

Predictors of Suicide Attempt Within 30 Days After First Medically Documented Suicidal Ideation in U.S. Army Soldiers

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Objective: The authors sought to identify predictors of imminent suicide attempt (within 30 days) among U.S. Army soldiers following their first documented suicidal ideation.

Methods: Using administrative data from the Army Study to Assess Risk and Resilience in Servicemembers, the authors identified 11,178 active-duty Regular Army enlisted soldiers (2006–2009) with medically documented suicidal ideation and no prior medically documented suicide attempts. The authors examined risk factors for suicide attempt within 30 days of first suicidal ideation using logistic regression analyses, including sociodemographic and service-related characteristics, psychiatric diagnoses, physical health care visits, injuries, and history of family violence or crime perpetration or victimization.

Results: Among soldiers with first documented suicidal ideation, 830 (7.4%) attempted suicide, 46.3% of whom (N=387) attempted suicide within 30 days (rate, 35.4 per 1,000 soldiers). Following a series of multivariate analyses, the final model identified females (odds ratio=1.3, 95%

CI=1.0, 1.8), combat medics (odds ratio=1.6, 95% CI=1.1, 2.2), individuals with an anxiety disorder diagnosis prior to suicidal ideation (odds ratio=1.3, 95% CI=1.0, 1.6), and those who received a sleep disorder diagnosis on the same day as the recorded suicidal ideation (odds ratio=2.3, 95% CI=1.1, 4.6) as being more likely to attempt suicide within 30 days. Black soldiers (odds ratio=0.6, 95% CI=0.4, 0.9) and those who received an anxiety disorder diagnosis on the same day as suicidal ideation (odds ratio=0.7, 95% CI=0.5, 0.9) were less likely.

Conclusions: Suicide attempt risk is highest in the first 30 days following ideation diagnosis and is more likely among women, combat medics, and soldiers with an anxiety disorder diagnosis before suicidal ideation and a same-day sleep disorder diagnosis. Black soldiers and those with a same-day anxiety disorder diagnosis were at decreased risk. These factors may help identify soldiers at imminent risk of suicide attempt.

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The U.S. Army suicide rate increased substantially during the Iraq and Afghanistan wars, surpassing the civilian suicide rate in 2008 and peaking in 2012 (1–3). Rates of suicidal behavior in the Army remain elevated (3–5). Identification of risk factors predicting the transition from suicidal ideation to suicide attempt can improve clinical care for soldiers at risk of acting on suicidal thoughts. Much of the epidemiological research examining suicide attempt risk among individuals with ideation is based on survey data (6–11). These studies make important contributions to our understanding of risk within community samples. However, it is also important to consider attempt risk in those with medically documented ideation, as these individuals have been detected and are in the health care system. To our knowledge, however, electronic health

records have not been used to predict suicide attempt among patients with documented ideation.

Previous research using Army and Department of Defense (DOD) administrative data found that suicidal behavior is associated with sociodemographic characteristics (e.g., gender, age, education) (12), Army career characteristics (e.g., time in service, deployment status, occupation), psychiatric diagnosis (13, 14), health care utilization (e.g., recent outpatient physical health care visits, previous treatment for an injury) (15–17), and crime victimization and perpetration (18, 19). However, it is not known whether these factors distinguish soldiers with documented suicidal ideation who make a subsequent attempt from those who do not. Army studies using survey data suggest that the transition from ideation

to attempt is often rapid (20), with the majority of suicide attempts occurring within 1 year (11, 21). However, this transition time has not been examined using information within the health care system where all soldiers receive care.

To better understand suicidal behaviors among U.S. Army soldiers and identify factors that predict the transition from suicidal ideation to attempt, we used medical records to examine attempt risk in soldiers with ideation in order to identify the period of highest risk and the proportion of soldiers with ideation who subsequently attempt suicide. We examined predictors of transition of ideation to attempt in the first month following ideation. Specifically, using administrative data from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (22), we examined sociodemographic and service-related characteristics, psychiatric diagnoses, physical health care, and crime and family violence as potential predictors of attempt risk within 30 days of first medically documented suicidal ideation.

METHODS

Sample

We used data from the Army STARRS Historical Administrative Data Study (HADS), integrating 38 Army and DOD administrative data systems in which suicidal events are medically documented, including de-identified archival Army and DOD records from databases that capture medical, legal, and personnel information during military service. The HADS includes individual-level person-month records for all soldiers on active duty between January 1, 2004, and December 31, 2009 (N=1.66 million) (23). This study includes data from the period 2006–2009. Analysis of the de-identified data was approved by the institutional review boards of the Uniformed Services University of the Health Sciences, the University of Michigan Institute for Social Research, University of California, San Diego, and Harvard Medical School.

