



Suicidal Mental Imagery in Psychiatrically Hospitalized Adolescents

Hannah R. Lawrence¹ · Jaqueline Nesi^{2,3} · Taylor A. Burke^{3,3} · Richard T. Liu⁴ · Anthony Spirito² · Jeffrey Hunt^{2,3} · Jennifer C. Wolff^{2,3}

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Abstract

Suicide is the second leading cause of death in adolescents and suicide rates in this population have increased in recent years. A critical step in preventing suicide is improving the accuracy of suicide risk assessment. Measurement of suicidal cognitions typically emphasizes assessment of verbal thoughts about suicide. Recent research suggests, however, that suicidal mental imagery, or mentally imagining suicide-related content, may be even more strongly associated with suicidal behavior. No research has evaluated suicidal mental imagery in adolescents, however. The present study evaluated suicidal mental imagery and suicidal verbal thoughts in a sample of adolescents ($N = 159$) admitted to an adolescent psychiatric inpatient unit. Of those adolescents who reported suicidal cognitions, 63.73% reported suicidal mental imagery. Adolescents who reported suicidal mental imagery had 2.40 greater odds of having made a suicide attempt, after accounting for history of suicidal verbal thoughts and relevant covariates. Findings suggest that suicidal mental imagery should be directly assessed when evaluating suicide risk, and that treatments may be optimized by targeting both suicidal verbal thoughts and suicidal mental imagery.

Keywords Suicidal behavior · Suicidal mental imagery · Suicidal verbal thoughts · Adolescents

Suicidal Mental Imagery in Psychiatrically Hospitalized Adolescents

Suicide is the second leading cause of death among adolescents and rates have risen over 35% since 1999 (Hedegaard et al., 2020). Further, since 2008, hospitalizations for suicide risk have more than doubled in this age group (Plemmons et al., 2018). In the context of these rising suicide rates and related hospitalizations, clinicians are increasingly completing suicide risk assessments. Such assessments are critical to inform hospitalization-related decision making, including patients' needs for inpatient admission and readiness for discharge. Along with inquiring about suicidal

behavior history, suicide risk assessments typically focus on the presence and severity of suicidal cognitions. Despite the fact that suicidal cognitions can take the form of verbal thoughts or mental images, the most widely accepted and evidence-based approaches for these assessments (e.g., the Columbia-Suicide Severity Rating Scale; Posner et al., 2011) predominantly focus on the evaluation of suicidal verbal thoughts (e.g., the verbal thought, *I want to hang myself*) when assessing for suicidal cognitions. Clinically, however, many individuals report that their suicidal cognitions take the form of mental imagery (e.g., mentally imagining hanging oneself). Furthermore, the limited research on suicidal mental imagery suggests it may be associated with increased risk for suicidal behavior (Crane et al., 2012; Schultebrucks et al., 2019), suggesting current suicide risk assessment measures may be improved by also assessing for suicidal mental imagery.

To date, no research has examined suicidal mental imagery in adolescents, let alone psychiatrically hospitalized adolescents. The few studies that have empirically evaluated the prevalence of suicidal mental imagery in adult community samples find suicidal mental imagery to be strikingly common. Studies demonstrate that 78–85% of adults with a history of suicidal cognitions have experienced suicidal

✉ Hannah R. Lawrence
hannah.r.lawrence@maine.edu

¹ Department of Psychiatry, McLean Hospital/Harvard Medical School, Boston, USA

² Department of Psychiatry & Human Behavior, Division of Clinical Psychology, Brown University, Providence, USA

³ Bradley/Hasbro Research Center, Rhode Island Hospital, Providence, USA

⁴ Department of Psychiatry, Massachusetts General Hospital, Boston, USA

mental imagery (Crane et al., 2012; Holaday & Brausch, 2015). In studies of previously depressed, bipolar, and/or suicidal adults (Crane et al., 2012; Hales et al., 2011; Holmes et al., 2007a, b) 100% of participants reported having experienced suicidal mental imagery at the point they felt most suicidal. When adults with a history of depression, suicidality and/or borderline personality disorder (Holmes et al., 2007a, b; Schultebrucks et al., 2019) were presented with a list of topics related to suicide (e.g., a time you tried to harm yourself, what might happen to you if you died) and asked whether they had experienced any mental imagery or verbal thoughts about each topic, adults reported as much, if not more, suicidal mental imagery than suicidal verbal thoughts for each topic.

