bayer and colleagues (2007) describe such an initiative developed in Melbourne, Australia[257]. The program was developed based on a finding that 39% of six month old infants in primary care were found to have some level of risk for subsequent MDs (i.e. their parents had anxiety, depression or substance misuse; relationship conflict or violence in the home financial problems or infant temperamental difficulty). The rationale provided for the universal component (i.e. offering the intervention to all new parents) was based on evidence that approaches that target children at older ages can stigmatize as well as miss many families in need, but a targeted component is also included. The program "Toddlers Without Tears" involves a parenting program offered through the primary care contact with outreach to those not attending primary care and is being tested in a cluster randomized trial in Victoria. It is described as an approach to the prevention of mental health problems and is offered to all families in the community with specialized support to very high risk families. A similar initiative in South Australia, has established 24 integrated centers for early childhood development and parenting, home visiting with greater intensity for those at risk, pre-school programs and related interventions[258]. Both initiatives reflect more emphasis in Australian policy on early childhood healthy development.

Treatment as Prevention

Several articles, that spanned the entire time period of the review, stood out in terms of their emphasis on treatment of childhood disorders as prevention for adolescent concurrent disorders (mostly SUDs) or adolescent disorders as prevention for young adult disorders. This approach might also be characterized as secondary prevention or even early intervention for concurrent disorders, and the sentiment is driven by the literature on the longitudinal course of disorders. The authors of these articles expressed very strong feelings about the potential for quality treatment at early ages to prevent disorders in adolescence. For example Rounds-Bryant et al. (1998) called adolescence a 'cross-roads' with enormous potential for arresting progression to longstanding disorders[259]. Kandel at al. (1999) place emphasis on early treatment for CD and other childhood psychological disorders for prevention of later SUDs[48], and Killeen (2000) concurs that the early treatment of child or adolescent onset MDs (especially ADHD and CD/ODD) for prevention of SUDs is an "exciting notion"[260]; Merikangas and Avenevoli (2000) suggest that the research on pathways provides an "outstanding opportunity" for treatment of primary psychiatric disorders to prevent subsequent SUD[163]. Glantz (2002) points out that the potential for secondary benefits from treatment of childhood disorders adds further rationale for investments in early intervention and that it may be an approach that reaches some young people with high risk before they become more difficult to reach[111]. Bukstein (2005) echoes these sentiments[51].

Glantz (2002) emphasizes that childhood disorders warrant treatment in their own right but that clinicians should be more consciously incorporating prevention for SUDs:

> *"children with psychiatric problems should probably participate in a SUD prevention program, and their parents should be encouraged and assisted to learn about SUD and prevention and the steps they can take. When providing treatment for childhood psychopathologies, clinicians could incorporate SUD prevention considerations into their interventions. There is now adequate research to warrant viewing certain childhood psychological disorders as reliable signals of*

greater than average susceptibility to SA…this is a prevention approach that should be considered and evaluated for implementation"[111. p.1204].

In a special issue of the Journal of Consulting and Clinical Psychology titled **the Impact of Childhood Psychopathology Interventions on Subsequent Substance Abuse** the evidence for effectiveness of current treatments for externalizing and internalizing disorders in children was reviewed respectively [93,164] and an editorial summarized the key points that a) the risk for going on to SUDs is well known, b) many interventions can reduce symptoms of these disorders, but that c) very little is known about their potential to prevent SUD outcomes. The reason given for the third finding was that currently intervention studies do not measure these secondary outcomes; nor do they follow the participants long enough for them to manifest. On an encouraging note, the authors identified several longitudinal studies that are underway that could extend the research in these ways, instead of entirely new studies having to be initiated. A final message from the special issue was that more effectiveness research (i.e. research in context) is needed as well as better dissemination[111,261].

The State of the Evidence for Prevention

The state of evidence for preventive approaches to MD and SUDs in children and youth was discussed by the authors of several review or commentary articles[91,246,251,252,262-267]. Key points arising from these papers were that prevention programs are increasingly being designed on the evidence-base, but that the science of prevention program evaluation is in its infancy and to date there is little evidence of program effectiveness.

Two very recent review articles were found for MDs prevention. First, a systematic review of trials of preventive approaches for depression in children and adolescents aged 5 to 19 years concluded that evidence is insufficient to justify implementation of programs but that current findings suggest that further study is warranted[268]. A second systematic review on prevention programs for childhood MDs examined 15 randomized controlled trials for CDs, anxiety and depression. Programs were based on parent training, child social skills training or cognitive behavior therapy (CBT). Program effects were found to be positive but modest and were considered to be promising but in need of replication[252].

The review yielded much more information on the effectiveness of substance use and SUD prevention. Health Canada published a report on best practices for substance use prevention in 2001[269]. A report summarizing prevention practice and a set of principles for substance use and SUDs was produced by the U.S. National Institute on Drug Abuse (NIDA) and tabled in 2003[270]. In their 2005 practice parameter, the AACAP lists several empirically-based prevention approaches aimed at increasing resilience factors and reducing risk factors[7]. Several very recent systematic reviews have also been conducted on prevention programs for adolescent drug use in both school[267] and non-school settings[266] as well as a review of the effectiveness of programs targeted to high-risk youth[265]. The results of these reviews are a bit less encouraging. Sambrano et al. (2005) reviewed 48 secondary prevention programs for SUDs and found few differences in substance use outcomes for those who had participated compared to those who hadn't, although the higher intensity, more comprehensive programs had more encouraging outcomes[265]. The Children's Health Policy Centre at Simon Fraser University also published a research summary on the effectiveness of prevention programs for substance abuse in 2007[271]. A systematic review of 17 studies of drug use prevention interventions for youth in non-school settings updated to 2008 concluded that the body of studies heterogeneous to make overall generalizations, and that many had methodologic drawbacks, but that one study using motivational approaches and three family interventions may be beneficial for preventing cannabis use[266]. The review of school-based programs included 29 trials of interventions. This review concluded that skills-based interventions were more effective across a range of outcomes, including reducing drug use, improving decision-making skills, self-esteem, knowledge and peer pressure resistance than affective or knowledge programs[267].

Unfortunately none of these reviews comprehensively examined approaches that would address *both* MDs and SUDs, despite their shared risk factors. Even so, a broad review conducted in the UK that considered a diverse range of health promotion areas including mental health found that, despite the stage of development of research, "good" evidence was found for parenting programs and some school-based programs[264]. This paper also offers practical recommendations for practice, policy and research.

General recommendations from these reviews are that programs should be based on known risk and protective factors, should go beyond didactic to interactive and skills approaches, should be of sufficient duration and should include boosters or follow-up. The concept of unintended effects is also a fairly recent development, but early experiences with, for example, suicide prevention, SUD prevention and EDs prevention have raised consciousness among program developers that both positive and negative outcomes need to be evaluated[251,272]. A classic example relevant to the population of interest in this review is the 'Scared Straight' program that involved visits to prisons by offending youth or youth at risk for delinquency visit which has now been unequivocally shown to be more harmful than doing nothing[273].

A few authors stress the importance of designing prevention programs that are developmentally appropriate and that this necessitates involvement of youth in their design; this may seem obvious and expected now, but historically programs were simply developed by 'experts'[141,180]. While it is understood that most prevention/promotion programs would not be conceptualized as preventing concurrent disorders per se, because of their close interactive risk, at least theoretically, prevention of one would also prevent the other. Even with a primary programming focus on one or the other, one would hope that outcomes for both would be measured. Further recommendations on the topic of methods and measurement include the need for stronger designs[252], more sophisticated measurement approaches (specific domains and instruments for measurement are reviewed by Clark and Winters (2002))[263] and to document program fidelity. More research is recommended on implementation processes and other delivery settings such as those for high risk youth who are lost to school-based programs[42,91,263].

Early Intervention

The term 'early intervention' is most frequently defined in the context of early educational interventions for children with or at risk of developmental delay or early treatment for psychosis. No authoritative definition was found in the review in relation to mental health or substance use problems in youth, even though there were widespread calls among authors for early intervention. In fact, so many stressed this need it would have been unreasonable to cite them all. The rationale for early intervention was based on the repeated observation that pathways to disorders begin early and tend to persist without intervention (see for example Stroufe 2005)[160]. Several authors advocated intervention as soon as early life attachment or care problems become evident through family-based supports for healthy early child development: *"While difficult, we believe that helping parents overcome the legacy of their own malevolent experiences is especially important"* [160 p.285]. However, the term 'early intervention' in its most frequent use implied any early stage action to the longer term outcomes of these disorders. It was also used in specific discussions of prevention (any of universal, targeted or selective) as well as the early stages of treatment in the adolescent. No article defined, conceptualized or described an approach that could be distinctly characterized as early intervention *for concurrent disorders per se*. This contrast between expressed imperative for a specific approach and almost no conceptual development or discussion of specific approaches was a glaring feature of the literature on this topic. In a very recent article: **Service responses for youth onset mental disorders**, Patton et al. (2007) is an exception on this point[115]. While the article does not speak to concurrent disorders specifically, it does discuss the concept of early intervention for childhood MDs more distinctively. The authors lament the poor intervention response to date for adolescent disorders, and comment that psychosis is the only disorder that currently has a well conceptualized early intervention model, that has demonstrated promise. They claim that the advances in longitudinal research have given a clear rationale for early intervention, and also cite more recent research

in affective disorders that also indicates a need to intervene in the prodrome (very early stages) of the disorders. The challenges are summarized in the article:

> *There is a continuing debate about the threshold at which young people might best be engaged with health services. Self-limiting and milder disorders, or emotional problems in their earlier stages, may respond to simple and benign approaches such as e-health interventions, exercise and relaxation interventions, and psychoeducation delivered in nonspecialist settings…Interest continues in early detection and phase-specific interventions, particularly for those disorders with an onset in adolescence. A clinical staging model has been proposed as it provides a useful framework for early intervention and treatment. This assumes a better response to treatment in the earlier stages of a disorder, as well as greater scope for offering more benign treatments.…The wider use of early intervention strategies seen in other areas of adolescent and youth healthcare has, arguably, not yet occurred for mental disorders*[115 p.321].

Included in a special issue in the Medical Journal of Australia published in October 2007 on early intervention in youth mental health, are articles which apply the concept to bipolar disorders, depression, borderline personality disorder and harmful substance use[274]. Application of the concept has also recently been discussed for eating disorders[275]. Development of a comprehensive program that includes, at least conceptually, promotion, prevention *and* early intervention as described by Rowling et al (2007) in the previous section seems to be a promising approach[254] if the appropriate attention is paid to development of the distinct concept of early intervention and it is applied to concurrent disorders.

A Business Case for Prevention and Early Intervention

A small body of research has examined the costs of and benefits of prevention programs for either mental health or SUD prevention. Cost-benefit information in the literature tends to be piecemeal. For example Waddell et al. (2007) cite an article (that predates the review) that estimated the accumulated lifetime savings attributable to the prevention of just one case of CD to be about 1.5 million USD[262]. In a very unique article just published in 2008, Zechmeister et al. conducted a systematic review of economic evaluations of mental health promotion and prevention programs for children to young adults[276]. Only 14 programs met criteria for inclusion. This was a diverse group ranging from prevention of a single disorder (e.g. depression) to a single behavior (e.g. suicide) to an overall risk reduction approach (e.g. programs to improve parenting). The most favorable results were found for the early childhood development programs (using a variety of outcomes including parent/child well-being, school performance and reduced subsequent drug problems and depression). In a study that examined *costs of care* for youth with multiple problems including concurrent disorders, King et al. (2000) outlined the challenges related to a 'business case' for prevention. *"The opportunity to prevent the development of substance use problems in a client base of at-risk adolescents may represent potential long-term cost savings for managed mental health service systems. Assessment of the cost-effectiveness of prevention services for at-risk clients would seem an appropriate step for systems of managed care. Recognizing the cost of comorbidity and the opportunity for cost savings may provide an incentive to pay for prevention and early intervention services, provided the effectiveness of these services can be demonstrated"* [37 p.428]. Given the clear, and potentially long standing individual, family and societal costs and consequences of concurrent disorders, it is surprising that the case for renewed investment in prevention and early intervention has yet to be made in the form of a systematic business case. This is a gap in the literature that will likely not take long to fill since the component information for such a document is rapidly accumulating. McGorry et al. (2007) contend that the evidence is sufficient to consider early intervention in youth mental health as a 'best buy'[274] and in a special issue of the Medical Journal of Australia, published in October of that year, present a plan for achieving this in Australia. A model for this approach could be the current emphasis and initiatives in workplace mental health, which got much traction from a business case approach.

Identification - Screening

Identification of individuals with elevated risk, or *possible* subclinical or clinical disorders can be made through screening; though diagnosis can only be confirmed through full assessment. Screening approaches will miss some individuals with the disorder (false negatives) and classify some as having the disorder when they don't (false positives)[277].

In order to be effective and ethical, screening programs must meet key principles including having an understanding the natural course of the illness, using a valid and reliable screening tool, attending to the psychological effects of positive and negative results, and the availability of treatment for probable cases[278,279]. Many but not all of these principles are currently met in relation to concurrent disorders screening. Other 'best practices' on screening for concurrent include meeting development standards for instruments, documenting psychometric characteristics of the instrument for the population and setting of interest, ensuring developmental and cultural appropriateness. In the context of adolescent screening, for example, several authors caution that some screening instruments, e.g. the CAGE screener for alcohol dependence, is not suitable for adolescents[27,173,280].

Screening adolescents for risk for or existing concurrent disorders can be done in general populations where prevalence is relatively low, general healthcare settings where one would expect moderately higher prevalence (e.g. primary care) and settings where one would expect high prevalence (e.g. SUD treatment settings). Driven by the concern about the long term consequences of concurrent disorders and the increasing recognition that problems and behaviors present in childhood and preadolescence that predict concurrent disorders (albeit imperfectly) in adolescence, calls for early identification via screening have increased in this literature[(e.g.237,255,281)]. While most are recommendations for screening in treatment settings, some literature was found that also proposed or discussed screening in general populations of youth.

<u>Screening in the General Population</u>

There are still mixed opinions in the literature about screening general populations in community or school settings. Some authors express concerns about labeling/stigma and the lack of health services capacity to respond to youth in need, once identified. Costello et al. (2005) describe some developments in screening, such as tools for identification by teachers in school and by pediatricians for general practice[54]. They conclude the science for identifying individual children is not yet adequate and express particular concern over inadequacies and unintended effects of screening for suicide risk. In the same year, however, Gould et al. reported on a randomized trial of a suicide screening program in over 2000 high school students in New York State[281]. No unintended effects were found in their approach and the authors concluded that *"screening in high schools is a safe component of youth suicide prevention efforts"* [281.p.1635]. Mason (2004) observes that risk for SUDs and MDs is cumulative and that a useful screening approach (in preadolescents) might be a simple summation of risk factors[43]. In a very recent publication (2007), Jankowski et al. developed a screening tool to identify adolescents engaged in multiple problem behaviors[282]. A pool of items drawn from standard surveys and related instruments was tested in nearly 17,000 New Hampshire high school students (aged 14 to 18). Nine items were selected which were designed to be minimally sensitive and elicit honest responses in non-anonymous situations. The items represented indicator behaviors that were highly correlated in the sample with a broad range of risk behaviors, including substance use, sexual risk taking, disordered eating and suicidality. Endorsement of five or more risk items was considered high risk, and in the study sample, 10% of students met this criterion. Evidence for validity was quite good and the screen worked well with both sexes. The false positive rate was a bit higher than desired, but with additional refinement the potential for early identification of at-risk youth seems quite good. The authors noted that alcohol and tobacco use were typically the first risk behaviors to develop. The tool was also quick (10 minutes or less) and was easy to administer, score and interpret by school guidance counselors, pediatricians, family physicians, and

mental health clinicians to identify those for targeted prevention or referral for full assessment. The relationship between the scores and subclinical or clinical concurrent disorders is not yet known, but could be known with a bit more study. Patton et al (2007) caution that there is as yet little rigorous evidence to show that early identification of MDs in adolescence improves long-term outcomes[115]; though most authors in this literature consider that there is sufficient rationale for advancing such research.

Screening in Primary Care

Despite increasing recognition of mental health concerns in youth by health professionals, studies continue to be published that indicate a lack of recognition of clinically significant mental health or substance use symptoms (or both) in primary care. For example, Wilson and colleagues (2004) studied 533 patients aged 14 to 18 years in one large urban medical clinic in Boston[283]. Using clinical impression alone, only 18% of those with problem use or abuse were identified, and none of those with substance dependence were identified. The authors conclude that structured screening was needed in primary care settings serving adolescents. In a similar study, this time focused on detection of mental disorders, Brown et al (2007) audited 774 visits to 54 primary care providers in 13 clinics in DC and New York. Identification was highly variable according to provider, family and patient variables. The authors proposed the use of a theory-based model (the Gateway Provider Model) for improving identification in that setting[284]. Practical advice for the primary care provider on identification and management of SUD is provided by Kaye (2004); though there is not a lot of emphasis on concurrent disorders per se. Examples of useful information found in this article are the stages of substance use seen in teens, a list of clinical warning signs and a recommended screening instrument for SUDs in that setting – the CRAFFT[285].

Screening in Treatment Settings

In 2002, Health Canada recommended that "all people" seeking help from either SUD or mental health services be screened for the other disorder[27]. They provided guidance for general screening approaches, but the advice was not specific to youth[27]. The rationale for screening in treatment settings is predicated on substantial evidence that detection levels for MDs and SUDs is abysmally low in almost any service setting that has been studied, not just primary care as just described, but also in very specialized and high risk care settings settings (such as juvenile justice services)[52,64,286,287]. Like other topics, more research has been done in adults. For example Huang et al (2007) merged administrative databases across mental health and SUD treatment systems in New Jersey[286]. For patients in the mental health system, only 53% with co-occurring SUDs were detected. Detection rates were lower for acute settings, and among female, older and psychotic patients. Even in settings where there should be a high index of suspicion, most disorders go undetected. Wasserman et al. (2008) studied 583 youth in juvenile justice services and in probation officers caseloads. Identification was poor especially for internalizing disorders, where only about 25% of those with disorders were identified (compared to half of other disorders)[287]. Dennis et al. (2006) report that despite the fact that about 70 to 80% of youth in SUD treatment have one or more concurrent psychiatric disorders, the disorders are identified in only about 28% of clients[52]. King et al. (2000) reported that in the Fort Bragg study (a large study of integrated versus usual care systems for adolescents with multiple emotional/behavioral problems in the mid 1990s) 43% of SUD went undiagnosed by clinicians even *in the intervention* group, resulting in a recommendation for systematic screening, even with a brief checklist[37]. This call for systematic screening in treatment settings was virtually universal among the many authors in the review that discussed the topic, including both screening for SUDS in adolescents in mental health services including inpatient units and screening for psychiatric disorders in adolescents in SUD treatment settings[48,74,288]. Earlier recommendations were typically specific to one or the other disorder or setting. For example, an AAP guideline published in 2000 indicated that all adolescents presenting to pediatricians should be screened for SUDs and noted that adolescents' self-reports can be more reliable than parental reports under the right conditions[138,280]. More recently standardized assessment (including screening and diagnosis) of concurrent disorders for youth presenting to mental health, SA, social services and justice systems is now widely recommended[52]. Even

for the earlier preadolescent period, Glantz (2002) advises clinicians to be actively vigilant for early signs of substance use in children with MDs[111].

Screening Instruments

A focused search that would capture all literature related to *all* screening instruments used for SUDs or MDs separately was beyond the scope of this review; and there were many articles on screening and screening instruments for each condition for both clinical and research purposes. The vast majority of instruments noted in articles were specific to the identification of substance use behaviors or disorders or mental health symptoms, separately.

The number of articles that reported on screening tools *specifically designed* for concurrent disorders was very few; these are described in greater detail in this section. A very encouraging development on screening was identified in the grey literature. This was a recent Canadian Institutes of Health Research (CIHR) sponsored workshop on screening for co-occurring disorders in adults, lead by CAMH scientist Dr. Brian Rush. Related research has included an empirical study comparing several screening tools; which represents the kind of research that will be critical in advancing best practice in screening and assessment for co-occurring disorders[289]. After the workshop, a project to review the literature, catalog and evaluate screening instruments for co-occurring disorders *in adolescents* in-depth was also initiated; and release of the results of that review are imminent[290]. Because of the comprehensiveness and recency of this new review, we chose not to specifically identify other older reviews and catalogs of screening tools found in the review.

Screening Tools Designed Specifically for Concurrent Disorders

Lengthy diagnostic instruments have been available for many years for both SUDs and mental health problems. Unfortunately because of the complexity and heterogeneity of disorders and their symptoms, these tools have been considered too burdensome, too detailed and/or too training-intensive for screening purposes. Despite a plethora of tools for measuring substance use and related behaviors and attitudes, no single widely accepted screening instrument was available for adolescent SUDs as of 2000[280]. Agreement about screening tools for adolescent concurrent disorders is understandably even further behind. Most current instruments have as their starting point a set of clients that is presumed to already have either a SUD or a MD and only screen for the other disorder. In line with trends toward broadening and integrating mental health services for youth, it would make sense to have an instrument that could screen for symptoms relevant to both types of disorders as indicators of existing concurrent disorders right at the time of first presentation. This seems to be a very recent concept in the literature, but two articles were found that reported on screening tools specifically designed for concurrent disorders in adolescents[52,64].

In 2006, Dennis and colleagues reported on the development of the Global Appraisal of Individual Needs Short Screener (GAIN-GSS) for initial identification of concurrent disorders in youth presenting to *any of* mental health, substance use, social or justice services[52]. The GSS is based on a more comprehensive diagnostic instrument, and is designed for quick indication of the types of problems and their severity as well as to guide referral for further assessment and treatment. It screens for the most commonly presenting disorders including internalizing disorders (depression, anxiety, somatic, traumatic distress, suicide); externalizing disorders (ADHD, CD and other impulse control disorders); and SUDs (abuse, dependence, other substance-induced health or psychiatric problems). It also allows for screening of issues related to crime and violence (interpersonal violence, drug related crime, property crime, interpersonal crime) of relevance to juvenile justice services. The GSS has been tested so far in clinical populations with encouraging psychometric results but the authors suggest that it may be possible to use it in broader settings (e.g. schools, workplaces, and child welfare settings). It is also noted to require minimal training and technical support, and that it might also have utility for outcome assessment. More research is needed for these broader uses.