The HADS contains administrative records for 975,057 Regular Army soldiers on active duty during the study period (excluding activated Army National Guard/Army Reserve). The analytic sample consisted of the 11,178 Regular Army enlisted soldiers with medically documented suicidal ideation during this time. Of this group, 387 had a documented attempt within 30 days (Table 1).

Measures

A full description of the study measures is provided in the online supplement.

Suicidal ideation and attempt. Soldiers' first medically documented episode of suicidal ideation and soldiers with a suicide attempt within 30 days of ideation were identified. Soldiers attempting suicide within 30 days of their suicidal ideation diagnosis were classified as case subjects and those who did not were classified as control subjects. Classification used

administrative records from the Department of Defense Suicide Event Report (24), a DOD-wide surveillance mechanism, and ICD-9-CM codes V62.84 (suicidal ideation) and E950–E958 (self-inflicted poisoning or injury with suicidal intent) from health care encounter information from military and civilian treatment facilities, combat operations, and aeromedical evacuations (see Table S1 in the online supplement). Records from different data systems were cross-referenced, ensuring that cases represented unique soldiers.

Sociodemographic and service-related characteristics. Army and DOD administrative records were used to construct sociodemographic variables (gender, current age, race/ethnicity, education, marital status) and service-related variables (age at Army entry, time in service, deployment status [never, currently, previously], demotion, delayed promotion, and military occupation [combat arms (which includes combat arms and special forces), combat medic, other; see Table S2 in the online supplement]).

Psychiatric diagnoses. Administrative medical records identified 28 categories of documented psychiatric diagnoses defined by aggregated ICD-9-CM codes (e.g., attention deficit hyperactivity and learning disorders [ICD-9-CM codes 314.0–315.9]) and V codes for stressors and adversities (V40.0–V40.9, V61–V61.9, V62–V62.90) and marital problems (V61.1–V61.12) (see Table S3 in the online supplement). Each psychiatric diagnosis was categorized into two time periods, identified by disorders occurring on the same day as the first suicidal ideation diagnosis and those occurring prior to the day of first ideation diagnosis. The indicator variables included each of the ICD-9-CM psychiatric codes and the stressors/adversities and marital problems V codes.

Physical health care visits and injuries. Administrative medical records identified number of days with a recent outpatient physical health care visit (previous 2 months [18]), presence and recency of outpatient and inpatient visits for previous injury, and combat injury-related visits.

Family violence and crime. Family violence victimization and perpetration history (e.g., physical, sexual, or emotional abuse of spouse or child) were assessed using legal records, the Army Central Registry (a Family Services data system capturing family violence-related events), and medical records (using ICD-9-CM) (see Tables S4 and S5 in the online supplement; details have been reported elsewhere [19]). We constructed variables for any history of family violence, number of family violence events, time since most recent family violence event (i.e., number of months, not including month of suicide attempt or sampled control person-month), and role in family violence events (perpetrator, victim only). We created variables that indicated crime perpetration or victimization separately by examining legal records for which the Army found sufficient evidence to warrant investigation (see Table S6 in the online supplement).

TABLE 1. Association of sociodemographic and service-related characteristics of active-duty U.S. Army soldiers with documented suicide attempt within 30 days following initial suicidal ideation, 2006–2009

