Research report

Service use among Mexico City adolescents with suicidality

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ARTICLE INFO

ABSTRACT

Background: We report the lifetime and 12-month prevalence and associations of mental health treatment among Mexican adolescents with suicide-related outcomes (SROs; including ideation, plans, gestures and attempts).
Methods: A representative multistage probability household survey of 3005 adolescents aged 12 to 17 years residing in the Mexico City Metropolitan Area was carried out in 2005. Discrete-time survival analyses were used to assess the relationships between SROs and receiving treatment for emotional, alcohol, or drug problems.
Results: The prevalence of lifetime service use among respondents with SROs was 35% for those with ideation only, 44% for those with ideation and plan, 49% for those with gesture and 50% for those with attempt; the prevalence of 12-month service use was 10%, 24%, 6% and 21%, respectively. Timing between onset of SRO and receiving treatment for emotional, alcohol, or drug problems showed that about 50% of adolescents will have contact with a service provider before developing any SRO. Healthcare professionals were the most likely to be consulted, followed by school-based programs.
Limitations: This survey was limited to adolescents living in one of the largest metropolitan areas in the world and the analyses used data on retrospectively reported ages of onset that are subject to recall errors.
Conclusions: Most suicidal adolescents do not receive treatment, and many adolescents develop their suicidality in spite of prior contacts with service providers. Interventions to increase treatment, prevention, and monitoring are sorely needed for this vulnerable population.

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1. Introduction

Suicidality is a persistent mental health problem. Among respondents in adult community samples, about 30% of ideators reported additional episodes during a 10-year

follow-up (Borges et al., 2008a), and in clinical samples, suicide re-attempt post-discharge is frequent (Prinstein et al., 2008; Cooper et al., 2006). Only a minority of adolescents with psychiatric disorders receive some form of mental health treatment in Mexico (Borges et al., 2008a,b,c), and even those adolescents with the most severe disorders often remain untreated (Benjet et al., 2009). Surveys of the general adult population in Mexico have shown that those with suicide ideation, plan and attempt have higher rates of 12-month treatment for emotional, alcohol, or drug problems than those without suicidality (Borges et al., 2005). Similarly, research on adolescents around the globe, mainly in developed societies, has shown higher rates of visits to a primary care provider among completed suicides (62.4% with primary care

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providers one year before the suicide; Luoma et al., 2002) and among those with suicide ideation (36.7% lifetime use; De Leo et al 2005; 64.4% 12-month use; Kessler et al., 2005) and attempts (98% 12-month use; Suominen et al., 2002; 42% lifetime use; De Leo et al., 2005; 79% 12-month; Kessler et al., 2005). However, it is important to examine the use of mental health resources among suicidal adolescents in less developed countries, which often have much more limited capacities to provide mental health care in general (Wang et al., 2007).

In addition to documenting rates of mental health treatment after adolescents develop suicidality, it is also important to examine whether there had been opportunities for providers to intervene prior to the development of suicidality (Suominen et al., 2002; Seymour-Barnes et al., 2001; Houston et al., 2003; Suominen et al., 2004). Studies among completed suicides have shown that about 50% of adolescents that die by suicide had, at some time, consulted with the health care system (Beautrais, 2003). Follow-ups of suicide attempt cases suggest that 71% had seen their general medical provider (GP) in the 12 months prior to the index attempt (Houston et al., 2003) and as many as 89% (Suominen et al., 2004) consulted any type of health provider before the index attempt. After the index attempt, 73% (Houston et al., 2003) consulted again within 12 months with their GP and 93% did so with other types of providers (Suominen et al., 2004).

Prior studies of treatment rates among suicidal adolescents do not always differentiate between ideation, plans, gestures and attempts (Cheung and Dewa, 2007; Freedenthal, 2007; Pirkis et al., 2003; Rhodes et al., 2006; Benjet et al., 2007) and usually focus on a single measure such as attempt. More detailed analyses of these different forms of suicidal behavior may lead to new insights on where to allocate scarce treatment resources (Kessler et al., 2005). Finally, reasons for and potentially modifiable determinants of mental health treatment among adolescents with suicidality are largely unknown, with little prior research controlling for the presence of concurrent mental disorders (Pirkis et al., 2003; Houston et al., 2003). All of this information is crucial to guide the development and targeting of effective interventions to increase treatment, prevention, and monitoring of suicidality among adolescents.

1.1. Objective

In 2005, the National Institute of Psychiatry in Mexico conducted the Mexican Adolescent Mental Health Survey (MAMHS), a representative household survey of 3005 adolescents aged 12 to 17 residing in Mexico City (Benjet et al., 2007). In order to address the lack of information about the relationships between suicidality and treatment for emotional, alcohol, or drug problems in developing countries, we report here on the lifetime and 12 month rates of mental health service use (in three service sectors: healthcare, non-healthcare and school-based) among adolescents with suicide-related outcomes (SROs; including suicidal ideation, suicide plan, gesture and attempt), the temporal order of suicidality and consultation, and potential determinants of mental health treatment.

