



Original Contribution

# Adolescent violence screening in the ED

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**Abstract** Youth violence is widely recognized as a major public health problem. Adolescent suicidality (ideation, behavior, or both) is disturbingly common in the United States, and homicide remains one of the leading causes of death for young people aged 10 to 24 years. Assessing youth suicidality and homicidality in the emergency department (ED) is a complex and challenging task. Evidence about the value of available ED risk assessments is not encouraging. Attempts to develop models that predict violence have in part been unsuccessful from the fact that ideation is common and the value of depression is hard to determine. The current study presents an empirically based assessment (adolescent and child urgent threat evaluation) and algorithm (violence ideation and suicidality treatment algorithm) evaluating the impact of ideation and nonideation states on attempt among clinical samples, such as serotonin reuptake inhibitor akathisia and acute adjustment disorders. The authors suggest important time-related factors and easy-to-administer procedures when assessing near-future youth violence. A validated suicide-homicide final common pathway model is discussed.

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## 1. Introduction

Homicide and suicide are the second and third leading causes of death in youths 15 to 24 years old [1,2]. Emergency department (ED) visits for attempted suicide and violence are relatively common and most frequent among adolescents and young adults [3,4]. Studies have found that up to 60% of high school students experience some degree of suicidal ideation or action [5]. Annual estimates of suicide attempts among 15- to 24-year-olds surpass 1 million in the United States [1,4,6]. These estimates correspond to an average rate of 1 attempt every 3 minutes and a completed suicide every 90 minutes [1].

There was an estimated national average of 434 000 ED pediatric mental health visits from 1993 to 1999, and suicide attempt was the diagnosis in 14% [7].

Youth homicidality (ideation, behavior, or both) has received a great deal of deserved publicity in recent years. Overall, the statistics on murders of teenagers aged 12 to 17 years by known juvenile offenders are grim, with particularly devastating impact on males and minority youth [8,9]. The number of homicides involving teenage victims increased nearly 158% between 1984 and 1993 [10]. Even after declining from 1993 to 1997, the current rate for teenagers remains about 10% higher than the average rate for all persons [11].

The ED, often poorly staffed for evaluation and treatment of adolescent mental health problems, is only one of the several clinical settings in which adolescents may present

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for emergent concerns. Standard risk assessments have been of limited value in protecting this population [12]. Although there is some evidence of convergence concerning the factors considered important for formulating violence assessments, there is an appreciable variance in the accuracy of forecasts [13]. High false-positive and false-negative results have compounded the inaccuracy of these screening measures with associated financial, emotional, ethical, and legal consequences.

An efficient and effective evidence-based approach is necessary, as the difficulty in diagnosis, the lack of predictive value of available screeners, the limited time frame in which to initiate appropriate treatment, the life threatening complications of a missed diagnosis, and the increased awareness of health care expenditures and liability make these entities intimidating diagnostic challenges [7,14,15]. However, due to the lack of reliable and valid assessment and treatment approaches to reducing adolescent suicidality and homicidality, there are a few practice guidelines to implement to improve the quality of care provided in emergency settings [12].

The purpose of the current study is (a) to establish the psychometric properties of the adolescent and child urgent threat evaluation (ACUTE) for use with adolescents aged 13 to 18 years, (b) to provide descriptive information regarding the impact of early and late precipitating clinical factors, (c) to explore the relevance of ideation on attempt among various subsamples of adolescents, (d) to investigate the possible association between acute nonideation states and cognitive and motor impairments using brief and easy-to-administer neuropsychological examinations, and (e) to present an evidence-based guideline, the violence ideation and suicidality treatment algorithm (VISTA) for adolescents who present to the ED with suicidality and homicidality, at times unconventionally.

## 2. Current standards for assessment

No standard of care exists for the prediction of adolescent suicide and homicide. However, a standard of care does exist, whether legal (mandatory) or professional (ethical), requiring primary care and emergency physicians and other medical and mental health professionals to adequately assess risk when it is clinically indicated [16].

The assessment of suicide and homicide is complex and challenging. Previous research reveals that multiple pathways and a number of factors increase the probability of violence during adolescence [5,10,11,19]. The causes of violent acts involve an imbalance of biologic, psychologic, and social factors within the patient. The evaluation of violence potential in adolescents is analogous to that of suicidal potential and requires the specific and systematic assessment of these variables that informs treatment.

Although psychiatric diagnosis per se should not be used as an indicator for adolescent violence, there are some

categories that are overrepresented, for example, substance use and psychotic delusional states, affective disorders, such as bipolar conditions, and conduct disruptive borderline and antisocial personality disorders [5,6,10,14]. Therefore, the emergency physician should make a preliminary attempt to categorize the patient's condition into organic, psychotic, or nonpsychotic, nonorganic disorders.

Also, clinicians must be vigilant in evaluating unobvious nonideation suicidality and homicidality that may occur in drug-related movement disorders (ie, serotonin reuptake inhibitor [SSRI]-induced akathisia) and acute adjustment disorders (AD) and warrant increased suspicion for underlying lethality. However, there is surprisingly little in the scientific literature describing these psychologic characteristics of approximately 500 000 children and adolescents who present annually in the ED with mental health-related diagnoses [7]. For example, studies on suicide and homicide have tended to focus on traditional constructs, such as ideation, depression, hopelessness, and helplessness; however, nonideation states have been largely absent from these analyses [14,17-19].

## 3. Definitions

### 3.1. Nonideation suicidality and homicidality

Most adolescent suicide and homicide attempts are premeditated [5,19,20]. However, evidence across studies and populations indicates that 20% to 30% of pediatric violent attempts have no apparent premeditation or ideation [5]. Investigations demonstrate that suicidal and homicidal ideations vary widely by country, psychiatric disorder, cultural features, religious practices, sex, and childhood and family adversities [14,17]. Some authors suggest that adolescent attempts without premeditation are committed impulsively [5]. However, impulsive attempts are generally associated with lower lethality and lack of depression [21]. Moreover, recent research indicates that suicidality may be a consequence of autonomous irresistible motor behavior without forethought [22]. Therefore, merely obtaining a "contract for safety" from these patients and documenting that the "patient denies suicidal or homicidal ideation" is not an adequate risk assessment [16]. These findings point out a current dilemma: the value of the independent finding of ideation is hard to determine. Thus, the absence of suicidal or homicidal ideation may convey uniquely important information for assessing near-future violence and, therefore, should be carefully assessed in addition to other factors.