Instead of a single instrument approach, Hides and colleagues (2007) reported on tiered approach to screening for psychological distress, self-harm, suicide risk, depression, anxiety, psychosis, mania, and substance use[64]. Existing standardized symptom assessment tools (e.g. the Beck Depression Inventory) were noted to be valid and reliable for detection of specific mental health symptoms in SUD populations but the authors considered them to be too narrow in focus or not sufficiently developed or tested for adolescents to be useful in their context. They tested a series of questions taken from a range of instruments in two stages of screening. In the first stage, the Kessler-10 (K-10) (for psychological distress); items from the Mini International Neuropsychiatric Interview (MINI) (for current suicide risk plus two items for self-harm); items from the Patient Health Questionnaire (PHQ) (for depression and anxiety) are used. At this stage a skip structure limited the number of items to 32 or fewer. Depending on responses, a second stage allowed more detailed screening for psychosis and mania. Lifetime and past three month substance use were also documented using the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). The authors report on an exploratory study of feasibility of the screening process with 84 youth aged 14 to 21 years and acceptability among staff. No work has yet been published to establish validity and document psychometric characteristics of this approach. Much reluctance to use the screening items among staff was observed.

Research is just beginning to bear fruit on options for screening, though more validation work is clearly needed. Recently the lines between screening and formal diagnosis are becoming less distinct and staged or tiered approaches are coming to the fore[289]. Health Canada recommended a framework for levels of screening for adult co-occurring disorders in 2002. Level 1 involves adopting an index of suspicion, asking a few questions, using brief screening instruments and clinical judgment. Level II procedures involve the use of longer instruments. Dennis et al. (2006) advise *"it is important to recognize that assessment costs money and staff/client time. Rather than one size fits all, we have consistently advocated a more progressive approach to assessment – screening general populations, a brief assessment for targeted populations, and full assessment for more complicated/multi-morbid population* [52 p.89].

Assessment and Diagnosis

General Issues in Diagnosis of Substance Use and Mental Disorders in Adolescents

Structured diagnosis with the DSM system is noted by several authors to have been valuable for achieving consistency in clinical diagnosis and comparability across studies in research[43]. However most also acknowledge it to be an imperfect system in which much variability in application and interpretation exists; efforts are underway to refine the system including the classification of SUDS prior to the release of DSM V in 2012[291]. Nunes and co-authors (2006) discuss the historical features of DSM I and II that contributed to the thinking about SUDs and psychiatric disorders as being distinct[292]. DSM-IV is noted to have added the notion of psychiatric disorders occurring secondary to SUDS (a.k.a. substance-induced disorders), which is also believed to incorporate advances in understanding of pathophysiology. The authors also discuss proposed changes for the upcoming DSM V; some of which are relevant to concurrent disorders but few which address the issues of concern regarding youth concurrent disorders. Concern has been expressed about the over-diagnosis of comorbidity resulting from closely related symptoms within diagnostic categories (homotypic comorbidity) and to a lesser degree across diagnostic categories (heterotypic comorbidity) because of the increasing splitting of disorders in the DSM over time. Goldberg (2008) for example, notes that evidence is mounting that most DSM disorders can be collapsed into a much smaller number, and that comorbidity should only be used in reference to co-presentation of a physical and psychiatric disorder[293]. A thorough review of the issues of diagnosis and the DSM is provided by Samet et al. (2004)[294]. Martin and Volker (2007) acknowledge that *"certain issues, such as classification of combination categories versus use of multiple diagnoses, remain to be resolved. Specific issues arise with respect to inclusionary and exclusionary rules and aspects of comorbidity. Although much has been accomplished, considerable work remains to be done"* [58 p.308.]

Despite the concerns, no wholesale changes to the DSM are on the horizon, improvements are more likely to occur incrementally

Beyond these general issues, several practical and theoretical limitations of the DSM classification system *for child and adolescent disorders* were discussed by several authors in the review. There is increasing concern that DSM categories do not reflect how conditions manifest in individuals and in particular children and youth[7,24,36,138]; and that DSM is an adult-oriented system that does not have established validity in application to adolescents[7,172]. Several specific issues were raised in the literature. ***First,*** authors from both the mental health and SUD fields frequently express the opinion that the symptoms and behaviors associated with these disorders, in the real world, manifest as continua of symptoms and severity, and that the categorical approach is both arbitrary and ill-fitting with that reality[24,36]. Merikangas and Kalaydjian (2007) go further in suggesting that "*if comorbidity results in part from the lack of valid boundaries between discrete categories of disorders or the imposition of arbitrary thresholds on the components of disorders that are dimensional, future versions of the diagnostic nomenclature should consider reformulating these categories"*[18 p.355]. ***Second,*** additional complexity is introduced into the process of diagnosis for children and youth due to multiple informants and lack of decision rules about how to reconcile variability across respondent reports[43]. ***Third,*** the expression of symptoms and disorders over time and in relation to the complex process of development is increasingly acknowledged[160]. Ruchkin and Schwab-Stone (2003) write: "*In keeping with this view, it has been suggested that a developmental framework for psychopathology should be incorporated into the next diagnostic nosology"*[165 p.1952]. Merikangas and Kalydjian (2007) express a related notion for diagnosis in the research context: "*Likewise, prospective data are necessary to discriminate the order of onset and developmental expression of these conditions in order to minimize the impact of recall bias*[18 p.355].

A ***fourth*** issue of great specific pertinence to the topic of concurrent disorders that is repeatedly raised in the literature is the recognition that adolescents often do not meet DSM criteria (especially criteria for abuse and dependence in SUDS) because the duration and/or severity of their symptoms may not reach thresholds. For example, sufficient time may not have elapsed for consequences to have developed[1,173,295]. Despite this, the level of use and related behaviors or physical, cognitive and psychological reactions may be very concerning, and a focus on meeting strict diagnostic criteria may mean an opportunity for early intervention in a trajectory with high likelihood of reaching disorder level is lost. Deas (2006) and Winters (2006) introduce the concept of 'diagnostic orphans'; those just subthreshold but who will likely go on to full criteria disorders[68,295]. The AACAP stresses that impairment in psychosocial and academic function is the most important indicator of the clinical significance of SUDs in this age group, but provides a balancing comment that some of the negative consequences for youth may result from of the illegal nature of underage use rather than the actual use[7]. A ***fifth*** issue on the converse situation has also been raised (e.g. Mason 2004) where the youth meets diagnostic criteria yet are functioning well, and issues then come up about labeling and stigma. An analogous concern about 'over-diagnosis' in population surveys of adults has lead to the addition of impairment criteria; which adds further complexity to case identification in research or practice. ***Finally***, a concern related to the time-line for diagnosis is expressed by Solhkhah et al. (2003) who argue that at least some symptoms of mental disorders may be a result of acute substance abuse and that sufficient time for observation of symptom change in the abstinent state is often not allowed[35].

The concerns about the diagnostic process in general and DSM nomenclature in particular for adolescents date back to some of the oldest articles in the set (e.g. Angold 1999[20]). Change is advocated by several authors (e.g. Stroufe 2005)[160] and other diagnostic approaches and systems have been proposed by a few. Angold et al. (1999) identified some early work such as one proposal for seven syndromes which would collapse into either internalizing or externalizing disorders but notes that empirical work didn't completely support conceptualization either[20]. In a more recent review of related developments along with empirical work, Rowe and co-investigators (2004) attempted to develop a classification system for

juvenile justice-involved adolescents aged 12 to 17, using risk, associated problems, severity and age of onset as differentiating factors, not just symptoms[296]. They found some suggested patterns but nothing "earth-shattering". In addition, work like this in special populations is very limited in terms of generalizabiltiy to all adolescents.

Recommendations for the Assessment Approach

Recommendations for the *general* approach to assessment when concurrent disorders are present or strongly suspected were made by several authors. In terms of an overall framework for assessment, the biopsychosocial approach is widely accepted in this literature[58]. The need for a comprehensiveness of assessment including multiple disciplines, multiple components and sources is also a common recommendation. Weinberg et al. (1998) suggest that assessment should include a history, psychiatric and physical exam at its core[91]. The recommendation is made in context of a practice guideline for psychiatrists but would apply to multi-professional teams as well. In articles published in 1998 and 2002, Riggs and colleagues stress the need for a detailed history and introduce the concept of a lifetime timeline approach. This approach allows for understanding of the emergence of symptoms over time, i.e. the temporal dynamics of the disorders[53,108]. These and other authors also mention the need to interview multiple informants (to ensure capture symptoms or behaviors that may be under-reported by the adolescent (due to, for example, denial or social desirability bias) or by caregivers (due to, for example, lack of awareness)[297].

Turner et al. (2004) document recognition by the federal authorities in the U.S. for the adequate assessment of adolescents with concurrent disorders, and call for additional funding to ensure that validated biopsychosocial instruments were used for all adolescents presenting in either treatment setting[75]. In a survey of mental health and SUD treatment settings at that time, only about 10% of programs were using instruments capable of assessing both types of disorders and there were no widely recommended or accepted diagnostic instruments for the purpose. By 2008, Winters et al. (2008) noted a trend toward the use of at least one standardized assessment instrument for intake and treatment planning in SUD treatment programs, indicating a small amount of progress in recent years[297]. These authors also outline the domains of importance for assessment which include consideration of concurrent disorders, as follows: *drug involvement; SUDs; externalizing disorders; internalizing disorders, family history, family environment, childhood abuse* and *social functioning.* Each domain includes key variables and recommended assessment tools. Issues of validity of self-report are also discussed. For greater advice on assessment of *specific pairs of concurrent disorders,* the reader is referred to Kaminer and Bukstein (2008)[87].

Health Canada (2002) also notes the need for multiple sources, for a continuing assessment approach, and one that covers symptoms, behaviors (frequency and patterns of substance use) and psychosocial functioning[27]. Stage of change is also recommended as an important area for assessment. Some suggestions for improving reporting reliability and establishing rapport with youth are also made. The importance of connecting the assessment to subsequent treatment planning is also underscored. The AACAP's 2005 practice parameter on SUDs in adolescents also endorses an assessment approach that includes multiple information sources, is nonjudgmental in tone, covers attitudes and readiness for treatment, *differential diagnosis for concurrent disorders* and a timeline approach (as per Riggs above)[7]. Notably assessment of adolescents with SUDs for concurrent disorders is considered a *minimum* standard in that practice parameter.

As an example of a specific assessment process (for SUDs) developed in practice, Smith and Hall (2007) discuss a process integrates the assessment process with immediate motivational interviewing, a strength-based orientation and solution-focused therapy[298]. The process, called Strengths Oriented Referrals for Teens (SORT) uses the Global Assessment of Needs (GAIN) instrument and collateral information from families. The assessment is followed by a one hour session which involves 20 minutes each with teen and

family and 20 minutes together. Training on the process is available but no information on evaluation is provided by the authors.

Diagnostic Instruments

A comprehensive review of the history of all diagnostic tools for mental disorders and SUDs *separately* is beyond the scope of the current review, and many sources of that information are already available [e.g. 297;58]. In any case, the level of detail needed on symptoms will often necessitate the use of several disorder-specific instruments.

There are many options for diagnosis of concurrent disorders *for research purposes*, and several authors list these, e.g. the Diagnostic Interview Schedule for Children (DISC) and the Kiddie-Schedule for Affective Disorders and Schizophrenia (K-SADS)[54]. Most of these tools have well tested standardized modules for many disorders, but they are not perfect. For example, West (2003) discusses use of the DISC in a large research study in Scotland, and problems resulting from one versus two stage case identification, single versus multiple informants, and the use of impairment critieria[104]. Innovations in formatting and administration modes, such as automated interviewing (e.g. the voice-DISC), visual cues, picture interviews, which are largely being used in research contexts, have the potential to make measurement more valid, efficient and appealing to youth[54,104] and may ultimately have utility for clinical setting as well.

To date many authors lament that diagnostic instruments developed for research are not ideal for the clinical setting because they are too lengthy (many exceed one hour in administration time), require specialized training and/or have been found to be difficult to administer to multi-problem adolescents[66,299]. Abrantes and colleagues (2004) describe optimal characteristics of a more useful tool for the clinical setting:

> *"To accurately assess adolescents with co-occurring conditions, a practical instrument should be adolescent-specific, developmentally appropriate, and obtain a continuous measure of symptomatology to provide indications of severity. The instrument should also demonstrate strong psychometric properties across a wide range of mental health problems, including SUDs. In addition, the instrument should be able to be effectively used by program staff in juvenile justice settings to provide a foundation for diagnostic documentation and treatment referrals"*[299 p.330].

This section describes four instruments that, based on descriptions in the literature, appear to allow for assessment of at least some symptoms and behaviors of *both* disorders in a single tool. The intent of describing these instruments separately was to illustrate the development of integrated instruments, and was not meant to imply that they are superior to well-developed separate instruments.

Hoffman et al. (2004) developed a tool called the Practical Adolescent Dual Diagnostic Interview (PADDI) which was tested in 284 adolescents in the juvenile justice setting to screen for more common disorders and symptoms (depression, mania, psychosis, PTSD, panic attacks, mania, generalized anxiety disorder and specific phobias, OCD, CD, ODD, SUDs and possible paranoid and dependent personality disorders)[66]. The PADDI was reported to have excellent internal consistency reliability by the developers (alphas .62 to .94; most over .80). It has an administration time of 30 to 45 minutes. To date the PADDI does not appear to have been validated against a gold standard and has now been commercialized.

The Global Assessment of Individual Needs (GAIN) was developed by Dennis et al. beginning in 1993 as part of a suite of tools for behavioral healthcare in the U.S.[52]. The full version of the GAIN can be used for a full biopsychosocial assessment and it can be administered in either structured interview or self-completed forms, taking about one to two hours. It has 123 items questions in four subscales that cover depression, anxiety, trauma, suicidality, substance abuse and dependence, CD, ADHD and

criminality/violence with links to DSM IV diagnoses. It has been extensively tested including in more than 6000 adolescents at multiple sites in the U.S. Psychometric information and norms are readily available.

The Millon Adolescent Clinical Inventory (MACI), developed by Million and Davis, is described in a validation study by Pinto and Grilo (2004)[300]. This instrument has 160 items in 31 scales covering three general areas (clinical syndromes, expressed concerns, and personality styles). Syndromes covered are depression, suicidality, hopelessness, impulsivity, drug and alcohol use and self-esteem, but these are not clearly mapped to formal diagnoses. The MACI includes items to assess reporting issues including disclosure, debasement and desirability. Norms are available for adolescents in inpatient, residential and related mental health settings, and by age and gender groups.

The Teen Addiction Severity Index (T-ASI) (developers Kaminer et al.) is described in Hilarski (2004) and Winters (2008)[138,173]. Despite its title this instrument was designed to assess adolescents for problems associated with concurrent MDs and alcohol disorders. It is formatted as a semi-structured interview with 133 items in seven areas of symptoms and functioning: drug use, school status, employment-support status, family relationships, legal status, peer-social relationships, and psychiatric status. The assessment includes severity ratings for each content area. The interview takes about 30 to 45 minutes.

Approaches to the Assessment of Readiness to Change

One special topic relevant to both early identification and intervention in concurrent disorders in adolescents is the assessment of readiness for change, following the dramatic rise in use of Stages of Change theory-based or motivational approaches. On this topic, one study on the issue of reporting found that, among youth including disadvantaged youth in mental health treatment settings in East Harlem, New York, the willingness to self-report on substance use and related risks was quite good. The authors concluded that barriers to assessment of substance use issues based on concerns about biased reporting and sensitivity may be exaggerated[301]. These authors also found all stages of readiness to change among those presenting, and that motivational interviewing was a useful strategy for initiating treatment. In a related study, Chung (2005) assessed readiness to change substance use behavior among youth with concurrent disorders in outpatient SUD treatment. Lower levels of readiness to change were found among those with concurrent externalizing disorders as compared to those with internalizing and other concurrent disorders[302]. Hilarski (2004) reports on a 19-item assessment instrument for readiness to change called the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES). In articles aimed at primary care providers, Simkin (2002) and Monti (2004) discuss the value of motivational interviewing for encouraging youth to engage in treatment, noting that using this approach "*a clinician can elicit pros and cons, give advice, provide choices, practice empathy, clarify goals, and remove barriers. This technique allows youth to be less defensive and more proactive*" [197 p.472]. These authors outline research demonstrating the utility of this approach for getting youth into treatment and also provide the mnemonic "FRAMES" which stands for the aspects of the interview to be covered[188,197].

Treatment

The literature on treatment for adolescent concurrent disorders was the most complex and diverse among all topics in the review. The search yielded volumes of literature on treatment for the disorders separately which required sifting to locate the more specific information of interest. In this chapter, general summaries of the current evidence for each of the types of disorders separately are provided for context; but the focus is on what is known about either *the application of existing treatments to concurrent disorders* or the development of *new treatments specifically for concurrent disorders.* It begins with *general* points and trends from the articles about treatment for concurrent disorders in youth. It then lists information *specific* to treatment types, relevant guidelines, pairs of disorders, and specific treatment settings. The final sections cover more recent thinking about broader changes in services and related issues such as staff training. Note that while the details of specific prevention programs were tabulated in

Appendix, specific treatment programs were not – because in initial searches across developed countries we found the number of programs to be very large, yet non-comprehensive and the details were often very sketchy and sometimes quite dated. Details were extracted for several Canadian programs (available from the author).

General Points about Treatment for Adolescent Concurrent Disorders

The science on clinical interventions for concurrent disorders is considered to be at a very early stage of development. For example, Rowe et al. (2004) comment that little is known about how to manage concurrent disorders despite the fact that they are the usual presentation in many treatment settings[168]. To the middle of the 2000s several authors note that there were still few controlled well-researched treatment protocols for concurrent disorders in the adolescent population and few studies on how comorbidity impacts the effectiveness of treatment modalities for single disorders[23,75,120,206]. Historically, treatment studies have either selected 'pure disorders' or not considered comorbidity in analysis, leaving health professionals without critical information for applying results to 'real world' clients[18,53]. Initial naturalistic studies of the course of concurrent disorders under conventional treatment approaches have also been disappointing, as described in Chapter 6. Evans et al. (2005) lament that most SUD counselors currently have little or no training in mental health and that programs either ignore MDs or refer clients to other systems for parallel or sequential treatment[5]. In this scenario those who receive mental health services tend to improve on mental health outcomes and those who receive SUD services tend to improve on substance use outcomes but in both cases not on non-targeted outcomes[38,75]. This observation parallels the adult literature on separate treatment.

In addition to this lack of knowledge, relatively poorer funding support for treatment for mental disorders in youth more generally has made it even more difficult to provide accessible, appropriate and high quality treatment for those presenting with concurrent disorders[17]. Costello et al. (2005) point out that only *one-ninth* of the money for mental health or SUD services in the United States is provided to services for the youngest *quarter* of the population[54]. In a very recent article, Mark and colleagues (2008) estimated that national mental health spending in 2003 was only $232.00 per youth compared with $376.00 per adult and $419.00 per older adult[303]. The differential for youth vs. mid-age adult was even greater at $26.00 per youth and $98.00 per adult. Aside from funding, other general trends in treatment of children and adolescents as context for adolescent concurrent disorders treatment include more outpatient care, more managed behavioral health care (in the U.S.), more pharmacological treatment (especially for ADHD and depression) and more diagnosis and treatment in pediatric primary care settings[54].

Yet strong messages abound in the literature advising that concurrent disorders should be systematically identified and wherever found aggressively treated[260]. Many authors, e.g. Crome et al. (2004) describe child and adolescent mental health services as being *"under serious pressure"*[16 p. 47]. In a context of such high need, constrained resources, and difficult treatment decisions, the situation for clinicians and families is very difficult.

Why Adult Approaches are not Suitable for Adolescents

In a discussion paper on treatment for adolescents with SUDs, Fagan et al. (2006) outline key differences between adults and adolescents that impact treatment and which are also relevant to concurrent disorders:

> "Ad*olescent substance abusers have unique characteristics that impact the effectiveness of their treatment, including (a) briefer and more episodic history of (substance) use; (b) undergoing rapid developmental changes that may mimic or exacerbate (substance) effects; (c) being less likely to suffer from serious medical and psychological consequences of protracted use; (d) being more likely to present with co-occurring problems such as psychiatric comorbidity, family, school, legal, and community problems so they need comprehensive services; (e) being more likely to "outgrow" or "mature out" of (substance) problems by early adulthood without formal treatment;*

> *(f) being less likely to admit they have a problem with (substance) use and voluntarily seek and participate in treatment; (g) possibly being less amenable to adult treatment techniques such as confrontational of denial approaches to treatment given developmental issues associated with independence and autonomy; and (h) relapse and continued problems being the norm..*" [89 p. 329.]

Also in the context of SUD treatment, Stevens et al. (2007) elaborate on the developmental issues that necessitate different approaches for adolescents. They note that adolescents typically have a low level of motivation because they see their use as being normal and time-limited; and the developmental tasks of defining identity and mastering formal logical thinking are not complete.

> *"In the past decade, with improved methodologies, investigators have found that adolescent brains are far less developed then previously believed. Delayed development is reliably noted in the prefrontal cortex; the mediator of behavioral planning and reasoning, attentional processes, impulsivity and response inhibition. Given this, mastering formal logical reasoning is a challenge for adolescents. With regard to SUD treatment, adolescents may need more time and different strategies than their adult counterparts to understand the disconnect between their substance use and life goals"* [304 p.25].

Those with concurrent disorders tend not to see a life without substances, and generally have low coping ability and self-efficacy[304]. Though some adolescents may choose or have court-mandated abstinence, in many their mindset may be incompatible with the expectation of immediate and complete abstinence that is common in adult treatment programs. Harm reduction approaches (i.e. looking for ways to decrease problem behaviors while increasing positive behaviors and pro-social activities) may be more successful. These authors and others (e.g. Monti 2004) also identify that motivational approaches seem to be increasingly suitable and used, and that successful strategies guide the adolescent through the process of developing mature thinking about their behavior; allowing time for development[188]. They stress that a focus on abstinence may backfire and undermine the therapeutic relationship, and may generate *"argumentative exchanges or by dishonesty, in which adolescents merely pretend to make a decision to quit using drugs"* [304 p.26].

