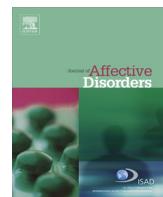




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**Journal of Affective Disorders**journal homepage: www.elsevier.com/locate/jad**Research report****Use of the Suicide Status Form-II to investigate correlates of suicide risk factors in psychiatrically hospitalized children and adolescents**Magdalena Romanowicz ^a, Stephen S. O'Connor ^{b,*}, Kathryn M. Schak ^c, Cosima C. Swintak ^c, Timothy W. Lineberry ^c^a Department of Child and Adolescent Psychiatry, Stanford University, Stanford, CA, USA^b Department of Psychiatry and Behavioral Sciences, University of Washington, 325 Ninth Ave, Box 359911, Seattle, WA^c Department of Psychiatry and Psychology, Mayo Clinic, Rochester, MN, USA**ARTICLE INFO****Article history:**

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ABSTRACT

Background: Suicide is the third leading cause of death in the United States for youth 12–17 years or age. Acute psychiatric hospitalization represents a clear worst point clinically and acute suicide risk is the most common reason for psychiatric admission. We sought to determine factors associated with differences in individual suicide risk assessment for children and adolescents during acute psychiatric admission.

Methods: Study participants were 1153 youth consecutively admitted to an inpatient psychiatry unit who completed a self-administered Suicide Status Form (SSF) within 24 h of admission. Additional information on suicide risk factors was obtained through medical chart abstraction.

Results: Females reported significantly greater psychological pain, stress, hopelessness, and self-hate on the SSF and were significantly more likely to have made a suicide attempt just prior to the index hospital admission ($OR=1.59$, $SE=0.29$; $CI=1.12-2.26$), report a family history of suicide ($OR=2.02$, $SE=0.33$; $CI=1.47-2.78$), and had experienced a greater number of inpatient psychiatry admissions related to suicidal ideation ($RR=1.33$, $SE=0.13$; $CI=1.10-1.61$). High school aged youth and those with a primary diagnosis of depression displayed consistently elevated SSF scores and risk factors for suicide compared to comparison groups.

Limitations: Diagnosis was determined through chart abstraction. Responses to access to firearm question had missing data for 46% of the total sample.

Conclusions: Systematic administration of a suicide-specific measure at admission may help clinicians improve identification of suicide risk factors in youth in inpatient psychiatry settings.

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1. Introduction

Suicide and suicide-related behaviors are a major public health problem in children and adolescents. Suicide is the third leading cause of death in children and adolescents (Centers for Disease Control, 2012). In the United States (U.S.) in 2010, among those aged 12–17, 975 individuals died by suicide (Centers for Disease Control, 2012). Of those dying, 719 were male and 256 were female—a rate of almost three to one for males versus females (Centers for Disease Control, 2012).

Recent nationally representative data on suicidal behavior prevalence reflects how common suicidal behavior is among adolescents. The National Comorbidity Survey Replication Adolescent Supplement (NCS-A), assessing those aged 13–17, found the estimated lifetime prevalences of suicidal ideation, plans, and attempts are quite common

(Nock et al., 2013). Almost one in eight adolescents (8.1%) has had thoughts of suicide while one in 25 (4.0% and 4.1%) has made a plan and/or attempted suicide respectively (Nock et al., 2013). In stark contrast to the data on suicide deaths with males versus females, suicidal thoughts, plans and attempts are significantly greater in females versus males. Females were almost three times more likely to attempt suicide than males (Nock et al., 2013).

Though rates of suicide in children and adolescents have remained stable over the past 15 years (Centers for Disease Control, 2012), the U.S. demand for acute psychiatric hospitalization and total inpatient days increased markedly from 1996 to 2007 (Blader, 2011). Acute hospitalization rates per individual patients increased from 155.5 to 283/100,000 children, defined as 5–13 years, and from 683.6 to 969/100,000 for adolescents, defined as 14–19 years.