An additional study (Ng et al., 2016) found that even when not specifically asked about suicidal mental imagery, suicidal individuals spontaneously report such imagery. Ng and colleagues (2016) prompted adults with current suicidal cognitions to describe any future-oriented mental imagery they had experienced over the prior week and mental images were then coded as ‘suicidal’ or not. Results demonstrated that 36.6% of suicidal adults described mental images related to suicide. Taken together, these findings suggest that suicidal mental imagery is extremely common among adults at risk for suicide. However, no study to date has examined the prevalence of suicidal mental imagery in adolescents. It is especially critical to examine suicidal mental imagery among adolescents given that rates of suicide increase dramatically (Centers for Disease Control and Prevention, 2019) and mental imagery abilities peak (Heyes et al., 2013) during this developmental period. In particular, research on suicidal mental imagery among adolescents experiencing psychiatric hospitalization is needed given this population’s high risk of future suicide attempts (e.g., Yen et al., 2013).

Compounding the need to assess for suicidal mental imagery given its high prevalence, emerging evidence suggests that experiencing suicidal mental imagery may confer specific risk for suicidal behavior. More vivid, realistic, and distressing suicidal mental imagery has been found to be associated with increased severity of suicidal ideation (Crane et al., 2012; Holaday & Brausch, 2015; Holmes et al., 2007a, b; Ng et al., 2016), which may, in turn, be associated with increased risk for suicidal behavior (Franklin et al., 2017; Ribeiro et al., 2016). In addition, compared to adults who have not attempted suicide, adults who have attempted suicide reported greater suicidal mental imagery (Crane et al., 2012). The severity of distress experienced due to suicidal mental imagery also has been shown to be associated with a higher number of suicide attempts in adults (Schultebrucks et al., 2019). In another study of young adults (Lawrence, Nesi, & Schwartz-Mette, under review), the presence of suicidal mental imagery was associated with nearly three times greater odds of having made a suicide attempt, even after adjusting for severity of suicidal

verbal thoughts. Importantly, however, no research has examined the prevalence of suicidal mental imagery in adolescents nor its association with risk for suicidal behavior in this age group.

Present Study

The primary aims of this study were twofold. First, to characterize the prevalence of suicidal mental imagery in a sample of psychiatrically hospitalized adolescents. Second, to evaluate associations among suicidal mental imagery, suicidal verbal thoughts, and lifetime history of suicide attempt. We hypothesized that (1) the majority of adolescents would report suicidal mental imagery, (2) a subset of adolescents would report both suicidal verbal thoughts and suicidal mental imagery, and (3) experiencing suicidal mental imagery would be associated with greater odds of having made a suicide attempt over and above suicidal verbal thoughts.

Method

Participants

Participants were 159 adolescents (age range: 11.40–18.30 years; *Mean* = 14.98 years, *SD* = 1.72) hospitalized in an adolescent inpatient unit in a psychiatric hospital in the Northeastern, United States. See Table 1 for demographic characteristics of the sample. Upon admission to the inpatient unit participants met diagnostic criteria for the following disorders based on

Table 1 Sample Demographics

	<i>n</i>	%
Gender		
Female	77	48.43
Male	61	38.36
Other gender	19	11.95
Race		
White	91	57.23
Black or African American	19	11.95
Biracial or multiracial	30	18.88
Other race	19	11.95
Ethnicity		
Hispanic	46	28.93
Non-Hispanic	113	71.07

For gender, one participant selected “do not identify as any of these options”, and one selected “prefer not to answer.” Other race = Asian (*n* = 5), Native Hawaiian or other Pacific Islander (*n* = 2), American Indian or Alaska Native (*n* = 11), or other race (*n* = 24); Other gender = transgender (*n* = 11), gender queer, gender nonconforming, or gender fluid (*n* = 8). Total *N* = 159

self-report responses on the Mini-International Neuropsychiatric Interview (Sheehan et al., 2010): major depressive disorder (92.93%), bipolar disorder (3.15%), obsessive compulsive disorder (3.17%), social anxiety disorder (12.70%), generalized anxiety disorder (39.37%), post-traumatic stress disorder (23.39%), attention deficit/hyperactivity disorder (31.50%), conduct disorder (30.40%), oppositional defiant disorder (44.88%), an eating disorder (10.24%), a substance use disorder (15.75%). Approximately 80% were admitted due to suicide risk and 25.79% of the sample reported a suicide attempt in the week prior to admission.