### 3.2. Akathisia

Akathisia (inability to sit still) can be caused by several groups of drugs, including antipsychotics, antihistamines, and SSRIs [23]. Symptoms secondary to streptococcal and mycoplasma infections have been reported [24]. The core of

akathisia, which can be intense, is inner restlessness, mental unease, and dysphoria. Recent findings suggest that adverse drug-related movement disorders with associated psychological symptoms are most likely experienced soon after antidepressant medication is started [25]. However, akathisia may be continuous as long as the offending drug is administered or persistent even after the causative agent has been discontinued [23]. The differential diagnosis is difficult. The mental manifestations of these extrapyramidal adverse effects are frequently misdiagnosed as psychiatric deteriorations or mistreated by increased dosing of the offending drug [26]. There is a small and growing literature suggesting that SSRIs may cause significant extrapyramidal adverse effects, the most common being akathisia [27-30]. There is not an extensive literature on akathisia and suicide and homicide [26,29,31,32]. The anecdotal nature of these reports has placed a methodological limitation on the ability to attribute the akathisia and subsequent ideation or acts of violence to the medication [33]. However, there are recent data suggesting an association among SSRI administration, akathisia, and a distinct form of dysphoria with neurobiologic underpinnings similar to disorders of the basal ganglia [34].

### 3.3. Acute adjustment disorder

Although a remarkable proportion of adolescents suffering from AD without previous psychiatric diagnosis are suicidal or violent, few studies have documented the characteristics of these patients [14,35]. Adjustment disorder represents a short-term maladaptive reaction to what a layperson would call a personal misfortune or to what a psychiatrist calls a psychosocial stressor. Some reports treat AD as an acute stress or provisional posttraumatic stress disorder [36,37]. Nevertheless, the responses are maladaptive because of the symptoms or behaviors that are beyond the expected response to such a stressor. Some patients experience severe anxiety bordering on panic. The clinical significance relates not only to the subjectively experienced dysphoria and motor agitation, but also its association with violence [35]. These agitated mixed motor and psychologic states are often regarded as clinically similar to, and perhaps indistinguishable from, akathisia [38,39]. Several *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, diagnostic criteria for AD are shared with neuroleptic induced akathisia, namely, anxiety, agitation, and dysphoria. The forgoing signs and symptoms are also among the clinical features the US Food and Drug Administration lists as presaging suicidality on antidepressant monotherapy [39].

### 3.4. Deliberate self-harm (parasuicide)

Self-destructive behavior (eg, fine cutting self-mutilation) and nonfatal suicide attempts, although difficult to categorize, have been conceptualized as parasuicide. The distinction between parasuicide and completed suicide is

important: parasuicidal patients usually recognize that the methods are nonlethal. Most of the fine-cutting self-mutilators are found in personality disorders [40]. This pattern of behavior does not usually carry suicidal intent [40,41]. Rather, the behavior serves other functions, such as arousal, regulation of mood, interpersonal manipulation, and gratification or release while committing the act. These patients have different characteristics than patients who display lethal suicidal behavior [41]. For example, the patient who makes an attempt by pill “underdosages” or delicate wrist lacerations where he or she can be discovered at home or school has a low risk-to-rescue fantasy ratio. However, one cannot discount the importance of parasuicide. It appears that the risk of a repeated attempt is highest in the 3 months immediately after the first attempt and is associated with problematic functioning and psychopathology [5,18,40,41]. Although there does not appear to be an escalation of seriousness with subsequent attempts, some attempters will ultimately miscalculate and go on to completed suicide [5].