1.1. Clinical treatment and suicide risk

A surprising finding from the NCS-A (Nock et al., 2013) was that the majority of suicide attempts occurred during clinical

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treatment. Despite assumptions that those at risk are not in treatment and treatment is sought only after an attempt, their time-course analyses of onset of ideation and attempts showed most suicidal adolescents had received treatment *prior* to onset of suicidal thoughts and behavior, not after. (Nock et al., 2013)

Suicidal thoughts and behavior vary over time and with relational stressors, symptom severity, and internal emotional states (Joiner and Rudd, 2000). This characteristic creates challenges in defining suicide risk, performing suicide research, and in clinical care. Simply asking whether an individual is currently having thoughts of suicide or is not, does not allow for informed clinical decision making (Fawcett et al., 1987, Qin et al., 2006, Rudd et al., 2006). Previous research has found individuals may be more accurate than clinicians in self-assessing suicide risk and worst point suicide risk (Beck et al., 1999, Joiner et al., 2003) is a better predictor of future risk of suicidal behavior.

1.2. Study context and aim

Acute psychiatric hospitalization represents a clear worst point clinically and acute suicide risk is the most common reason for psychiatric admission (Conrad et al., 2009). With these facts in mind, along with the marked gender differences in attempts versus suicides, we sought to determine factors associated with differences in individual suicide risk assessment for children and adolescents during acute psychiatric admission. Our aim was to describe differences by gender, age, and diagnosis in SSF-II responses and other associated suicide risk factors including firearms access, history of psychiatric admission, history of suicide attempt and family history of suicide.

2. Methods

2.1. Participants

Study participants were consecutively admitted inpatients to the Mayo Psychiatry and Psychology Treatment Center Child and Adolescent Unit from May 1, 2007 to March 31, 2011 between the ages of 8 and 18 years. We included only subjects who provided research authorization consistent with Mayo Clinic Rochester processes and excluded those who did not assent to inclusion in the medical record research authorization database. Mayo Clinic has a powerful medical records linkage system and infrastructure through the Rochester Epidemiology Project (St Sauver et al., 2011) for tracking of research authorization, medical conditions and disease outcomes. 1240 children and adolescents were admitted to the child and adolescent inpatient unit during this timeframe, 1153 (93.0%) of which had research authorization to be included in the study. Forty-five patients had missing psychiatric information and were removed from the study. Upon further review of the data, we decided to remove patients who received a diagnosis of "Other" ($n=50$) and Pervasive Developmental Disorder ($n=24$) from the model given the lack of information to be gleaned from a category that contains multiple low count diagnoses and the low count for the latter diagnosis. Thus our final base sample consisted of 1034 patients.

2.2. Measures

The Suicide Status Form-II (SSF-II) is a measure of suicidal ideation comprised of both quantitative and qualitative responses and has demonstrated strong criterion and convergent validity in previous studies (Conrad et al., 2009, Jobes et al., 1997). The SSF-II along with other demographic information and clinical information related to suicide is gathered routinely at admission across all

age groups. The SSF-II was added as an additional tool, after being validated in adult inpatients (Conrad et al., 2009) to provide more in-depth standardized assessment of psychological factors associated with suicidal ideation. For our study purposes, we utilized Likert scale responses (1=low, 5=high) for the five core constructs of the SSF (Psychological Pain, Stress, Press, Hopelessness, and Self-Hate), self-reported overall risk of suicide, and frequency of suicidal ideation. Psychological Pain, Stress, and Press are based upon Shneidman's cubic model of suicide (Shneidman, 1993), while Hopelessness reflects Beck's theory of suicide (Beck et al., 1985, 1989; Beck, 1986) and Self-Hate is linked to Baumeister's conceptualization of suicide (Baumeister, 1990). The Mayo Clinic has for many years used an adapted version of the SSF-II that includes 2 additional dichotomous (yes/no) questions regarding family history of suicide and access to firearms, both were used for study purposes. Family history of suicide is based on the individual's perspective and thus may include death by suicide, suicide attempts, and family members beyond immediate family.