Procedure

The questionnaires completed in this study were part of a larger battery of admission measures administered as part of the intake process to the unit. This study was approved by the Lifespan Institutional Review Board and classified as a retrospective chart review; thus, the requirement for informed consent for use of this information in research was waived. Self-report questionnaires included:

Demographics

Adolescents reported on their age, gender identity, and racial and ethnic identities.

Suicidal Mental Imagery and Verbal Thoughts

Adolescents were provided definitions of verbal thoughts (i.e., “Verbal thoughts run through our mind like words or sentences”) and mental images (i.e., “Mental images run through our mind like pictures or movies. Mental images can include any of the five senses. For example, an image in your mind could have pictures, sounds, smells, or other sensations.”). They also were provided examples of a suicidal verbal thought (i.e., “I wish I were dead”) and a suicidal mental image (i.e., an image of a gravestone). Adolescents then indicated whether they had ever experienced suicidal verbal thoughts (yes, no) or suicidal mental images (yes, no).

Suicidal Behavior

Adolescents completed items from the self-report adaptation of the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock et al., 2007). For the purposes of this set of analyses, participants indicated whether they had ever made a suicide attempt by answering the question, “Have you ever made an actual suicide attempt, where you were trying to kill yourself, even just a little?” to which they indicated yes or no.

Non-Suicidal Self-Injury (NSSI)

Adolescents completed an additional self-report item adapted from the SITBI (Nock et al., 2007) to assess history of NSSI. Participants indicated whether they had ever engaged in NSSI in their lifetime by responding to the question: “Have you ever in your life done anything to purposefully hurt yourself without trying to die (for example, cutting or burning your skin)?” to which they indicated yes or no.

Results

Of the total sample ($N=159$), 64.15% ($n=102$) reported a lifetime history of some form of suicidal cognition (i.e. either a suicidal verbal thought or a suicidal mental image). A total of 89 participants (55.97% of the entire sample, 87.25% of those with any suicidal cognitions) reported a lifetime history of suicidal verbal thoughts. A total of 65 participants (40.88% of the entire sample; 63.73% of those with any suicidal cognitions) reported a lifetime history of suicidal mental imagery. A total of 52 participants reported experiencing both suicidal verbal thoughts and mental imagery (32.70% of the entire sample, 50.98% of those with suicidal cognitions). Thirty-seven participants (23.27% of the entire sample, 36.27% of those with suicidal cognitions) reported that their suicidal cognitions *only* took the form of verbal thoughts, and 13 (8.18% of the entire sample, 12.75% of those with suicidal cognitions) reported mental imagery only.

Age was not significantly associated with the likelihood of having experienced suicidal verbal thoughts (OR = 1.12, 95% CI [0.93, 1.35], $p=0.22$) or suicidal mental imagery (OR = 0.99, 95% CI [0.83, 1.19], $p=0.94$). Females did not differ from males (suicidal verbal thoughts: OR = 0.54, 95% CI [0.27, 1.06], $p=0.07$; suicidal mental imagery: OR = 0.85, 95% CI [0.43, 1.69], $p=0.65$) or individuals of other gender identities (suicidal verbal thoughts: OR = 2.53, 95% CI [0.77, 8.33], $p=0.13$; suicidal mental imagery: OR = 1.27, 95% CI [0.46, 3.47], $p=0.65$) in the likelihood of having experienced suicidal verbal thoughts or suicidal mental imagery. Relative to participants who identified as White, participants who identified as Black or African American (OR = 0.36, 95% CI [0.13, 0.98], $p=0.05^1$), biracial or multiracial (OR = 0.43, 95% CI [0.19, 1.00²], $p=0.05^1$), or other racial identities (OR = 0.23, 95% CI [0.08, 0.66], $p=0.006$) were less likely to report suicidal verbal thoughts. In terms of racial differences in

¹ The p value was rounded up but did not exceed .05.