Soldiers With Suicidal Ideation, 2000–2009								
				Soldiers With Suicidal Ideation				
				Attempted Suicide Within 30 Days ^a (N=387)		Did Not Attempt Suicide Within 30 Days ^b (N=10,791)		Total Population (N=11,178)
Characteristic	χ^2	Univariate Analyses		N	%	N	%	%
		Odds Ratio	95% CI					
Sociodemographic characteristics								
Gender	6.64*							
Male		1.0		296	76.49	8,834	81.86	81.68
Female		1.4*	1.1, 1.7	91	23.51	1,957	18.14	18.32
Current age (years)	11.14*							
<21		1.8*	1.1, 2.9	135	34.88	3,203	29.68	29.86
21–24		1.6	1.0, 2.6	139	35.92	3,813	35.34	35.36
25–29		1.6	1.0, 2.7	77	19.90	2,106	19.52	19.53
30–34		1.0		20	5.17	895	8.29	8.19
35–39		0.8	0.4, 1.8	10	2.58	531	4.92	4.84
≥40		1.1	0.4, 2.8	6	1.55	243	2.25	2.23
Race/ethnicity	12.14*							
White		1.0		297	76.74	7,715	71.49	71.68
Black		0.6*	0.4, 0.8	35	9.04	1,556	14.42	14.23
Hispanic		1.1	0.8, 1.6	43	11.11	1,009	9.35	9.41
Other		0.6	0.3, 1.1	12	3.10	511	4.74	4.68
Education	3.62							
Less than high school		1.2	1.0, 1.5	132	34.11	3,217	29.81	29.96
High school		1.0		239	61.76	7,102	65.81	65.67
Some college		1.1	0.6, 2.3	9	2.33	234	2.17	2.17
College or more		0.9	0.4, 1.9	7	1.81	238	2.21	2.19
Marital status	0.14							
Never married		1.0		206	53.23	5,680	52.64	52.66
Currently married		1.0	0.8, 1.2	173	44.70	4,848	44.93	44.92
Previously married		0.9	0.4, 1.8	8	2.07	263	2.44	2.42
Service-related characteristics								
Age at Army entry (years)	1.19							
<21		1.1	0.9, 1.5	259	66.93	6,904	63.98	64.08
21–24		1.0		80	20.67	2,465	22.84	22.77
≥25		1.0	0.7, 1.5	48	12.40	1,422	13.18	13.15
Time in service	12.06*							
1–2 years		1.4*	1.0, 1.8	235	60.72	5,652	52.38	52.67
3–4 years		1.1	0.8, 1.6	82	21.19	2,486	23.04	22.97
5–10 years		1.0		58	14.99	1,950	18.07	17.96
>10 years		0.6	0.3, 1.1	12	3.10	703	6.51	6.40
Deployment status	4.98							
Never		1.0		248	64.08	6,197	57.43	57.66
Current		0.8	0.5, 1.2	26	6.72	874	8.10	8.05
Previous		0.8*	0.6, 1.0	113	29.20	3,720	34.47	34.29
Demotion	1.95							
Past year		0.8	0.6, 1.1	35	9.04	1,177	10.91	10.84
Before past year		0.8	0.6, 1.3	24	6.20	786	7.28	7.25
Never demoted		1.0		328	84.75	8,828	81.81	81.91
Delayed promotion	12.63*							
On schedule		1.0		194	50.13	4,499	41.69	41.98
Late: ≤2 months		1.2	0.7, 2.1	15	3.88	283	2.62	2.67
Late: >2 months		0.7	0.5, 1.0	41	10.59	1,329	12.32	12.26
Not relevant due to rank ^c		0.7*	0.6, 0.9	137	35.40	4,680	43.37	43.09
Military occupational specialty	8.20*							
Combat arms ^d		1.0	0.8, 1.3	105	27.13	2,942	27.26	27.26
Combat medic		1.7*	1.2, 2.3	40	10.34	710	6.58	6.71
Other specialty		1.0		242	62.53	7,139	66.16	66.03

^a Soldiers with first-time documented suicidal ideation who attempted suicide within the next 30 days of recorded ideation.^b Soldiers with first-time documented suicidal ideation who did not attempt suicide within the next 30 days.^c Soldiers above the rank of E4 are not promoted on a set schedule.^d Combat arms includes combat arms and Special Forces soldiers.

*p<0.05.

Statistical Analysis

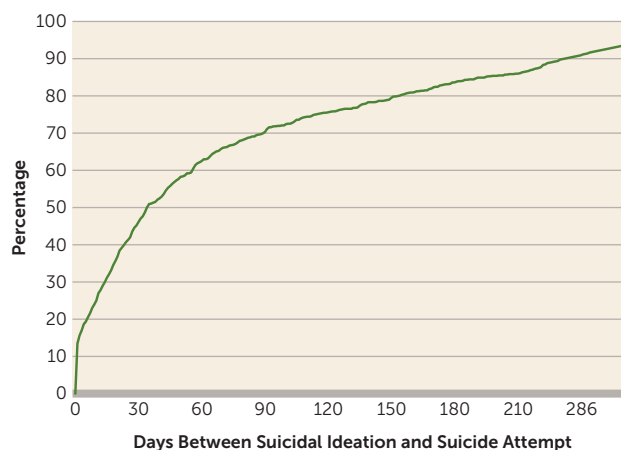
All analyses were conducted using SAS, version 9.4 (25). Initially, the associations of all sociodemographic and service-related characteristics, psychiatric disorders, recent physical health care visits, and family violence and crime history with suicide attempt within 30 days of soldiers' ideation were examined using univariate logistic regression. This time frame was determined to identify imminent attempt risk, and it accounted for 46.3% of all attempts in this sample. A series of multivariate logistic regression analyses were conducted for each of the primary predictors listed above, adjusting for sociodemographic and service-related characteristics. A final model was conducted including only those variables that were significant in the separate multivariate analyses that adjusted for sociodemographic and service-related variables. This model-building approach was based on purposeful selection of factors to identify the most parsimonious model that includes all relevant variables of imminent suicide attempt risk (26). The significance threshold for all analyses was set at a *p* value of 0.05, with selected variables for the final model identified by this criterion, as recommended (26), as opposed to using correction for multiple comparisons.