More broadly, psychosocial research on adolescent development that has implications for treatment stance (as well as for promotion and prevention) is also advancing (see for example Kagicibasi 2005[305] and Becker-Stoll 2008[306]). For example, adolescents' drive for autonomy is no longer seen as being incompatible with maintenance of relatedness to parents. Research on concepts such as attachment, autonomy and relatedness has enormous potential to inform intervention approaches.

<u>Trends in Treatment Philosophy and Stance</u>

A few articles in the review discussed and/or advocated for shifts in the general philosophy of treatment for concurrent disorders. In a position analogous to the view that risk factors are insufficient for preventive interventions, some authors argued that more of a 'strengths' (vs. a pathology) perspective needed to be incorporated in working with this population. For example, Yip (2003) contrasted these philosophies: "*The disease orientation stresses addiction and mental illness; intoxication and dependence; symptoms and diagnosis; detoxification and treatment; confusion and control as well as resistance and labeling. The strengths perspective focuses on: decoding frustration and emptiness from addiction; searching for strengths to satisfy normal needs; establishing social support and encouraging participation in a healthy environment; re-anchoring self-confidence and capability development as well as maintaining empathetic trust."* [307 p.189]. Duncan and co-authors (2007) apply the concepts of positive youth development and a strengths-based approach to both promotion and treatment for adolescent health care more generally in the primary care setting[308]. In a related article, Smith et al. (2007) contrast a motivational approach with more traditional approaches. The former is described as involving empathic listening, rolling with resistance, providing feedback and offering a menu of options whereas the latter (which they note to have been influenced by the 12-step approach) emphasizes the client's need to accept

their SUD as a disease, considers abstinence as the only goal and vigorously confronts denial[298]. The authors outline the application of the motivational approach in a solution-focused therapy approach. The interview encourages self-change statements from the client through careful questioning, active listening and mutual goal setting. The questioning approach presupposes action (e.g. *"when this is no longer a problem, what will you be doing differently*?") The teen is treated as an expert on his/her own life and the general orientation is to concerns rather than diagnosis; strengths are also outlined. Unfortunately there is virtually no research that compares these treatment philosophies head to head; and it may be that no 'one size fits all' approach works anyway.

In a development parallel to prevention as discussed in that section, a few authors also raised the sobering point that treatment approaches can also have unintended effects[7,144]. These points were frequently made in reference to pharmacologic therapies, but not exclusively. This type of discussion remained at the level of conjecture level; scant empirical work on the issue was cited.

Summaries of Broad Reviews of Treatment for each Type of Disorder

A few articles were found that represented very current reviews of treatments for MDs and SUDS largely separately, but which also commented on issues of comorbidity. They are briefly mentioned here as foundational articles for treatment evidence for each type of disorder. Hoagwood et al. (2001) discuss the evidence base for treatment approaches for child and adolescent mental disorders, mentioning a general concern that for many therapies that show promise in research settings, the same benefits have not necessarily been shown in practice settings[309]. The authors discuss family therapies, intensive case management, therapeutic foster care, home-based services, integrated community-based treatment, multi-systemic therapy, school-based approaches, and medication. They list examples of ineffective treatments as peer-based group therapy for DBDs, non-behavioral psychotherapy for ADHD, and institutional care for children with emotional disturbance. In companion articles published in 2002, Farmer et al. and Compton et al. provide comprehensive reviews of the evidence for treatment for externalizing and internalizing disorders in childhood, noting that several treatments have positive outcomes but that note a *"striking lack of evidence"* for treatment for childhood DBDs (especially for longer term outcomes). A recent thorough review of the current evidence for treatment of adolescents with depression summarizes the latest evidence for combined antidepressants and CBT[310]. In a major initiative in the United States, the Annenberg Foundation Trust and the University of Pennsylvania Public Policy Centre convened a Commission – **Treating and Preventing Adolescent Mental Health Disorders: What We Know and What we Don't Know**. The results were published in 2005 as a major textbook which includes recommendations for policy and research[5]. Unfortunately the Commission's panels were organized around single disorders (depression and bipolar disorder; schizophrenia, anxiety ADs, EDs, SUDs and suicide); ADHD and CD were notably absent and coverage of issues of comorbidity was limited.

For SUDS, an early review by Weinberg et al. (1998) noted the shift from individual and peer-group psychotherapy toward family-based therapies, and outlined evidence for several closely related theory-based approaches Strategic Systemic Family Therapy (SSFT), Multi-Dimensional Family Therapy (MDFT) and Multi-Systemic Family Therapy (MSFT)[91]. Also mentioned at the time were behavioral approaches such as rehearsal, social contracting, problem-solving and coping skills training as well as the emergence of relapse prevention techniques. The authors also mentioned the paucity of evidence at the time for the 12- step approach. More recent reviews summarize the empirical support for psychosocial treatments for SUD to the middle of the current decade[173,311]. Listed as having *no* empirical support are: milieu therapy, general alcoholism counseling, educational lectures and confrontational therapy. Psychosocial therapies listed as having mixed empirical support are relapse prevention, behavioral self-control, and those listed as having empirical support are MDFT, CBT, social skills training, community reinforcement, behavior contracting and cue exposure. Brief interventions and motivational enhancement therapy (MET) have empirical support for problem use (not abuse or dependence)[173,311]. Promising new therapies are noted to be Brief Strategic Family Therapy (BSFT), integrated family and cognitive

behavioral therapy (IFCBT), Family Empowerment Intervention (FEI) and ecologically-based family therapy (EBFT); all interventions reflecting a more integrated and multi-systems approach[311]. Adolescent therapeutic communities and school-based group treatment are noted by several authors (e.g. Liddle 2006) to need more research[190].

In the 2005 AACAP practice parameter for adolescent SUDs treatment and prevention, MST is listed as an evidence-based approach with established lasting benefits[7]. Family therapy, CBT with or without motivational interviewing (for individual treatment) are also noted to have empirical support. Community reinforcement with contingency contracting and vouchers are listed as 'promising'. Slesnick et al. (2008) provide the most authoritative and current guidance on specific content and delivery of CBT approaches[311]. With respect to self-help support groups such as Alcoholics Anonymous and Narcotics Anonymous, the AACAP consensus was that they may offer adjunct support, but that adaptations for youth had not been examined in clinical trials. Slesnick and co-authors (2008) note that there are still questions about suitability for adolescents, and some information on their effectiveness as used in residential or inpatient settings but insufficient rigorous research as used in community-based groups[311]. Leukefeld et al. (2005) provide an excellent review of current treatments for adolescent SUDs in the reader-friendly categories of 'what works'; 'what might work'; and 'what does not work' for each of community setting and residential settings[312]. Good quality, current descriptions of some of the lesser known approaches of community reinforcement and behavioral reinforcement are given by Martin and Volkmar (2007) and manuals are available from the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA)[58]. Weis (2008) indicates that relapse rates are found to be high in many short-term inpatient and residential programs including those offering detoxification therapy (e.g. 60% within three months and 80% within one year)[85]. Evidence for pharmacologic approaches (including medications for substitution, detoxification, aversive therapy, and for reducing craving) is sparse in adolescents, although several such drugs have been approved for adults and are being used in adolescents. Relevant review articles are Upadhyaya (2008); Hilarski (2004) and AACAP (2005)[7,173,313]. Finally, a set of criteria for treatment placement for SUDs which have been adopted as a standard in the U.S. are outlined by Fishman (2008)[314].

A program to support new and innovative treatments for adolescent SUD treatment was sponsored by the SAMHSA CSAT in the early 2000s[315]. The aim of the research program was to identify promising existing treatments, evaluate their effectiveness and assist in standardization, manual development and dissemination. Unfortunately, the focus was on SUD treatment, and it seems little attention was given to concurrent disorders. Ten models were evaluated which included initiatives based in outpatient programs, family-based and intensive inpatient, step-down, residential and therapeutic communities. For example, Stevens and co-authors (2007) describe a small study of one treatment called the '7 challenges' approach[316]. The approach is a motivational approach which starts where the youth is in terms of stage of change and is designed to be appropriate to developmental issues. The format is group counseling with readings and interactive journals and is designed to be delivered in various settings (e.g. outpatient, residential or schools). Each step is detailed in the article. The philosophy is based on client 'strengths', a strong therapeutic alliance, and emphasis on the whole of the adolescents' life. The program was tested with 36 youth and three and six month follow-up data. Most substance use and mental health measures improved, but more research would be needed on this and other innovations to characterize them as 'evidence-based' for separate or concurrent disorders.

Finally, general features of successful adolescent SUD treatment programs put forth by NIDA were summarized by Fagan (2006) as having "*(a) qualified staff trained to work with adolescents; (b) recognize gender, cultural, and individual differences in their treatment approach; (c) address engagement and level of motivation for treatment; (d) involve families, schools, and other people in the treatment process; (e) use a manual-guided, developmentally appropriate treatment protocol; and (f) provide continued care after treatment*"[89 p.328].

Findings on the Use of Specific Treatment Types for Concurrent Disorders

Pharmacotherapy

Increasingly experts are recommending intervention studies that *combine medications with psychosocial interventions*[163]. Even so, discussions about the utility and efficacy of pharmacologic treatments continue to be somewhat separate from discussions of psychosocial treatments. About a dozen articles focused on either *trends in the use of* or the *evidence for effectiveness* of various medications in youth with concurrent disorders or a high likelihood of concurrent disorders. The findings are outlined here for major groups of psychotropic drugs.

Clark et al. (2003) describe medication use over a 10-year period from 1991 to 2000 among 277 adolescents aged 12 to 18 years with alcohol use disorders and comorbid psychopathology in SUD treatment programs in the Pittsburgh area[317]. The most commonly prescribed class of drug was ***antidepressants***. The authors concluded that *"In those with comorbid major depressive disorder and alcohol use disorders (n = 110), antidepressant medication use increased significantly from 18% to 55% over the decade studied…. The common and increasing use of psychiatric medications in this population emphasizes the urgent need for empirically based clinical guidelines"*[317 p.293]. A major development in this arena has been the approval of fluoxetine in 2003 for major depression in adolescents (based on two short-term randomized control trials) and then the subsequent U.S. Food and Drug Administration (FDA) official warning (in 2004) about an increased risk of suicide-related adverse events found for children and youth. The FDA's review process was detailed in Hammad et al. (2006)[318]. The risk was flagged through post-marketing surveillance of the drug paroxetine, but the review involved nine anti-depressants. The article concluded that *"the data suggest a risk of anti-depressant drug-induced suicidality in the pediatric population and that this risk was best understood as applying to all anti-depressant agents"* [318 p. 338]. The authors emphasized, however, that the warning was not to be interpreted as a strict contraindication of these drugs in youth, but as a warning to clinicians to carefully weigh risks and benefits before prescribing, and if prescribing to closely monitor patients.

Drug trials for co-occurring disorders are becoming more common in adults, but are still rare for adolescents. Only one article describing research on effectiveness of antidepressant medications for concurrent disorders per se came up in our searches. The authors (Cornelius 2005) report on a five-year pilot study of the clinical course of the antidepressant fluoxetine in 13 adolescents with depression *and* alcohol or cannabis dependence[319]. They found generally "good" results for alcohol and cannabis dependence symptoms and academic functioning but disappointing results in terms of course of depression and in adherence. Because the study was uncontrolled the findings for substance use could easily be explained by natural developmental trends to reduced use. The authors now have double-blind clinical trials in progress for concurrent depression and alcohol or cannabis use in adolescents respectively; but the results are not yet reported.

On the topic of ***antipsychotics***, the authors of a large sample (N > 2500) administrative database study in Texas reported that, among those under age 19 receiving an antipsychotic prescription, 35% had a diagnosis of DBD (including ADHD, impulse control disorders, CD and ODD) followed by depression and bipolar disorder[320]. While no mention was made of SUDS or concurrent disorders, these findings suggest that off-label anti-psychotic drug prescribing is also occurring among youth that have high likelihood of concurrent disorders. While no information about trends in use of these medications in Canada was found, a population-based study is underway to examine trends in antipsychotic use among adolescents in Nova Scotia[321]. Several authors (see for example Costello et al. 2005) express great concern about use of psychotropic medications in children and adolescents based on relatively few or small clinical trials, and off-label use based on no evidence[54].

A few articles examined the use of newer ***anti-alcohol drugs*** in adolescents, including anti-craving/withdrawal and aversion therapy agents. Concerns expressed include the minimal research to date on the use of these drugs in youth, and that they might divert focus from needed psychosocial treatments. Some question the appropriateness of aversion therapy in young people but also note that because few adolescents actually meet criteria for dependence, they are actually rarely needed. Even so, in a practice parameter published in 2005, the AACAP supports the use of medications for management of craving, withdrawal and for aversion therapy "when indicated" in youth with SUDs and provide specific guidance for this but suggest caution in medication use among those with concurrent disorders[7].

Another group of articles addressed the challenge of ***psychostimulant*** use in adolescents with concurrence of ADHD and SUDs. Concerns have largely focused on stimulant abuse or diversion. One early article (Riggs 1998) recommended that, for youth with ADHD and SUD, total abstinence be attempted before using stimulants, but if it was not possible, CBT and MSFT should be used to reduce substance use while carefully monitoring medications[108]. The author also stated that if abuse was a continuing problem, then a more supervised setting (e.g. inpatient or residential) might be necessary. In 2003 Biederman et al. published a study which followed 140 adolescents with ADHD and compared them with 120 who were unmedicated[322]. The authors found that those not on medication were three to four times more likely to develop SUD. While this finding was considered reassuring by some, the study results cannot be considered conclusive for many reasons. The design was naturalistic – that is treatment was not randomized so the participants may have differed on many other predictor variables. Outcomes were measured using only self-report, follow-up may have been too short, and the analysis may have overcorrected for several variables (e.g. for comorbid conduct disorders) and did not consider others (e.g. motivation, adherence, parent support). Funding for the study was provided by industry. In a commentary article on the same subject, Gordon (2004) discusses both stimulant abuse and diversion (sale or distribution to others) among those with ADHD[102]. In their treatment sample, one third reported abusing stimulants. The authors report on the emergence of newer stimulants with lower abuse potential but emphasize that "…*treatment of ADHD is multi-focused and should include a combination of psychosocial and medical interventions, such as parent management training, school-focused interventions, child psychotherapy, and pharmacotherapy. Insufficient treatment that relies primarily on pharmacotherapy is especially dangerous due to the high levels of Schedule II psychostimulant abuse and diversion found in this population*"[102 p.37]. Solhkhah (2005) report on the use of buproprion hydrochloride (aka Zyban or Wellbutrin) for substance abusing adolescent outpatients with both ADHD and mood disorders[323]. The study was an open label single group design with only 14 participants aged 12 to 19 years at the Massachusetts General Hospital. Clinically significant reductions in symptoms were found for 13 youth who completed the study and no adverse events; however no biological measures were taken to verify self-reports of substance use. The authors concluded that the results were promising for a drug with lower abuse risk. Wilson et al (2005) recommend careful use of stimulant medications in adolescents with ADHD and/or comorbid CD or SUD in the context of a multi-modal treatment plan. They suggest that bupropion and atomoxetine may be effective for those with concurrent disorders and appropriate symptomatic indication but warn that evidence is not yet conclusive for their use in adolescents.

Overuse and underuse of psychotropic medications generally was studied in a group of 406 youth leaving foster care (due to age) in the U.S. Midwest[324]. Ten percent of the sample were taking three or more concurrent psychotropics, and between 19 and 41% with indicated diagnoses were not taking any medications.

Several authors provide good discussions of the current challenges in and controversies with the use of psychotropic medications in adolescents with concurrent disorders[5,139,206,319]. These authors all underscore the paucity of efficacy research on medications in teens with concurrent disorders, clinician's fears about abuse, but also about interactions between medications and substances of abuse. They note that the usual approach is to refer for SUD treatment and expect abstinence *before* initiating treatment for psychiatric

disorders; an approach which has been increasingly criticized by many authors in the review. Other issues noted are that medications for single disorders are less effective in the presence of a comorbid condition, but that more recent studies on the utility and safety of some medications for psychiatric disorders are encouraging (e.g. lithium for bipolar disorder, fluoxetine for depression and pemoline for ADHD)[5]. Libby and Riggs (2005) report that several trials of alternative medications including fluoxetine, permoline and bupropion are underway as part of an ongoing program of research sponsored by NIDA[139]. Despite the lack of trial evidence to date, several very recent publications provide current, specific and practical expert advice on the use of pharmacotherapy, including the AACAP practice parameter (2005). Martin and Volkmar (2007) provide a detailed table on the use of pharmacological agents and their evidence for use in various comorbid conditions[7,58] and Leukefeld et al. (2005) provide a very useful table on how medications used for a range of psychiatric disorders may impact both psychiatric symptoms and substance use if present[312]. Finally, Evans et al. (2005) list a set of principles for selecting and managing medications in adolescents with concurrent disorders[5].

Cognitive-behavioral Therapy (CBT)

Many authors in the review concurred that the evidence for the efficacy and effectiveness of approaches based on CBT was accumulating. Surprisingly, very little was found about specific clinical adaptations or longer term outcomes of youth with concurrent disorders who have received CBT-based treatments. Rowe et al. (2004) confirm that CBT has been shown to reduce drug use and psychiatric symptoms among youth with concurrent disorders but that the course of recovery is slower and relapse common[168]. The authors randomized 182 adolescents to family or individual CBT in a program called "Temple Teen Care" and found that the group with concurrent internalizing and externalizing disorders responded to treatment initially but relapsed to baseline levels by one year post-discharge. Similar findings were reported by Rohde et al. in a trial of CBT for youth with SUDs and depression where those with CDs were excluded[82]. These findings underscore the need for follow-up and relapse prevention, for all interventions, regardless of level of evidence. Curry et al. report on the development and pilot-testing of a CBT-based intervention for adolescents with depression and SUDs. The intervention format was integrated group and family therapy[325]. It was tested in 13 adolescents aged 14 to 18 years and their families in two rounds and found to be feasible, to have high retention and to reduce both substance use behaviors and symptoms of depression. However, larger studies with stronger designs would be needed to confirm its effectiveness. CBT approaches are also noted to be increasingly used for relapse prevention in SUD treatment, because of their suitability for addressing the circumstances of relapse and associated distorted thinking[85]. Slesnick and colleagues (2008) report on some of the first randomized studies of CBT approaches for adolescents with concurrent disorders. The first studies were disappointing, with unsustained gains and high relapse rates, but results have improved with further refinement of interventions. These authors also report on a very new, promising intervention for comorbid depression and SUD that integrates CBT and family therapy (family and coping skills therapy (FACS))[311].

Family-Based Therapy and Multi-Systemic Therapy

There seems to be no clear distinction between family-based therapy and multiple systems therapy in the literature, and it seems that the latter evolved from the former. Many authors discuss them together. Rowe et al. (2004) say that family-based approaches which also target multiple systems have the most research support, and that they have been shown not only to reduce drug use but also psychiatric symptoms in children and youth with multiple problems[168]. Weis (2008) also reports that the research supports the effectiveness of MDFT for both SUDs and MDs, in improving social, emotional, behavioral and academic functioning in comparison with individual supportive therapy, group supportive therapy and family-based education[85]. Turner (2004) states that since these approaches have been shown in many studies to work for both types of disorders separately, it should be a safe assumption that they would also be suitable for and work in concurrent disorders[75].

A comprehensive systematic review of randomized controlled trials of family therapy and multiple systems therapy was published by Diamond and Josephson in 2005[326]. Most of the article addresses evidence generated for single disorders but there is still much that is relevant to the treatment of concurrent disorders. The authors summarize key milestones and trends in the development of Family Therapy including its endorsement by several oversight agencies, developments in licensing and training, and tools for assessment of family risk. In terms of evaluation, only MST and MDFT were considered to have had sufficient research to be considered empirically supported treatments, but that family-based treatments have now been tested for most child and adolescent disorders. Other treatments, many of which may be promising though not fully tested innovations are described in the article and include functional family therapy (FFT) and attachment based family therapy. These approaches are increasingly available in manualized form and therefore are more easily taught and evaluated. The authors make note that family-based therapy has been found to be *particularly effective for externalizing disorders including CD and SUD.* For ADHD they report that the evidence indicates that it contributes to the reduction of family and behavior problems but not so much to the reduction of core symptoms. They mention that research is less advanced but that increasing there are FT approaches for internalizing disorders as well. Also noted is a trend toward home-based family-centered treatment in both mental health and SUD treatment. Family-based approaches are also increasingly being used to support CBT and psychoeducational interventions. There are also trends toward a) programs not adhering strictly to Family Systems Theory but broadening into transactional, multidimensional and ecological approaches; and b) FT becoming more flexible and integrative in terms of participant roles and delivery (e.g. all members are no longer required to participate and medication and cognitive therapy components are incorporated). This is considered to be a promising direction toward a true biopsychosocial approach to treatment. The authors cite several interventions that combine these components (though they may not have been specifically tested for concurrent disorders). These broader approaches are being termed family-based treatment (for practice) and family intervention science (for research). The authors also express a concern that the forces of neurosciences, psychopharmacology and managed care may detract from advances in training and application of family interventions just as their potential is being realized.

Despite the enthusiasm noted by Diamond et al. for these approaches, a very recent Cochrane systematic review has shed more doubt on the strength of evidence for them. Littell et al (2008) reviewed eight studies of MST for youth aged 10 through 17 years[327]. They described MST as *"an intensive home-based intervention for families of youth with social, emotional and behavioral problems which targets communication, parenting skills, peer relations, school performance and social networks"*[327]. The authors found 35 trials in total but considered only eight to be methodologically strong enough to be included in the review. Comparison groups received usual services or an alternate treatment. Significant heterogeneity was found across studies, making comparisons difficult. The authors concluded that the evidence was not yet sufficient for unqualified endorsement of MST as an evidence-based treatment. Note that the studies reviewed were not specific to those with concurrent disorders; the implication of which is that there is even less evidence for its effectiveness in concurrent disorders. However the authors also underscored that there was no evidence for any harmful effects of these approaches.