² The upper end of the CI was rounded up but did not exceed 1.00.

Table 2 Prevalence of Suicidal Verbal Thoughts and Suicidal Mental Imagery by Suicide Attempt History

	Total Sample (<i>N</i> = 159)		History of Suicide Attempt(s) (<i>n</i> = 93)	No History of Suicide Attempt(s) (<i>n</i> = 66)	Group Comparison
	<i>n</i>	%	<i>n</i> (%)	<i>n</i> (%)	$\chi^2(1, N = 159)$
History of suicidal verbal thoughts	89	55.97	65 (69.89)	24 (36.36)	17.61***
History of suicidal mental imagery	65	40.88	49 (52.69)	16 (24.24)	12.93***

****p* < .001

suicidal mental imagery, White participants did not significantly differ from Black or African American (OR = 0.37, 95% CI [0.12, 1.10], *p* = 0.07) or multiracial (OR = 0.59, 95% CI [0.25, 1.38], *p* = 0.23) participants but reported less suicidal mental imagery than individuals of other remaining racial identities (OR = 0.27, 95% CI [0.08, 0.88], *p* = 0.03). Hispanic and non-Hispanic participants did not differ in this likelihood of experiencing suicidal verbal thoughts (OR = 0.75, 95% CI [0.38, 1.52], *p* = 0.43) or suicidal mental imagery (OR = 0.86, 95% CI [0.43, 1.72], *p* = 0.67).

Chi-square analyses were conducted to compare the prevalence of suicidal verbal thoughts and suicidal mental imagery among adolescents with (*n* = 93) and without (*n* = 66) a lifetime history of one or more suicide attempts. Compared to participants with no history of suicide attempt(s), those with a history of suicide attempt(s) were significantly more likely to have experienced suicidal verbal thoughts [$\chi^2(1, N = 159) = 17.61, p < 0.001$] and suicidal mental imagery [$\chi^2(1, N = 159) = 12.93, p < 0.001$] (see Table 2). Among those participants with suicidal cognitions (*n* = 102), 13 (12.75%) reported a

history of only mental imagery, 37 (36.27%) reported a history of only verbal thoughts, and 52 (50.98%) reported a history of both verbal thoughts and mental imagery. Comparing participants with suicidal cognitions by history of no suicide attempts versus history of one or more suicide attempts, there was no difference in the likelihood of experiencing both suicidal verbal thoughts and suicidal mental imagery, *only* suicidal verbal thoughts, or *only* suicidal mental imagery [$\chi^2(2, N = 102) = 5.62, p = 0.06$]³ (see Table 3).

Hierarchical binary logistic regression was conducted to examine whether suicidal mental imagery was associated with a history of one or more suicide attempts after controlling for the presence of lifetime history of suicidal verbal thoughts. Age, gender, race, ethnicity, and NSSI history also were included as covariates. The overall model was significant, $\chi^2(10) = 30.02, p = 0.001$. A lifetime history of suicidal mental imagery was significantly related to having made a suicide attempt (OR = 2.40, 95% CI [1.08, 5.35], *p* = 0.03), even after accounting for suicidal verbal thoughts, age, gender, race, ethnicity, and NSSI history (see Table 4).

Table 3 Prevalence of Suicidal Cognition Type by Suicide Attempt History in the Subsample of Adolescents with any Suicidal Cognitions (*n* = 102)

	<i>n</i>	History of Suicide Attempt(s) (<i>n</i> = 72)	No History of Suicide Attempt(s) (<i>n</i> = 30)
		<i>n</i> (%)	<i>n</i> (%)
History of both suicidal verbal thoughts and suicidal mental imagery	52	42 (58.33)	10 (33.33)
History of only suicidal verbal thoughts	37	23 (31.94)	14 (46.67)
History of only suicidal mental imagery	13	7 (9.72)	6 (20.00)

³ Findings regarding participants who reported only suicidal verbal thoughts or only suicidal mental imagery should be interpreted with caution given the small sample sizes of these subgroups.