Logistic regression coefficients were exponentiated to obtain odds ratios and 95% confidence intervals. Because the suicide attempt rate increased during the Iraq and Afghanistan wars (3), each logistic regression equation controlled for calendar month and year. Coefficients of other predictors can consequently be interpreted as averaged within-month associations, based on the assumption that effects of other predictors do not vary over time. Stability of predictors of suicidal behaviors over time has previously been documented in this population (2). To examine suicide attempt risk as a function of time, we used a discrete-time hazard function, with analyses estimating attempt risk by days since first documented ideation. Area under the curve, the Akaike information criterion, and the Bayesian information criterion were calculated to evaluate model fit.

RESULTS

Soldiers with suicidal ideation (*N*=11,178) were primarily male (81.7%), 29 years old or younger (84.8%), White (71.7%), high school educated (65.7%), never married (52.7%), and younger than 21 years old when they first entered the Army (64.1%) (Table 1). Approximately half of the soldiers (52.7%) were in their first 2 years of service, 57.7% had never deployed, and 27.3% were assigned to combat arms. The five most common psychiatric diagnoses among all soldiers with suicidal ideation were depression-related diagnostic categories (dysthymic disorder, neurasthenia, depression not otherwise specified, and adjustment disorder with depressed mood [58.98% on day of ideation; 43.16% prior to day of ideation]; and major depression [24.17% on day of ideation]), tobacco use disorder (35.68% prior to day of ideation), anxiety disorder (33.56% prior to day of ideation), and adjustment disorder (24.65% prior to day of ideation) (see Table S7 in the online

FIGURE 1. Cumulative percent of suicide attempts across days since first documented suicidal ideation among 11,178 active-duty U.S. Army soldiers, 2006–2009



supplement). The majority of soldiers with ideation (80.2%) had at least one day with an outpatient health care visit in the past 2 months. About one-fourth (23.7%) of soldiers with ideation were perpetrators of a crime (mostly minor, nonviolent offenses); 8.8% were victims of a crime prior to their first ideation; and 5.5% had a history of family violence as a perpetrator (4.1%) or as a victim (1.4%) (see Table S8 in the online supplement).

Among the 11,178 soldiers with suicidal ideation, 830 (7.4%) subsequently attempted suicide. As shown in Figure 1, nearly half (46.3%, *N*=387) attempted suicide within 30 days of their ideation. Figure 2 shows the hazard function indicating that soldiers were at the highest risk of attempting suicide in the first month after ideation (rate, 35.4 per 1,000 soldiers), with incrementally decreasing risk over time. Examination by day showed that the first day had the highest daily risk (rate, 10.1 per 1,000 soldiers).

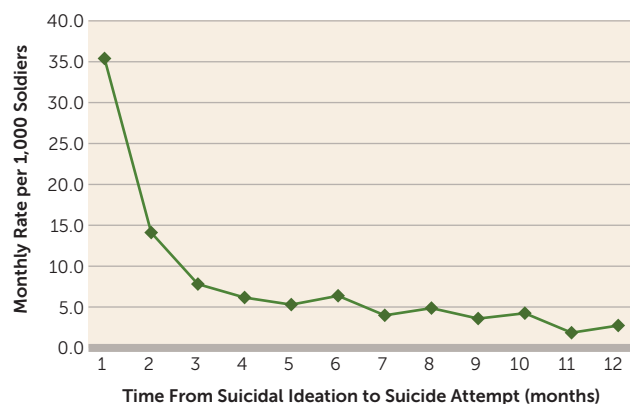
Sociodemographic and Service-Related Risk Factors