Motivational Approaches

Motivational approaches are alternatively called brief motivational interviewing (BMI) and motivational enhancement therapy (MET) in the review articles (occasionally they are also called motivational counseling or simply motivational interviewing). They are most often described as techniques to improve engagement in other therapies. For example, Weis (2008) describes the use of MET in conjunction with CBT and/or family therapy to reduce cannabis use[85]. Another technique being increasingly used in both CBT and MET is decisional balance interviewing. Decision balance techniques involve exploring the pros and cons/costs and benefits of a given behavior and they are being used in adolescent SUD intervention[316] and have also been tested in co-occurring disorders in adults [328].

Myers (2004) provides a whole chapter on the application of BMI/MET approaches in a range of settings including inpatient units, outpatient programs, primary care, juvenile justice and schools with adolescents with SUD and comorbid psychiatric problems. This author notes that these methods are not meant to replace more extensive interventions but have a place in a continuum of services[329]. These approaches have shown promise for problem substance use in the context of 'teachable moments'. Weis (2008) describes some studies in special settings including hospital emergency rooms and in high schools among high risk youth that had promising results in reducing substance use[85]. However, Kaminer and Bukstein (2008) caution that BMI/MET approaches are probably not sufficient on their own for treatment of more severe SUDs and where comorbidity with psychiatric disorders is present[87] but that they have a place in a comprehensive continuum of care. Our grey literature searches turned up a brief treatment (five sessions) based on motivational interviewing and CBT for adolescents aged 14 to 25 in individual or group formats. The intervention, called First Contact, seems to be in development, and no evaluative information was found[330].

12-Step and Other Approaches

Weis (2008) notes that there is some evidence for the single disorder groups (i.e. Alcoholics Anonymous and Narcotics Anonymous) but again, notes that they do not appear to have been adapted or systematically tested for adolescents[85]. "Double Trouble" and is an adaptation of the 12-step approach for adult co-occurring disorders which began in the late 1980s in Brooklyn New York[331]. A similar approach found in on-line searches is "Dual Recovery Anonymous"[332]. No but no information, either peer-reviewed or grey was found on whether these approaches have been used with youth. Evans et al. (2001) describe, in great detail, an approach that combines traditional mental health treatments with 12-step approaches for adolescents with concurrent disorders, but provide only anecdotal and reasoned evidence for its utility[333].

A few treatments received passing comment in one or two articles but there was insufficient information to form generalizations. These interventions were therapeutic foster care, therapeutic group homes, and home-based emergency/crisis services. While they represent possible components of a comprehensive treatment approach, it is reasonable to conclude that these interventions have not been developed or tested specifically for adolescents with concurrent disorders.

Unconventional treatments

A few authors made mention of some new or emerging treatment approaches that might be reasonably characterized, at least at this stage of their development, as unconventional treatments. Most of these approaches seem to have arisen in the context of the treatment of adult SUDs or MDs, but, with further research and adaptation, they may become adjunct or mainstream therapies with adolescents as well. For example, exercise is now beginning to be seriously considered as a prevention or treatment option for some individuals with mood and anxiety disorders, supported by plausible biophysiological mechanisms and some promising early research results[334,335].

Mindfulness-based approaches are also receiving much attention. They are described by Leigh et al. (2005) as "'*moment by moment experience arising from purposeful attention (i.e., meditation), along with a non-judgmental acceptance of these present-moment experiences*"[336 p.1335]. Usually applied in the context of CBT these approaches (also called 'meta-cognitive'approaches) appear to have promise in some cases for the individual psychotherapy component of multi-component interventions. Some evidence for the efficacy of mindfulness-based interventions for chronic pain, anxiety and depression relapse is noted for adults, as well as their early adaptation for SUDs and anxiety disorders[336-338]. However no articles were found that described their application to adolescents with concurrent disorders. A closely related new approach is spirituality-based therapies – a few of which have been noted in the grey literature for adults with mental health problems. However, no specific study of any spirituality-based intervention for adolescents with concurrent disorders was found in the generalized searches for this review.

One article was found that describes the adaptation of brain wave biofeedback approaches for adults to adolescents with SUDS[339]. Despite its perceived benefits (medication free, compatible with other therapies and feasibility for the difficult to treat) its drawbacks (expensive, time-consuming, special equipment required) and especially the lack of any controlled studies in concurrent disorders in adolescents make it unlikely to have widespread applicability or utility with the current technology.

Another novel line of investigation related to treatment is experimentation with novel delivery methods. Skinner et al. (2004) describe several initiatives involving delivery of treatment and prevention interventions on the internet[340]. Montgomery et al. (2001) reviewed 11 studies of media-based (written or internet based) interventions for parents/carers of children with behavioral problems – and concluded that these approaches (largely based on CBT) had moderate effects as an adjunct to medication with best effects seen in circumstances where a small amount of therapist time is added[341]. The authors suggest that alternative modalities for therapy may improve access for more families in need, that they may have both clinical and economic benefits and that they possibly fit in as the first stage of access in a stepped-care approach The authors are currently running a trial of this type of care.

Many locally developed, unique treatment approaches for SUDs or MDs, both conventional (such as residential programs) and alternative programs such as wilderness programs or youth development programs were found in the grey literature in this review. The potential promise of these programs for youth with concurrent disorders is entirely unknown because of the nearly complete lack of research on them. Only one relevant peer-reviewed article (Grella et al. 2001) was found in the review[69]. This article mentioned one inpatient/wilderness program and two residential programs but laments that outcome studies of such programs are rare, and where they do exist the samples are typically small and very selected.

Relevant Practice Parameters, Guidelines and Position Statements

In 2005, Godfrey et al. reported a high comorbidity rate in youth presenting to a public mental health centre in Melbourne, Australia, and lamented that the current clinical practice guidelines (CPGs) had limited utility because of their focus on single disorders[41]. The authors strongly suggested that depression and anxiety should be treated together, and that there appeared to be little hope of guidelines for SUD/MD treatment in the short-term. They authors also express concern that a current guideline in Australia suggesting that SUD should be treated before depression is out of synch with consensus in the literature. Crome and Bloor (2005) mention the release by the British Association of Psychopharmacology of a set of evidence-based guidelines for medication use in comorbid substance misuse and psychiatric disorders, but the evidence summarized is for adults[207]. Even though the science is not yet advanced enough to develop guidelines based on rigorous studies, even best practice statements based on consensus would represent an advance over what is currently available. Our search process for the review yielded a few statements by research or professional organizations which were (mostly indirectly) relevant to the general treatment of concurrent disorders in adolescents. Those published in 2004 or later are listed in Table 3:

Table 3 – Practice Parameters, Position Statements or Guidelines

Organization/Date	Title	Comments
American Medical Association[283]	Guidelines for Adolescent Preventive Services: the Gaps in Practice	Recommends that healthcare providers screen adolescents for use of alcohol and drugs annually as part of routine care
American Academy of Pediatrics Committee on Substance Abuse [283]	Alcohol Use and Abuse: A Pediatric Concern	Reinforces the role of the pediatrician in addressing adolescent SUD
American Academy of Child and Adolescent	Practice Parameter for the Assessment and Treatment of	Provides background on the current problem of substance use and SUDs in adolescents including

Psychiatry[7]	Children and Adolescents with Substance Use Disorders	predictors and covers the topics of prevention, early intervention, screening, assessment and all current major treatment options as well as a discussion of comorbidity.
SAMHSA CSAT[15]	Treatment Improvement Protocols (TIPs)	Five of 47 TIPs (on SUD treatment for juveniles in justice system, for SUD treatment in primary care, for assessment and treatment of SUDS in adolescents and for persons generally with co-occurring disorders) to date are indirectly relevant but none directly relevant to intervention with adolescents with concurrent disorders. Some of these are getting dated e.g. dating back to 1999.
Canadian Pediatric Society[342]	Harm reduction: An approach to reducing risky health behaviors in adolescents	Discusses evidence for and use of harm reduction approaches with adolescents for substance use and other risky behaviors.
Centre for Addictions and Mental Health[330]	Youth & Drugs and Mental Health: A Resource for Professionals	General facts on information on concurrent disorders in youth
American Society of Addiction Medicine[87]	Patient Placement Criteria (ASAM-PPC)	Placement criteria widely used in the U.S. that is SUD treatment focused but considers concurrent conditions
Illinois Behavioral Health Recovery Management Program[343]	Psychopharmacology Practice Guidelines for Individuals with Co-occurring Psychiatric and Substance Use Disorders	For adults
British Columbia Child Health Policy Centre (Simon Fraser University)[344]	Treating Concurrent Substance Use and Mental Disorders in Children and Youth	Recent concise summaries of the literature on this topic

Treatment for Specific Disorder Pairs

Many authors provided information on current treatment approaches for specific concurrent disorder pairs or groups. Key points of interest are summarized here for concurrent SUDS with DBDs (separately for ADHD and CD or ODD), mood disorders (depression and bipolar disorder), anxiety disorders (including PTSD), EDs and personality disorders.

Treatment for youth with ***ADHD, CDs and SUDs*** is outlined by Riggs (1998) although the article is a bit dated[108]. The authors comment that in the past treatment has typically been sequential with SUD being addressed first. MST, CBT, family therapy and individual therapy are all discussed along with considerations for psychopharmacology. The paucity of evidence on medications at that time was underscored along with the need for caution and careful monitoring. A more recent summary is provided by Wilens (2008) which does not contradict Riggs, but provides more detail[107]. Simultaneous treatment is important but emphasis is still on initial rapid stabilization of substance use. Treatment modalities recommended are CBT with a therapist knowledgeable in both disorders, and structured, goal-directed sessions along with careful selection and monitoring of medication. Stein et al. (2008) provide a thorough discussion of assessment and treatment approaches for youth with ***concurrent ODD or CD and SUDs***[100]. The utility of MST and family therapy (with the inclusion of parent management training) are featured in a thorough discussion, but mention is made of the recent systematic review less encouraging findings on MST. CBT is considered useful, especially if family members are not available and in correctional or residential settings. MET is noted to have been used successfully in incarcerated adolescents. Notably these authors discuss how treatment might be adapted for some unique aspects of presentation in girls; though it is admitted that there is virtually no empirical research on interventions for girls. The authors note the importance of addressing contextual and environmental factors in these high risk youth using

multi-modal approaches, and including mostly family-based psychosocial interventions. Pharmacological approaches in general are not felt to be very effective in these youth; and are recommended as adjunct to behavioral interventions. Relevant primary studies of treatments for youth with DBDs and SUDs are Henggeler et al. (2002) and Waldron et al. (2001)[345, 346]. In the first study 118 youth aged 12 to 17 years were randomized to MST or service as usual. No group differences were found after four years on mental health symptoms, property crimes, or cocaine use. The intervention group had better marijuana abstinence rates and fewer self-reported criminal convictions[345]. In the second study, 13 to 17 year-old adolescents with concurrent SUDs and DBDs (some with anxiety, depression and attention problems) were randomized to Functional Family Therapy (FFT) alone, FFT and CBT, CBT alone and psychoeducation[346]. At three-month follow-up there were no group differences on marijuana use, mental health symptoms, but the combined group had a slightly percentage of low-level marijuana users.

For ***depression and SUDs***, Rohde et al. (2001) describes a structured group CBT approach and reports that it was feasible and had no contraindications for concurrent disorders but that compared to those without concurrent disorders recovery was slower and recurrence more frequent[62]. Riggs and Davies (2002) emphasize that, in adolescents with concurrent disorders depression is often not alleviated by abstinence and that treatment for SUDs alone is not adequate, and conversely treatment for depression alone is not effective for SUDs[53]. These authors provide a useful guideline for a staged intervention that begins with MET, family therapy, CBT and behavioral-contingency approaches, proceeds through careful consideration of medication and monitoring (using urine toxicology), the addition of a 12-step program if suitable to the individual, consideration of MST or residential treatment if there is no response with in two months, and relapse prevention[53]. Cornelis (2008) provides the most recent treatment advice found in the review[117]. This author provides details of very preliminary findings on combined CBT and fluoxetine together, as well as the potential for integrated CBT and family therapy. The general importance of psychosocial therapies and close monitoring of medication is once again stressed by this author. Recent research and experience-based recommendations for treating ***bipolar disorder and SUDS*** are outlined by Goldstein and Bukstein (2008)[123]. These authors describe a single study on mood-stabilizing medications in adolescents, involving lithium; the results of which were considered encouraging for substance use reduction and general functioning, but not for a change in dependence criteria. Nor are there studies of psychosocial treatments in concurrence of these two disorders per se, however there is mention made of an adaptation of group psychotherapy (called integrated group therapy) for adults with these disorders. Overall there is very little guidance for the clinician in this type of concurrence beyond use of evidence-based approaches for the separate disorders.

Treatment for concurrent ***anxiety disorders and SUDS*** is outlined by Clark et al. (2008)[128] but to date (with the exception of PTSD), also involves the application of existing psychosocial approaches for anxiety disorders to those with both disorders, rather than the development or adaptation of integrated therapies[128]. A low probability of achieving abstinence has been seen in adolescents with anxiety disorders, and the lack of medication trials in teens with both disorders makes the use and management of anti-anxiety medications in this type of concurrence more complicated[128]. In relatively recent articles, three authors described and discussed specific treatment approaches to ***PTSD and SUDS***. First, Cohen et al. (2003) reviewed the literature on concurrent PTSD (resulting from child abuse) and SUDs in adolescents[347]. They concluded that evidence supported an approach called 'trauma-focused CBT' over nondirective play therapy, general supportive therapy, child-centered therapy, and standard treatment in the community. The article also mentions a relatively new therapy: "eye movement desensitization and reprocessing treatment" (EMDR) with one study showing comparable effects to trauma-focused CBT. One study was also reported that supported individual psychodynamic abuse-focused treatment was superior to psychoeducational group therapy. Family therapy was also considered by these authors to be better than standard community treatment. Little support was found for psychological debriefing and other crisis interventions and non-traditional therapies such as music, art, and dance were noted to need more study. The article provides a very good overview of the components of trauma-focused CBT and

notes that it is considered first-line treatment for childhood PTSD (as a single disorder) by the International Society for Traumatic Stress Studies (ISTSS). While very comprehensive, none of the studies reviewed by this author examined substance use behaviors or disorders as outcomes and in fact some explicitly excluded youth with active SUD from their sample. Both Cohen et al (2003) and Clark (2008) underscore that there are as yet no proven adaptations of PTSD therapies for concurrent disorders in adolescents, nor are there any studies yet published on the use of medications in SUDS/PTSD[128,347]. An example of a more specialized, disorder and gender-specific approach, Najavits and colleagues (2006), describe a new treatment called 'safety therapy' for adolescent girls with SUDs and PTSD[348]. The approach was, manualized, CBT-based, adapted from an adult version and based on the premise that treating both disorders simultaneously would be more effective than sequential treatment. The authors tested it in a small randomized controlled trial with 18 adolescent girls compared with 15 'treatment as usual'. The treatment group reduced substance use and related problems, trauma-related symptoms, cognitions as well as other symptoms (e.g. anorexia, somatization). Moderate effect sizes were sustained at three-month follow-up. In a slightly different population, Stevens et al. (2007) used a behavioral sleep intervention with 20 adolescents aged 13 to 19 with trauma and SUDs in a clinic in Arizona, with some indication of symptom improvement[304]. While both these approaches require much more research, they are examples of increasingly customized approaches that hold promise for special types of concurrent disorders.

Despite an established association, Bulik et al. (2008) lament that "*The status of treatment research on comorbid **eating and substance use disorders** is bleak*"[130 p. 390]. This is reflective of the state of treatment research on EDs generally. A serious concern is that among the few treatment trials that have been done, individuals with active SUDs are often excluded. For the time being, current practice for EDs alone provides the only guidance for intervention[130].

Very current information on treatment for ***personality disorders in adolescence in context of their high risk for SUDS*** in young adulthood is provided in a review article by Cohen and co-authors published in 2007[96]. The report that dialectical behavior therapy (DBT), which has been used extensively in adults with personality disorders (and often concurrent SUDs) has now been adapted and evaluated for the treatment of SUDs and for individuals with co-occurring personality disorders and SUDs is encouraging. The authors report that DBT skills training approaches have also recently been integrated with family therapy for adolescents with SUDS. Searches of the grey literature yielded references to its use with suicidal adolescents and adolescents with multiple problems, but no report of specific use in adolescent concurrent disorders or research on its effectiveness for any adolescent disorder was found.

Treatment in Specific Settings or in Special Populations

Despite comments in the literature about the increase in, and promise of, ***school-based treatment services*** for youth with concurrent disorders, no article emerged that gave a comprehensive overview of this topic. A few articles surfaced in the review that described specific programs. In articles published in 1999 and 2001 by Pressman and colleagues[349-351] a day treatment program in a high school in New York state is describes that involves multiple group therapy for adolescents with concurrent disorders (typically mood or anxiety disorders and SUDs). Therapy components included health, psychotherapy, leisure time, self-awareness, multiple family and 12-step sessions scheduled around regular class time. Medication and toxicologic use monitoring was included. Some aspects of the program could be considered problematic, such as the exclusion of those not motivated to change and those without family support. There is no report of the intervention being manualized or evaluated in any way; nor is it known whether the program is still active.

A school-based treatment service targeted to children in disadvantaged communities with diagnosed DBDs (and therefore at risk of later SUDs) in kindergarten to grade four is outlined by Atkins et al. (2006)[352]. The program, called 'Positive Attitudes Toward Learning in School' uses a behavioral-

ecological model featuring a positive classroom environment, engagement of parents, enhanced academic supports and training for teachers in the use of appropriate behavior management strategies. The authors compared nearly 300 children in 60 classrooms versus 60 versus referred to clinics. Positive changes were found in both behavior and academic performance. The authors specifically noted the importance of including learning as an important outcome to better engage schools, whose primary mandate is education:

> "*Specifically, we suggest that in these high-poverty communities, the goal should not be to make mental health services a primary goal of schools, but rather to make children's schooling a primary goal for mental health services. Our data suggest that this shift in focus can reach parents more effectively than can services delivered in clinics, and can contribute towards enhancing children's academic performance and behavioral adjustment. Although much more work is needed to refine and improve these services, we believe this is a promising start towards a model of accessible, effective, and sustainable services in disadvantaged communities"*[352 p.153].

In a very different approach, Grenard et al. (2007) describe a feasibility study of a very brief (25 minute one-on-one counseling) intervention aimed at heavy substance users in alternative high school settings in the Netherlands and Los Angeles[353]. While the investigators experienced lots of logistical problems including high initial refusal rates, they suggest that such an approach could be used to supplement more general interventions in classrooms, or in the context of follow-up of more intensive treatments. It is likely that the search terms for the review tended not to capture specific school-based approaches, perhaps because they are not yet defined or packaged as approaches specifically for concurrent disorders, despite their great potential. A comprehensive project has recently been announced that will be lead by the Child and Youth Advisory Committee of the Mental Health Commission of Canada that will examine research and practice on school-based interventions (promotion and prevention through intensive treatment) for mental health problems and SUDs in children and adolescents. The project will involve multiple focused literature reviews, a national survey and environmental scan and a major knowledge translation Symposium at the end. The project holds great potential for informing and advancing school-based treatment approaches in Canada.

No articles were found that addressed concurrent disorders treatment per se in ***non-specialized health care settings*** but indirectly relevant information on handling SUDs in these settings was found. The AAP Committee on Substance Abuse produced a guideline in 2000 that acknowledges that comorbidity is extremely common among adolescents with substance misuse, but provides practical advice for pediatricians on approaches for identifying and managing SUD only[354]. An article by Solkhah, published in 2003, which provides advice for emergency room physicians on how to handle youth presenting with acute intoxication takes a similar approach. It makes note that other psychiatric disorders are very common in these youth and recommends motivational interviewing and possible referral to 12-step programs but does not provide much information on how and where to refer these youth for more comprehensive treatments[35].

Six articles emerged that addressed the topic of treatment in ***juvenile justice*** settings. Thomas and Penn (2002) provide a thorough overview of all related issues, largely directed at psychiatrists, including training, specific programs, pharmacotherapy, the use of seclusion/restraint and standards for care[158]. The article also outlines recent trends in services in the U.S. including higher volumes of multi-problem clients and families, typically presenting with comorbid medical MD/SUD and decreasing resources for court-ordered treatment programs, and in situ treatment and rehabilitation. They note that the documented high rates of MDs among incarcerated youth are stimulating calls for reform. Their recommendations include screening all clients for mental health concerns in these settings, increased access to a continuum of services tailored to specific needs including wraparound services, early detection and diversion/alternative sentencing, and improved planning and coordination among agencies. In the same

year, Armstrong and Costello suggest that evidence is good for MST and family therapy among populations of youth with SUDs in juvenile justice settings[47]. A systematic review of 12 trials of CBT for antisocial behavior in youths aged 12 to 24 (many of whom presumably had concurrent disorders) in secure or non-secure residential treatment by Armelius and Adreassen which is updated to 2008 concludes that CBT is more effective than standard treatment in such settings for reducing recidivism and that effects are sustained to about one year post-release[355].

Two articles described specific interventions in juvenile justice settings. In the first, Jenson and Potter (2003) studied an intervention involving cross-system collaboration on outcomes for detained youth with concurrent disorders. The term 'cross-system' was defined as "*"the application of integrated intervention principles and practices jointly selected and administered by professionals representing juvenile justice, mental health, and SUD service delivery systems"*[356p.590]. Specific interventions used were psychoeducation, case management, individual and peer-based group therapy, SUD treatment and family therapy. The authors described the approach as being similar to MST but less intensive. In a naturalistic observational design, property and drug offense rates declined, but the study was very weak in design and measurement and included a component (peer-based group therapy) that has been more recently contraindicated. In the second article describing an intervention, Smith et al. (2006) piloted a six-week family-oriented psychoeducation/parenting program ('Parenting with Love and Limits') in 102 youth involved with juvenile justice services, aged 9 to 18 years with SUD and concurrent ODD or CD[357]. The rationale for the approach was based on the perceived success of family therapy approaches but their limited use in juvenile justice settings. The authors reported some positive effects in adolescents (no attitudinal change but some reduction in substance use) but validity of results is questionable because of a weak design (single group pre-post test), self-report measures and a high drop-out rate.