Table 4 Hierarchical Logistic Regression Analyses for Associations Between Suicidal Mental Imagery and History of Suicide Attempt

	Suicide Attempt	
	OR	95% CI
Step 1		
Age	1.19	0.97, 1.47
Female (reference)	1.00	
Male	0.59	0.28, 1.27
Other gender	1.07	0.35, 3.29
White (reference)	1.00	
Black or African American	0.47	0.16, 1.41
Biracial or multiracial	0.89	0.35, 2.25
Other race	1.44	0.45, 4.57
Hispanic	1.33	0.60, 2.59
NSSI history	2.44*	1.14, 5.22*
Step 2		
Age	1.16	0.93, 1.43
Female (reference)	1.00	
Male	0.59	0.27, 1.30
Other gender	0.91	0.29, 2.91
White (reference)	1.00	
Black or African American	0.58	0.19, 1.75
Biracial or multiracial	1.05	0.40, 2.77
Other race	1.86	0.56, 6.23
Hispanic	1.27	0.56, 2.88
NSSI history	1.61	0.70, 3.69
Suicidal verbal thoughts	3.16**	1.45, 6.88**
Step 3		
Age	1.17	0.94, 1.45
Female (reference)	1.00	
Male	0.54	0.24, 1.22
Other gender	0.96	0.30, 3.14
White (reference)	1.00	
Black or African American	0.63	0.20, 1.96
Biracial or multiracial	1.08	0.40, 2.90
Other race	2.13	0.62, 7.31
Hispanic	1.27	0.55, 2.93
NSSI history	1.34	0.57, 3.16
Suicidal verbal thoughts	2.54*	1.13, 5.72*
Suicidal mental imagery	2.40*	1.08, 5.35*

OR Odds Ratio; 95% CI 95% Confidence Interval

* $p < .05$; ** $p < .01$; *** $p < .001$

Discussion

The present study is the first to our knowledge to evaluate suicidal mental imagery in adolescents. Our findings suggest that the experience of suicidal mental imagery is highly prevalent in psychiatrically hospitalized youth. Our results additionally indicate that the experience of suicidal mental imagery is associated with higher risk of lifetime suicide

attempts, even after adjusting for history of suicidal verbal thoughts and other important clinical characteristics. The present findings extend the adult literature to high-risk adolescents and provide compelling evidence for the necessity of assessing suicidal mental imagery in standard suicide risk assessments.

Suicidal mental imagery was found to be a common phenomenon in psychiatrically hospitalized adolescents. Over 40% of all adolescents in this sample indicated that they have experienced suicidal mental imagery. Among those youth who endorsed suicidal cognitions of any type, 63.73% indicated experiencing suicidal mental imagery. Rates of suicidal mental imagery largely did not differ based on age, gender, race, or ethnicity. Although it is not surprising that a large proportion of this high-risk sample experienced suicidal cognitions, these high rates of suicidal mental imagery are striking given that mental imagery is not routinely assessed on measures of suicide risk or as a part of standard clinical suicide risk assessment. Although there are no existing prevalence estimates of suicidal mental imagery in other samples of adolescents, these findings are consistent with prior evidence of high rates of suicidal mental imagery in adult community samples (e.g., Crane et al., 2012; Hales et al., 2011; Holmes et al., 2007a, b). This study therefore adds to this body of research, providing the first estimate of suicidal mental imagery among psychiatrically hospitalized adolescents.

It also is worth noting that 8.18% of the sample reported experiencing only suicidal mental imagery and no suicidal verbal thoughts. These adolescents may be overlooked by current approaches to suicide risk assessment. In fact, prior research has found that many adults who deny suicidal verbal thoughts on commonly used suicide assessment measures go on to endorse having experienced suicidal mental imagery when explicitly asked (Crane et al., 2012; Holaday & Brausch, 2015; Gutierrez et al., 2001). Very little is known regarding this subset of individuals. One possibility is that these individuals experience hyperphantasia, or an abundance of mental imagery (Zeman et al., 2020). If they tend to experience mental imagery-based cognitions in general, it would follow that their suicidal cognitions may also take the form of only mental imagery. Hyperphantasia is uncommon, however, with only 2.5% of the population falling into this category (Zeman et al., 2020). Another possibility is that suicidal mental imagery is more easily recalled than suicidal verbal thoughts. Mental imagery is found to be more vivid and realistic than verbal thought (Mathews et al., 2013); thus, individuals may be more likely to remember suicidal mental imagery than suicidal verbal thoughts when asked to retrospectively report on their experience of suicidal cognitions. Additional research is needed examining individuals' tendencies to experience mental imagery in daily

life as well as the ease of recall of their suicidal mental imagery to determine whether either of these hypotheses are supported.