2. Method

2.1. Participants

The MAMHS survey was designed to be representative of the 1,834,661 adolescents aged 12 to 17 that are permanent residents of private housing units in the Mexico City Metropolitan Area. The final sample included 3005 adolescent respondents selected from a stratified multistage area probability sample. In all strata, the primary sampling units were census count areas—or groups of them, similar to US census tracts, cartographically defined and updated by the Instituto Nacional de Estadística, Geografía e Informática (INEGI) in 2000 (INEGI, 2000). Secondary sampling units were city blocks (or groups of them) selected with probability proportional to size. All households within these city block units with adolescents aged 12 to 17 were selected. One eligible member from each of these households was randomly selected. The response rate of eligible respondents was 71%. Details about the survey have been presented elsewhere (Benjet et al., 2009).

2.2. Procedures

Fieldwork, which involved face-to-face interviews in the homes of the selected participants, was carried out from March through August 2005. An oral and written explanation of the study was given to both parents and adolescents. Interviews were administered only to those participants for whom signed informed consents were obtained from a parent/legal guardian and the adolescent. All study participants were left a mental health resources card with contact information for different institutions where they could seek services should they wish to do so. The Human Subjects Committee of the National Institute of Psychiatry approved the recruitment, consent and field procedures.

A number of actions were taken for quality assurance, such as extensive interviewer training, elaboration of field manuals, and continuous feedback and independent supervision of field managers, supervisors and interviewers. Finally, quality control programs designed for the World Mental Health Survey Initiative were used to identify possible errors regarding the dating of events (onset and recency, age consistency, etc.), as well as possible missing patterns, and to introduce corrected values when possible (Kessler et al., 2004). Dating of events is available only at yearly intervals.

2.3. Measures

Suicidal outcomes, receiving treatment for emotional, alcohol, or drug problems and potential risk factors were assessed in the Mexican Adolescent Mental Health Survey using the World Mental Health computer assisted adolescent version of the Composite International Diagnostic Interview (WMH-CIDI-A) (Kessler and Ustun, 2004). The translation of the adolescent instrument was done according to the translation and back-translation recommendations of the World Health Organization. The fieldwork was conducted by Berumen and Associates, an established survey research firm in Mexico that employed interviewers who had received

training in the CIDI according to the WHO protocol stipulated for participating WMH countries.

2.3.1. Measures of suicide-related outcomes

The WMH-CIDI-A contains a module that assesses several different suicidal outcomes consistent with prior recommendations and definitions (O'Carroll et al., 1996), such as: suicide ideation ("Have you ever seriously thought about committing suicide?"), suicide plans ("Have you ever made a plan for committing suicide?"), and suicide attempts ("Have you ever attempted suicide?"). Respondents were first asked whether they had experienced these suicide-related events and, if so, whether they had these events in the past 12 months. The age of onset of these events and the age of the respondent if the event occurred in the past 12 months were recorded. Respondents who reported having suicidal ideation were then asked whether they ever made a plan for committing suicide. Regardless of the answer to the question about a plan, respondents who reported suicidal ideation were then asked whether they ever attempted suicide. Respondents who reported making an attempt were then asked to describe the lethality intent of the attempt by indicating which of the following 3 statements best described their attempt: "I made a serious attempt to kill myself and it was only luck that I did not succeed." "I tried to kill myself, but knew the method was not foolproof." "My attempt was a cry for help. I did not intend to die." Respondents who endorsed either of the first 2 statements were considered in the analysis to have made a suicide attempt, whereas respondents who endorsed the third statement were considered to have made a suicide gesture. Based on evidence that potentially embarrassing behaviours are more highly reported in self-administered than interviewer-administered surveys (Turner et al., 1998), these questions were printed in a self-administered booklet and referred to by letter. Interviews assessed the lifetime presence and age-of-onset of each outcome.

Following a previous paper from our group (Kessler et al., 2005) respondents who reported suicidal ideation were divided into 3 mutually exclusive subgroups defined by the presence of an attempt, a gesture, or neither. Respondents in each of these 3 subgroups were then distinguished by whether or not they had a suicide plan, thus creating 6 subgroups. The stratification of ideation, gesture and attempt by a plan is justified by prior research (Conner, 2004; Conner et al., 2005) that advocates different strategies for detecting and treating patients conditional on the existence of a plan, and the finding that having a plan tends to increase the treatment rates of those with a suicide ideation, gesture and attempt (Kessler et al., 2005).

2.4. Treatment sectors

Information was obtained about ever receiving and 12-month treatment for emotional, alcohol, or drug problems, the type and context of professionals visited, as well as the use of self-help or support groups and hotlines and school-based programs. Near the end of each CIDI diagnostic section, respondents were asked whether they ever in their life "talked to a medical doctor or other professional" about the disorder under investigation. The interviewer clarified that the term "other professional" was meant to apply broadly to include

"psychologists, counselors, spiritual advisors, herbalists, acupuncturists, and any other healing professionals." Respondents who reported ever talking to any of these professionals about the disorder in question were then asked how old they were the first time they did so. The response to this question was used to define age of first treatment contact. Respondents were then asked to describe all treatment received in the preceding twelve months for emotional, alcohol or drug problems. Those who reported any such treatment were classified as having mental health treatment in the past year.