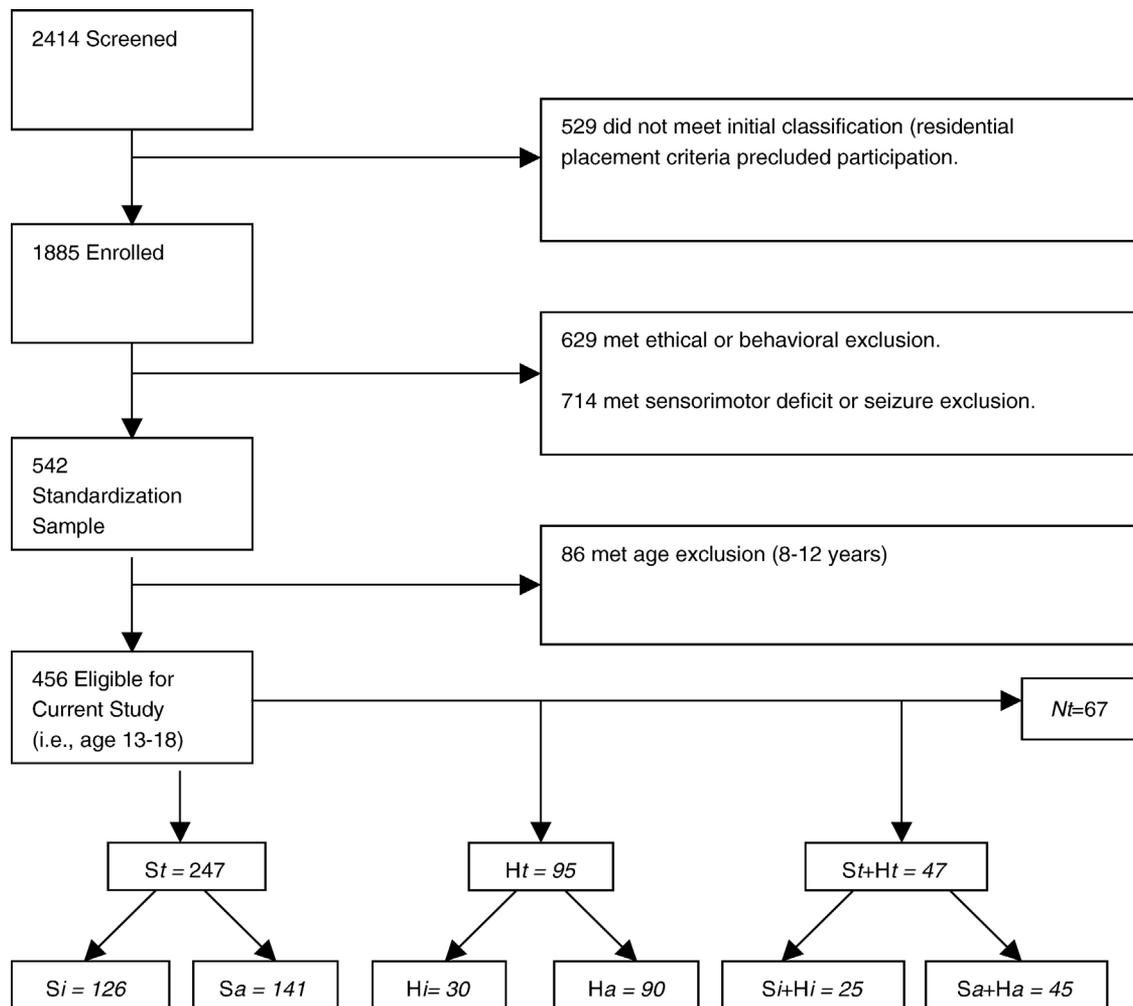
## 4. Development of a new measure

### 4.1. Background and significance

Current screening or “indicator” measures are widely used to assess psychopathology and suicide, much more than are full psychiatric interviews [12]. Although suicide scales have been developed for research purposes, they lack the predictive validity necessary for use in routine clinical practice and should not be used as substitutes for a thorough clinical evaluation [42]. Screening instruments have several limitations: (a) they identify adolescents as being suicidal when they are not (false positives); (b) they miss true cases (false negatives); (c) they are biased by a nonspecific ideation risk relationship; and (d) they lack clarity in areas of definition, sample representation, symptom criteria, and severity in scoring [12,13,16]. Furthermore, there is surprisingly little work done recently to examine validity of often-used measures [12].

However, a new assessment, the ACUTE [43], was recently developed with the goal of creating a reliable and valid evaluation of violence risk for children and adolescents aged 8 to 18 years. More specifically, the ACUTE was designed to identify time-related factors such as threat (lethality), precipitating clinical (early and late), predisposing historical, impulsivity (autonomous), and ideation (cognition) that compose the common unifying central mechanism underlying violence and future violence. As a result, the ACUTE provides information regarding the associated level of risk (ie, extreme, high, moderate, low) for near-future violence (ie, hours to days).

Several scaling methods were considered; however, a percentile-based scaling approach was used. For each study group (ie, suicide threat, homicide threat, homicide



**Fig. 1** Study design and subject flow. S indicates suicide; H, homicide; SH, suicide and homicide; *t*, threat; *a*, attempter; *I*, ideator; *Nt*, nontreat group.

and suicide threat, combined threat, and nontreat), cumulative frequency distributions derived from raw scores were generated. The final percentile ranges were based on a combination of adequate distribution spread of raw scores and meaningful cutoff points that would correspond with familiar qualitative categories (ie, extreme, high, moderate, low).

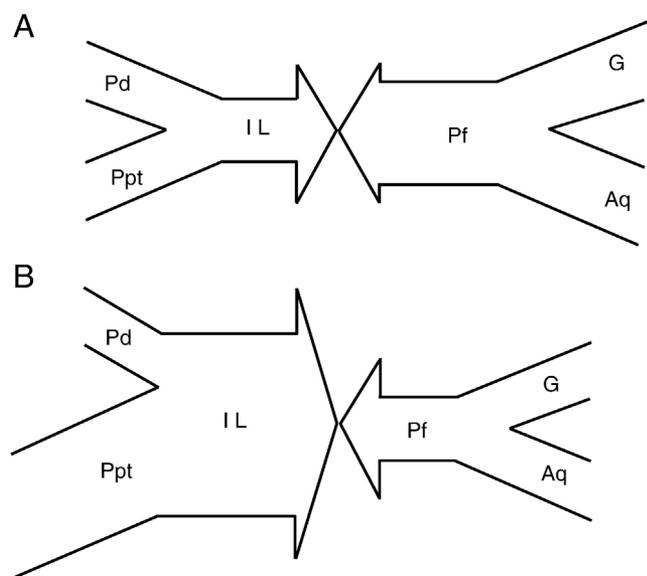
## 4.2. Materials and methods

As part of a program of longitudinal research on youth violence begun in 1980, the authors collected data regarding suicidality and homicidality in 8- to 18-year-old children and adolescents. Some of these findings have been published [42], and some results are presented here for the first time.

Children and adolescents aged 8 to 18 years were recruited to take part in this prospective, observational, multicentered study from 1985 to 1994. Inpatient participants ( $n = 2414$ ) were enrolled from community mental health centers and ED referrals. After consultation,

529 participants were considered inappropriate because hospitalization was instituted when placement facilitation was primarily the issue. A total of 1885 requests were thus obtained and considered relevant to the study. Parents or guardians provided written informed consent for their children, and adolescents provided written assent to participate in addition to parent/guardian consent. Fig. 1 demonstrates the study design and flow diagram.