2.3. Procedure

This study was a retrospective, chart review of archival data collected from medical records. All data was de-identified such that each participant was identified by a pre-assigned number not affiliated with any personally identifying information. Patient age, sex, determination of suicide attempt at index hospitalization, history of suicide ideation-related inpatient psychiatric hospitalizations, and primary psychiatric diagnosis were determined through medical record abstraction. A Diagnostic and Statistical Manual of Mental Disorders 4th edition-Text Revision diagnosis (American Psychiatric Association, 2000) was assigned by a board certified child and adolescent psychiatrist after clinical interviews with patients and their parents/guardians and was obtained from their discharge summary.

For the purposes of this study, the primary diagnosis was identified and classified into one of 11 broad diagnostic categories: adjustment reaction, major depression, anxiety, conduct disorder, attention deficit hyperactivity disorder, bipolar disorder, eating disorder, psychotic disorder and substance use disorder. Additionally, child and adolescent psychiatrists used clinical interview and collateral information to determine whether patients were admitted following a suicide attempt.

All patients completed a self-administered SSF-II within 24 h of admission to the inpatient psychiatry unit. Patients who had difficulty completing the measure received assistance from nursing staff. This study was completed after review and approval by the Mayo Clinic Institutional Review Board.

2.4. Data analysis

Prior to data analysis, we reviewed the data for missingness and found age and gender had no missing values. All outcome variables had complete data for at least 86% of the total sample except for the access to firearm item; 46% of the total sample had missing data on this item with a 50% non-response rate in girls and a 39% non-response rate in boys. Thus, sample sizes for our final analyses range from $n=883$ to 919 with the exception of access to firearm analysis, with a sample size of $n=562$. We report sample size with each respective analysis in the Section 3.

Next, we conducted a series of regression models to analyze the outcomes. We utilized multiple linear regression models for continuous outcomes and logistic regression for dichotomous outcomes. We examined descriptive data for our count outcome, number of previous suicidal ideation-related inpatient psychiatry admissions, and observed positive skew in the distribution. Fit statistics were conducted and we determined that a negative

binomial distribution provided optimal fit for the model. We transformed the patient age into elementary ($n=133$), middle ($n=303$), and high school ($n=598$) age groups given the non-linear relationship between age and suicide risk, with a substantial and abrupt increase in risk occurring during the high school years (Centers for Disease Control, 2012). Interpreting age as a continuous variable would therefore be misleading for younger patients. Gender, age, and diagnosis were included in each model. Major Depression was the comparison group for diagnoses in all models.

3. Results

3.1. Participant characteristics

The majority of participants were female (68%), and their ages ranged from 8 to 18 years ($M=14.64$, $SD=0.08$). A majority of the sample self-identified as White/Caucasian (82.1%), followed by other (7.0%), Unknown (5.5%), and Black/African American (3.2%). The ethnic distribution is reflective of the ethnic composition of the surrounding community. Major depressive disorder was the most frequent primary diagnosis (53.0%), followed next by adjustment disorder (13.4%), conduct disorder (9.5%), and anxiety disorder (6.7%). Smaller percentages were reported for the remaining diagnoses (Table 1).

3.2. Gender outcomes

When analyzing the continuous outcomes on the SSF, significant differences above and beyond the impact of age and diagnosis were found, with females reporting significantly greater psychological pain ($\beta=0.30$, $SE=0.08$; $CI=0.14-0.45$; $n=917$), stress ($\beta=0.23$, $SE=0.09$; $CI=0.05-0.41$; $n=918$), hopelessness ($\beta=0.28$, $SE=0.08$; $CI=0.12-0.45$; $n=917$), and self-hate ($\beta=0.45$, $SE=0.09$; $CI=0.28-0.62$; $n=918$). No significant differences were observed for agitation ($\beta=0.12$, $SE=0.78$; -0.04 to 0.27; $n=917$) or self-perceived overall risk of suicide ($\beta=0.14$, $SE=0.08$; $CI=-0.01-0.29$; $n=917$) (please see Table 2 for results for the full models).