Mental health treatment types were classified as: 1) any mental health specialty provider, consisting of psychiatrists, psychologists, counselors, psychotherapists, mental health nurses, and social workers in a mental health specialty setting; 2) general medical practitioners, including family physicians and pediatricians; 3) human services, including outpatient treatment with a religious or spiritual advisor or a social worker or counselor in any setting other than a specialty mental health setting; 4) complementary-alternative medicine and internet use, including self-help groups, any other healer, such as an herbalist, a chiropractor, or a spiritualist, and other alternative therapies; 5) school-based programs that consisted of any special schools, special classes within a school, and school-based therapies. We grouped "any mental health specialty provider" and "general medical practitioner" under "any health care services"; the "human services" and "complementary-alternative medicine" under "non-health care services"; special schools or special classes and school therapy or counselor use were grouped under "school-based treatment".

2.4.1. Covariates

Three sets of potential correlates of service use among respondents with suicide-related outcomes are presented: socio-demographic factors, characteristics of the suicidality, and prior DSM-IV mental disorders (Borges et al., 2006). General information was collected on sex, age, the respond education, parents' educational level and family constellation. Family constellation was categorized as living with both parents or not living with both parents. Adolescents were asked whether they worked during the school year, whether they were ever married and whether they had children. All three conditions represent an additional burden not typical of the adolescent stage; therefore, adolescents answering affirmatively for any of the three were categorized as having adolescent burdens. The adolescents were asked about the educational attainment of each of their parents. Parental education was then categorized as none/elementary (six or less years of education), junior high (seven to nine years), high school (ten to twelve years) or university (thirteen or more years) and the score of the parent with the highest level of education was used. Parent-reported family income was categorized into tertiles. Characteristics of suicidality included: Age at onset of ideation, time since onset of ideation, presence of a suicide plan, age at onset of plans, time since onset of plans, age at onset of attempts and time since onset of attempts. For this paper, we only used information on the first incident of each type of suicidal behavior, i.e., ideation, plan, and attempt. Respondents' psychiatric disorders were assessed by the WHM-CIDI-A according to DSM-IV criteria for mood (major depressive

Table 1
Lifetime and 12-month prevalence of suicide-related behaviors among 3005 adolescents in Mexico City (2005).

	Lifetime	12-month
	% (s.e.)	% (s.e.)
Ideation without gesture or attempt		
No plan	6.1 (0.36)	3.2 (0.30)
Plan	1.1 (0.20)	0.8 (0.18)
Total	7.2 (0.43)	4.0 (0.36)
Gesture		
No plan	0.4 (0.08)	0.2 (0.11)
Plan	0.7 (0.20)	0.2 (0.08)
Total	1.1 (0.20)	0.5 (0.13)
Attempt		
No plan	1.0 (0.18)	0.7 (0.20)
Plan	2.1 (0.37)	0.9 (0.24)
Total	3.1 (0.44)	1.6 (0.35)

disorder, dysthymia, and bipolar disorder), anxiety (panic disorder, agoraphobia without panic disorder, specific phobia, social phobia, generalized anxiety disorder, post-traumatic stress disorder, and separation anxiety disorder), impulse-control (oppositional-defiant disorder, conduct disorder, and attention deficit/hyperactivity disorder), and substance use (alcohol abuse, drug abuse, alcohol abuse with dependence, and drug abuse with dependence) disorders. A time-varying variable for number of lifetime disorder was introduced as a control variable for multivariate models of lifetime treatment for emotional, alcohol, or drug problems.

2.5. Statistical analysis

Cross-tabulations were used to estimate lifetime and 12-month prevalence of SROs and mental health treatment among those with suicide ideation (with or without a plan), a suicide gesture (with or without a plan) and an attempt (with or without a plan). Discrete-time survival analysis with time-varying covariates (Efron, 1988) was used to study the associa-tions between prior risk factors and subsequent use of any service. Due to sample size limitations, discrete-time regression models were fit only for ideation (with or without a plan) and all attempts (including gestures, with our without a plan).

Coefficients were converted to odd-ratios (ORs) for ease of interpretation. Standard errors (SE) and significance tests were estimated using the Taylor series method (Wolter, 1985) with SUDAAN software (Research Triangle Park, 2002) to adjust for the weighting and clustering of the data. The 95% confidence intervals (CIs) of the ORs are also reported and have been adjusted for design effects. Multivariate signifi-cance was evaluated using Wald χ^2 tests based on design-corrected coefficient variance–covariance matrices. Statistical significance was evaluated using two-tailed 0.05-level tests.

3. Results

3.1. Lifetime and 12-month prevalence of mutually exclusive SROs

The lifetime and 12-month prevalence of the mutually exclusive six groups of SROs is reported in Table 1. Approximately 7.2% of the sample reported lifetime suicide ideation in the absence of a gesture or an attempt. Notably, this prevalence is lower than previously reported by our research group (Borges et al., 2008a,b,c) as the current estimate is based on suicide ideation in the absence of attempts and gestures. Frequency of lifetime gesture (1.1%) was one-third the frequency of attempt (3.1%). Frequency of 12-month ideation, gesture and attempt is about half that of the reported lifetime prevalence. Suicide ideation in the absence of a plan is much more common than gestures or attempts in the absence of a plan.