Study staff made it clear to referring agencies or guardian that lack of participation in the study would in no way affect other aspects of treatment. Inclusion criteria included conduct disorders, substance abuse, mania, antisocial or borderline personality disorder, positive psychotic symptoms, major syndromal or attenuated depressive disturbance such as dysthymia, AD with depressed mood or other features, bereavement, emergent adverse drug reaction, such as SSRI withdrawal syndrome or akathisia, and coarse cutting self-mutilation. Exclusion criteria included head trauma, seizure disorder, sensorimotor deficits, such as deafness, blindness, inadequate command of language, and dyslexia, neurologic disorder, and pyramidal or extrapyramidal



**Fig. 2** The violent behavior continuum model. A, The schematic representation of the homeostatic balance between risk and protective factors, composed of risk provocation (predisposing and precipitating factors) and strength (intent and lethality components); protective (genetic and acquired inputs); direction (arrow width) and duration (arrow length). Any set of conditions that produces increased aggressive impulses (risk factors) in the context of diminished control (protective factors) may produce violent acts. B, The schematic representation of acute risk factor accumulation and cascade of precipitating factors by a number of potential triggers, for example, drug-induced akathisia and extreme stress. As a result of precipitating factor progression, the violent process is strengthened and accelerated. Protective factors are overwhelmed. The probability of violent behavior increases as protective factors are decompensated and cognitive distortions develop. Note that precipitating factors are not invariably influenced by predisposing historical factors, that is, previous mental disorder (see text). I indicates intent (expectation of death); L, lethality (likelihood of death); Pd, predisposing; Ppt, precipitating; Pf, protective factors; G, genetic; Aq, acquired.

system lesion. Also, participants were excluded if the ethical and safety risks of extreme violence or withholding emergency treatment outweighed the benefit of continued study enrollment.

A 2-stage ascertainment procedure was used to select the standardization sample. A child or adolescent psychiatrist or trained staff, who had participated in a yearlong practicum on violence assessment and intervention with the primary investigator, conducted clinical interviews, reviewed multiple source records, and assigned a best estimate predominating *Diagnostic and Statistical Manual of Mental Disorders, Third Edition*, diagnosis as part of the comprehensive evaluation. Also, brief, structured neuropsychological tests were completed to evaluate executive processes, motor functioning, and akathisia. Participants were evaluated within 1 hour of admission; each examiner completed

the ACUTE as part of the evaluation. Test-retest examinations were completed within 24 to 48 hours.

Suicidal and homicidal ideations were assessed on the basis of clinical experience, the cutoff being defined as occasional, frequent, or worsening thoughts of death and dying. Transitory, fleeting, or impermanent thoughts of death were included as positive ideation if any circumstances surrounding the attempt increased the actual risk (ie, intent with expectation and likelihood of death). Violent behavior was considered as being experienced along a risk-protective factor continuum having provocation (predisposing and precipitating factors), strength (expectation of death [intent] and likelihood of death [lethality]), direction (suicide and/or homicide), and duration (hours to days) (Fig. 2).

In those cases where combination violence patterns (ie, homicide and suicide) were demonstrated, the prevailing attempt or threat was categorized as the primary presenting complaint. In the case of discrepant reports, the most severe complaint from any source was used and considered positive if criteria were met and were considered clinically meaningful, and if the study team consensus was achieved.

Subjects were initially divided into 4 groups: (a) suicide threat, (b) homicide threat, (c) suicide and homicide threat, and (d) nonthreat. The nonthreat clinical control group was a demographically matched age- and sex-equivalent comparison group, recruited from the inpatient sample, who had never met criteria for a neurologic disorder, reported a history of suicide or homicide attempt, or demonstrated a current intent or lethality score greater than 0 (ie, none/rarely) on assessment measures. In addition to the groups mentioned, a fifth group was created—the combined threat group. This group was made up of the suicide threat group, homicide threat group, and the suicide and homicide threat group. Although the original study included both children (aged 8-12 years) and adolescents (aged 13-18 years), only data obtained from adolescent participants are presented here ( $n = 456$ ). The demographic data for the current study can be found in Table 1.

For the current study, the participants in the 3 clinical groups (suicide threat, homicide threat, and suicide and homicide threat) were further separated into 6 clinical samples, consisting of (a) attempters (possible or probable suicide and/or homicide attempt, actual or interrupted, 24 hours or less before admission, regardless of the level of intent or lethality) or (b) ideators (no actual or interrupted suicide and/or homicide attempt, however, considered or threatened, 24 hours or less before admission; Fig. 1).

### 4.3. Adolescent and child urgent threat evaluation

As described earlier, the ACUTE is a 27-item structured assessment that is based on information obtained through various sources, including, but not limited to, patient interview, chart review (eg, medical, school), and family interview. The newly developed assessment assessed 6 logically derived clusters of items (threat, precipitating,

**Table 1** Demographic characteristics of the ACUTE sample by study group

	Study group				
	Nonthreat	Suicide threat	Homicide threat	Homicide/suicide threat	Combined threat
n	67	247	95	47	389
Age (y)					
Mean	15.46	15.60	15.44	15.40	15.53
SD	1.16	1.15	1.37	1.33	1.41
Sex (%)					
Male	55.2	39.3	70.5	74.5	51.2
Female	44.8	60.7	29.5	25.5	48.4
Ethnicity (%)					
Caucasian	58.2	41.7	44.2	46.8	43.2
African American	9.0	19.0	15.8	10.6	17.3
Hispanic	20.9	22.3	34.7	25.5	25.8
Other	12.0	16.6	5.3	14.9	13.7
Primary diagnosis (%)					
Dysthymia	25.4	46.2	22.1	25.5	38.1
Substance abuse	10.4	13.0	5.3	12.8	11.1
Personality disorder	34.3	25.9	46.3	40.4	32.9
Conduct disorder	7.5	2.8	14.7	10.6	6.7
Other	22.4	10.9	11.6	10.6	11.1

early precipitating, late precipitating, predisposing, and impulsivity) and a total score.

#### 4.4. Neuropsychological evaluation

The neuropsychological protocol was as follows:

(a) Executive functioning was assessed with 2 measures: (1) Trail making test/part B (Lezak, 1969) that assesses the ability to flexibly shift response sets. This is a “connect-the-dots” type of task in which the patient must connect the dots in an alternating sequence of numbers and letters (eg, 1 to A to 2 to B to 3 to C). Handedness, time to completion, and number of errors were noted. (2) Simple dysdiadochokinetic tasks, such as alternating dominant hand palm up-palm down and then presenting as the next task palm up-palm down-fist, may result in repeated performance of only 2 components of the task. Similarly, asking the patient to write, in script, alternating “m’s” and “n’s” may elicit simple motor perseveration. These tests are scored on the basis of clinical experience and cutoff scores, permitting the analysis of both accuracy and latency of response. The threshold occurs on the 2 higher scaling points (ie, 2 = mild to moderate, 3 = moderate to severe) rather than on the 2 lower scale points (ie, 1 = minimal, 0 = rarely/none of the time) to be rated positive.