Controlling for age and diagnosis, the results indicated females were significantly more likely to have made a suicide attempt at the index hospital admission ($OR=1.59$, $SE=0.29$; $CI=1.12-2.26$;

Table 1
Study group characteristics.

Race	Female	Male	Total (%)
Asian	2	2	4 (0.35%)
Black/African American	20	15	35 (3.04%)
Caucasian	517	330	847 (73.46%)
Native American	4	0	4 (0.35%)
Other	40	31	71 (6.16%)
Pacific Islanders	7	5	12 (1.04%)
Unknown	37	20	57 (4.94%)
Hispanics	3	1	4 (0.35%)
Age			
8–11 (Elementary)	48	85	133 (12.86%)
12–14 (Middle)	195	108	303 (29.30%)
15–18 (High School)	387	211	598 (57.83%)
Diagnoses			
Depression	367	181	548 (53.90%)
Adjustment	96	43	139 (13.44%)
Anxiety	51	18	69 (6.67%)
Bipolar	23	12	35 (3.38%)
Conduct	27	71	98 (9.48%)
ADHD	10	38	48 (4.64%)
Eating Disorder	32	8	40 (3.87%)
Psychotic	9	19	28 (2.71%)
Substance	15	14	29 (2.80%)
Total	630	404	1034 (100%)

$n=883$), report a family history of suicide ($OR=2.02$, $SE=0.33$; $CI=1.47-2.78$; $n=911$), and have experienced a greater number of inpatient psychiatry admissions related to suicidal ideation ($RR=1.33$, $SE=0.13$; $CI=1.10-1.61$; $n=909$). There were no significant differences observed for access to firearm ($OR=1.31$, $SE=0.37$; $CI=0.75-2.29$; $n=562$) (please see Table 3 for results for the full models).

3.3. Age group outcomes

Significant differences were observed for age, with high school age patients having greater likelihood of reporting worse psychological functioning on all suicide-related constructs included on the SSF and all risk factors for all suicide than middle school age patients. Compared to high school age patients, the elementary age patients were significantly less likely to have made a suicide attempt prior to the index admission and were less likely to report access to a firearm; yet, there were no observed differences on the SSF variables that were significantly different between these two age groups, nor for other suicide risk factors.

3.4. Diagnosis outcomes

The significant relationship between depression and suicide risk factors was most evident with reported family history of suicide and frequency of inpatient psychiatry admissions related to suicidal ideation. Results for the SSF items reflected near universality for primary diagnosis of depression being associated with worse self-report on the SSF variables, though significant differences were not always observed. Of note, the exception to this trend was the primary diagnosis of substance use, for which greater, but non-significant differences, were observed for SSF severity on self-perceived overall risk of suicide, agitation, stress, and psychological pain, as well as frequency of psychiatric admissions for suicidal ideation.

4. Discussion

The aim of the current study was to describe differences comparing gender, age, and psychiatric diagnosis on SSF-II self-reported psychological variables along with differences in other suicide and suicide-related behavior risk factors including firearms access, history of suicide attempt, history of psychiatric admission and family history of suicide. We found females scored significantly higher on four of six core self-report rating items on the SSF-II, which included psychological pain, stress, hopelessness, and self-hate. There were no significant differences observed on the agitation and self-perceived overall risk of suicide items.