3.2. Lifetime and 12-month prevalence of mental health treatment among respondents with SROs

As shown in Table 2, 23.1% of adolescents free of any SROs ever used any type of treatment for emotional problems, and

Table 2
Lifetime and 12-month prevalence of service use among 3005 adolescents in Mexico City (2005) with suicide-related behaviors.

	Any health [a]		Any non-health [b]		Any school [c]		Any service	
	Lifetime	12 month	Lifetime	12 month	Lifetime	12 month	Lifetime	12 month
	% (s.e.)	% (s.e.)	% (s.e.)	% (s.e.)	% (s.e.)	% (s.e.)	% (s.e.)	% (s.e.)
No suicide-related behaviours	17.4 (0.85)	6.0 (0.55)	3.1 (0.44)	1.7 (0.31)	8.5 (0.70)	2.3 (0.33)	23.1 (0.87)	8.8 (0.65)
Ideation without gesture or attempt								
No plan	26.9 (4.82)	8.9 (2.88)	6.1 (2.27)	0.0 (0.00)	14.9 (3.31)	4.4 (1.41)	34.9 (4.88)	9.8 (3.05)
Plan	28.9 (8.33)	17.0 (7.89)	7.2 (3.49)	7.4 (4.24)	19.0 (7.36)	9.1 (6.67)	43.9 (10.61)	24.4 (7.21)
Total	27.2 (4.01)	10.5 (3.16)	6.3 (1.93)	1.4 (0.99)	15.5 (3.01)	5.3 (1.77)	36.3 (4.14)	12.7 (3.28)
Gesture								
No plan	27.7 (14.40)	0.0 (0.00)	7.4 (7.54)	0.0 (0.00)	20.3 (15.32)	0.0 (0.00)	27.7 (14.40)	0.0 (0.00)
Plan	49.1 (15.75)	0.0 (0.00)	10.7 (7.46)	12.3 (11.55)	13.3 (7.90)	0.0 (0.00)	62.1 (13.70)	12.3 (11.55)
Total	40.9 (12.82)	0.0 (0.00)	9.5 (5.53)	5.9 (5.84)	16.0 (9.66)	0.0 (0.00)	49.0 (12.22)	5.9 (5.84)
Attempt								
No plan	31.9 (9.72)	9.2 (7.52)	5.6 (3.73)	4.7 (5.61)	29.9 (9.05)	0.0 (0.00)	52.0 (10.72)	9.2 (7.52)
Plan	36.9 (5.37)	21.7 (8.73)	10.9 (5.04)	2.9 (2.55)	23.5 (4.94)	10.3 (7.30)	48.2 (7.54)	29.1 (10.30)
Total	35.2 (5.83)	16.4 (6.45)	9.1 (3.77)	3.6 (2.75)	25.6 (4.36)	5.9 (4.01)	49.5 (6.92)	20.7 (6.75)

[a] Any mental health specialty provider, consisting of psychiatrists, psychologists, counselors, psychotherapists, mental health nurses, and social workers in a mental health specialty setting, plus medical practitioners, consisting of family physicians and pediatricians.

[b] Human services, including outpatient treatment with a religious or spiritual advisor or a social worker or counselor in any setting other than a specialty mental health setting, plus complementary-alternative medicine and internet use, including self-help groups, any other healer, such as an herbalist, a chiropractor, or a spiritualist, and other alternative therapy.

[c] School-based programs that consisted of any special schools, special classes within a school and orientation or school-based therapies.

Table 3
Time order between onset of suicidality and onset of first use of services among 3005 adolescents in Mexico City (2005) with suicide-related behaviors.

	Suicidality first (%)	Same year (%)	Service use first (%)
Ideation without gesture or attempt			
No plan	32.4 (7.16)	21.1 (5.90)	46.5 (7.56)
Plan	30.7 (8.22)	22.7 (9.04)	46.6 (10.19)
Total	32.1 (6.13)	21.4 (5.18)	46.5 (6.55)
Gesture			
No plan	21.5 (25.25)	0.0 (0.00)	78.5 (25.25)
Plan	18.0 (12.86)	39.0 (23.00)	43.0 (19.72)
Total	18.8 (9.05)	30.6 (20.26)	50.6 (15.14)
Serious attempt			
No plan	19.0 (9.96)	27.1 (10.89)	53.8 (12.79)
Plan	27.8 (8.42)	19.1 (6.86)	53.1 (10.30)
Total	24.7 (6.42)	21.9 (5.45)	53.4 (6.90)

8.8% did so in the prior 12 months. In comparison, a larger prevalence of any service use was observed among those with ideation (36.3% for lifetime and 12.7% for 12 months), those with a lifetime gesture (49.0%) and for those with a suicide attempt (49.5% lifetime and 20.7% for 12 months). One in every three ideators and one in very two planners and attempters ever used any service for treatment of mental and substance use disorders. Use of 12-month services among cases was much less frequent, ranging from one in every twenty planners, to one in every five attempters. Having a plan increased the lifetime use of any service from 34.9% to 43.9% for those with suicide ideation, and from 27.7% to 62.1% for those with a gesture; for 12-month use of any service those with ideation showed more service use if they had a plan (24.7%) than not (9.8%), with increases also for gesture (12.3% vs. none) and attempt (29.1% vs. 9.2%). By far, the health sector showed the highest prevalence of service use, although a large proportion of lifetime cases of gesture and attempt without a plan were also seen by school services. As seen in the table, small sample sizes in some cells make the estimates in these instances imprecise and should be interpreted with care.