(b) Akathisia was assessed using the standardized Barnes Akathisia Rating Scale (Barnes, 1989). Patients were observed while seated for at least 2 minutes and also while standing and engaged in neutral conversation for 2 minutes. If there were other opportunities, subjects were observed in other situations (eg, waiting room, drinking fountain). Akathisia is rated according to objective motor signs (eg, pacing, shuffling, stereotypic movements) and subjective

distress (eg, dysphoria, obsessive or doom anxiety, mental unease). The diagnostic threshold on the global akathisia item score is 2 (ie, a score of 2 or more indicates the presence of akathisia). However, the condition may present only as “subjective akathisia.” The presence of akathisia can be made on the basis of the typical subjective report but in the absence of any motor phenomena.

## 5. Results

All statistical analyses used SPSS version (11.5; SPSS, Chicago, Ill). First data were analyzed to evaluate the psychometric properties of the ACUTE among adolescents aged 13 to 18 years. Several types of analyses were conducted, including internal consistency reliability, test retest stability, and intercorrelations among clusters and total score of the ACUTE. Next, the impact of early and late onset was explored using intercorrelations and frequency

**Table 2** Coefficient  $\alpha$  reliability of the ACUTE scores for the combined threat sample

Cluster/score	<i>r</i>
Threat cluster	0.78
Precipitating factors cluster	0.80
Early precipitating factors cluster	0.67
Late precipitating factors cluster	0.81
Predisposing factors cluster	0.85
Impulsivity cluster	0.62
ACUTE total score	0.84

N = 389.

**Table 3** Test-retest reliability coefficients ( $r$ ) for the ACUTE scores

Cluster	$r_c$	First rating		Second rating	
		Score			
		Mean	SD	Mean	SD
Threat cluster	0.94	2.26	2.32	1.30	1.04
Precipitating factors cluster	0.96	4.18	3.43	3.43	1.62
Early precipitating factors cluster	0.95	2.70	2.20	2.43	0.73
Late precipitating factors cluster	0.92	1.47	1.46	0.99	1.11
Predisposing factors cluster	0.70	4.03	3.47	4.66	1.24
Impulsivity cluster	0.90	3.95	2.41	4.58	0.96
ACUTE total score	0.92	8.37	5.40	8.22	2.50

N = 67.

distributions. In addition, intercorrelations were used to investigate the possible association between acute non-ideation states and cognitive and motor impairments. Finally, the impact of ideation and nonideation was investigated using frequency distributions.

### 5.1. Reliability and validity

As previously reported, the ACUTE has been found to be a reliable and valid measure for use with children and adolescents aged 8 to 18 years. The results in the following section represent evidence for reliability and validity of the ACUTE among adolescents aged 13 to 18 years.

Internal consistency was moderate to high for both the cluster scores and the total score, with coefficients ranging from 0.67 to 0.85 (Table 2). In addition to internal consistency, test-retest stability was measured with a subsample of 67 adolescents. The retest evaluations were conducted over a period of 24 to 48 hours. However,

because violent or suicidal ideation constructs are thought of as unstable over time, moderate fluctuations in scores were expected. It is important to note that the correlations were corrected for the restriction in range. The corrected correlations ranged from 0.70 to 0.97 (Table 3).

Next, intercorrelations among the cluster scores and total score were examined. Because each of the cluster scores and the total score are all closely related constructs of risk for violence, it was expected that they would each correlate positively. Overall, the coefficients were moderate to high among all of the clusters and total score (0.54–0.96), with the exception of the predisposing factors cluster (0.11–0.78; Table 4). This is consistent with the results found in the overall standardization sample.

In addition to the intercorrelations, the sensitivity (87.5%), specificity (90.4%), and positive predictive value (87.5%) were calculated based on a subsample ( $n = 50$ ) of the combined threat group.

### 5.2. Late and early onset factors

#### 5.2.1. Correlation with threat cluster

As described earlier, there is a strong relationship between both late (ie, late precipitating factors cluster) and early onset (ie, early precipitating factors cluster) and risk for increasingly future suicide or homicide attempts (ie, threat cluster),  $r = 0.89$ ,  $P < .001$ , and  $r = 0.90$ ,  $P < .001$ , respectively. As indicated by strong correlations between both late and early onset, precipitating factors and the risk of a suicide or homicide attempt in the near future (24–48 hours) increased as a function of the frequency of factor occurrence.

### 5.3. Relationship with attempt and ideation

For those adolescents who endorsed 1 or higher late precipitating factors cluster item, 89.3% attempted violence (homicide or suicide) and 60.7% had violent ideations, compared with 0% in the nonthreat group

**Table 4** Intercorrelation among ACUTE scores

Cluster	Score						
	Threat cluster	Precipitating factors cluster	Early precipitating factors cluster	Late precipitating factors cluster	Predisposing factors cluster	Impulsivity cluster	ACUTE total score
Threat cluster	–	0.95	0.90	0.89	0.22	0.57	0.75
Precipitating factors cluster		–	0.96	0.91	0.23	0.69	0.78
Early precipitating factors cluster			–	0.76	0.28	0.72	0.79
Late precipitating factors cluster				–	0.11	0.54	0.65
Predisposing factors cluster					–	0.74	0.79
Impulsivity cluster						–	0.92
ACUTE total score							–

N = 456. All correlations are significant at  $P < .001$ .

**Table 5** Attempt and ideation among a late and early onset subsample for the combined threat group and the nonthreat group

	Combined threat group		Nonthreat group	
	Ideation <sup>a</sup> (%)	Attempt <sup>b</sup> (%)	Ideation <sup>a</sup> (%)	Attempt <sup>b</sup> (%)
Late onset	60.7	89.3	0	0
Early onset	53.3	81.3	0	0

N = 290. Late onset indicates endorsement of 1 or more of the late precipitating factors cluster items. Early onset indicates endorsement of 1 or more of the early precipitating factors cluster items.