Feldstein and Ginsburg (2006) provide a review of motivational interviewing approaches in juvenile justice settings and the theory behind its applicability to these high risk adolescents[358]. The author concludes that while motivational interviewing is theoretically indicated, much more empirical research is needed to demonstrate its effectiveness. Finally in a very recent publication, Hussey and co-authors describe a system-level intervention for treatment of female offenders with concurrent disorders[78]. The initiative, called Integrated Co-occurring Treatment (ICT) is described as a program based primarily in the home, providing mental illness and SUD treatment simultaneously and using a 'system of care' philosophy. No outcome or evaluation information is given in the article.

Three articles on interventions for two other special populations came up in our searches. The first of these focused on ***street/runaway youth*** with psychoactive SUD[359]. Not all of these youth had concurrent disorders but a majority likely did. The program was described as ecologically-based family therapy (EBFT) and included 15 sessions of manualized individual and group therapy for both youth and parent as well as assistance with other supports and liaison with schools and probation services. 124 youth aged 12 to 17 from two shelters were randomly assigned to the new treatment or usual shelter care and followed 12 months. The treatment was found to be more effective in reducing substance abuse; other problem areas improved in both conditions. The second and third articles highlight new approaches for concurrent disorders in ***First Nations/aboriginal youth***. The first describes the 'Wellbriety Movement' which is an approach that draws on traditional teachings and the participation of elders[49]. The second reports on a group treatment model under development by Marlatt et al (2003)[360]. Abbott concludes "*New models of treatment for American Indian adolescents need to be tested for effectiveness. Treatment models and outcome research in co-morbid disorders in American Indian and Alaska Native adolescents is nonexistent"*[360 p.19].

<u>Broader Approaches to Treatment – Comprehensive Care and Services Integration</u>

Two developments that represent broader approaches to treatment were frequently discussed in this literature are ***comprehensive care*** and ***integration of services***. In many articles these concepts were

mixed, making the findings and recommendations difficult to tease apart. For clarity they are discussed separately here, with the caveat that they are not nearly as distinct in the articles reviewed.

The first is a trend toward ***comprehensive, multi-component treatment programs***, both by the individual clinician as well as in the design of service/treatment programs. Multiple components are described as any of a) multiple therapies (e.g. a program that uses all of MET, CBT, primary care and pharmacotherapy) b) multiple delivery settings (a program that includes services delivered in clinics, schools and on the street), or c) multiple types of care on a continuum (e.g. a program that has prevention and promotion components, public education, and several stepped levels of treatment). Over the 10-year period of this review, there was a clear trend toward a preference for comprehensive, multi-component treatment programs for each disorder and both disorders. Research examining whole programs of care and their respective treatment components is limited, and the adult literature is not much further ahead. A recent review of 45 controlled studies, with a caveat about study heterogeneity, summarizes the evidence for effectiveness of specific treatment components within comprehensive interventions[361]. However this evidence relates to a very different population than adolescents with concurrent disorders, so it is not very generalizable.

The earliest article found in the review whose author advocates for more comprehensive service approaches for adolescents was Bushell et al. (2002)[42]. These authors summarize evidence that suggests that risk factors need to be addressed in adolescents who have comorbid conditions with SUDs, because when only symptoms are treated the broader life problems typically result in drop-out and/or relapse. They characterize the broader approach as involving a flexible, holistic, client-led, harm reduction process that includes attention to social roles and social exclusion as well as psychiatric disorders. They note that the broader approaches have shown promise but that interventions were small scale to that date.

In articles by Canadian researchers Byrne et al. (2004) recommendations are provided to address the issue of reluctance of at-risk youth to seek treatment[79,80], which speaks to comprehensiveness of care (including physical healthcare) and related issues at the service level. The authors describe the 'Youth Net' program in Ottawa, which, among other things, involves mechanisms to connect youth to a youth-friendly health professional. They also emphasize the need for investment in integrated approaches to adolescent mental health, which would imply inclusion of approaches to address substance misuse but also specifically include physical healthcare. They describe such an approach:

> *"A universal, youth-friendly, school-based approach to case-finding is merited. In this model, medical services could be universally accessible, collocated with youth counseling services onsite in the school versus on-call. For example, expelled youth could be assigned to an onsite mental health program rather than being left to fend for themselves in a fragmented system. Such an accessible service has drawbacks, such as potential labeling and confidentiality concerns. Yet nonuniversal services present the greater drawback of failing youth who have otherwise treatable problems*[79, 80 p.143].

The issue of comorbidity is raised in the article in points about assessment: "*The characteristic clustering of problems—anxiety disorders with affective disorders and disruptive behavior, for example, strongly suggest the need for an integrated rather than ad hoc approach to diagnosis in order to avoid missing the underlying complexity of each problem"* [80 p.143].

A progressive approach in Australia is described by Patton et al. (2007)[115]. The approach is predicated on the identified need to connect specialized mental health care with settings where adolescents will typically present with problems, and information on engaging adolescents from the broader adolescent healthcare literature: confidentiality, competence, youth participation, evidence-based treatment and collaboration across sectors. According to the authors, these approaches have been shown to increase service use in

primary care. Application of these features in a major initiative in Australia called 'Headspace' is described in the article. The initiative is based on collaboration between primary care and mental health/SUD professionals and links to accommodation, education and employment services; all provided in a single 'youth friendly' setting for young people aged 12 to 25 years. These latter two articles provide examples of efforts to move toward what might be as 'youth-friendly' or 'youth-centered' care approaches.

The second development, which is closely related, is the nearly universal call in the literature for ***integration***. Authors are rarely explicit about what they mean by integration, with some seeming to refer to integration at the individual clinician level, some at the program/service level, and some at the system level (across multiple programs and services). *System-level* integration would involve changes at the level of services planning and policy and would involve mechanisms like governance structures or funding streams. Health Canada (2002) provides definitions for integration at the service and system levels[27] (see Appendix A) and system-level integration is discussed in greater detail in the next chapter.

At the *individual clinician* level, integration is discussed in terms of providers, on their own, acquiring skills and knowledge about both types of disorders, and using therapies for both disorders in a single simultaneously delivered treatment plan for the client. One very comprehensive article was found which reports on a systematic review of six randomized controlled trials and 11 non-randomized studies of recent treatment interventions *specifically for concurrent disorders* at the clinical level in adolescents[17]. The authors list the three current approaches to the *process* of treatment (serial treatment (defined as 'treating one disorder before the other'); parallel treatment ('treating both disorders simultaneous by separate clinicians') and integrated treatment ('treating both disorders concurrently'). They use the term 'integrated' also in reference to the *content* of treatment, most commonly with respect to including issues presented by both types of disorders (SUD and MDs) but also other aspects, e.g. addressing both parent and peer relationships in treatment. They also underscore the cost and complexity of developing and delivering the newer comprehensive approaches as well as the cost and complexity of researching them, and note that these challenges may hinder the availability and quality of services for youth with concurrent disorders. General findings highlight 'family behavior therapy' and 'individual cognitive problem solving therapy' as efficacious approaches for externalizing, internalizing and SUDs in youth with concurrent disorders, but emphasize the limited specific research to date. The article culminates in a set of 10 preliminary (unofficial) treatment guidelines:

1. Assessment is multipronged and ongoing and includes practitioner, parental, and self-monitoring so that treatment is responsive to the changing needs of the client.
2. Treatment strategically enhances engagement and retention.
3. Treatment plans are flexible and allow for client choice and voice.
4. An integrated treatment approach is used to address both mental health and substance-related disorders concurrently.
5. Treatment is developmentally and culturally sensitive to match the unique needs of the client.
6. Treatment is ecologically grounded and systems oriented, including important individuals to the client such as family members, friends, and school personnel.
7. Treatment taps several domains of the client's functioning to enhance the client's problem-solving and decision-making skills, affect regulation, impulse control, communication skills, and peer and family relations.
8. Treatment is goal directed, here-and-now focused, and strength based.
9. Treatment requires active participation by all members involved, and includes homework assignments.
10. Interventions aim to produce sustainable changes over the course of treatment.

At the *program or service level*, integration mechanisms described include any of ensuring all providers in a program have adequate training, co-locating expertise in both types of disorders in the same program for consultation, or providing multi-disciplinary team interventions, but in most cases treatment philosophy and treatment plans are shared[59]. Service-level integration might also involve specific mechanisms for collaboration among services or the merging of programs and services previously serving one or the other of the disorders. Some authors (see for example Drake 2007) contend that co-location, coordination of information across separate services, collaboration between providers offering separate therapies, professional training across disparate settings and improved referral processes among services are early steps on the path to integration but are not true integration[362]. According to Drake, true integration, structurally, requires care for both disorders to be provided by the same provider or team, in a coherent approach, and in a single location[362] and its essential philosophical and service components are *"a comprehensive, long-term, stated approach to recovery; assertive outreach; motivational interventions; provision of help to clients in acquiring skills and supports to manage both illnesses and to pursue functional goals; and cultural sensitivity and competence"* [363,p. 469]. In a recent services study, Cook et al. (2005) operationally defined integration (of psychiatric and vocational services for adults with severe co-occurring disorders) as multidisciplinary team, all sharing the same program philosophy with face-to-face basis at least three times a week, in the same organization, at the same location and with a single case record[364].

With respect to evidence for the superiority of integrated over non-integrated services, again, most research is in adults with many dozens of related studies and target funding for demonstration projects[5]. Integrated treatment has been considered an evidence-based practice for adults with co-occurring disorders (with outcomes measured as treatment participation, improved symptoms and functioning) for many years[224,347,363]. Research continues for further refinement of integrated models of care in terms of specific components and cost-effectiveness. For example, in 2008, Craig et al. published the results of a cluster randomized trial in South London wherein patient outcomes were compared for 40 case managers trained in the treatment of both disorders (in adults with co-occurring disorders) and 39 without training[365]. Significant improvements were found in some outcomes (symptoms and met needs but not substance use or quality of life) for 232 patients. No additional service costs were incurred for this simple clinician-level intervention.

Most advances in practice have also come in the adult realm. Minkoff and Cline (2004) describe a specific service-level integration model for adult services called integrated dual-diagnosis treatment (IDDT), for which an implementation kit has been published by SAMSHA[366]. Many other developments to support integration for adult co-occurring disorders have included testing models, standards development, development and monitoring of implementation, alignment of incentives, training curricula, workforce competencies, scopes of practice, related policies and procedures, self-assessment and fidelity rating tools[367]. Quality of care has even begun to be examined empirically; see for example Kilbourne et al. (2006) who studied the quality of SUD treatment for adults with serious mental disorders[368]. These advances contrast with the relative underdevelopment of service models and standards for *youth* with concurrent disorders but the good news is that they provide a roadmap for the work that needs to be done. However, most authors consider these types of service changes for adolescent concurrent disorders consider them to be in the 'early days' in terms of implementation.

Most calls for service integration for adolescent concurrent disorders are thus based on practice experience and the perceived 'normative good' of integration, and there were many such calls in this literature. The AACAP (2005) practice parameter for adolescent SUDs treatment strongly recommends integrated treatment (vs. parallel or consecutive treatment)[7]. It also emphasizes the need for comprehensive treatment in a rehabilitation-based model that addresses coexisting psychiatric and behavioral problems, family functioning, peer and interpersonal issues and academic/vocational needs, in the least restrictive setting. Practical tools are also given including factors to consider in choosing the

level of care and six components of a comprehensive treatment plan. This approach is considered to be optimal, though the need for more research is acknowledged.

Several authors remarked on the lack of research on integration of SUD and mental health services for adolescents[5], which parallels the persistence of separate literatures on treatment. In a recent textbook **Handbook of Adolescent Behavioral Problems: Evidence-Based Approaches to Prevention and Treatment** by Gullotta and Adams (2005) the authors ponder where field will be in next 20 years. "… *this volume was sorely lacking in discussing co-occurring disorders. The reality is the field lacks the theoretical framework to bridge the SUD world with depression, schizophrenia, conduct disorder, and scores of other dysfunctional behaviors. Thus examples of integrated programming (not coexisting but integrated programming) are not to be found in the published literature. This fault must be corrected if progress is to occur*"[369,p.631]. The authors also note that knowledge generation follows the flow of research dollars, for which a tradition of funding specific and single diseases continues.

The few studies that were found in our searches that described structure and process service changes and provided a bit of information about client response, but few researchers have actually systematically operationalized and measured integration per se. One article was found that examined one step toward integration[76] in a treatment cohort of 419 adolescents aged 12 to 18 years enrolled in the Health Maintenance Organization Kaiser Permanente in California. All of intensive (abstinence-based) SUD treatment plus supportive group therapy, psychoeducation, relapse prevention, family therapy, individual therapy, and self-help (including 12-step) groups were available for a one-year treatment duration. Psychiatric services were co-located (i.e. provided at the same site, but not fully integrated with other services). Those who received the additional psychiatric services were found to be more likely to be abstinent at one year. The authors observed that the benefits of co-location for staff were convenience and increased collegiality.

Cleminshaw et al. (2005) describe what they call a 'promising practice' of integrated treatment – the Integrated Co-Occurring Treatment (ICT) model[370]. The program was developed for youth with concurrent disorders and juvenile justice involvement in Ohio, and used features of the adult IDDT model but with modifications critical to adolescent treatment. Consultation with stakeholders including youth and the extant literature were also used to develop the model. The intervention is home-based and addresses multiple systems, using a range of clinical interventions. Its integration features include a single-agency, single-treatment philosophy and single (direct) provider who addressed both SUDS and MDs with a single treatment plan. The authors report on a single group naturalistic follow-up study that showed positive outcomes across a range of symptom and functioning measures.

In a unique article published in 2000, Malekoff et al. describe the learnings from a five year-process to integrate mental health and SUD services for youth in a mideastern U.S. county[194]. Initially the services had separate records, separate fiscal and program accountability systems, separate data and separate reviews. In some cases structures actually 'forbid co-mingling of services' and examples of bureaucratic processes which stifled flexibility and creativity are given. The authors noted that rational approaches such as coherent proposals, supporting data, and documented recommendations were useful but that early on they failed to recognize irrational approaches. A multi-dept oversight committee was set up but turf behavior and animosity between SUD and mental health personnel continued (different philosophies of illness). It was necessary to move to an 'asset paradigm' in both the change process that also reflected the new treatment philosophy. The asset paradigm was described as "*creative, constructive, and competency-building activities…; …does not mean sacrificing anything currently accepted as good practice, but adds to and enhances it.*" [194 p.306]. One strategy that was very useful was making the case based on common risk factors, followed by simply working through a whole list of practical issues. The authors also commented on the irony in long slow process of changing structures and regulations of the very organizations that expect quick change among clients with complex histories and difficulties.

Other Treatment-related Issues

Many articles made mention of the training needs of specialist clinicians in either mental health services or SUD treatment services. Mechanisms for increasing staff skills for handling concurrent disorders were listed ranging from making simple external consultation available, in-service sessions, adding expertise in the form of individuals with expertise to a team, to cross program training to significant re-training to prepare teams for fully integrated services. A few articles also addressed the training needs of specific disciplines. Swadi and Bobier (2003) express concern that the training of child and adolescent psychiatrists has not had sufficient emphasis on SUD including its comorbidity with psychopathology, its developmental aspects, nor its distinction from adult disorders[74]. A major survey of a representative sample of PCPs treating adolescents in the U.S. found that physicians had great concern for the mental health of their patients and considered mental health to be an important responsibility; but that their confidence in detecting, treating and making referrals for disorders was weak[5]. Libby et al. underscore the training needs for family physicians on all of effective screening, assessment, evaluation, brief interventions, relapse prevention, referral practices, evidence-based treatment and continuing care and emphasized that these needs will have to be met if they are to be effective gatekeepers and coordinators of integrated treatment services for youth with SUDs. By implication, a range of similar needs would also be present for concurrent disorders[139,371]. Notably these authors did not mention the need for training specific to concurrent disorders issues. Training gaps and needs for primary care practitioners were also identified by Byrne et al. (2004) who considered them to be important players in a situation of scarcity of child and adolescent psychiatrists[79, 80]. Our grey literature searches identified encouraging developments in Alberta including on-line continuing professional development courses on managing co-occurring disorders[372] and in training front-line staff through a new interdisciplinary post-baccalaureate diploma program at the University of Calgary which covers both mental disorders and substance misuse, and for which child and adolescent components are in development[373].

Advances are also being made on approaches to human resources in the adult co-occurring disorders realm that may be adaptable to adolescent services as well. For example Wieder and co-authors (2007) provide guidelines for the hiring of clinicians and desirable characteristics for practitioners of specific therapies such as MST[374]. Even research, in a small way, has begun to look at the role of staff in treatment outcomes. Schoenwald and colleagues studied the effects of organizational climate and therapist adherence to treatment protocols on the outcomes of over 1900 youth receiving MST in 45 provider organizations in North America[375]. Both variables were found to be significantly associated reductions in problem behavior at one year follow-up. This study is a harbinger of more sophisticated multi-level health services research studies that will inform practice in the coming decades where interventions are direction, not only at the client, but also at providers and the organization as a whole.

KEY POINTS: Intervention for Adolescent Concurrent Disorders

- Prevention and early intervention are receiving increasing attention and emphasis in the literature.
- Prevention approaches continue to be largely separate for SUDS and MDs.
- Evidence is building on optimal content and delivery of prevention programs within a comprehensive population-based approach.
- Screening is considered a 'best practice' in SUD or MD treatment settings, though appropriate screening tools have generally not been available until recently.
- The DSM is problematic for adolescent mental disorders including concurrent disorders.
- Multi-stage approaches to assessment (screening and diagnosis) are recommended.
- Evidence for the effectiveness of a range of specific treatments including pharmacotherapy and psychosocial treatments is limited for adolescent concurrent disorders, as are specifically relevant practice guidelines.
- There are increasingly strong calls for comprehensive/integrated treatment approaches for adolescent concurrent disorders that are in keeping with directions in adolescent health services more broadly.

CHAPTER EIGHT

The ‘Big Picture’ - Service Systems and Policy

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The 'Big Picture' - Service Systems and Policy

The Current State of 'the System' for Concurrent Disorders

The State of the 'System' for Adults with Co-occurring Disorders

Integrated care at both service and system levels has been recommended by major national organizations in the U.S. for adults with co-occurring disorders for many years[224,347,376]. A model for an integrated system of care, called the Comprehensive Continuous Integrated System of Care (CCISC) has been developed which includes national consensus on a four quadrant model for determining the need care according to need and severity[366]. It also includes eight principles and 12 steps for implementation. In several articles, Minkoff discusses the model as well as progress in several jurisdictions in the U.S., and interestingly also in Manitoba[343,366]. Anderson et al (2003) explain how separate administration of mental health and SUD treatment systems have hampered system change in the state of Iowa. They lament that many in that state still receive serial (sequential) treatment which is contrary to current guidelines. They comment that "*Without a unified state blueprint for developing programs and action plans, it is difficult to organize current resources toward any long-term cohesive goal and to plan for future service needs*"[38,p.1340]. They argue that advances in treatment have largely not been implemented and that factors limiting system change are not well understood. Brunette et al. (2008) reported on the findings of implementation monitoring of IDDT at 11 sites and reported that only two reached high fidelity, six reached moderate fidelity and three remained at low fidelity over two years, indicating that even where a specific decision has been made to integrate and a specific model chosen, implementation is difficult[377].

In a very recent article, Rosenberg et al. (2008) summarize the current status of the U.S. system[376]. They note that access to integrated care remains poor, citing a SAMHSA estimate that in 2004 only 6% of American adults with co-occurring disorders were receiving integrated services; the equivalent proportion for adolescents was not known. The authors go on to charge that despite grants programs for initiatives and technical assistance little has trickled down to front-line care. *"Practice change requires sustained organizational investment: leadership's commitment and vigilance; re-ordering priorities; operational re-alignments: and ongoing outcome oriented clinical supervision for staff"*[376 p.1]. They contend that resources are needed to support the change process, including re-tooling operations, establishing a critical mass of expertise and retraining existing staff. They conclude by noting that a new Community Mental Health Services Improvement Act is being introduced to the U.S. Senate which includes integrated treatment for mental illness and addictions. In another recently published article, Keyser et al. (2008) provide an update on recent developments at the system level for adults in the U.S. including changes in resource allocation such as state incentive grants for integration[378]. The authors focus, in particular, on new thinking about the quadrant model for planning levels of care. They note that it is now considered to be a useful framework for improvement in systems-level delivery, but that more specific evidence-based practices are needed at the service level.

Empirical research sheds light on the current state of the service system in the U.K. Keene (2005) studied more than 645,000 health care events in a complete health region population. The author examined care provision across largely separate mental health and SUD treatment services (mostly in adults) for those who accessed care[379]. Lots of comorbidity was noted in both types of treatment, with more mental health problems present in SUD services than the other way around. Among those in mental health services, only 2% received drug services and 3% alcohol services, while 28 to 39% of drug or alcohol agency clients had received mental health services. Among 16 to 24 year old mental health clients, 26% had also received drug agency services and 7% had received alcohol agency services. The authors outlined several service and policy implications. First, they commented that the high prevalence of comorbidity in both settings makes the option of providing 'specialist teams' or co-located consultants nonideal as such teams

would be inadequate for the sheer volume of need. They suggested that both services needed to implement integrated treatment approaches and noted with the first priority being SUD services. A second recommendation was for increased inter-agency and inter-professional collaboration/coordination, with ultimately all services delivered and managed by a single Trust (implying full integration). In a commentary on this study Weaver and co-authors (2004) suggested that this research made it clear that parallel team approaches nonideal that, particularly for the youngest age group, there was an immediate need for the development of concurrent disorders expertise with an emphasis on staff training and competency[380].

General strategies for supporting system integration and initial steps were outlined by Health Canada in 2002[27]. These included improved information, training, leadership, and inter-organizational planning[27]. There is little documentation on Canada's progress in integration at either the service level or the system level, and it might be fairly characterized as spotty. Rush (2008) describes new programs and partnerships at the service level. A few policy developments and a few government department mergers are noted at the system level[59].

The State of 'the System' for Adolescents with Concurrent Disorders

Development of a system of care for *adolescents* with concurrent disorders appears to be even further behind, judging from the sparse information available. Information from a few diverse descriptive or intervention studies in the review provided some glimpses of the current state of service systems for these youth. Most of the literature at this level speaks to mental health services or substance use services or indeed child health services more broadly, not services for concurrent disorders per se.