The finding of higher self-report distress on these outcomes in females is consistent with other ongoing research using the SSF-II in a depressed adult inpatient population (Parsaik et al., 2013 unpublished). Adult females were also more likely to report higher ratings of psychological, pain, stress, hopelessness and self-hate. In contrast to younger females in our study, adult female ratings of agitation were higher than males. Similar to our child and adolescent findings, there were no differences in self-reported overall suicide risk between depressed adult females and males. Our findings support previous arguments for studying sex-specific psychological pathways associated with suicide risk (Labelle et al., 2013).

Consistent with findings from the NCS-A (Nock et al., 2013) females were more likely than males to have had a previous suicide attempt. Females were also more likely to have been hospitalized previously, and report a family history of suicide attempt. This contrasts with actual suicide data (Centers for

Table 2

Ordinary least squares regression models of association between gender and suicide status form.

	Coefficient	SE	Lower CI	Upper CI
Psychological pain				
Gender	0.29	0.07	0.13	0.45
Age				
Elementary	-0.03	0.08	-0.19	0.13
Middle	-1.35	0.12	-1.59	-1.10
Diagnosis				
Adjustment D/O	-0.30	0.10	-0.52	-0.09
Anxiety D/O	-0.35	0.15	-0.65	-0.04
Bipolar D/O	-0.52	0.20	-0.92	-0.13
Conduct D/O	-0.13	0.13	-0.40	0.13
ADHD	-0.42	0.18	-0.77	-0.06
Eating D/O	-0.17	0.18	-0.54	0.19
Psychotic D/O	-0.12	0.23	-0.58	0.32
Substance D/O	0.05	0.22	-0.38	0.49
Stress				
Gender	0.23	0.09	0.05	0.40
Age				
Elementary	-0.02	0.09	-0.21	0.15
Middle	-1.71	0.14	-1.99	-1.43
Diagnosis				
Adjustment D/O	-0.31	0.12	-0.56	-0.06
Anxiety D/O	-0.12	0.17	-0.47	0.21
Bipolar D/O	-0.57	0.23	-1.02	-0.11
Conduct D/O	-0.22	0.15	-0.53	0.08
ADHD	-0.41	0.20	-0.81	-0.01
Eating D/O	-0.17	0.21	-0.59	0.24
Psychotic D/O	-0.14	0.26	-0.66	0.38
Substance D/O	0.18	0.25	-0.31	0.68
Agitation				
Gender	0.11	0.07	-0.03	0.27
Age				
Elementary	-0.08	0.08	-0.24	0.07
Middle	-1.35	0.12	-1.59	-1.11
Diagnosis				
Adjustment D/O	-0.23	0.10	-0.44	-0.01
Anxiety D/O	-0.03	0.15	-0.32	0.26
Bipolar D/O	-0.16	0.19	-0.55	0.22
Conduct D/O	-0.04	0.13	-0.30	0.22
ADHD	-0.26	0.17	-0.61	0.08
Eating D/O	-0.02	0.18	-0.39	0.33
Psychotic D/O	-0.21	0.22	-0.66	0.23
Substance D/O	0.24	0.22	-0.19	0.68
Hopelessness				
Gender	0.28	0.08	0.12	0.44
Age				
Elementary	0.01	0.08	-0.16	0.17
Middle	-1.25	0.12	-1.51	-1.01
Diagnosis				
Adjustment D/O	-0.46	0.11	-0.69	-0.24
Anxiety D/O	-0.29	0.16	-0.61	0.01
Bipolar D/O	-0.44	0.21	-0.86	-0.03
Conduct D/O	-0.08	0.14	-0.36	0.20
ADHD	-0.37	0.18	-0.74	-0.003
Eating D/O	-0.15	0.19	-0.54	0.23
Psychotic D/O	-0.28	0.24	-0.76	0.19
Substance D/O	-0.15	0.23	-0.61	0.30
Self-Hate				
Gender	0.44	0.08	0.28	0.61
Age				
Elementary	-0.02	0.08	-0.19	0.15
Middle	-1.25	0.13	-1.51	0.98
Diagnosis				
Adjustment D/O	-0.46	0.11	-0.70	-0.23
Anxiety D/O	-0.50	-0.16	-0.83	-0.18
Bipolar D/O	-0.34	0.21	-0.77	0.08
Conduct D/O	-0.16	0.14	-0.46	0.12
ADHD	-0.48	0.19	-0.86	-0.10
Eating D/O	-0.10	0.20	-0.50	0.29
Psychotic D/O	-0.27	0.25	-0.76	0.22
Substance D/O	-0.20	0.24	-0.68	0.26
Overall risk of suicide				
Gender	0.13	0.07	-0.01	0.28