<sup>a</sup> Although transitory, fleeting, or impermanent thoughts of death and dying were generally excluded as positive ideation, where circumstances surrounding the attempt increased the actual risk (ie, impulsivity/irresistibility + expectation and likelihood of death), ideation was endorsed.

<sup>b</sup> Actual, aborted, or interrupted attempt with available or accessible means, and expected likelihood of death.

(Table 5). Similarly, for those adolescents who endorsed 1 or higher early precipitating factors cluster item, 81.3% attempted violence and 53.3% had violent ideations (homicide or suicide), compared with 0% in the nonthreat group (Table 5).

#### 5.4. Ideation and suicidality and homicidality

As described earlier, suicidal and homicidal ideations with associated extreme intent and medical lethality almost invariably were indicators of significant, recognizable, and diagnosable psychologic distress in adolescents [19,43,44]. Previous research has also shown that the presence of ideation, with few exceptions, is almost a universal indicator of Axis I psychopathology [5].

In the current study, for both males and females, it was strongly associated with predominating dysthymia (42.9%) compared with personality disorders (28.2%), substance abuse (12.9%), and conduct disorder (4.1%). Thus, ideation was most strongly associated with depression but also occurred in the absence of depression. As shown in Table 5, adolescents in these diagnostic groups, who demonstrated recent and moderate to high violent ideations with expectation and likelihood of death, were projected to make a suicide or homicide attempt approximately 81.3% to 89.3% of the time. These rates are consistent with previous research reporting transition probability of 72% from suicidal ideation to attempt as demonstrated in patients categorized by predominating psychiatric disorder [45-48].

#### 5.5. Nonideation suicidality and homicidality subsets

Although psychopathology is associated with suicidal and homicidal behavior and ideation, not all ideators have a history of attempt; not all attempters have a history of ideation. Nonideation suicidality and homicidality were common in 2 subsamples, that is, acute AD (dysthymia

**Table 6** Demographic characteristics of the acute adjustment and drug-induced subsamples

	Subsample	
	Acute adjustment	Drug induced
n	43	11
Age (y)		
Mean	14.81	15.91
SD	1.40	1.51
Sex (%)		
Male	25.6	63.6
Female	74.4	36.4
Ethnicity (%)		
Caucasian	25.6	54.5
African American	39.5	9.1
Hispanic	20.9	18.2
Other	14.0	18.2

subset) and drug-induced SSRI monotherapy adverse effects ("other" subset) (see Table 6 for the demographic characteristics of these samples). The rates of suicidal and homicidal ideation in these groups were significantly lower than for adolescents who were previously diagnosed with any mental disorder. For the AD subset, 79.1% of the sample reported no ideation; however, 97.7% made an attempt (Table 7). Similarly, for the drug-induced group, 54.5% of the sample reported no ideation; however, 100% made an attempt. Therefore, in contrast to past research [5], adolescents with either (1) no lifetime history of previous psychiatric disorder or (2) absence of suicidal or homicidal ideation do attempt suicide and homicide, and at alarming rates.

It is important to note that the drug-induced group consisted of only 11 patients. In addition, there was a great deal of variability in this SSRI monotherapy group (eg, medication adjustments, newly prescribed). To the authors' knowledge, these results have not been previously reported for community or inpatient adolescents, but given the small sample size, these findings should be cross-validated among a larger sample.

To summarize, nonideation rates were highest in adolescents with acute adjustment disturbances without previous

**Table 7** Attempt and ideation among acute adjustment and drug-induced subsamples

Sample	n	Ideation <sup>a</sup> (%)	Attempt <sup>b</sup> (%)
Acute adjustment	43	20.9	97.9
Drug-Induced	11	45.5	100

N = 290. Late onset indicates endorsement of 1 or more of the late precipitating factors cluster items. Early onset indicates endorsement of 1 or more of the early precipitating factors cluster items.

<sup>a</sup> Although transitory, fleeting, or impermanent thoughts of death and dying were generally excluded as positive ideation, where circumstances surrounding the attempt increased the actual risk (ie, impulsivity/irresistibility + expectation and likelihood of death), ideation was endorsed.

<sup>b</sup> Actual, aborted, or interrupted attempt with available or accessible means, and expected likelihood of death.

**Table 8** Correlations between the ACUTE and neurologic tests for acute adjustment subsample

Cluster	Score			
	Trail making test part B	Palms	M's and N's	Bars
Threat cluster	0.46	0.49*	0.42**	0.39**
Precipitating factors cluster	0.55***	0.59***	0.48***	0.45**
Early precipitating factors cluster	0.46**	0.48***	0.36*	0.33*
Late precipitating factors cluster	0.55***	0.61***	0.54***	0.51***
Predisposing factors cluster	0.08	-0.06	0.01	-0.11
Impulsivity cluster	0.23	0.20	0.14	0.03
ACUTE total score	0.38*	0.38*	0.31	0.18

N = 43.  
 \*  $P < .05$ .  
 \*\*  $P < .01$ .  
 \*\*\*  $P < .001$ .

psychopathology and antidepressant-induced adverse effects. On the basis of diagnostic write-ups and reviews of assessment screening measures, these attempts were linked to peritraumatic behavioral pathology or acute akathisia without premeditation. It is possible that agitated acute adjustment states may overlap considerably with the so-called antidepressant activation syndrome. There are cognitive and behavioral variables present in both: those present in acute adjustment states and those present only in drug-induced akathisia. Cognitive rigidity identifies both conditions, as do various associated features, such as onset, mental unease, panic, doom anxiety, and sleep disturbance. The behavioral features uniquely predictive of akathisia include motor restlessness, lower extremity paresthesias, repetitive crossing of the legs, and pacing in place. Although the overlap of behavioral and cognitive features is substantial, for example, mental unease, doom anxiety, and cognitive rigidity (ie, “tunnel vision,” 1-dimensional thinking, inability to manipulate options), 1 variable is more strongly predictive of acute AD. This includes nighttime worsening (diurnal maxima) of behavioral and cognitive features, confirming earlier clinical observations that akathisia tends to disappear during sleep [49].