Table 4
Predictors of lifetime treatment among 3005 adolescents in Mexico City (2005) with suicide-related behaviors.*

	Ideation			Attempt		
	OR	95%CI	p Wald χ^2	OR	95%CI	p Wald χ^2
Number of mental disorders						
0	1.00	(1.00–1.00)	0.04	1.00	(1.00–1.00)	0.42
1	0.89	(0.38–2.05)		0.96	(0.37–2.45)	
2	1.16	(0.51–2.68)		1.41	(0.51–3.88)	
3+	2.08	(1.01–4.28)		0.88	(0.35–2.19)	
Sex						
Male	1.00	(1.00–1.00)	0.00	1.00	(1.00–1.00)	0.57
Female	0.43	(0.30–0.62)		0.74	(0.26–2.15)	
Cohort						
15–17	1.00	(1.00–1.00)	0.61	1.00	(1.00–1.00)	0.07
12–14	1.13	(0.69–1.87)		1.72	(0.93–3.19)	
Living with both parents						
No	1.00	(1.00–1.00)	0.15	1.00	(1.00–1.00)	0.30
Yes	0.71	(0.44–1.16)		1.71	(0.60–4.91)	
Max parental education						
None/elementary school	0.56	(0.21–1.48)	0.09	0.67	(0.24–1.89)	0.23
Junior high	1.67	(0.71–3.96)		0.74	(0.22–2.56)	
High school	1.01	(0.40–2.52)		1.32	(0.36–4.85)	
University +	1.00	(1.00–1.00)		1.00	(1.00–1.00)	
Income						
Low	1.11	(0.51–2.40)	0.47	0.94	(0.36–2.47)	0.74
Average	1.38	(0.70–2.71)		0.74	(0.27–2.02)	
High	1.00	(1.00–1.00)		1.00	(1.00–1.00)	
Early adolescent burden						
No	1.00	(1.00–1.00)	0.68	1.00	(1.00–1.00)	0.34
Yes	0.76	(0.20–2.94)		0.56	(0.16–1.94)	
Respondent years of education						
9 or less	1.00	(1.00–1.00)	0.33	1.00	(1.00–1.00)	0.16
10+	2.14	(0.44–10.40)		0.37	(0.09–1.57)	
Years since ideation onset						
<1 year	1.00	(1.00–1.00)	0.09	1.00	(1.00–1.00)	0.86
1 year after	1.77	(0.74–4.24)		0.77	(0.04–16.34)	
2+ year after	0.63	(0.27–1.45)		1.18	(0.09–14.78)	
Years since plan onset						
No plan and <1 year	1.00	(1.00–1.00)	0.64	1.00	(1.00–1.00)	0.53
1+ year after	1.40	(0.32–6.21)		0.64	(0.15–2.77)	
Gesture						
No				1.00	(1.00–1.00)	0.65
Yes				1.52	(0.24–9.80)	
Years since attempt onset						
<1 year				1.00	(1.00–1.00)	0.03
1 year after				2.77	(0.19–39.56)	
2+ year after				0.20	(0.01–3.49)	

* These two models, one for ideation and another for suicide attempt, were estimated in a discrete-time survival framework with person-year the unit of analysis.

3.3. Timing of mental health treatment among respondents with SROs that used any service

About one-third of those with lifetime suicide ideation reported an age of onset of ideation prior to the age of first receiving treatment for emotional, alcohol, or drug problems (Table 3). This percentage was lower for a gesture (19%) and attempt (25%). Of those reporting SRO onset prior to treatment, the median time from first reporting ideation, a plan or an attempt to service use was one year. On the other hand, about 50% of respondents used services for mental and substance use disorders prior to the onset of ideation, a plan or an attempt (third column). Among those, the median time from service use to developing ideation was three years, two years from service use to a plan and two years from service use to an attempt.

3.4. Determinants of receiving mental health treatment among adolescents with SROs

Table 4 presents the socio-demographic, suicide-related characteristics and mental disorders as predictors of any lifetime service use among respondents with suicidal ideation (with or without a plan) and attempts (those with gestures and those with or without a plan). Our limited number of suicidal respondents that used any services precluded a more detailed analysis among gestures and attempts separately. Among ideators only (with or without a plan), those with more disorders and females were less likely to use services. No variables were associated with the treatment among attempters (including gestures and with or without a plan).