Dierker et al. (2001) observes that all major mental health policy reports in the United States in the past 30 years declared a need for integrated services for youth at the community level, yet to that date few 'systems of care' had been developed[229]. Libby and Riggs (2005) also note that integrated treatment has one of nine core principles for SUD treatment put forth by NIDA since the mid-1990s but that implementation has been very slow[139]. In a study published in 2005, Anderson and Gittler list five national organizations in the U.S. that have recognized the need for integrated treatment for adolescents with MD/SUD[224]. They suggest that very few adolescents currently receive integrated care and that services are still very fragmented, though promising practices likely exist that are not be reported anywhere. In their rural Iowa sample, only 30% of teens aged 12 to 18 with concurrent disorders who were discharged from either mental health or SUD treatment had received for both disorders.

Grimes et al. (2006) summarizes the current state of health services for children's mental health in terms of primary care specialty care, noting that policies, including those in the **President's New Freedom Commission on Mental Health** (2003) are increasingly calling for integration of services, including integration of mental healthcare with physical healthcare[10]. However, prior gaps between these have made it difficult to implement and study system innovations. The article makes reference to a set of 12 principles for child/youth healthcare published in the late 1980s by the Child and Adolescent Service Systems Program (CASSP) including that they be child-centered, family-focused, need-driven, community-based and culturally competent. In reference to children at higher risk, the recommended strategy for change is to recruit communities to change whole systems of care rather than just focus on clinical level change in individual organizations.

In terms of empirical research at the system level in the U.S., Cavanaugh (2005) showed that changing financing mechanisms influenced relevant changes in care use and delivery in SUD and mental health services for children and adolescents[381]. These included access to 24-hour services, the number of admissions, the length of hospital stay, and the number of individuals receiving care. Though this was a study of managed care so the specific funding mechanisms are not relevant to the Canadian setting, an important lesson is that high level changes can influence service on the ground and that change at all

levels should be considered. This study also provides an example of health services research – that system-level changes can be studied for impact.

The status of the service system for youth with comorbid psychiatric disorders (including SUD/MD) in Australia was discussed by Godfrey et al. in 2005[41]. Australia was described as still having very separate treatment delivery systems. They observe that while the problem has been discussed at the policy level there was very little implementation on the ground (to that date). The authors conclude that *"integration between mental health and SUD services is well overdue and must be addressed at policy, service system and clinical levels"* [41, p. 379].

Libby (2008) summarizes existing models of integrated care for *mental health and physical healthcare* from around the world, mostly developed for adults[371]. The models described are: shared or collaborative care in Canada; single funding stream HMO models in the U.S., specific primary care models, and case management approaches. These authors also present a cogent article as to why the primary care setting and a primary care-centered model might be particularly suitable for adolescents, but acknowledge that there are theoretically many possible ways to operationalize integrated care for youth, with little health services research evidence, including cost-effectiveness research on how to go forward. Recommendations from these authors for overcoming current barriers to change include generating evidence through policy and services research (in addition to clinical research) including evaluation of innovative integrated service models, realigning financial incentives and funding streams, retraining and recruitment of providers.

International policies on child and adolescent mental health are also discussed in a recent article by Belfer (2007), who notes that recommendations from the WHO that every country have a plan for child and adolescent mental health date back to the late 1970s, yet only 7% of counties had such a policy by 2002[382]. Child and youth policies are recognized to be different from those for adults in that they need a developmental framework, need more intersectoral cooperation and must allow for issues such as dependence of care recipients. Actions to support child mental health are also acknowledged to be very different. The article also stresses the need for 'evidence informed' policies and recognizes that policies themselves can have unintended effects (e.g. targeting to one disorder at the expense of others, opportunity costs of implementing programs that have no supporting evidence). Effective policies are described by the authors as those which address the needs of the population, assess current resources, assess strategies in other jurisdictions, consult with stakeholders to build consensus, and develop policy options that include mechanisms for financing, governance and evaluation and include assessment of barriers to implementation. The authors report that tools to guide policy development are now available.

In the Canadian context, several major articles about *child and youth mental health policy more generally* have been recently published. These came in the context of broader discussion surrounding the Canadian Senate Committee Report **Out of the Shadows at Last**[11]. Kutcher and Davison (2007) underscored the great burden on mental illness in children and adolescents, that services are still often unavailable, primary care providers are poorly equipped and that competencies of staff in non-governmental organizations are unknown[383]. They also observed that there is little evidence for school or community-based prevention programs and few resources for those with persistent, complex mental disorders, and emphasized the potential effectiveness of early identification, diagnosis and treatment. Both primary and specialty care services were noted to be in need of reform to improve response to need for mentally-ill youth. *"It is essential that appropriate, evidence-based mental health care to meet these needs is accessible. Resources should include a variety of interventions, horizontally integrated into current health services"* [383, p. 417]. In another article, McEwan et al. (2007) expressed similar sentiments, including that current mental health policy in Canada is too heavily focused on adults and existing disorders; not enough on the promotion of social and emotional well-being and prevention. They point out the imbalance in current expenditures and underscore a deep concern that 75% of children and youth with

disorders do not receive services[246]. A strong rationale for a public health approach to childhood mental disorders in Canada is also further outlined by Waddell and colleagues in recent companion articles in the Canadian Journal of Public Health[252,262]. In 2007, the Canadian Paediatric Society issued a status report on Canadian public policy on child and youth health, stressing (among other things) the need for addressing mental health[6], and in 2008, in a media release, the Canadian Psychological Association has also called for a lot more government action on mental health problems in young people, including school-based programs and services and actions to address the shortage of school psychologists[384].

The first provincial policy on child and youth mental health was released in 2003 in B.C.[385]. This plan increased funding ($46M in additional funding) and focused on shifting investments. It addressed concurrent disorders with an emphasis on improvement of service coordination, and a plan to develop practice guidelines. Subsequent reviews of progress have found that the plan still has wide support yet the need is still urgent[28,386]. An expert table on concurrent disorders is in place and a practice parameter has recently been released[387]. Mental health promotion is also a stated priority of the provincial Health Officer in British Columbia who has recommended expanding mental health initiatives[388]. A review of mental health and illness in Atlantic Canada by the Public Health Agency of Canada also made mention of concurrent disorders as a priority for youth and other special populations[389].

In Alberta, a Children's Mental Health Plan was released in 2008. It includes $50.5 million in funding to new initiatives and contains actions that are potentially important for addressing adolescent concurrent disorders, including a focus on children and youth at risk, as well as community, school, family and primary care based initiatives targeting drug abuse; and promoting mental health in schools[390]. However, there is no specific mention of concurrent disorders in the Alberta policy document. Alberta stakeholders also set priorities for child and adolescent mental health research in the province in 2007, which include relevant priorities such as 'prevention and mental health promotion' and 'risk factors and vulnerable populations' (under which 'dual diagnosis' was a suggested area for research)[391]. A recent survey of Albertans confirmed broad public support for investments in early child development and parenting programs[392].

Toward Better Systems of Care for Adolescents with Concurrent Disorders

Current Thinking about Integration

Throughout much of the period of this review, the dominant rhetoric about healthcare solutions for adolescent concurrent disorders could be characterized as the 'integration imperative'. Integration is strongly recommended by many, and many have lamented slow progress. The barriers to integration discussed in this literature are virtually identical to those which have been articulated for adult services. Anderson (2003) describes barriers as falling into five categories "policy, funding, program, clinical and consumer/family". The following list of barriers was compiled across several authors:

- the historical separation between mental health and SUD services which have resulted in different treatment philosophies and clinical approaches;
- narrow professional boundaries, exclusive professional cultures;
- separately trained workforces which are not equipped to change practice;
- concerns about the complexity or difficulty of treating both disorders simultaneously;
- gatekeeping in both primary and specialty care;
- 'single disorder' thinking in both treatment systems (i.e. the lack of recognition that comorbidity is the rule rather than the exception);
- an undersupply of providers with training in integrated treatment especially in rural areas;
- separate funding and administration streams at the highest levels; eligibility and reimbursement policies and practices;
- lack of understanding of and support for integrated care by those who allocate resources;
- confidentiality policies; and, lack of leadership [5,38,53,75,190, 224,347,371]

More recently a more nuanced and cautious perspective on integration has emerged; reflected in a newly published report of the Canadian Executive Council on Addictions titled **On the Integration of Mental Health and Substance Use Service and Systems**[393]. The thinking is predicated on the observation that both the prevalence of concurrence and the level of need are highly variable by population and setting, and thus integration initiatives must be planned considering the risk benefit for both those with and without concurrent disorders in context of a broad strategic planning approach, and based on a foundation of evidence[59,393]. Recommendations of the report include adequate resources for thoughtful and targeted integration initiatives; a program of supportive research and demonstration projects (particularly at the systems level); a strengths-based approach which values and recognizes commonalities across mental health and SUD services, among others. A population health approach which includes planning for integration of broader health services, and in particular primary care is also advocated.

System Change Initiatives and Evaluations

Recent system-level initiatives and some evaluative information were described in a few articles. Dierker et al. (2001) list the earlier Fort Bragg (North Carolina) and Stark County (Ohio) studies as prior examples of research on system-level interventions[229]. They also report on the development of their own system of care (one of 19 in the state of Connecticut). The system includes 36 agencies, a case management approach, and 24-hour mobile crisis availability. The charts of 117 children and adolescents with concurrent disorders referred between 1992 and 1999 were reviewed for predictors of drop-out but the there was no comparative systems analysis. While the original non-randomized Fort Bragg study conducted in the mid-1990s reported disappointing results that outcomes for youth in the integrated model of care were no better than those in usual care[37] more sophisticated analyses have now shown better outcomes than previously thought[54]. Forster et al. (2004) compared two Ohio counties, one which had restructured child and adolescent mental health services for better coordination and integration and another which had not, over a two year period. The rate of youth becoming involved with juvenile justice services was reduced by 30% with effects stronger for more serious crimes.

Grimes et al. (2006) describe a system-level evaluation of The Massachusetts Mental Health Services Program for Youth (MHSPY)[10]. It is a system of care for seriously emotional disturbed youth which combines education, primary care, mental health, substance abuse, juvenile justice and social services resources for each adolescent as needed. Administrative database analyses found that the system increased ambulatory care service use compared with either privately insured or Medicaid standard populations and at less cost than expected. Though the findings may be difficult to generalize to the Canadian healthcare system, the authors concluded that system-level changes can improve access and care delivery without necessarily increasing costs. In a similar article, Young and co-authors outline another state-wide initiative, also for youth with severe emotional disturbance – the Mississippi Youth Programs Around the Clock (MYPAC)[394]. The initiative arose from a federal grant program to conduct demonstration projects of community alternatives to residential placement for these youth. In Mississippi, the adolescents receive wraparound care services (such as home based therapy and telehealth, web-based services and 24 hour crisis coverage) in their home communities and outcomes are tracked. The article does not make specific mention of concurrent disorders.

Liddle et al. (2006) consider one driver of better systems to be performance measurement and alignment of incentives. Specifically they advise that the focus of interventions and incentives should be on broader youth outcomes rather than just targeted behaviors such as substance use: "*Funding and budgets could be linked to youth performance on a range of developmental outcomes not just reducing problem behaviors*"[190, p. 186].

Visioning Optimal Systems

Policy and service system developments in the United Kingdom are outlined by Munoz-Solomando and Williams (2007) in the context of adolescent substance misuse[237]. Concurrent disorders are only briefly mentioned but the ideas have clear applicability. The authors note that the U.K. government has taken a strong policy position that agencies should work together to prevent and reduce substance misuse and that recent policy documents stress "*the need for more effective education about drugs, prevention and early intervention delivered through holistic, multiagency outcome-focused approaches*"[237 p.333]. Other policy points include that service systems must recognize differences between adults' and adolescents' needs and behaviors, and that the adolescent system must deal with legal frameworks for interaction with and care for minors, legal competence, age appropriateness, parental responsibility, confidentiality and protection from harm. It is also recommended that youth be engaged in designing, planning and delivery; that services be user-friendly, in one location, staffed by youth-sensitive personnel and that materials be age-appropriate. The policy also stresses the desirability of co-location with other relevant services including social and education support services. These ideas echo the 'youth friendly' service recommendations made by several authors which were discussed in the Treatment section above. The authors note that child and adolescent services, in the context of this policy, have been designed under a four-tier strategic framework with multiagency, mutidisciplinary stepped models of care; though they admit that the new model is not fully implemented. To advance service design, the authors recommend a 'care pathways' approach. The 'care pathway' is a mechanism to get best practice into everyday use across components of care ranging from universal prevention through targeted high risk and services for those with established and persistent disorders. In their conceptualization, it ideally links service plans with government policies/strategic plans and results in a 'model of care'. The approach is described as an extension and broadening of the concept of a 'clinical pathway' which has emerged from the evidence-based practice movement. The framework is built on a foundation of literature reviews of all relevant topics, followed by a design outlining how multiple components would relate to each other as well as clients' pathways through services. The plan covers, for example, the ways that assessment information is brought together into a treatment plan which includes follow-on care. The resulting model of care including all components is detailed in the article.

Hodges et al. (2007) describe policy and service developments for child and youth mental health in Australia[45]. They note that mental health is considered to be the number one health issue among young people in Australia with 14% of 12 to 17 year olds and 27% of 18 to 25 year olds having mental health problems each year, but only about 25% receiving treatment. Barriers to care are those recognized elsewhere, but are considered to be worse in rural areas because of stigma, lack of anonymity, cost and availability of transportation. The National Youth Mental Health Foundation (a Consortium of the ORYGEN Research Centre, Australian Divisions of General Practice, Australian Psychological Society and the Brain and Mind Research Institute) has been established to address the problem through the Headspace Initiative (previously described in the treatment section). The initiative's goals are to establish Communities of Youth Services (CYS) through service development grant programs, to conduct awareness campaigns, to establish a centre of excellence for evidence based practice, and to translate findings into provider training programs. Emphasis is placed on early identification and effective response (through reform and enhancement of existing services), coordination and integration. Special initiatives are included for rural, remote and indigenous pops are also included. Each CYS will have a lead agency but will be a partnership among local organizations and will deliver mental health, drug and alcohol, primary care, vocational assistance, training, employment support and accommodation services. Employment and accommodation services are considered to be key to relapse prevention. Funding mechanisms for primary care practitioners and psychologists will be reformed. Design and development of services will include significant engagement of young people and carers. Patton et al. (2007) also discuss developments in the thinking about child-centered health care in Australia and the move toward adopting features of services that result in better engagement of youth, but admit that there is much

evidence to be gathered about the how such models are developed and implemented and their relation to outcomes[115].

A broader approach to mental health services reform for all ages in Australia has been developed by Dr. Gavin Andrews and colleagues, which is a needs-based stepped care model which proposes evidence-based care for 15 disorders (including SUDs and MDs although co-occurrence per se is not mentioned)[395]. This approach covers inpatient to primary care to school-based approaches and internet-based self-care for all ages. Based on economic modeling, the authors suggest that a 30% increase in budget would treat 50% more people and result in a health gain of 90%. Services for adolescents with concurrent disorders, like those at the treatment level described in the previous section by Patton et al. (2007) and at the systems level as described by Hodges et al. (2007) in the previous paragraph are not incompatible with this framework.

Hazell et al. (2007) offer thoughts about the impact of investments in child and youth mental disorders prevention and treatment in terms of "*completion of study and transition to employment, a capacity for sustained relationships, and the absence of psychiatric hospitalisation, unemployment, a criminal record, premature parenthood, relationship failures, substance misuse, and persistent psychological symptoms*"[396,p.315]. While these outcomes require a relatively long time frame to demonstrate, they note that longitudinal research is increasingly demonstrating that the impact can be substantial. Key mechanisms listed for ensuring mental health in youth and beyond are noted to be ensuring positive attachment in infancy, ensuring early school success, ensuring physical health and identifying and intervening on symptoms of ADHD, CD, ODD, anxiety, depression and EDs early in childhood.

In an article focused on policy directions for high risk youth, Tubman and co-authors (2004) argue that past policy approaches have been the two solitudes of school-based prevention or legal and punitive approaches delivered in the juvenile justice system (e.g. alternative schools, juvenile assessment centers)[141]. A public health/preventive approach is recommended rather than a judicial approach for the future. The authors cite a 1990 United Nations document "*youth delinquency and SUD as a global problem that should be addressed from a maturational growth perspective and for which formal agencies of social control should be used only as a means of last resort*" [141,p.23]. The recommended approach to planning involves collaboration among stakeholders in legal, mental health, health services and education systems to develop and use early intervention to reduce the long-term costs of these problems in adolescence and to achieve safer schools and communities. The authors also state that policies and programs must be evidence-based.

<u>Relevant Research on System Change</u>

Across the many articles discussing policy issues, the key messages of system re-design through comprehensive planning approaches and re-investment were clear. The importance of using evidence to design and evaluate services is also stressed. There is a surprising volume of information on *what* to do; but much less (beyond general strategies like collaboration across sectors) on *how* to do it. A few articles describing change processes in mental health and SUD treatment services, reflecting the emerging field of 'implementation science' (changing complex systems) provided some insights.

Processes for alignment of organizational and financial incentives to integrate substance use and mental health treatment for adolescents are discussed by Libby and Riggs (2005), with an emphasis on the role of primary care[139]. Mechanisms are outlined for three key barriers to system-level integration. Solutions include unifying funding streams, delivering mental health care in primary care, shifting the gatekeeper role to primary care but enhancing referral processes, and major training initiatives. "*In order for a blended, comprehensive care model to function effectively, primary care providers generally must play a central role as gatekeepers and coordinators of integrated treatment services. The effectiveness of primary care providers in this role is currently limited by inadequate training in effective screening,*

assessment, evaluation, brief interventions, relapse prevention, and referral practices, and inadequate knowledge of evidence-based treatment and continuing care practices" [139 p. 832].

Nissen and colleagues (2005) describe the development of an initiative for high risk teens called Reclaiming Futures – a national program in the U.S. to create *"an integrated, comprehensive, seamless system of care for teens with SUD problems involved in juvenile justice"*[397,p.123] using leadership approaches and multi-organization collaborations in a process called 'connected leadership'. *"Most health and social issues have complex etiologies and require a multidisciplinary approach that draws on many people's experience and expertise …the concept emphasizes that leadership occurs in the relations between people and among ideas, values, and cultures* [397 p.129]. The authors developed a framework for this type of change leadership with five components that are each described in detail. Sullivan et al. (2008) report on learnings from the application of a theoretical implementation model for system-wide clinical staff training in a complex mental health system (the Veterans Affairs healthcare network) in the adult context[398]. Finally, the grey literature search yielded a description of one process for evidence-informed system change based on change management strategies and targeted practice changes for services for severe addictions and CDs including youth disorders in the British Columbia Mental Health and Addiction Services[399].

The Role of Research in Addressing Adolescent Concurrent Disorders

A small number of articles focused on policies regarding the role of research in addressing concurrent disorders in adolescents. Research policy sets strategic directions for research, and resulting funding mechanisms strongly influence the type and content of research that is generated, and how it is used. While many authors offered specific recommendations for research, few articles were found that focused on research issues for the field broadly.

Throughout the period of the review, authors (see for example Gilvarry 2000) lamented the relative scarcity of research on treatment outcomes in adolescents in comparison with adults, and in particular the lack of effectiveness research for multi-faceted interventions for high risk youths. In a very comprehensive, high quality article published in 2001, Hoagwood and co-authors discuss the development of supportive evidence for practice in child and adolescent mental health[309]. Earlier approaches in evidence-based practice (defined as the "body of scientific knowledge about service practices, for example, referral, assessment, and case management or about the impact of clinical treatments or services on the MH problems of children and adolescents") were noted to be heavily on the realm of 'clinical *efficacy*' research (i.e. what works in ideal settings). Next came knowledge translation and synthesis approaches, and more recently the strongly stated need for *effectiveness* research. Effectiveness research addresses:

> *"nuisance variables" that may need to be understood if treatments are to fit within clinic or community settings. These variables— such as comorbidity, parental SUD or pathology, life stresses that lead to early termination of treatment, reimbursement structures, service availability, and parental self-efficacy—may make or break the successful adoption of an evidence-based practice in a new practice setting. Unfortunately, the development of the evidence base has rarely attended to such nuisance variables. Consequently, implementation of many treatments into the long term design and cumulative construction of new treatments and services"*[309 p.1186]

The authors also describe effectiveness research as addressing factors that predict success at implementation such as organizational climate, and practitioner and community contextual factors. These and other authors argue for clinic and community intervention development models that address these 'real world' factors. They also cite a new report of the U.S. National Institute of Mental Health's Advisory Council, titled **Blueprint for Change: Research on Child and Adolescent Mental Health**

which outlines a new cyclical model of treatment development. The authors acknowledge that this type of research is extremely challenging but necessary to ensure that evidence is used in practice:

> *"On the basis of past performance, when treatments are developed and tested via the typical medical model, ten to 20 years may be required before the treatment can be understood in terms of its effects within a practice setting. As the Surgeon General's National Action Agenda for children's mental health demonstrates, this time frame is impractical and inefficient if the goal of a public health science of children's services is to improve practice. Instead, a new model is needed that will encourage studies of the effectiveness of new treatments and services in the context of the practice setting in which the treatment or service is ultimately to be delivered*[309,p.1187].

Other proponents for a move toward intervention research in real world settings make the important point that this type of research can also be used to test etiologic hypotheses, so knowledge can be advanced on causes as well as solutions[132].

As in other areas of health care, the imperative for knowledge translation and exchange is also strongly expressed in this literature, and there has been a dramatic increase in knowledge transfer and exchange (KTE) initiatives such as networks, Symposia, communities of practice more broadly. No such initiative specific to youth concurrent disorders was identified in the grey literature but a major paper on KTE has just been put out by Children's Mental Health Ontario[400]. One innovative program to help get evidence-based treatment into practice is described by Magnabosco (2006)[401]. It is a project which supports and monitors the uptake of five evidence-based approaches for adult mental health services, based on diffusion of innovation theory and implementation science. The project itself could be characterized as 'meta-research' since it also develops, tests and disseminates tools and methods to facilitate implementation in the field. For example, a framework of implementation stages and key activities at each stage is provided. This project may be a model of active and self-evaluative KTE exchange that could be modeled for child and adolescent mental health services more broadly and to interventions for adolescent concurrent disorders specifically.