Table 2 (continued)

	Coefficient	SE	Lower CI	Upper CI
Age				
Elementary	0.04	0.07	-0.11	0.20
Middle	-1.05	0.11	-1.29	-0.82
Diagnosis				
Adjustment D/O	-0.21	0.1	-0.42	-0.01
Anxiety D/O	-0.25	0.14	-0.54	0.03
Bipolar D/O	-0.08	0.19	-0.46	0.29
Conduct D/O	-0.15	0.13	-0.41	0.10
ADHD	-0.27	0.17	-0.61	0.06
Eating D/O	-0.23	0.18	-0.59	0.12
Psychotic D/O	-0.20	0.22	-0.64	0.23
Substance D/O	0.25	0.21	-0.16	0.67

Note: S/P—status post; D/O—disorder. All bold values indicate $p < 0.05$.

Disease Control, 2012), as noted earlier, which shows an almost three to one difference between males versus females in completed suicide.

For clinical purposes, our finding that male and female adolescents did not differ in their self-report of agitation and overall suicide risk may be helpful in identifying males and females at risk. Previous research (Busch et al., 2003) in adult inpatients found severe or extreme anxiety/agitation was present 79% of the time in the 7 days prior to suicide while hospitalized or immediately after discharge. Recent research comparing agreement between maternal reports of emotional and behavioral difficulties versus adolescent self-report, found mothers in the general population were typically unaware of suicidal ideation and attempts in their children (Shoval et al.). While other research has also demonstrated suicidal adolescents often reveal their intentions to peers rather than to adults and that girls are more likely than boys to seek adult help for suicidal thoughts and behaviors (Kalafat and Elias, 1992), our findings utilizing the SSF-II do not support concerns about differential validity of reporting self-perceived overall risk between sexes when completing a thorough self-report suicide risk assessment measure.

Based on previous research (Blader, 2011; Centers for Disease control, 2012; Nock et al., 2013) we expected increases in age would be associated with greater self-report on the SSF-II. Our results partially supported this hypothesis, with significant differences observed between high school and middle school age patients for all SSF-II and suicide risk factor outcomes. Several of these differences, such as previous attempt and hospitalizations, most likely reflect elevated chance of occurrence with increased exposure time in the older group. However, we were surprised by the degree of severity and risk factors present in the elementary age children. Hospitalization for such young children may indicate a more severe sub-population of patients in our larger sample that was unevenly concentrated in the elementary school age group. Early age of onset of depression has been associated with worse functional outcomes (Zisook et al., 2007). Unfortunately, our data does not include additional measures of function with which we might compare our different age groups.

Our results showing the strong association with depression and psychological factors associated with suicide and suicide risk factors are consistent with previous research. Although we noticed a pattern of patients with substance use disorders reporting greater, though non-significant, ratings on SSF items of overall risk of suicide, agitation, stress, and psychological pain, as well as frequency of previous hospitalizations related to suicidal ideation, it is unclear what these results indicate. This may be associated with acute withdrawal syndromes or impaired coping skills when free of alcohol or drugs. It would be useful to collect longitudinal data on suicidal ideation to determine whether patients with primary substance use disorders potentially experience shorter,

yet more severe suicidal and emotional crises as compared to other diagnostic groups.