In univariate analyses, soldiers with suicidal ideation were more likely to attempt suicide within 30 days if they were female ($\chi^2=6.64$, *df*=1; odds ratio=1.4, 95% CI=1.1, 1.7) and were under 21 years of age ($\chi^2=11.14$, *df*=5; odds ratio=1.8, 95% CI=1.1, 2.9), and less likely if they were Black ($\chi^2=12.14$, *df*=3; odds ratio=0.6, 95% CI=0.4, 0.8) (Table 1). Soldiers with 1–2 years of service ($\chi^2=12.06$, *df*=3; odds ratio=1.4, 95% CI=1.0, 1.8) and combat medics ($\chi^2=8.20$, *df*=2; odds ratio=1.7, 95% CI=1.2, 2.3) were more likely to attempt suicide. Delayed promotion was not associated with increased attempt risk.

Psychiatric Diagnosis, Physical Health Care, and Family and Crime Risk Factors

Univariate analyses indicated that soldiers who were diagnosed with an anxiety disorder on the same day as suicidal ideation were less likely to attempt suicide within 30 days

FIGURE 2. Risk of suicide attempt among 11,178 active-duty U.S. Army soldiers following first documented suicidal ideation, 2006–2009



($\chi^2=4.54$, $df=1$; odds ratio=0.7, 95% CI=0.5, 1.0), and those diagnosed with a sleep disorder on the same day were more than twice as likely to attempt suicide ($\chi^2=4.36$, $df=1$; odds ratio=2.1, 95% CI=1.0, 4.1) (Table 2; see also Table S7 in the online supplement). Soldiers with marital problems prior to their ideation were less likely to attempt within 30 days of ideation ($\chi^2=5.69$, $df=1$; odds ratio=0.7, 95% CI=0.5, 0.9). Physical health care and injury-related factors (frequency of outpatient physical health care visits in the past 2 months, injury-related health care visits, and combat injury) (see Table 2; see also Table S8 in the online supplement) and family violence and crime-related factors (see Table S8) were not significantly related to 30-day attempt.

Multivariate analyses. A multivariate model with sociodemographic and service-related characteristics indicated that soldiers with suicidal ideation were more likely to attempt suicide within 30 days if they were female ($\chi^2=6.2$, $df=1$; odds ratio=1.4, 95% CI=1.1, 1.8) or were combat medics ($\chi^2=6.8$, $df=2$; odds ratio=1.6, 95% CI=1.1, 2.3) and were less likely to attempt suicide if they were Black ($\chi^2=10.4$, $df=3$; odds ratio=0.6, 95% CI=0.4, 0.9) (see Table S9 in the online supplement).

A series of separate multivariate models examining specific psychiatric disorders, adjusting for sociodemographic and service-related variables, indicated that soldiers diagnosed with an anxiety disorder on the day of their ideation were less likely to attempt suicide within 30 days ($\chi^2=4.6$, $df=1$; odds ratio=0.7, 95% CI=0.5, 1.0), and those diagnosed with a sleep disorder on the same day were over twice as likely to attempt suicide ($\chi^2=4.7$, $df=1$; odds ratio=2.2, 95% CI=1.1, 4.3) (Table 2; see also Table S10 in the online supplement). Soldiers with a documented anxiety disorder prior to their ideation were more likely to have attempted suicide ($\chi^2=4.1$, $df=1$; odds ratio=1.3, 95% CI=1.0, 1.6). No other psychiatric disorders were significantly associated with attempt. As the anxiety disorder variables (prior to and on the same day as ideation) had opposite associations with attempt risk,

we examined these variables together in a model that took into account their respective effects. Both variables continued to have the same significant association with attempt risk.

Among physical health care and family and crime predictors, only recency of last outpatient physical injury visit ($\chi^2=7.97$, $df=3$; 1 month: odds ratio=1.4, 95% CI=1.1, 1.9) was significantly related to suicide attempt after adjusting for demographic and service-related variables (Table 2; see also Table S11 in the online supplement).

We examined a final model that included all sociodemographic and service-related characteristics and the variables that were significant in the separate multivariate models (i.e., anxiety disorder [prior to suicidal ideation and on the same day as ideation], sleep disorder [on the same day as ideation], and recency of last injury-related outpatient visit) (Table 3). In this model, being female and being a combat medic continued to be associated with suicide attempt risk, and Black race was associated with lower risk. Anxiety disorder prior to ideation and sleep disorder on the same day as ideation were related to suicide attempt risk, and anxiety disorder on the same day as ideation was associated with lower attempt risk. Recency of outpatient injury-related visit was no longer significantly related to attempt. In a separate model, we examined the influence of both prior and same-day anxiety disorder diagnoses; however, this factor was not associated with suicide attempt risk. The area under the curve of the final model including all sociodemographic and service-related characteristics and variables that were significant in the separate multivariate models (i.e., anxiety disorder prior to and on the same day as suicidal ideation diagnosis, sleep disorder on the same day as suicidal ideation, and recency of last injury-related outpatient visit) was 0.64; the Akaike information criterion and Bayesian information criterion of this final model were 3,372.17 and 3,730.94, respectively.