KEY POINTS: The 'Big Picture' Service Systems and Policy

- Progress has been slow on changing health systems to respond to both adult and adolescent concurrent disorders, but processes to support change for adult services are more advanced.
- Many child and youth mental health policies stress the obvious need for change to respond to the evident needs for intervention for adolescents, though few address adolescent concurrent disorders specifically.
- Some innovative approaches are being proposed and some initiatives for broad, comprehensive population health approaches to MDs and SUDs in youth are being launched.
- Effectiveness research and knowledge translation and exchange initiatives are needed to support policy and practice change.

Synthesis and Top Recommendations

The literature on adolescent concurrent disorders has impressive depth and breadth. Though no grand and immediate solutions were found to eliminate the costs and complications of these complex problems in youth, the literature was rich with information and resources that can be tapped for specific practice and policy initiatives. There were many areas for which broad consensus was evident; as well as some issues that continue to be controversial. In this last section these 'themes' of general consensus and non-consensus are presented as a way of offering some synthesis to a very diverse literature, and illuminating where future action is needed. In addition, dozens of recommendations for treatment, prevention, policy and research were extracted from the first round articles (available from the author). The 'top' five recommendations, (by frequency), are also provided in this last section. Articles which are recommended for further reading are listed in Appendix D and resources from the grey literature are tabulated in Appendix E.

Selected Points of Consensus

- concurrent disorders are common in adolescents, especially in treatment settings
- there are many unmet needs for treatment among youth with concurrent disorders
- treating these disorders is challenging and to date outcomes are not optimal
- systematic screening for concurrent disorders should be done in treatment settings
- services where high proportions of clients with concurrent disorders present should be integrated
- there is very little evidence to support interventions for adolescent concurrent disorders and much more research is needed
- comprehensive planning and services design is needed to address youth concurrent disorders

Selected Points of Non-Consensus

- whether screening ought to be done in general populations
- whether preventive efforts should be targeted or universal
- whether preventive approaches should be focused on specific risks or broader constellations of risk
- the degree of concern or intervention that is needed for substance experimentation in adolescents
- whether full abstinence or graduated harm reduction approaches are more suitable or effective for adolescents with concurrent disorders

<u>Top Recommendations:</u>

For Treatment:

- all adolescents presenting for treatment to either mental health or SUD services should be routinely screened for concurrent disorders, with full assessment (including for subclinical symptoms) followed by concurrent treatment for those who screen positive
- treatment for mental disorders that present in childhood and preadolescence should include strategies to prevent later SUDs
- health professionals in settings with high concurrent disorders prevalence and 'gateway' professionals such as primary care providers should receive training in concurrent disorders
- treatment settings should become more 'youth-friendly' and treatments need to be developmentally appropriate; adult approaches are usually not appropriate
- treatment for adolescent concurrent disorders usually needs to be intensive, long-term and include strategies for retention, relapse prevention; outcomes should be tracked

For Prevention and Early Intervention:

- prevention programs should be evidence-based, including consideration of risk and protective factors, and include the most effective developmentally appropriate approaches
- prevention programs should consider multiple levels of risk and intervention

- family and early developmental approaches are important in addition to school-based approaches
- adequate resources are needed for the development and evaluation of complex preventive interventions
- promotion, prevention and early intervention aspects need to be adequately conceptualized and included along side treatment interventions in a total population health approach

For Policy:

- strategies for concurrent disorders should be included in broader child and adolescent mental health policy
- a population health approach should be used for broad planning of the service system
- barriers to help-seeking mean that many youth in need will not seek care in conventional health systems, strategies for identifying children and youth at risk in broader settings that serve them such as schools, community organizations and primary care are needed including the role of other adults in a position to detect problems early
- cross-sector planning to address the problem of youth concurrent disorders in multiple settings and systems is needed, considering the key roles of primary care and services for high risk youth such as juvenile justice
- the emerging sciences related to system change and intervention may have much to offer in informing change strategies

For Research

- intervention research is needed for the development and testing of new interventions, including all of promotion, prevention, early detection and treatment; this type of research, if well designed, can also generate knowledge about causes
- health services research in real settings will be important in studying the complex processes of help seeking, developing and adapting treatments in real settings (effectiveness research), and measuring outcomes; system-level interventions should also be studied
- comorbidity, including subthreshold conditions should be measured and described in descriptive and intervention studies of adolescent mental or substance use disorders, and disorders should be examined not as isolated events but as dynamic processes over time; the impact of disorders in childhood and adolescence on subsequent mental health and development tasks is particularly important requiring examination over longer time periods
- a more systematic business case for early intervention and prevention is needed
- knowledge translation and exchange is important to getting what we currently know into practice

Conclusion

This review was designed as a broad systematic survey of the current literature and practice on concurrent disorders in adolescents, including how they are conceptualized, their frequency and consequences for youth, families and society, as well as the state of practice, research and policy. While clearly diverse and fragmented, there was a considerable depth and richness to the literature. Although there are no easy solutions and much work remains to be done, it is clear that advances have been made on all fronts. There are ideas and related resources that can be tapped for strategic planning and specific actions in all realms: practice, research and policy. While there are points of controversy, there are many more points of consensus and a chorus of recommendations which are grounded in both evidence and collective wisdom. Concurrent disorders in adolescents are enormously concerning and challenging, but there is much that can be done to reduce their frequency and impact on current and future generations.

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Appendix A – Glossary of Definitions, Terms and Acronyms

Few authors provided specific definitions for either the general (comorbidity) or specific (co-occurring substance and mental disorders) topics of the review. The definitions that were found are listed in the following table from earliest to most recent publication.

Definitions used in this Literature for the Central Topic

Author and Year	Definition	Comments
Gilvarry 2000	the presence of more than one disorders in a person in a defined period of time	Author says this definition has broad acceptance in the psychiatric literature
Abram 2003	more than one alcohol, drug or mental disorder	
Costello 2003	(concurrent comorbidity) "the co-occurrence of two or more diagnoses at the time of measurement (within same 3-month period).	Also uses the terms homotypic and heterotypic continuity in the context of change over time. Homotypic is "a disorder that has a similar manifestation across the age range of the study" and heterotypic is "an underlying vulnerability to psychiatric illness that may expose children to different disorders at different ages or an underlying disorder that has different manifestations at different ages"
Shane 2003	single comorbidity defined as an SUD with either externalizing or internalizing disorder; mixed comorbidity was defined as SUD with at least one internalizing and one externalizing disorder	
Silberg 2003	the concurrent or successive co-occurrence of two supposedly separate conditions	
Solhkhah 2003	meeting criteria for an SUD and another psychiatric diagnosis on Axis I or Axis II	
Whitbeck 2004	two or more disorders	Categories unspecified
Arcelus 2005	presence of another psychiatric disorder OR medical disorder in a person with a psychiatric disorder	Also says homotypic disorders are psychiatric disorders in the same diagnostic group and heterotypic are disorders across diagnostic groups
Johnson 2005	two or more disorders	Categories unspecified
Anderson 2005	at least one mental disorder as well as an alcohol or drug use disorder	Says a US Department of Health and Human Services expert panel endorsed this definition in 2002
Bender 2006	(dual diagnosis) simultaneously having SUDs and comorbid psychiatric mental health disorders	Notes the term remains ambiguous because it includes variety of substance-use problems and mental disorders and that the approach to studying and treating the problem depends on which disorder pairs or clusters are presenting

Terms Generally used Interchangeably in this Literature for the Central Topic

Comorbidity
Dual disorders

Dual diagnosis
Co-existing disorders
Co-occurring disorders (COD)
Concurrent disorders
Overlapping disorders
Triple disorders
Triple diagnosis
Multi-morbidity
Concurrent comorbidity
Co-presenting disorders
Co-occurring addiction and mental disorder (COAMD)
Alcohol, drug or mental disorder (ADM)

Terms and Acronyms used in this Literature for Individuals with Concurrent Disorders

MICA – mentally ill chemically abusing
MISA – mentally ill substance abuser
PISA – psychiatrically ill substance abuser
PICA – psychiatrically ill chemically addicted
MCSU – medically compromised-substance using
MISU – mentally ill substance user
SAMI – substance abusing mentally ill
CAMI – chemically abusing mentally ill
COA – children of alcoholic

Terms and Acronyms used in this Literature for Conditions that Co-occur

SUD – substance use disorder (formally this term includes alcohol use disorder but it is frequently used to refer to a use disorder for substances other than alcohol)
SA – substance abuse
SD – substance dependance
CD – chemical dependance
SAD – substance abuse disorder
SDD – substance dependance disorder
SU/A/D – substance use, abuse or dependance
SI – substance involvement
AUD – alcohol use disorder (includes either or both alcohol abuse and alcohol dependence)
AOD – alcohol and other drug
AD – alcohol dependent
IDD – illicit drug dependent
CUD – cannabis use disorder
Substance misuse – use at a harmful, problematic or dependent level (Bushell 2002)
Substance use – use at a more controlled, occasional, experimental or recreational level (Bushell 2002)

MD – mental disorder
SED – serious emotional disorder (psychiatric disorder as defined by DSM-IV PLUS significant impairment in child's functioning – a closely related term is serious emotional and behavioral disturbance)
ED – eating disorder
ADHD – attention deficit hyperactivity disorder
CD – conduct disorder
ODD – oppositional defiant disorder

DBD – disruptive behavior disorder (includes ADHD, CD, ODD)
CDB – conduct disorder behavior
PTSD – post traumatic stress disorder
GAD – generalized anxiety disorder
AD – anxiety disorders (includes GAD, PTSD and others)
MDD – major depressive disorder
BPD – bipolar disorder
BPD – borderline personality disorder
APD – antisocial personality disorder
ASPD – antisocial personality disorder
PD – personality disorder (includes BPD, ASD, ASPD and others)
Internalizing disorders
Externalizing disorders
The term delinquency is also used, often interchangeably with terms like deviant behavior, antisocial behavior, mixed in with conduct disorder and antisocial personality disorder.

Terms and Acronyms used in this Literature for Treatment Approaches

CBT – cognitive behavior therapy
MET – motivational enhancement therapy
DBT – dialectical behavior therapy
MST – multi-systemic therapy
FT – family therapy
SSFT – structural-strategic family therapy
MDFT – multidimensional family therapy
MSFT – multi-systemic family therapy
TF-CBT – trauma focused cognitive behavioral therapy
SFT – solution-focused therapy
IDDT – integrated dual diagnosis treatment

Four Ways that Individuals (Adults) Manifest Co-occurring Disorders (Ryglewicz 1996)

1. a major mental illness and a major problem with alcohol and/or drug abuse, dependence or addiction.
2. a major mental illness and a special vulnerability to the effects of alcohol and other drugs.
3. a personality disorder and other mental/emotional problems that are complicated or aggravated by alcohol and/or street drug use or abuse, but no major mental illness that in itself would produce psychotic episodes or require hospitalization
4. diagnosed or identified alcohol/drug abuse, dependence or addiction, plus personality disorder or other mental/emotional/cognitive problems that are masked by the substance use and may increase during withdrawal

Other Key Terms Used in the Report

Term	Definition and Source
Health Promotion	the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well-being, an individual or groups must be able to identify and realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy life-styles to well-being". (Ottawa Charter 1986)
Prevention	prevention involves universal, selective, and indicated actions that protect existing states of health… promote psychosocial wellness and prevent… problems (Gullotta 2005)
Universal Prevention	a preventive intervention that is applied to the whole population not selected on the basis of risk (IOM 1994; Evans 2005)
Selective Prevention	a preventive intervention that is focused on populations at risk (whose risk of developing a disorder is significantly higher than average (IOM 1994; Evans 2005)
Indicated/Targeted Prev.	a preventive intervention that is directed at subgroups who are identified as having minimal but detectable signs or symptoms that predict the disorder or biological markers indicating predisposition to the disorders (includes early intervention) (IOM 1994; Evans 2005)
Primary Prevention	reduction of the incidence of a disease or disorder through prevention of the occurrence of new cases… before they occur. (Evans 2005; Burger 2007)
Secondary Prevention	Reduction in the prevalence in the general population of recurrences or exacerbations of a disease or disorder that has already been diagnosed (including early detection and intervention to reverse, halt or retard the progress of a condition). (Evans 2005; Burger 2007)
Tertiary Prevention	the reduction of the disability associated with and existing disease or disorder (Evans 2005; Burger 2007)
Early Intervention	Programs that identify and provide treatment for individuals whose personal condition and social experiences could potentially produce mental, emotional or social dysfunctions with the objective of preventing their development; or which conduct general screening efforts to achieve early identification and treatment of those who have incipient problems to ensure the best possible prognosis. http://www.informalberta.ca
Screening	"the presumptive identification of unrecognized disease or defect by the application of tests, examinations or other procedures which can be applied rapidly. Screening tests sort out apparently well persons who probably have a disease from those who probably do not. A screening test is not intended to be diagnostic." (Last 1995*)
Diagnosis	"the process of determining health status and the factors responsible for producing it; may be applied to an individual, family, group or community. The term is applied to both the process of determination and to its findings. (Last 1995*)
Treatment	Interventions in those who meet diagnostic criteria (Evans 2005)
System of Care	"a system of care is a comprehensive spectrum of mental health and other necessary services which are organized into a coordinated network to meet the multiple and changing needs of children and adolescents with severe emotional disturbances and their families" 3 core values are: child centered and family focused/community based/culturally competent. Guiding principles include individualized services, least restrictive environments, well-integrated and coordinated care, rights of children, and early identification and intervention. (March 2002)

System Level	"the resources (money, people, physical infrastructure and technology) and the organizational configurations used to transform these resources into healthcare services in a given geographic area". (Health Canada 2002)
Service Integration	"mental health treatments and substance abuse treatments are brought together by the same clinicians/support workers, or team of clinicians/support workers, in the same program, to ensure that the individual receives a consistent explanation of illness/problems and a coherent prescription for treatment rather than a contradictory set of messages from different providers. (Health Canada 2002)
Systems Integration	"the development of enduring linkages between service providers or treatment units within a system, or across multiple systems, to facilitate the provision of service to individuals at the local level. Mental health treatment and substance abuse treatment are, therefore, brought together by two or more clinicians/support workers working for different treatment units or service providers. Various coordination and collaborative arrangements are used to develop and implement an integrated treatment plan". (Health Canada 2002)
Public Health or Population Health Approach	…A public health approach - and its more contemporary incarnation - population health approach - refer to health planning or policy frameworks that "aim to improve the health of the entire population and to reduce inequities among population groups…. it looks at and acts upon the broad range of factors and conditions that have a strong influence on health". It involves upstream investment, evidence-based decisions, multiple strategies to act on determinants of health, collaboration across levels and sectors, citizen engagement, and accountability for health outcomes (Public Health Agency of Canada 2008).
Odds Ratio	The odds ratio is a way of comparing whether the probability of a certain event is the same for two groups. An odds ratio of 1 implies that the event is equally likely in both groups. An odds ratio greater than one implies that the event is more likely in the first group. An odds ratio less than one implies that the event is less likely in the first group. http://www.childrensmercy.org/stats/definitions/or.htm

* this source, not cited in the body of the report, is:
Last JM. A Dictionary of Epidemiology, New York, Oxford University Press 1995.

Appendix B – Studies of Prevalence: Community, Clinical and Diagnostic Groups

Concurrent Disorders in Adolescents – Studies of Samples from the General Population/ Community - 2001 to 2008

Author; Date, Study Name Quality Rating*	Location; Sample Age and Size	Diagnoses Covered and Time frame	Diagnostic Instruments	Findings
Rohde 2001 Oregon Adolescent Depression Project (OADP) (Longitudinal) 10	Western Oregon (9 high schools) N=940 (85% participation) Age 14-18 in 1987-89 Age 24 in 1993-99	AUD, DUD, Depression, AD, CD, ODD, nicotine dependence	K-SADS PDE DSM IV	Among those with AUD in adolescence, 52.6% had depression, 15% had anxiety (NS), 13.6% had borderline personality disorder, and 30.9% had antisocial personality disorder at age 24. ORs – 2.3, 3.7 and 5.8 for significant associations compared with those with problem use or no use
Kilpatrick 2003 National Survey of Adolescents 11	N=4023 (75% of eligible) population-based U.S., age 12-17	Mood, AD (PTSD) SUD	Modules for PTSD, Mood and SUD from National Women's Study based on DSM IV	Of boys with SUD 29.7% also had PTSD and 18.1% also had a mood disorders; of girls with SUD 24.2% had PTSD and 17% had mood
West 2003 Scotland West Scotland 11 to 16 Study 10	N = 1860 (67%) of eligible 15 year olds in probability sampled schools	AD, mood, DBDs, SUDS	Voice-DISC DSM IV	19% of those with MDs (less substance) had comorbid disorders across classes; 3.2% of total sample. OR for disorder pairs: AD/SUD 1.60; mood/SUD 3.60, ADHD 3.40; ODD or CD/SUD 8.30
Costello 2003 (Longitudinal) 14	11 counties in Western N. Carolina N=1420 Age 9-13, assessed until age 16	Mood, AD, DBD, SUD	CAPA DSM IV	Extensive list of estimates for concurrent comorbidity by gender with adjusted and unadjusted odds ratios are given in Table 4 in the article.
Roberts 2007 Teen Health Survey 2000 10	Probability sample households of HMO enrollees representative N = 4175 (66% of eligible) Age 11–17 Houston metro area	SUD, mood, AD, DBD	DISC-IV CGAS	Odds of disorders are presented according to subcategories of SUDs, i.e. abuse, dependence and type (alcohol, marijuana or other substances). Dependence is more associated with ADs than abuse; abuse and dependence associated with mood disorders and DBDs, with the strongest associations for DBDs
Rush 2008 Canadian Community Health Survey	Population-based probability sample N= 36,984 in Canada (77% of	Mood (depression and mania) AD (panic, social,	World Mental Health CIDI and items for SUDs	12 month prevalence for all ages was 1.7%; for age 15-24 was 3.8%. Substance problems among age 15-24 with MDs was

(CCHS 1.2) 12	eligible) ages 15+	agoraphobia)		32.4% and for MDs among age 15-24 with substance problems was 15.6%

* empirical study quality ratings range from 0 - 15

Concurrent Disorders in Adolescents – Studies of Samples from Treatment Settings - 2001 to 2008

Author; Date, Study Name (if applicable) Quality Rating	Location; Sample Age and Size	Diagnoses Covered	Diagnostic Instruments	Findings
Wise 2001 (Longitudinal) 3	N = 91 admissions to residential SA treatment program in S. Carolina, over a one year period, age 13-18: SUD IP sample	DBD (ADHD, CD) mood disorders	DSM IV clinical assessment, retrospective chart review	63.7% had at least one other disorder with CD (24%) ADHD (11%) depression (24%) adjustment 7.7%, bipolar 3.3%
Grella 2001 Drug Abuse Treatment Outcome Study – Adolescents (DATOS-A) Study (Longitudinal) 6.5	N = 1734 age 11-18 from 23 residential, short-term IP and OP SA treatment programs in 4 US cities: SUD mixed sample	SUDs, DBD (CD/ ADHD), mood disorders, ADs, nicotine	DSM-III-R criteria for SUDs DISC-R	64% had at least one comorbid MD: 59% CD, 15% mood disorders, 13% ADHD and 1-2% ADs
Swadi 2003 5	N = 62 psychiatric inpatients age 16-18 – Christchurch, New Zealand: MD IP sample	SUD, mood, AD, psychotic disorders	Non-standard DSM IV clinical interview	64.5% had a SUD (all abuse, no dependence); 63% of those with AD, 60% of those with mood disorders, and 80% of those with schizophrenia
Anderson 2003 5.5	N = 177 adolescents discharged from community mental health or SUD treatment settings, age 12 to 18 Mixed OP sample	Emotional, behavioral or substance use problem	CANS	Unclear but notes that 22/177 had 'co-occurring disorders' (12.4%)
Cosgrave 2004 5	N = 102 consecutive referrals to a public mental health service in Melbourne, Australia age 15-18 MD OP sample	SUD, mood, AD, DBD	SCID for DSMIV-TR K-SADs CES-D YRBS	Among those with a mood disorder (frequency not given), 23.1% also had a SUD
Turner 2004 4	Federally funded MH clinics and 64 SA treatment settings, N=4,421 Mixed setting sample	CD, ADHD, mood, AD, PTSD, victimization	GAIN, CAFAS, CBCL	74% of those in SUD treatment settings had at least one concurrent psychiatric disorder (59% CD, 48% ADHD, 36% mood, 28% AD); the majority of those in mental health services had more than one mental/behavioral disorder but the proportion with SUD and another disorder was not reported in the article

Byrne 2004 6	Ontario Health Service Organization enrollees N = 300 (22.6% of eligible) age 10-18 OP primary care sample	ADs, mood, DBDs, SUDs, EDs, psychotic disorders.	NIMH-DISC parents and youth versions; YRBS	21.7% of those with at least one had two or more of 10 disorders, of those with at least one disorder, 7% had SUD, and among those with SUD, 67% had at least one other disorder
Godfrey 2005 4	N = 149 (72% of eligible) consecutive referrals to a specialist mental health service in Melbourne, Australia age 15-24 MD OP sample	SUD, mood, AD, DBD, ED	SCID for DSMIV-TR K-SADs CES-D	78% at least one disorder, 45.7% two or more disorders. Of those with 2 or more disorders 27.9% had mood/SUD; 17.6% had AD/SUD; 5.9% had DBD/SUD and 2.9% had ED/SUD
Staller 2005 5	8 outpatient treatment settings presentations to child psychiatrists N = 1292 age 1-18 Central New York U.S. MD specialist OP sample	DBD, mood, AD, SUD, ED	Clinical diagnosis DSM IV	2 diagnoses occurred in 1/3 of sample and 3 or more in 16%. For those with >1 diagnosis, ADHD and DBD were most frequent followed by ADHD and mood disorders. SUD only reported in .5% of the sample as a single disorder. The low frequency of SUD and attributed that to selection biases and under ascertainment. Internalizing and externalizing disorders frequently found in same patient
Sterling 2005 7	N = 419 (91% of eligible) age 12-18 HMO enrollees in California on intake to a SUD treatment program SUD OP sample	Mood, AD, DBD, ED	CASI-A YSR	55% had at least one psychiatric diagnosis in addition to SUD (OR 36.8). Odds ratios for disorder pairs: Mood/SUD 144.3; CD/ODD/SUD 79.3; AD/SUD 36.4; ADHD/SUD 20; ED/SUD 8.3
Hodgins 2007 5	Single urban clinic in Sweden, N = 180/373 (48.3% of eligible) seeking help for substance use problems, age range unclear but some 18+ and average around 16 years SUD OP sample	SUD, DBD, mood disorders, AD	K-SADS SCID DSM IV	90% of girls and 81% of boys met criteria for at least one other disorder, on average they suffered from 3 other disorders
Hussey 2007 3	Juvenile detainees (at least one night) with SUDS; N = 140 (66.3% of eligible) age 12-18 with SUDS SUD IP Sample	Mood, AD, DBD, SUD	UNCOPE GAIN-I	66% had both SUD/MD. Among those with concurrent disorders 85% had CD/ADHD/SUD; 48% had mood/SUD; 55% had ADHD/SUD; 21% had AD/SUD
Evans 2007 3	Single IP unit in S. New England N = 192 age 11-17 MD IP Sample	SUD, PTSD, CD	CHIPS TSCC	CD/PTSD/SUD 66.7%; PTSD/SUD 27.6%; CD/SUD 37.9%