As demonstrated by Nock et al.'s recent findings (Nock et al., 2013), an important next step in youth suicide prevention research is to improve the treatment of suicidal patients. These efforts include increased screening, assessment, and follow-up treatment of at-risk youth in medical settings (King et al., 2009, 2012), including inpatient psychiatry. Currently there are no official guidelines as to the best approach for the assessment of suicidality in children and adolescents. Prinstein et al. (2001) have recommended the use of multiple modalities of assessment to be completed by informed members of the child's social support network, including family and teachers. Best practice recommendations for suicide risk assessment in adults include self-report, collateral from family, and clinical observation (American Psychiatric Association, 2003).

4.1. Clinical use of the SSF-II

We believe use of the modified SSF-II as self-report can be particularly helpful clinically as a patient-centered suicide risk assessment. Beyond quantitative data, it provides ample opportunity for written responses about specific psychological factors (Jobes et al., 2004) underlying an individual's suicidal ideation while also gathering information on empirically-supported risk factors for suicide. A patient-centered suicide risk assessment may enhance the development of a suicide-specific treatment plan by matching onto the issues *the patient* perceives as driving their suicidal ideation. However, the self-administration of the SSF-II used in the current study is different from the collaborative assessment style typically employed, where patient and provider complete the form sitting side-by-side. It may be that a self-assessment questionnaire fosters greater disclosure of suicidal ideation and behavior in youth, as opposed to face-to-face report to a clinician or a parent, but this should be investigated in greater detail in future studies.

The SSF-II is typically completed in the first session of weekly, suicide-specific outpatient treatment (Jobes, 2006). Our results indicate that it appears to be effective as a self-report measure if used as part of a standardized intake process for child and adolescent inpatient psychiatry admissions. In the current study, we utilized only quantitative data obtained from the core SSF-II; yet, the form does inquire for more detailed information about each of the core factors (e.g., hopelessness, agitation), as well as written information about specific reasons for living and dying. Thus, the SSF provides youth with a greater degree of flexibility in reporting their self-perceived drivers of suicidal ideation than more standardized approaches to suicide risk assessment.

Table 3

Logistic regression and negative binomial regression models of association between gender and suicide risk factors.

	OR/RR	SE	Lower CI	Upper CI
Admitted S/P suicide attempt				
Gender	1.59	0.28	1.11	2.26
Age				
Elementary	0.65	0.11	0.46	0.93
Middle	0.11	0.05	0.04	0.28
Diagnosis				
Adjustment D/O	1.22	0.27	0.79	1.90
Anxiety D/O	0.75	0.26	0.38	1.50
Bipolar D/O	0.74	0.33	0.30	1.81
Conduct D/O	0.82	0.29	0.41	1.65
ADHD	1.07	0.49	0.43	2.64
Eating D/O	0.22	0.13	0.06	0.74
Psychotic D/O	0.27	0.20	0.06	1.21
Substance D/O	0.53	0.27	0.19	1.46
Family history of suicide				
Gender	2.01	0.32	1.47	2.77
Age				
Elementary	0.77	0.12	0.56	1.06
Middle	0.04	0.01	0.02	0.10
Diagnosis				
Adjustment D/O	0.55	0.12	0.36	0.85
Anxiety D/O	0.44	0.13	0.24	0.81
Bipolar D/O	0.37	0.14	0.17	0.79
Conduct D/O	0.57	0.17	0.32	1.02
ADHD	0.38	0.15	0.16	0.86
Eating D/O	0.14	0.05	0.65	0.31
Psychotic D/O	0.19	0.09	0.07	0.49
Substance D/O	0.45	0.18	0.20	1.02
Access to firearm				
Gender	1.31	0.37	0.75	2.28
Age				
Elementary	0.49	0.14	0.27	0.89
Middle	0.04	0.04	0.006	0.34
Diagnosis				
Adjustment D/O	0.86	0.33	0.40	1.83
Anxiety D/O	0.88	0.50	0.28	2.73
Bipolar D/O	0.44	0.34	0.10	2.01
Conduct D/O	0.60	0.34	0.19	1.85
ADHD	0.40	0.43	0.05	3.26
Eating D/O	1.40	0.85	0.42	4.61
Psychotic D/O	0.30	0.31	0.03	2.37
Substance D/O	0.70	0.45	0.19	2.51
Frequency of psychiatric admission for suicidal ideation				
Gender	1.33	0.12	1.10	1.61
Age				
Elementary	1.00	0.09	0.83	1.20
Middle	0.18	0.05	0.10	0.31
Diagnosis				
Adjustment D/O	0.67	0.08	0.51	0.87
Anxiety D/O	0.58	0.11	0.39	0.87
Bipolar D/O	0.69	0.17	0.43	1.12
Conduct D/O	0.80	0.14	0.55	1.15
ADHD	0.36	0.13	0.18	0.73
Eating D/O	0.26	0.09	0.13	0.51
Psychotic D/O	0.45	0.16	0.22	0.92
Substance D/O	1.27	0.27	0.83	1.93