DISCUSSION

To our knowledge, no other studies have examined soldiers with documented suicidal ideation and risk of attempt in the following 30 days to understand the progression from ideation to attempt. Identification of factors that may be predictive of suicide attempt provides information for mental health assessment that could help reduce the risk of imminent suicide attempt. In this study, 74% of soldiers with ideation subsequently attempted suicide. Nearly half of these attempts (46.3%) were within 30 days after ideation, with attempt risk highest soon after suicidal ideation diagnosis and decreasing over time. Importantly, the rates indicate that more than 3.5% of soldiers with ideation attempted suicide in the month after suicidal ideation diagnosis.

Women and combat medics were at increased risk of attempt within 30 days of first ideation diagnosis, and Black race was associated with lower risk. Women and combat medics have previously been identified as having a higher rate of attempt (27). The present study adds to these earlier findings, highlighting the particular importance of the risk shortly after

TABLE 2. Association of mental and physical health characteristics of active-duty U.S. Army soldiers with documented suicide attempt within 30 days following initial suicidal ideation, 2006–2009

Soldiers With Suicidal Ideation											
Characteristic	χ^2	Univariate Analyses		χ^2	Multivariate Analyses ^a		Attempted Suicide Within 30 Days ^b (N=387)		Did Not Attempt Suicide Within 30 Days ^c (N=10,791)		Total Population (N=11,178)
		Odds Ratio	95% CI		Odds Ratio	95% CI	N	%	N	%	%
Psychiatric diagnosis											
Anxiety disorder (day of suicidal ideation)	4.54*			4.60*							
Yes		0.7*	0.5, 1.0		0.7*	0.5, 1.0	54	13.95	1,977	18.32	18.17
No		1.0			1.0		333	86.05	8,814	81.68	81.83
Anxiety disorder (prior to suicidal ideation)	2.42			4.10*							
Yes		1.2	1.0, 1.5		1.3*	1.0, 1.6	141	36.43	3,610	33.45	33.56
No		1.0			1.0		246	63.57	7,181	66.55	66.44
Sleep disorder (day of suicidal ideation)	4.36*			4.70*							
Yes		2.1*	1.0, 4.1		2.2*	1.1, 4.3	9	2.33	127	1.18	1.22
No		1.0			1.0		378	97.67	10,664	98.82	98.78
Injury-related health care visit											
Recency of injury-related outpatient or inpatient visit	6.87			7.97*							
1 month		1.3	1.0, 1.8		1.4*	1.1, 1.9	122	31.52	2,819	26.12	26.31
2 months		0.9	0.6, 1.3		0.9	0.6, 1.4	33	8.53	1,158	10.73	10.65
≥3 months		1.0	0.8, 1.4		1.2	0.9, 1.7	154	39.79	4,498	41.68	41.62
No injury-related visit		1.0			1.0		78	20.16	2,316	21.46	21.42

^a Each variable was examined in a separate multivariate model that adjusted for sociodemographic (gender, current age, race, education, and marital status) and service-related characteristics (age at entry into Army service, time in service, deployment status, delayed promotion, demotion, and military occupation).

^b Soldiers with first-time documented suicidal ideation who attempted suicide within next 30 days of recorded ideation.

^c Soldiers with first-time documented suicidal ideation who did not attempt suicide within the next 30 days.

* $p < 0.05$.

the diagnosis of ideation. Women, younger individuals, White race, and sleep and anxiety disorders were found to be associated with higher risk of attempt within 30 days, similar to previous findings in military (7) and civilian populations (8, 10, 28, 29). Combat medics have been identified as being at elevated risk of attempting suicide in their first year of service (27), possibly associated with the challenges of advanced training and high performance demands. Previous research also supports the finding of lower attempt risk among Black soldiers for all suicide attempts, not only those associated with ideation (13). Although these differences are not well understood, some researchers have suggested that they may reflect the protective role of cultural and family ties and spiritual/religion-based coping strategies (29). Further research is needed to understand why these demographic and service-related characteristics act as risk or protective factors, and to identify various life events and transitions (e.g., new assignments, transitions out of training, stressful duty assignments, or deployment departures or returns) that may be associated with rapid transition to suicide attempt after ideation. Such information can help identify opportunities for early intervention.