4. Discussion

4.1. Main findings

Among adolescents in Mexico City that reported any history of suicide ideation, gesture or attempt, one in every three ideators and one in every two who made gestures or attempts ever had contact with a service provider. This percentage dropped sharply for a recent contact with a service provider: only one in every 8 ideators, one in every 17 gestures, and one in every five attempters used services in the prior 12-months. Those with a plan were, in general, more likely to report mental health treatment. Higher rates of consultation were found for the healthcare sector, followed by school-based programs. Non-healthcare, in general, was infrequently used.

Although adolescents with SROs were more likely to use services than those without SROs, it is notable that the use of services in Mexico overall is very low compared to other countries. In previous population-based studies in Canada and the United States, 12-month mental health service use has been reported to be in the range of 28–50% among adolescents with suicidality (Cheung and Dewa, 2007; Freedenthal, 2007). In Finland, rates of service use for those with suicidality reach almost 90%, in sharp contrast with our findings (Suominen et al., 2004). Surveys among adults have found prevalences of lifetime and 12-month service use similar to our results (36% among planners and 42% among attempters for lifetime use (De Leo et al., 2005) but also well above the one reported in the present study; 76% among planners and 79% among attempters for 12-month use (Kessler et al., 2005). The broad variability in these rates probably reflects important cross-national differences in the definition of healthcare service, their availability, access and costs, as well as differences in the definition of suicidality used in our own study and in other reports.

Where one searches for services depends in part on one's conception of the problem. In societies that are less medicalized, less educated and with rich religious and or folk beliefs, such as Mexico, the problem of suicidality, may not be deemed a health problem by the lay public. Indeed, of Mexican adults 9% of those with ideation, 13% of those with a plan and 12% of those with an attempt, have used complementary-alternative medicine (Borges et al., 2005). Thus the comparison of health and non-health care sector services is pertinent. Additionally, adolescents do not typically seek help for themselves, but must be brought to services by a parent. School-based services differ from health sector and non-health sector services in that the parent as intermediary is often bypassed, and thus, facilitators or barriers to treatment are likely to be different for school-based services. In terms of the sectors from which care is received, our results for Mexican adolescents are consistent with other studies, in that the healthcare sector is most frequently used (De Leo et al., 2005; Kessler et al., 2005; Garland et al., 2003; Rancans et al., 2003). Counseling provided in schools also appears to be an important source of mental health care, as suggested by our findings and other reports (Pirkis et al., 2003). A limitation to school-based services in many developing countries like Mexico, is that youth drop out of school earlier such that school-based services, while potentially cost-effective, are not likely to reach those most in need.

Our results regarding the temporal relationships between the onset of SRO and receiving treatment for emotional, alcohol, or drug problems are also potentially important and, to our knowledge, have not been explored before in community samples of adolescents. We found that 19–32% of respondents develop a SRO prior to using any service. Once they developed a SRO, the majority get into treatment in one year (median time). This window of opportunity could be used by the treatment providers in Mexico to establish a bridge between adolescents and the healthcare system, to provide follow-up and avoid further episodes of SROs. We have reported prior on our adult sample (Borges et al., 2007) that there is a long delay between the onset of mood, anxiety and substance use disorders and mental health treatment in Mexico: 10 years for substance use disorders, 14 years for mood disorders, and 30 years for anxiety disorders. In this context of long treatment delays, one year between onset and treatment seeking in cases of suicidality suggest that these problems are not trivial. These SROs produce high levels of stress and suffering among adolescents and their families such that they act promptly in search of treatment. On the other hand, a sizable group (approximately 50%), have contact with a provider *before* developing any SRO. It is likely that in such cases adolescents are receiving treatment for a psychiatric or substance use disorder that precedes the onset of the SRO. This result highlights the critical importance of providers screening for SROs, especially in the Mexican healthcare settings where screening instruments, personnel

and a system for reference are already available. Once a case is detected the system needs to take action to prevent SROs during and after the course of treatment. It is more difficult to compare these rates to prior research in this area because earlier work has focused primarily on clinical samples of suicide attempters and on post-mortem studies of adolescents who die by suicide, rather than using large community samples as in the current study. Nevertheless, general population studies that have characterized the pattern of health contacts before SROs report high rates of healthcare service use in the year prior to a suicide attempt (88%), with frequency of visits clustering the month before (Suominen et al., 2004). Furthermore, of all healthcare professionals, general practitioners are the most likely to be consulted, stressing the need to develop and target screening and prevention interventions for primary care settings (Houston et al., 2003).

Among those with a SRO, few variables examined here differentiated between those that did or did not consult with providers for treatment. Ideators with more comorbid disorders had a tendency to be more likely to consult. Among the demographic variables examined, females were less likely to use services. The recency of ideation, plans or attempts increased the likelihood of receiving treatment for emotional, alcohol, or drug problems, although these relationships did not reached statistical significance. Among the few earlier studies that have examined predictors of service use among adolescents, gender has been most extensively reported on, with significant differences being noted in some studies (Luoma et al., 2002; Suominen et al., 2004), but not others (Cheung and Dewa, 2007; Pirkis et al., 2003; Cohen and Hesselbart, 1992).