**5.6. Neuropsychological assessment**

In addition to exploring the impact of ideation on violence, the relationship between neurocognitive functioning and violence was also examined among these groups. It was hypothesized that there would be significant correlations between the threat cluster and precipitating factors cluster

**Table 9** Correlations between ACUTE (threat cluster) and Barnes Akathisia Rating Scale

	n	Minimum	Maximum	Mean	SD
<i>AD group</i>					
BARS	43	.00	4.00	1.9535	1.13292
Valid n (listwise)	43				
<i>Drug-induced group</i>					
BARS	11	1.00	4.00	2.4545	1.21356
Valid n	11				

(early and late) of the ACUTE and tests of neurocognitive functioning, and that the magnitude of the correlations would be stronger among the drug-induced group.

For the acute adjustment sample, as hypothesized, significant correlations were found between the threat cluster and precipitating factors cluster of the ACUTE and the battery of neurocognitive tests (Table 8), indicating a strong relationship between poor neurocognitive functioning and high levels of risk for violence. Overall, these findings are consistent with other studies, suggesting that marked acute symptom severity may cause appreciable changes in neurocognitive functioning [50]. There was a strong correlation between the threat cluster and the Barnes Akathisia Rating Scale (Table 9).

For the drug-induced sample, again, significant correlations were found between the ACUTE and the neurocognitive functioning; however, the strongest correlations were found between the alternating palm task and the threat cluster and precipitating factors cluster (early and late) (Table 10). In addition, the scores for item 11 of the ACUTE (which assesses motor restlessness) were compared and found to be statistically significant,  $t_{10} = 4.583$ ,  $P < .001$ .

**Table 10** Correlations between the ACUTE and neurologic tests for drug-induced subsamples

Cluster	Score			
	Trail making test part B	Palms	M's and N's	Bars
Threat cluster	0.43	0.75**	0.26	0.65*
Precipitating factors cluster	0.38	0.73**	0.25	0.51
Early precipitating factors cluster	0.32	0.69*	0.28	0.31
Late precipitating factors cluster	0.39	0.66*	0.18	0.67*
Predisposing factors cluster	-0.33	0.00	-0.17	-0.32
Impulsivity cluster	-0.2	0.13	-0.04	-0.16
ACUTE total score	0.00	0.46	0.03	0.09

N = 11.  
 \*  $P < .05$ .  
 \*\*  $P < .01$ .

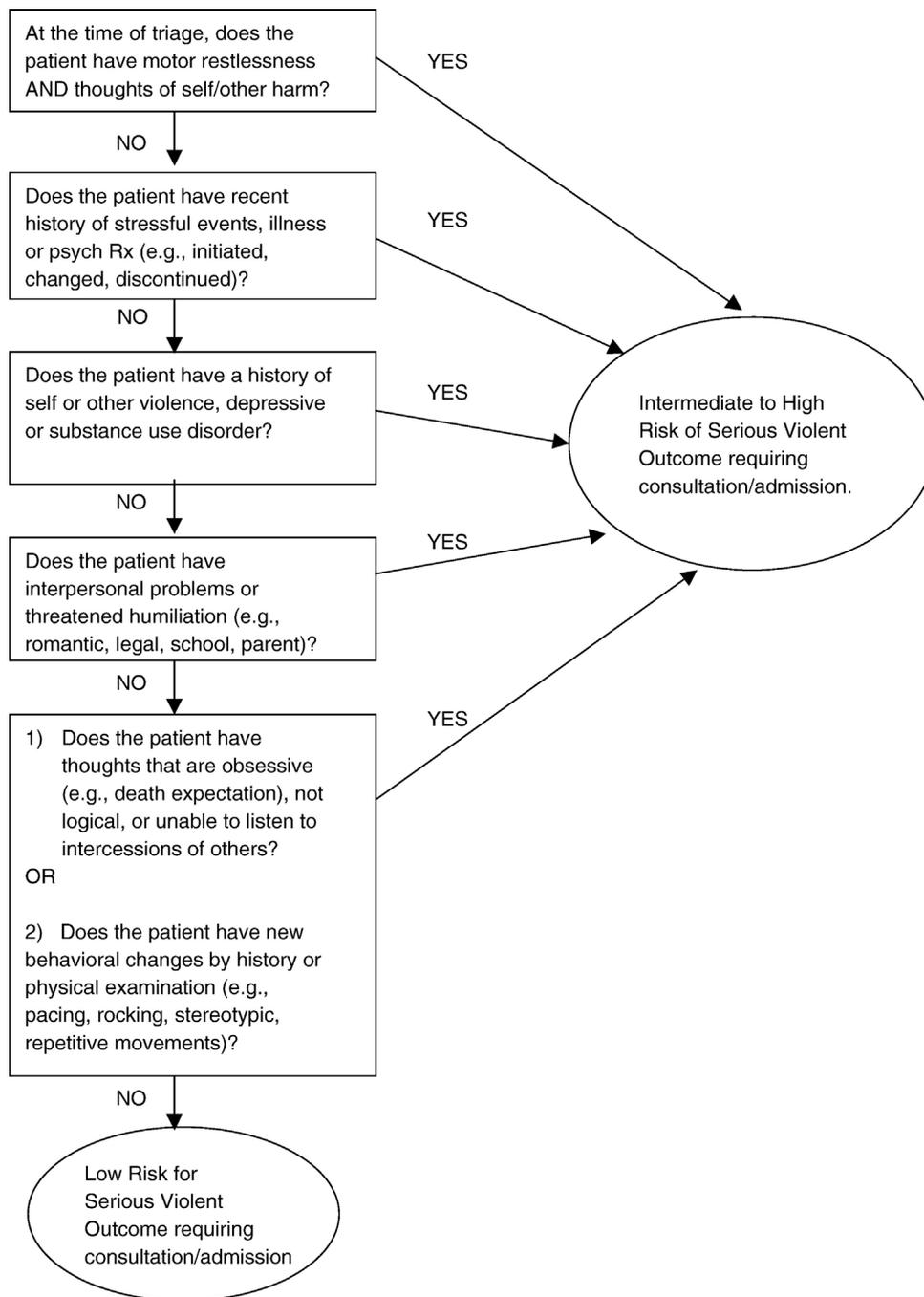


Fig. 3 Violence ideation and suicidality treatment algorithm.