In this study, three psychiatric diagnoses, on the day of suicidal ideation or prior to ideation, were associated with

attempt. Soldiers diagnosed with a sleep disorder on the same day as ideation were more likely to attempt suicide within 30 days. This may reflect a new-onset stress-related sleep disorder and be an indicator of acute distress. Anxiety disorder diagnosed prior to ideation (i.e., a history of anxiety disorder) was also associated with increased risk of attempt, while anxiety disorder diagnosed on the same day as ideation was associated with decreased risk. This variation in the influence of anxiety disorders on attempt risk is important and has not previously been observed. Anxiety associated with depression (agitated depression) has been noted as a risk factor for suicidal behaviors (30–32). This may be reflected in the finding of a history of an anxiety disorder prior to ideation being associated with increased attempt risk. This finding also corresponds with that of the community survey research in the National Comorbidity Study (9) and the World Health Organization's World Mental Health Surveys (10). The diagnosis of anxiety disorder on the same day of suicidal ideation associated with decreased risk is unexpected. One possible explanation might be that an anxiety disorder diagnosis on the same day as ideation may have led clinicians to a rapid intervention (e.g., psychiatric treatment and/or prescription of an anxiolytic), mitigating risk of attempt. Examination of these factors

TABLE 3. Multivariate associations of psychiatric diagnosis and health care factors in active-duty U.S. Army soldiers with documented suicide attempt within 30 days after initial suicidal ideation, 2006–2009^a

Characteristic	χ^2	Odds Ratio	95% CI
Sociodemographic characteristics			
Gender	4.64*		
Male		1.0	
Female		1.3*	1.0, 1.8
Current age (years)	2.77		
<21		1.4	0.7, 3.0
21–24		1.4	0.7, 2.7
25–29		1.5	0.8, 2.5
30–34		1.0	
35–39		0.9	0.4, 1.9
≥40		1.2	0.5, 3.3
Race/ethnicity	9.98*		
White		1.0	
Black		0.6*	0.4, 0.9
Hispanic		1.2	0.8, 1.6
Other		0.6	0.4, 1.2
Education	1.64		
Less than high school		1.1	0.9, 1.4
High school		1.0	
Some college		1.3	0.7, 2.6
College or more		1.2	0.5, 2.8
Marital status	3.47		
Never married		1.0	
Currently married		1.2	1.0, 1.6
Previously married		1.3	0.6, 2.7
Service-related characteristics			
Age at Army entry (years)	1.05		
<21		1.2	0.8, 1.6
21–24		1.0	
≥25		1.1	0.7, 1.8
Time in service (years)	0.95		
1–2		1.1	0.6, 2.0
3–4		1.1	0.7, 1.6
5–10		1.0	
>10		0.7	0.3, 1.6
Deployment status	0.22		
Never		1.0	
Currently		0.9	0.6, 1.4
Previously		1.0	0.7, 1.4
Demotion	0.32		
Past year		0.9	0.5, 1.4
Before past year		1.0	0.6, 1.6
Never demoted		1.0	
Delayed promotion	3.18		
On schedule		1.0	
Late: ≤2 months		1.2	0.7, 2.2
Late: >2 months		0.8	0.5, 1.3
Not relevant due to rank ^b		0.7	0.4, 1.2
Military occupational specialty	6.41*		
Combat arms ^c		1.1	0.8, 1.4
Combat medic		1.6*	1.1, 2.2
Other specialty		1.0	
Psychiatric diagnoses			
Anxiety disorder (day of suicidal ideation)	6.67*		
Yes		0.7*	0.5, 0.9
No		1.0	

*continued***TABLE 3, continued**

Characteristic	χ^2	Odds Ratio	95% CI
Anxiety disorder (prior to suicidal ideation)	5.16*		
Yes		1.3*	1.0, 1.6
No		1.0	
Sleep disorder (day of suicidal ideation)	5.47*		
Yes		2.3*	1.1, 4.6
No		1.0	
Physical health care and injury visits			
Recency of injury visit (outpatient)	6.56		
1 month		1.4*	1.0, 1.9
2 months		0.9	0.6, 1.4
≥3 months		1.2	0.9, 1.6
No injury-related visit		1.0	

^a All variables that were significant in separate multivariate models that adjusted for sociodemographic (gender, current age, race, education, and marital status) and service-related characteristics (age at entry into Army service, time in service, deployment status, delayed promotion, demotion, military occupation) were examined together in a final multivariate model.