4.2. Limitations

These findings must be evaluated in the context of several study limitations. This survey was limited to adolescents living in one of the largest metropolitan areas in the world where health services are more available, and these results may not be generalized to and may overestimate treatment for emotional, alcohol, or drug problems in other urban or rural areas of Mexico. The MAMHS is a household survey that excluded youth who are institutionalized or living in the streets, populations known to have high prevalences of mental disorders and suicidal behaviours and low rates of mental health service use (Gutierrez and Vega, 2003).

Second, the diagnostic instrument used in the MAMHS did not include an assessment of all DSM-IV disorders, some of which have been linked to increased risk of suicidal behavior, such as schizophrenia and other non-affective psychoses (Harkavy-Friedman et al., 2004; Kessler et al., 1999).

Third, validity and reliability data were not obtained on the measures of ideation, plans or attempts and the validation of the adolescent-CIDI version used in this study is still under way. Fourth, although we examined suicide ideation, plans, and attempts, we did not measure other important behaviors such as non-suicidal self-injury (Nock and Kessler, 2006; Nock and Prinstein, 2004), and so the epidemiology of these outcomes awaits further study. Finally, these analyses used data on retrospectively reported ages of onset that are subject to recall errors.

5. Conclusions

Many adolescents experiencing suicide ideation, gestures and attempts do not receive treatment. In addition, a large percentage of adolescents experiencing these outcomes did so after having made contact with service providers. Clearly, two types of interventions are sorely needed to address these highly prevalent and dangerous problems: interventions that increase the timely treatment of adolescents after they develop SROs and interventions to prevent and monitor for SROs among adolescents that are already receiving care. Further research to develop, test, and implement both types of interventions will be necessary to address the large unmet mental health service needs of this young and extremely vulnerable population.

References

Beautrais, A.L., 2003. Suicide and serious suicide attempts in youth: a multiple-group comparison study. Am. J. Psychiatry 160 (6), 1093–1099.

Benjet, C., Borges, G., Medina-Mora, M.E., et al., 2007. Prevalence and socio-demographic correlates of drug use among adolescents: results from the Mexican Adolescent Mental Health Survey. Addiction 102 (8), 1261–1268.

Benjet, C., Medina-Mora, M.E., Borges, G., et al., 2009. Youth mental health in a populous city of the developing world: results from the Mexican Adolescent Mental Health Survey. J. Child Psychol. Psychiatry 50 (4), 386–395.

Borges, G., Wilcox, H., Medina-Mora, M.E., et al., 2005. Suicidal behavior in the Mexico National Comorbidity Survey (M-NCS): lifetime and 12 month prevalence, psychiatric factors and service utilization,. Salud Ment. 28 (2), 40–47.

Borges, G., Angst, J., Nock, M.K., Ruscio, A.M., Kessler, R.C., 2008a. Risk factors for the incidence and persistence of suicide-related outcomes: A 10-year follow-up study using the National Comorbidity Surveys. J. Affect. Disord. 105 (1–3), 25–33 Jan.

Borges, G., Benjet, C., Medina-Mora, M.E., et al., 2008b. Suicide ideation, plan and attempt in the Mexican Adolescent Mental Health Survey. J. Am. Acad. Child Adolesc. Psychiatry 47 (1), 41–52 Jan.

Borges, G., Benjet, C., Medina-Mora, M.E., et al., 2008c. Treatment of mental disorders for adolescents in Mexico City. Bull. W.H.O. 86, 757–764.

Borges, G., Medina-Mora, M.E., Zambrano, J., Garrido, G. . Epidemiología de la conducta suicida en México. Capítulo VII, 205–236. 2006. México, DF, SSA. Informe Nacional sobre Violencia y Salud. Ref Type: Report.

Cheung, A.H., Dewa, C.S., 2007. Mental health service use among adolescents and young adults with major depressive disorder and suicidality. Can. J. Psychiatry 52 (4), 228–232.

Cohen, P., Hesselbart, C., 1992. Demographic factors in the use of children's mental health care services. Am. J. Public Health 82, 49–52.

Conner, K.R., 2004. A call for research on planned vs. unplanned suicidal behavior. Suicide Life-Threat. Behav. 34, 89–98.

Conner, K.R., Phillips, M.R., Meldrum, S., Knox, K.L., Zhang, Y., Yang, G., 2005. Low-planned suicides in China. Psychol. Med. 35, 1197–1204.

Cooper, S., Lezotte, D., Jacobellis, J., Di Giuseppi, C., 2006. Does availability of mental health resources prevent recurrent suicidal behavior? An ecological analysis. Suicide Life-Threat. Behav. 36 (4), 409–417.

De Leo, D., Cerin, E., Spathonis, K., Burgis, S., 2005. Lifetime risk of suicide ideation and attempts in an Australian community: prevalence, suicidal process, and help-seeking behaviour. J. Affect. Disord. 86 (2–3), 215–224.

Efron, B., 1988. Logistic regression, survival analysis, and the Kaplan-Meier curve. J. Am. Stat. Assoc. 83, 414–425.

Freedenthal, S., 2007. Racial disparities in mental health service use by adolescents who thought about or attempted suicide. Suicide Life-Threat. Behav. 37 (1), 22–34.

Garland, A.F., Aarons, G.A., Hawley, K.M., Hough, R.L., 2003. Relationship of youth satisfaction with mental health services and changes in symptoms and functioning. Psychiatr. Serv. 54 (11), 1544–1546.