**5.7. Violence ideation and suicidality treatment algorithm**

The research on the ACUTE lead to the development of the VISTA, (Fig. 3). The VISTA is a theoretical guideline that is a sensitive tool that can improve upon the diagnostic accuracy and reliability of unstructured physician or mental health professional judgment and eventual decision making. The sensitivity that indicates the ability of the VISTA to detect patients who are at risk for violence was found to be

80.3%. In addition to the sensitivity, it is important to determine the specificity, which was found to be 98.1%.

**6. Discussion**

The evidence to support this work comes from a series of studies and seeks to provide a strategy leading to reduction of problem violent behavior in adolescents. We used strict inclusion and exclusion criteria and allowed the enrollment of

patients with coexisting conditions and those who were taking medications. The study was conducted in a variety of clinical settings in which adolescents presenting with suicidality and homicidality are evaluated. These features of the study were intended to make the results widely applicable.

A statistical pattern emerged, indicating that near-future adolescent suicidality and homicidality were related with minimal differences in risk factor relationships. Specifically, when cutoff scores were stringently set, there were significant differences on the ACUTE for those adolescents with and without late precipitating factors. Late onset features included cognitive rigidity and behavioral autonomy. These findings suggest that adolescent suicidality and homicidality are not simply consequences of current psychiatric disorder, but rather represent accumulation of risk factors from multiple domains.

Nonideation suicidality and homicidality were highest in 2 subsamples, that is, acute AD and SSRI-induced akathisia. The overlap of behavioral and cognitive features was substantial. These 2 conditions with attendant alarmingly high attempt rates warrant increased suspicion for underlying lethality.

Recent Food and Drug Administration deliberations on antidepressant risks in pediatric patients have incited debate [51-54]. Systematic empirical testing and validation of safety methodology are needed. This study attempted to test the factor relationships linking hostility and suicidality with SSRI's. However, in that the drug-induced akathisia subset was small, we could not test whether drugs most closely associated with one were also most closely associated with the other. In the 3 cases where SSRI monotherapy was prescribed before admission for some reason other than depression (ie, school phobia, obsessive-compulsive disorder, and posttraumatic stress disorder), it was easier to presume that medication, rather than the sudden worsening of depression, actually "caused" suicidality or homicidality. These patients did not have histories of bipolar illness or antidepressant-induced manic conversion that carries a high risk of violent behavior. Therefore, the only other clinical entity associated with violence in these cases was the drug-induced akathisia.

Quantifiable alterations in executive functions and involuntary motor behavior were demonstrated in nonideation acute AD and antidepressant-induced akathisia. Overall, for the AD sample, the threat and the precipitating factor (ie, early and late) clusters were significantly correlated with neuropsychological assessments. However, very different results appeared with the drug-induced sample. Notwithstanding the small sample size, there was a robust correlation between the precipitating clinical factors and dysdiadochokinesia. Although this finding implicates selective feed forward and feedback mechanisms of frontal-subcortical-cerebellar neural circuits [55,56], specific neurophysiologic mechanisms identified through neuropsychological assessments remain to be clarified. Nevertheless, these remarkably brief tests of cognitive flexibility, dysdiadochokinesia, and

involuntary motor behavior may be reliable methods of measuring and confirming important early warning signs when combined with the ACUTE or VISTA assessments.

## 7. Limitations

This study possesses several limitations. Obvious ethical and safety considerations, where death was a potential outcome, may have precluded additional data inclusion. These observations are predominantly correlational because research that could lead us much closer to causes of adolescent violent behavior cannot be done in humans. It is important to note the small number of subjects in the drug-induced akathisia group, which limits the extent to which firm conclusions can be drawn. As a result, the authors have interpreted these results with caution and highlight the need for further research with a larger sample size.

In addition, there is the possibility that sex could have been a confounder in the acute adjustment vs drug-induced groups. Although this may have been a result of more females in the sample, the literature indicates sex differences in the clinical features of stressful events and depressiogenic risk factors [57-60]. Although these differences are not completely understood, females manifest symptoms by an earlier age of onset with greater symptom reporting [57,58]. An alternative explanation involves the methodology of face-to-face interviews that may have exposed male adolescents to greater negative repercussions for exhibiting depressed behavior. There are other limitations to this study. There was no intent to collect a "matched" nonclinical sample; however, the demographics of the clinical control sample appear to be very similar to the threat samples. Despite the fact that clinical controls may have been biased, in this study, they offered advantages in terms of sample size, ease of investigation, and fewer ethical dilemmas. Some examiners may have had clues of a subject's condition at the time of the evaluation, and dichotomous "yes" or "no" scoring on the ACUTE and VISTA assessments may have contributed to reduced statistical power. In addition, although discussed thinly in the literature, our definitions of nonideation suicidality and homicidality have not been formally established or validated. This study reinforced the need for clarity in areas of sample representation, taxonomy, symptom criteria, and scoring. Finally, the current model, based on our findings, is new. Some of the components are not. Additional prospective investigations are required in which adolescents are assessed on the basic findings of this study.

## 8. Conclusion

This study illustrates that the ACUTE assessment is a psychometrically sound instrument that can be used in the ED to identify violence risk factors in suicidal and homicidal adolescents. Assessments can be extensive or

accomplished with relatively few questions. We suggest that given ED clinician's limited time, the use of remarkably brief easy-to-perform tests of motor and cognitive executive functions and akathisia, in addition to the VISTA algorithm, has the potential to discriminate within minutes between early and late onset violent states.

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