Rush 2008 11	N = 9839 (all ages) clients of a mental health system in Ontario (including IP and OP settings) MD mixed sample	Any presenting MD and SUD	CCAR severity rating or SUD DSV IV clinical diagnosis	For age 16 to 24, 55% of inpatients had a concurrent disorder, and 22 to 28.9% of outpatients

Concurrent Disorders in Adolescents – Selected by Diagnosis – 2001 to 2006

Author; Date, Study Quality Rating	Location; Sample Age and Size	Diagnoses Covered	Diagnostic Instruments	Findings
Rohde 2001 13	151 age 14-18 with depression in trial of group CBT, recruited in through advertising, 81.6% participation among those recruited	Mood disorders, AD, DBD, SUD	K-SADs, BDI	40% had one or more lifetime comorbid disorder at intake; 21.2% had AD, 19.9% DBD, 11.3% SUD Of those with a comorbid condition, 76.7% had 2, 15% had 3 and 8.3% had 4
Diamond 2006 10	N = 600 adolescents with marijuana abuse and depression in OP treatment, age 12-18; 4 metro areas in US SUD OP Sample	CD, ADHD, mood disorders, AD, SUD	GAIN DSM-IV	72% endorsed acute levels on 2 or more other syndromes. 74% CD, 77% ADHD, 37.7% mood, 28.8% AD and 13.8% traumatic distress.
Karlsson 2006 3	Consecutive outpatients aged 13-19 with depression at 2 clinics in Finland N = 218 Mood Disorders OP sample	Mood disorders, ADs, DBDs, SUDs, personality disorders	GHQ BDI K-SADS DSM-IV Axis I and II	Any comorbid disorder was found in 78.4% of depressed (these were mostly ADs). Concurrent SUD was found in 14.6% of females, 25% of males, 15.4% of 13-15 year olds and 17% of 16-19 year olds (16.5% overall) The authors noted that primary SUD is usually treated elsewhere

Acronyms for Diagnostic Instruments:

BDI – Beck Depression Inventory
CASI-A – Comprehensive Addiction Severity Index
CANS – Child and Adolescent Needs and Strengths
CAFAS – Child and Adolescent Functional Assessment Scale
CAPA – Child and Adolescent Psychiatric Assessment
CBCL – Child Behavior Checklist
CCAR – Colorado Client Assessment Record
CGAS – Children's Global Assessment Scale
CES-D – Centre for Epidemiologic Studies Depression Scale
CHIPS - Children's Interview for Psychiatric Syndromes
CIDI – Composite International Diagnostic Interview
DISC-R – Diagnostic Interview Schedule for Children
GAIN – Global Appraisal of Individual Needs
GHQ – General Health Questionnaire
K-SADS - Kiddie-Schedule for Affective Disorders and Schizophrenia

NIMH DISC – National Institute of Mental Health Diagnostic Interview Schedule for Children
PDE - Personality Disorder Exam
SCID – Structured Clinical Interview for DSM Diagnoses
SDS – Severity of Dependence Scale
TSCC Trauma Symptoms check list for children (TSCC)
UNCOPE – 6 quick screening items for alcohol or drug abuse problem
YRBS – Youth Risk Behavior Surveillance System Questionnaire
YSR – Youth Self-Report

Other Acronyms:
HMO – health maintenance organization
IP - inpatient
OP - outpatient

For Disorders Acronyms see Appendix A

Appendix C – Prevention Programs which may be Relevant for Concurrent Disorders

The information tabulated here represents examples of prevention programs that were identified by name in the peer-reviewed and grey literature read for this broad review. A complete catalog of prevention programs would require focused literature searches and systematic environmental scanning. Information on effectiveness is provided in some of the reference material. For a listing of prevention programs (only for SUDs) that have been tested in randomized controlled trials see Faggiano (2008).

Prevention Programs found in Peer-Reviewed Literature

Name of program	Location	Type of program	Target of prevention	Participants
Head Start (Dulmus 1997)	United States	Targeted Parent/family-based	Mental disorders and school failure	High-risk preschoolers
Even Start (Dulmus 1997)	United States	Targeted Parent/Family-based	Mental disorders and school failure	Children of families from disadvantaged backgrounds (until youngest child reaches age 8)
Toddlers Without Tears (Bayer 2007)	Victoria, Australia	Universal and Targeted Parent/Family-based offered through primary care	Mental disorders	Newborns/Preschool
The Gatehouse Project (Milne 2007) (Toumbourou 2007)	Victoria, Australia	Universal Secondary School-based	SA and broad mental wellness promotion	Adolescents in secondary school
TeenLink Program (Milne 2007)	Western Sydney, Australia	Targeted Parent/family-based	SA prevention by building family resilience	Children and adolescents (ages 8 – 16) who have a parent on methadone replacement (or related treatment) for opioid dependency
Preparing for the Drug-Free Years (Simkin 2002)	United States	Universal Parent/family-based	Risks of substance and alcohol abuse and other adolescent problems	Parents of children aged 8 to 14 years
Strengthening Families Program (NIDA 2003 in Skiba 2004) Program as implemented in Iowa described in Simkin (2002) (Galanter 2005)	United States	Universal and Targeted Family-based	Risk factors for SA	Children age 10 – 14 and children of substance-abusing parents
All-Stars Program (Simkin 2002)	United States	Universal School-based	Prevention of substance use	Middle school students aged 11 to 14 years
FRIENDS (McEwan 2007)	British Columbia, Canada/Developed in Australia	Universal Elementary school-based	Anxiety and depression	Children in fourth and fifth grade
Project STAR	United States	Universal	SA	Adolescents in grades 6 to

(Students Taught Awareness and Resistance) (NIDA 2003 in Skiba 2004) (Galanter 2005)		School-based		8
Life Skills Training Program (NIDA 2003 in Skiba 2004; McLennan 2004)	United States	Universal School-based	SA	Children and adolescents
Adolescent Alcohol Prevention Trial (NIDA 2003 in Skiba 2004)	United States	Universal School-based	Alcohol use	Adolescents
Reconnecting Youth (NIDA 2003 in Skiba 2004)	United States	Indicated School-based	Risk for SA and related problems	Youth with multiple problem behaviors (i.e., substance abuse, depression and suicide)
Adolescent Transitions Program (NIDA 2003 in Skiba 2004)	United States	Targeted School-based	Substance use	Adolescents with problem behaviors linked to substance use
Positive Action Program (Mann 2004)	United States	Universal School-based	Promotion of self-concept and self-esteem	Adolescents
The Nurse-Family Partnership (McLennan 2004)	United States	Targeted Parent-based	Mental health problems	At-risk first-time mothers and their child
Healthy Babies, Healthy Children (McLennan 2004)	Ontario, Canada	Universal? Parent-based	Mental health problems	Children
The Incredible Years Program (McLennan 2004)	United States	Universal? Community-based group parenting programs	Mental health problems	Children
Nobody's Perfect (McLennan 2004)	Canada	Universal? Parent-based	Mental health problems	Children
Drug Abuse Resistance Education (DARE) Program (McLennan 2004)	United States and Canada	Universal School-based	SA	Older children
KidsMatter (Toumbourou 2007)	United States	Universal and Targeted Primary school-based	Mental health promotion, prevention and early intervention	Children in primary school
Risk Assessment and Management Process (RAMP) Program (Toumbourou 2007)	United States	Universal, Targeted and Indicated Primary school-based	Mental health promotion and intervention	Children in primary school
The Seattle Social Development Project (SSDP) (Toumbourou 2007)	United States	Targeted Primary school-based	SA, violence, and crime	Children in first and sixth grades in high-crime neighborhoods

Mind Matters (Rowling 2007)	Australia	Universal School-based	Mental disorders	Young people

Prevention Programs found in Grey Literature

Name of program	Location	Type of program	Target of prevention	Participants
DREAMS (Developing Redcliff Educational and Mental Health Supports)	Alberta	Targeted and Indicated Prevention and Early Intervention School-based	Mental Disorders	Grades K to 9
Project Northland (Galanter 2005)	United States	Universal School-based	Alcohol use, delay age at first drink	Grades 6 to 8
YouthNet: Focus on a Healthy Headspace	Ontario	Targeted Community-based	Mental Disorders (also early intervention)	Ages 12 to 20
Better Beginnings Better Futures	Ontario	Targeted Family and Community-based	Emotional and behavioral problems	Children age birth to 8 in economically disadvantaged neighborhoods
Strong Start Early Learning Centers	British Columbia	Universal? Community-based	School failure and developmental problems	Preschool-aged children
New Beginnings* (Martin 2007 textbook and web)	United States	Targeted Family/community based	Mental health problems	Children of divorce and children experiencing the death of a parent
DARE to be You*	Colorado, USA	Universal Family, Community and School-based	Behavior problems, mental health problems	Preschool through middle school children
The Incredible Years The Good Behavior Game (Martin 2007 textbook)	United States	Universal and Targeted School-based	Behavior disorders	School children

* not associated with the Drug Abuse Resistance Education (D.A.R.E.) program

Appendix D - Recommended Reading

The articles with the highest quality ratings and with greatest relevance (including one textbook) *for those selected in the first round only* are listed here. Highly recommended articles from both rounds are also periodically identified in the review. Full citations can be found by searching on the authors' names in the Reference list.

Best Empirical Articles

Abram 2003	Fergusson 2007	Montgomery 2006	Silberg 2003
Bayer 2005	Goldstein 2007	Pardini 2007	Stice 2004
Brook 1998	Gould 2005	Roberts 2007	Sung 2004
Button 2007	Iacono 2002	Rohde 2001 (A)	Tubman 2004
Cohen 2007	Jankowski 2007	Rohde 2001 (B)	Whitbeck 2006
Costello 2003	Kilpatrick 2003	Schoenwald 2008	Wilson 2004
Chen 2006	Lewinsohn 2004	Shane 2003	Wittchen 2007
Dennis 2006	McGue 2006	Slesnick 2005	

Best Non-empirical Articles

Armstrong 2002	Diamond 2005	Littell 2008	Riggs 2002
AACAP 2005	Fergus 2005	Mason 2004	Rosenberg 2008
Angold 1999	Glantz 2002	Merikangas 2007	Ruchkin 2003
Avenevoli 2006	Hoagwood 2001	Munoz-Solomando 2007	Zechmeister 2008
Cappella 2008	Hodges 2007	Nissen 2005	
Chambers 2003	Kaye 2004	Patton 2007	
Costello 2005	Libby 2005	Rao 2006	

Best Textbook:

Kaminer Y, Bukstein OG. Adolescent Substance Abuse: Psychiatric Comorbidity and High-risk Behaviors. New York: Routledge Taylor & Francis Group; 2008.

** this book is very recent and very comprehensive but targeted to a clinical, not policy audience*

Appendix E
Resources from the Grey Literature

Methods for Searching the Grey Literature

Grey literature materials included materials from governments, professional organizations, clinical programs and advocacy groups from five sources – the author's files; documents that were specifically cited in the peer-reviewed articles, materials from some of the broader academic search engines, searches of the Canadian Health Research Collection and the Canadian Research Index (which catalog government and other organizations' reports and textbooks) and searches of the Internet using 'Google'. Internet searches were directed at identifying key policy developments, innovative programs and assessment tools that might not have been otherwise reported in the peer-reviewed articles, mostly from the major developed countries (the U.K., the U.S., Australia and Canada). Internet searches also yielded a lot of peer-reviewed literature (i.e. journal articles) that had to be filtered out or moved into the second round of article procurement during the process.

The following terms were used for 'Google' searches:

- Youth and comorbid disorders + policy / guidelines
- Youth and concurrent disorders + policy / guidelines
- Youth, dual diagnosis, policy guidelines – (Australia, U.K.)
- Youth concurrent d/o and programs
- Youth, dual diagnosis, policy guidelines (U.K.)
- Programs and initiatives
- Youth health – mental health
- Terms: youth dual diagnosis treatment
- Dual diagnosis, assessment, youth
- Dual diagnosis, screening tools, youth

As anticipated, the searches were complicated by the use of different terms for co-morbidity' both within and between countries. The grey literature searches did not identify enormous quantities of information that was *highly specific or precisely relevant* to MDs/SUDs in adolescents, but the accumulation of materials related, more indirectly, from all sources was substantial. Nearly forty pages of tabulated specific material on key organizations, potentially innovative practices, and documents covering topics from identification through tertiary treatment that were at least tangentially related to teen SUD/MD were generated by the search. In this Appendix, general thematic findings from the grey literature are listed first, followed by a Table summarizing some of the prominent organizations, websites and materials.

General themes from Internet postings:

Policy / system change: All four countries searched acknowledge that concurrent disorders are an issue that needs attention for reasons – fragmentation, lack of coordination, gatekeeper policies etc. They recognize that the treatment in youth has its own special issues, similarly aboriginal and other marginalized populations, and gender. While most countries have at least position papers on recommendations for adult treatment and follow up, the only countries that appear to have actual guidelines in place or in progress are Australia and the UK. Most are at the recommendation stage for youth. With respect to training, there is a recognition that counselors dealing with SUD/MD in adolescents need to be cross-trained in mental health and addictions. In addition, there are other components such as various behavior therapies, motivational interviewing recommended. Some examples

of training exist. There is recognition that primary care providers are integral to SUD/MD screening, assessment and treatment and specialized education and training is required.

Innovation / promising practices: There are some integrated, multidisciplinary treatment services, although very little seems to be innovative. Examples are a culturally relevant program in Thunder Bay, (New Experiences) run by a not-for-profit agency and Wraparound Ottawa, which includes youth diversion, and is community-driven and operated. There are grant funded initiatives in Australia; one of these may be called 'Turning Point' (the details are not clear). There were several other programs referenced – SUMMIT and the South Sydney Dual Diagnosis program but details were not available on-line. Similarly, there are references made to innovative programs in the UK, but no details came up in searches on program names. As would be expected, most from the US appear to be privately operated.

Prevention: School-based programs with more net-based information available are Mind Matters and KidsMatter, Australia and Fit and Healthy Kids, Vermont, USA. In Australia the website for youth from the 'Headspace' program has lots of information and testimonials about mental health and addictions issues. Youth can access 'talk now', online counseling, kids help line etc. from the website. Headspace also provides clinical services.

Screening: In terms of screening, diagnostic and assessment tools, there were a few organization-specific "tools", which appear to be administrative datasets rather than assessment tools (e.g. there is an Alaska "screening tool". In terms of general expressed sentiment, there is much support for screening youth for *both* mental health problems and substance use issues. There are a few recommendations for tools such as the CRAFFT, SASSI (for substance use) and the Beck Youth Inventory for mental health. There is also reference to a dual diagnosis tool called MASYI (Alaska). The Victorian Dual Diagnosis Advisory Group in Australia has just completed a review of screening and assessment tools. Unfortunately this was mainly for adults but there is one page that addresses specific concerns of youth (confidentiality and disclosure, age at which screening should start, and screening approaches). Tools currently in use include ASSIST, AUDIT (alcohol use only) and CRAFFT. The CAGE is not recommended for adolescents, which echoes the peer-reviewed literature. The Turning Point treatment program, also in Australia, is using a new dual diagnosis screening tool called PsyCheck. The PsyCheck assessment tool has a table of possibilities. Notably this tool was not mentioned in any of the peer-reviewed literature so further information on validation would be needed before recommending it.

Organizations and Materials Relevant to Concurrent Disorders in Adolescents found in Grey Literature Searches (very recent and highly relevant material is marked as **)

Organization	Website(s)	Key Reports or Document(s)
Alberta Alcohol and Drug Abuse Commission	www.aadac.com	Youth Risk and Protective Factors (2003) The Alberta Youth Experience Survey Summary Report (2005)
Alberta Health and Wellness	www.health.alberta.ca/	Children's Mental Health Plan for Alberta (2008)
Alberta Mental Health Board Research Partnership Program	www.amhb.ab.ca www.mentalhealthresearch.ca	A Report on Child and Adolescent Mental Health Research Priority Setting Roundtable (2007)
American Psychological Association	www.apa.org/	Developing Adolescents: A Reference for Professionals (2002)
The Annenberg Foundation	www.annenbergfoundation.org	A website for teens on handling

Trust at Sunnylands US	www.copecaredeal.org/	mental health issues; resources for parents too
British Columbia Ministry of Children and Family Development	www.mcf.gov.bc.ca	Child and Youth Mental Health Plan for British Columbia (2003)
British Columbia Provincial Health Officer's Office	www.health.gov.bc.ca/pho/	An Ounce of Prevention Revisited: A Review of Health Promotion and Selected Outcomes in BC Schools
California Institute for Mental Health	www.cimh.org/Portals/0/Documents/webcast/	** Very recent webcast
Centre for Addiction and Mental Health (CAMH) Toronto	www.camh.net	** Youth & Drugs and Mental Health: A Resource for Professionals (2004)
Canadian Centre on Substance Abuse	www.ccsa.ca	National Framework for Action to Reduce the Harms Associated with Alcohol and other Drugs and Substances in Canada
Canadian Mental Health Association – Peel Region, Ontario	www.youthnet.cmhapeel.ca/	**YouthNet – Focus on a Healthy Headspace website and community action program for mental health in youth
Canadian Paediatric Society	www.cps.ca	Harm reduction: An approach to reducing risky health behaviors in adolescents (2008) Are We Doing Enough: A Status Report on Canadian Public Policy and Child and Youth Health (2007)
Canadian Senate Committee on Social Affairs, Science and Technology	www.parl.gc.ca	**Out of the Shadows at last: Transforming Mental Health, Mental Illness and Addiction Services in Canada
Centre for Addiction and Mental Health (CAMH) Toronto	www.camh.net	** Youth & Drugs and Mental Health: A Resource for Professionals (2004) Increasing Linkages between Addiction and Mental Health Services in Ontario (2003)
Children's Health Policy Centre, Simon Fraser University	www.childhealthpolicy.sfu.ca	Preventing Substance Use Disorders in Children and Youth (2007) **Treating Concurrent Substance Use and Mental Disorders in Children and Youth (2007)
Children's Mental Health Ontario	www.kidsmentalhealth.ca	Knowledge Transfer and Implementation of Evidence-based Practices in Children's Mental Health

Concurrent Disorders Ontario Network		Concurrent Disorders Policy Framework (2005) –recognizes policies developed for adults do not transfer to children and youth
Double Trouble	www.scshare.com/double_trouble.html	
Dual Recovery Anonymous	www.draonline.org	
Health Canada	http://www.hc-sc.gc.ca www.cds-sca.com	Best Practices: Treatment and Rehabilitation for Youth with Substance use Problems (2001) Preventing Substance Use Problems among Young People: A Compendium of Best Practices (2001) Best Practices: Concurrent Mental Health and Substance Use Disorders (2002) – includes on a website a National Program Inventory Reaching for the Top: A Report by the Advisor on Health Children & Youth (2007) The Population Health Template: Key Elements and Actions that Define a Population Health Approach (2001)
Institute of Medicine - US	www.iom.edu/	Improving the Quality of Healthcare for Mental and Substance-Use Conditions
McCreary Centre Society (BC, Canada)	www.mcs.bc.ca	Adolescent Health Survey (2008)
National Institute for Health and Clinical Excellence UK	www.nice.org.uk	Interventions to Reduce Substance Misuse among Vulnerable Young People (2007)
National Institute on Drug Abuse (NIDA) US	www.nida.nih.gov/NIDAhome.html http://teens.drugabuse.gov/index.php	Preventing Drug Use among Children and Adolescents (2003) Monitoring the Future: National Results on Adolescent Drug Use (2007) **Comorbidity: Addiction and other Mental Illnesses (2008) website about drug abuse for teens
National Institute on Mental Health	www.nimh.nih.gov/	Blueprint for Change: Research on Child and Adolescent Mental Health

New South Wales Association for Adolescent Health -Australia	www.naah.org.au	Caught in the Gap (2003) youth's perspectives on SUD/MH
Public Health Agency of Canada (PHAC)	www.phac-aspc.gc.ca	An Environmental Scan of Mental Health and Mental Illness in Atlantic Canada (2007) What is the Population Health Approach?
PHAC + Health Canada, Statistics Canada, CIHI and Mood Disorders Society of Canada	www.phac-aspc.gc.ca	The Human Face of Mental Health and Mental Illness in Canada (2006)
Rethink Severe Mental Illness UK	www.rethink.org	Dual Diagnosis Toolkit: Mental Health and Substance Misuse (very adult oriented)
Royal College of Psychiatrists	www.rcpsych.ac.uk	Co-existing Problems of Mental Disorder and Substance Misuse (Dual Diagnosis) An Information Manual
Substance Abuse and Mental Health Services Administration (SAMSHA) US	www.samhsa.gov	Definitions and Terms relating to Co-occurring Disorders CSAT Treatment Improvement Protocols
Turning Point Alcohol and Drug Centre, Victoria Australia	www.turningpoint.org.au/	Comorbidity Screening and Intervention: Psycheck and other Options (powerpoint presentation on screening) (2008)
United States Government	www.mentalhealthcommission.gov/	President's New Freedom Commission on Mental Health (2003)
Victorian Dept. of Human Services	www.health.vic.gov.au/	Dual Diagnosis: Key Directions and Priorities for Service Development (2007)
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