Psychiatrically hospitalized adolescents who reported suicidal mental imagery had 2.40 times greater odds of having attempted suicide than those who have not experienced suicidal mental imagery, even after accounting for the experience of more common, albeit still high-risk, suicidal verbal thoughts. Prior empirical evidence contextualizes these findings, highlighting that suicidal mental imagery may be experienced as more preoccupying than suicidal verbal thoughts (Hales et al., 2011). Further, it is possible that suicidal mental images are also more vivid or real and thus more upsetting than suicidal verbal thoughts (Hales et al., 2011; Holaday & Brausch, 2015). Together these findings suggest that suicidal mental imagery may intensify distress more so than suicidal verbal thoughts, potentially increasing risk for suicidal behavior. In fact, prior work has found that between 45% (Hales et al., 2011) and 81.6% (Schultebraucks et al., 2019) of adults who experience suicidal mental imagery report that this mental imagery made them want to act on suicidal urges.

As one of the first studies to examine the experience of suicidal mental imagery among adolescents, this study significantly adds to the suicide literature. However, a number of limitations highlight important directions for future research. First, we employed a brief cross-sectional assessment of suicidal mental imagery in the present study, assessing only the presence or absence of this form of suicidal cognition. Future research should examine prospective associations between suicidal mental imagery and later suicide attempts, as well as specific characteristics of suicidal mental imagery that may be especially predictive, such as its frequency, intensity, and vividness. Second, this study focused only on psychiatrically hospitalized youth who are at high risk for suicidal behaviors. Future research should examine the prevalence of suicidal mental imagery in nonclinical samples, as well as its association with suicidal behavior risk in nonclinical populations. Third, research employing larger samples is needed to increase confidence in results and also to allow for more nuanced evaluation of potential differences in suicidal mental imagery based on race, ethnicity, or diagnostic category, and to compare smaller subgroups of participants, such as those who experience only suicidal mental imagery or only suicidal verbal thoughts.

It also is worth noting that participants completed measures during their intake procedures at an inpatient facility. Thus, it is possible that adolescents may have underreported suicidal cognitions and behaviors (e.g., due to concerns about possible restrictions on their behavior while hospitalized or a delay in hospital discharge). Given the ultimate goal of preventing suicide-related psychiatric

hospitalization, future research should assess for suicidal mental imagery in at-risk populations before hospitalization, both to reduce the risk of potential underreporting and to determine whether suicidal mental imagery is related to the probability of hospitalization.

The high prevalence of suicidal mental imagery among adolescents in this sample suggests that it is important for clinicians and researchers alike to be aware of this phenomenon. The association between suicidal mental imagery and suicidal behavior underscores the significant clinical implications of the current findings for assessment and treatment of suicidal youth. In particular, our findings suggest that assessment of suicide risk should include questions about suicidal mental imagery. For example, in addition to asking, “*Have you had thoughts about death, dying, or suicide?*” clinicians may gain valuable information by also asking, “*Have you imagined or experienced mental images about death, dying, or suicide?*” In addition, future research is needed to develop and test interventions effective in targeting such suicidal mental imagery, for instance, by evaluating the accuracy of such imagery or by enhancing positive imagery about the future.

Author contributions The lead author designed the study. HL, TS, RL, JH, and JW contributed to material preparation and data collection. Data analysis were performed by HL and JN. All authors contributed to writing the manuscript and commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval The Lifespan Hospitals Institutional Review Board (IRB) approved this research.

Informed Consent This study was classified as a retrospective chart review; thus, the requirement for informed consent for use of this information in research was waived.

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