Gutierrez, R., Vega, L., 2003. Las investigaciones psicosociales sobre la subsistencia infantil en las calles desarrolladas en el INP durante los últimos 25 años. Salud Ment. 26 (6), 27–34.

Harkavy-Friedman, J.M., Nelson, E.A., Venarde, D.F., Mann, J.J., 2004. Suicidal behavior in schizophrenia and schizoaffective disorder: examining the role of depression. Suicide Life-Threat. Behav. 34, 66–76.

Houston, K., Haw, C., Townsend, E., Hawton, K., 2003. General practitioner contacts with patients before and after deliberate self harm. Br. J. Gen. Pract. 53 (490), 365–370.

Instituto Nacional De Estadistica Geografica e Informatica. XII Censo General de Población y Vivienda 2000. México, D.F. 2000. Instituto Nacional de Estadística Geográfica e Informática. Ref Type: Report.

Kessler, R.C., Ustun, T.B., 2004. The World Mental Health (WMH) survey initiative version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). Int. J. Methods Psychiatr. Res. 13, 93–121.

Kessler, R.C., Borges, G., Walter, E., 1999. Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. Arch. Gen. Psychiatry 56, 617–626.

Kessler, R.C., Berglund, P., Chiu, W.T., Demler, O., Heeringa, S., Hiripi, E., Jin, R., Pennell, B.E., Walters, E.E., Zaslavsky, A., Zheng, H., 2004. The US National Comorbidity Survey Replication (NCS-R): design and field procedures. Int. J. Methods Psychiatr. Res. 13, 69–92.

Kessler, R.C., Berglund, P., Borges, G., Nock, M.K., Wang, P.S., 2005. Trends in suicide ideation, plans, gestures, and attempts in the United States, 1990–1992 to 2001–2003. JAMA 293 (20), 2487–2495.

Luoma, J.B., Martin, C.E., Pearson, J.L., 2002. Contact with mental health and primary care providers before suicide: a review of the evidence. Am. J. Psychiatry 159 (6), 909–916.

Nock, M.K., Kessler, R.C., 2006. Prevalence of and risk factors for suicide attempts versus suicide gestures: Analysis of the National Comorbidity Survey. J. Abnorm. Psychol. 115, 616–623.

Nock, M.K., Prinstein, M.J., 2004. A functional approach to the assessment of self-mutilative behavior. J. Consult. Clin. Psychol. 72, 885–890.

O'Carroll, P.W., Berman, A.L., Maris, R., Moscicki, E., 1996. Beyond the tower of Babel: a nomenclature for suicidology. Suicide Life-Threat. Behav. 26, 237–252.

Pirkis, J.E., Irwin, C.E., Brindis, C.D., et al., 2003. Receipt of psychological or emotional counselling by suicidal adolescents. Pediatrics 111 (4 Pt 1), e388–e393.

Prinstein, M.J., Nock, M.K., Simon, V., Aikens, J.W., Cheah, C.S.L., Spirito, A., 2008. Longitudinal trajectories and predictors of adolescent suicidal ideation and attempts following inpatient hospitalization. J. Consult. Clin. Psychol. 76, 92–103.

Professional Software for Survey Data Analysis [computer program]. Research Triangle Park, NC: NC. Research Triangle Institute, 2002.

Rancans, E., Lapins, J., Salander-Renberg, E., Jacobsson, L., 2003. Self-reported suicidal and help seeking behaviours in the general population in Latvia. Soc. Psychiatry Psychiatr. Epidemiol. 38 (1), 18–26.

Rhodes, A.E., Bethell, J., Bondy, S.J., 2006. Suicidality, depression, and mental health service use in Canada. Can. J. Psychiatry 51 (1), 35–41.

Seymour-Barnes, L., Ikeda, R., Kresnow, M., 2001. Help-seeking behavior prior to nearly lethal suicide attempts. Suicide Life-Threat. Behav. 32 (1), 68–75.

Suominen, K.H., Isometsa, E.T., Ostamo, A.I., Lonnqvist, J.K., 2002. Health care contacts before and after attempted suicide. Soc. Psychiatry Psychiatr. Epidemiol. 37 (2), 89–94.

Suominen, K.H., Isometsa, E.T., Martunnen, M., Ostamo, A., Lonnqvist, J.K., 2004. Health care contacts before and after attempted suicide among adolescent and young adult versus older suicide attempters. Psychol. Med. 34 (2), 313–321.

Turner, C.F., Ku, L., Rogers, S.M., Lindberg, L.D., Pleck, J.H., Sonenstein, F.L., 1998. Adolescent sexual behavior, drug use, and violence: increased reporting with computer survey technology. Science 280 (867), 873.

Wang, P.S., Aguilar-Gaxiola, E., Alonso, J., et al., 2007. Worldwide use of mental health services for anxiety, mood, and substance disorders. Results from 17 countries in the WHO World Mental Health (WMH) Surveys. Lancet 370 (9590), 841–850 2007.

Wolter, K., 1985. Introduction to Variance Estimation. Springer-Verlag, New York.