^b Soldiers above the rank of E4 are not promoted on a set schedule.

^c Combat arms includes combat arms and Special Forces soldiers.

* $p < 0.05$.

and how they may influence the association of anxiety disorder diagnosis with suicide attempt is important and merits further attention. Additional differences related to the neurobiology of anxiety and suicide-related emotion regulation are yet to be found. Future research should address these complex relationships and identify the role of treatment.

Neither posttraumatic stress disorder (PTSD) nor depression-related diagnoses were associated with increased risk of 30-day suicide attempt in those with ideation. Major depression was identified in 24% of soldiers on the same day as ideation and in 15% prior to ideation. The additional disorders characterized by depressed mood (dysthymic disorder, neurasthenia, depression not otherwise specified, and adjustment disorder with depressed mood) were identified in nearly 60% of soldiers on the same day as ideation and in 43% prior to the day of ideation. The high prevalence of these disorders suggests that they may be associated with ideation in some soldiers, but they do not appear to distinguish those who attempt suicide shortly after diagnosed ideation. The stressors/adversities diagnoses, in contrast to previous studies (33–35), were not related to attempt among soldiers with ideation, suggesting that these broad diagnostic categories (V codes) may not capture more nuanced assessments of life context.

Research examining the risk of attempts or suicides among individuals with suicidal ideation is important to clinical care, yet it has been relatively less studied. In a previous case-control survey study of hospitalized suicide attempters, soldiers with ideation who self-reported PTSD in the past 30 days were more likely to attempt suicide (20). This differs from the present study and represents the value of self-report in potentially identifying undiagnosed or documented psychiatric disorders. Similarly, in a large psychological autopsy

study of Army soldiers who died by suicide (36), using interviews with next of kin and supervisors, an internalizing disorder or three or more diagnoses in the past month distinguished soldiers with suicidal ideation from those who died from suicide. Importantly, less than 2% of studies examining suicide specifically focus on imminent risk factors (e.g., within the month prior) (37). Future research should consider the contributions of specific psychiatric disorders in the context of different time frames of risk to better understand rapidly developing suicide attempt.

Several limitations should be considered in the interpretation of the study findings. First, this study used administrative records. Thus, the identified cases are subject to classification and coding errors and are limited to events that come to the Army's attention. As identification of suicidal ideation cases has important clinical implications, efforts to address underascertainment and to detect predictors of imminent attempt would help move individuals to timely and appropriate interventions. Although the extent to which attempts are accurately captured in military medical records cannot be conclusively identified (similar to civilian care settings), a substantial number of at-risk soldiers were documented. Further, examination of diagnoses identified through records as opposed to survey data suggests that some suicidal ideation and attempts, psychiatric disorders, and crime and family violence data are not reported or may have been recorded only in clinical notes, and therefore were not captured in administrative records. Future analyses of Army STARRS survey data that are linked to respondents' administrative records can allow for examination of undiagnosed psychiatric disorders, subthreshold disorders, and undocumented stressful events among soldiers with self-reported suicidal ideation and those with no documented psychiatric disorders. Second, our injury variable may have captured injuries that were self-inflicted but unrecognized as such. Third, our data in this study focus exclusively on the 2006–2009 period, and therefore our findings may not generalize to other time periods. Research to replicate these findings using different military cohorts or registries is recommended and should include the Army National Guard and Army Reserve soldiers, as well as veterans.

Importantly, this study identified factors predicting acute suicide attempt risk among soldiers with suicidal ideation, highlighting the significance of rapid transition from ideation to attempt and possible needed clinical intervention or follow-up. Those who attempt suicide in the 30 days following ideation include soldiers with an anxiety disorder diagnosis prior to their ideation or a sleep disorder diagnosis identified on the day of ideation. We have also identified two populations of particular importance, given their increased risk for rapid transition from ideation to attempt, namely, combat medics and women.

Although the majority of soldiers who attempt suicide have no history of administratively documented ideation, there is a significant minority whose suicidal thoughts are diagnosed prior to their attempt. This group is particularly important to the health care system as they fall within the purview of

clinicians who assess suicide risk and deliver evidence-based treatments. Developing screening tools specifically for suicidal ideation may help identify individuals at imminent risk. Future research should include examination of attempt methods as predictors of imminent attempt risk and the contribution of treatment and treatment-related factors in the transition of ideation to attempt.

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