Note: S/P=status post; D/O=disorder. All bold values indicate $p < 0.05$.

4.2. Firearms access

Our level of missing data on firearms access merits special comment. In previous research within our larger adult clinical practice (Kolla et al., 2011) over 80% of our hospitalized inpatients had documentation of firearms access in the medical record consistent with levels of data available for all other variables in this study. However, 46% of our total child and adolescent sample had missing data for this risk factor. Considering that over a third of suicides in those 17 and under are by firearms (Centers for Disease Control, 2012), this information is critical to obtain. Data

from the NCS-A (Nock et al., 2013) illustrates the highly impulsive nature of suicide attempts in children and adolescents compared to adults, making clinical strategies of reducing access to highly lethal means potentially an effective clinical prevention strategy. Practice factors underlying this under-collection of data may include discomfort about asking, lack of knowledge by patients combined with not obtaining information from families or perceived lack of efficacy in obtaining information (Price et al., 2007). Future studies should inquire into barriers for assessing access to means in children and adolescents with psychiatric illness.

4.3. Strengths and limitations

Strengths of our study include a large sample size in a high risk clinical population with a greater level of information on suicide risk factors, including a validated psychological survey instrument (SSF-II), than many other studies in comparative child and adolescent inpatient samples. Our results are consistent with previous research for suicide and suicide-related behavior in children and adolescents and the impact of depression and differences between males and females.

The study had several limitations. Generalizability is limited to hospitalized patients. The generalizability may be further affected by the fact that our current sample is from a single site, one geographic region and not racially diverse. We did not differentiate multiple attempters from single attempters, although we are aware there are studies that show differences between these two populations. There was marked missing data on reporting possession of firearms as earlier noted. Although we observed no significant differences between girls and boys for reported access to firearm, our results should be interpreted with caution. Information on diagnoses was based on board certified child and adolescent psychiatrist clinical interviews and not structured research interviews and may underestimate co-morbidity or have inherent biases.

4.4. Summary

This study addressed several important aspects of factors associated with suicide and suicide-related behavior in children and adolescents. The results demonstrated statistically significant differences between males and females in self-report of psychological risk factors associated with suicide and other empirical risk factors for suicide. Future research is needed to better understand the phenomenological differences between males and females related to disclosure of psychological distress and suicidal ideation (Labelle et al., 2013), as boys remain at greater risk for suicide despite less frequent suicide attempt behavior and presence of fewer empirical risk factors. Findings regarding age and diagnosis replicate national research demonstrating depressed adolescents are at heightened risk for suicidal ideation and attempts behavior compared with younger children (Nock et al., 2013). Assessment of firearms access was not completed at the level anticipated and represents an area of focus for future research and enhancement of clinical care.

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The authors declare no study sponsors.

Conflict of interest

The authors declare they have no conflicts of interest.

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