

Supplement 1

LCA Measures (including psychometric information)

History of Mental Health Service Utilization. We asked adolescents and parents questions to assess: (1) youth's history of psychiatric hospitalization; (2) medication treatment for mental health concern; (3) outpatient psychotherapy/counseling/psychosocial intervention. Response options were Yes/No for lifetime and past month utilization. These items were adapted from the Healthy Minds Study¹ and the National Epidemiologic Survey on Alcohol and Related Conditions,² which has documented strong reliability and validity.³ The primary reason for the ED visit was coded as psychiatric or non-psychiatric.

Suicidal Ideation, History of Multiple Suicide Attempts. We asked adolescents to complete the Suicide Severity Scale of the Columbia-Suicide Severity Rating Scale (C-SSRS),⁴ which includes five items related to suicidal thoughts and yields scores ranging from 0 to 5, and has documented strong convergent validity and internal consistency.⁵ Adolescents completed an adapted version of the C-SSRS Behavior scale, which includes yes/no questions about a range of suicidal behaviors. We asked the suicide attempt question in two ways (with and without the exact phrase "suicide attempt," but with the same definition and probes) and coded a positive response to either as a suicide attempt.

Depression, Alcohol Use, Drug Use. We used the PHQ-9, a nine-item scale that asks the respondent to indicate the frequency of depressive symptoms over the past two weeks.⁶ The PHQ-9 has shown strong internal consistency for adolescents males and females,⁷ in addition to excellent construct validity^{7,8} and criterion validity in samples of adolescents.^{8,9} We used the Alcohol Use Disorders Identification Test- Consumption (AUDIT-C), which assesses at-risk drinking and alcohol consumption in the past year.⁶ The AUDIT has been validated for use with adolescents in

the ED.¹⁰ It has demonstrated strong internal consistency ($\alpha = .80$) and satisfactory validity for the identification of adolescents with alcohol use disorders.¹¹ We also used categories and response choices from the NIDA-Modified ASSIST version¹² of the Drug Use Scale to assess frequency of use during the past 3 months (never, once or twice, monthly, weekly, daily or almost daily) for multiple drug categories, including cannabis. In the LCA, we included a dichotomous variable to indicate whether or not the youth scored 3 or higher on the AUDIT-C and whether or not the youth had used cannabis at least monthly during the past 3 months.

Aggression. We used a 1-item screen from the Impulsive Premeditated Aggression Scale (IPAS):¹³ “Over the past three months, have you had times when you became angry and enraged with others in a way that was out-of-control or inappropriate?” Follow-up questions assess the number of times and the behaviors (verbally attacked someone, thrown or destroyed objects, physically attacked someone). The score is the number of these items endorsed.

Childhood Sexual and Physical Abuse. Abuse was assessed with a brief two-item screener derived from the Childhood Trauma Questionnaire (CTQ-SF).^{14,15} The screener has a Yes/No response format: “People in my family have hit me so hard that it left me with bruises or marks.” and “Someone has tried to touch me in a sexual way or tried to make me touch them.”¹⁵ This screener has been used previously with adolescents¹⁶ and has excellent sensitivity and specificity for identifying childhood abuse (determined by responses to a semi-structured interview focused on child abuse history) in a sample of women.¹⁵ Scores on this screener have been associated with NSSI in adolescents.¹⁶

Additional Measures of Suicide Risk Factors (Examined in LCA, not included in final model)

The variables described below were considered for addition to the LCA model; however, classes remained unchanged when they were added. In order to maintain a more parsimonious model, they were not included in the final LCA model.

Hopelessness. This was assessed with one item from the Mood and Feelings Questionnaire, which assesses hopelessness during the past two weeks and is scored on a 3-point scale.¹⁷ The item is as follows: “I thought there was nothing good for me in the future.” This variable was used as a three-level ordinal categorical variable for analysis.

Anxiety, Agitation, Impulsivity. Anxiety was measured with the 5-item Screen for Child Anxiety Related Emotional Disorders (SCARED), which has shown psychometric properties to those of the longer version of SCARED.¹⁸ Agitation over the past week was assessed with the Brief Agitation Measure (BAM),¹⁹ which is a three item self-report instrument with a 7-point Likert scale. Sample items are: “I feel so stirred up inside I want to scream”, and “I feel a lot of emotional turmoil in my gut”. The BAM has demonstrated very good to excellent internal consistency, convergent validity, and discriminate validity.¹⁹ Impulsivity was assessed with the 4-item Urgency subscale of the UPPS Impulsivity Behavior Scale,²⁰ which assesses the propensity to experience strong impulses, often associated with negative affect. Sample items include “It is hard for me to not act on my feelings” and “Sometimes I do impulsive things that I wish I hadn’t.” This subscale has demonstrated high internal consistency ($\alpha = .91$) and incremental validity for predicting suicide attempts and NSSI.²¹

Non-Suicidal Self-Injury (NSSI). We assessed NSSI with the Youth Risk Behavior Survey NSSI question: “During the past 12 months, how many times did you do something to purposely hurt yourself without wanting to die, such as cutting or burning yourself on purpose?”²² NSSI was coded as present (any non-zero response) or absent for the LCA analysis.

Social/Interpersonal Risk Factors. We used the two peer victimization items from the 4-item Peer Victimization and Perpetration Questionnaire to assess peer victimization in and away from school. Responses are scored on a 5-point Likert scale, ranging from “I haven’t been bullied in school this term” to “several times a week.” Youth reports of victimization on these items have been associated with suicide risk factors, including suicidal ideation and suicide attempts.²³⁻²⁵ To assess friend connectedness, we used the sum of scores on two items from the 6-item measure of adolescent connectedness.²⁶ These items are as follows: “I have friends I’m really close to and trust completely.” “Spending time with my friends is a big part of my life.” We assessed parent and family connectedness with two items from the 13-item Parent-Family Connectedness scale.²⁷ These items were: “How much do people in your family understand you?”, “How much does your family pay attention to you?” For school connectedness, we used two items from the 6-item School Connectedness Scale.²⁷ These items were: “You feel close to people at your school”, “You feel like you are part of your school.”

Adaptive Functioning. We used an adapted version of the PHQ-9 item: “How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?”⁶ This item has shown excellent concurrent validity in studies with adult patients⁶ and college students.^{28,29} Because we were interested in functional impairment broadly, rather than only in association with depressive symptoms, we modified this to: “Over the last two weeks, how hard has it been for you to do what you need to do and get along with others?”

Table S1. Fit Statistics for Models with Three, Four, and Five Classes

# Classes	Parameters	Smallest Class	BIC	AIC	Entropy
3	29	19.5%	27183	27027	0.99
4	38	10.4%	27024	26820	0.95
5	47	8.9%	26666	26413	0.97

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Table S2. Demographics in Relation to Five Latent Classes

	Latent Class Assignment ^a					P-value
	S-STB+AGG (9%) (N = 142)	S-STB (21%) (N = 342)	STB (15%) (N = 239)	HX-STB+AGG (10%) (N = 164)	HX-STB (45%) (N = 722)	
Age at enrollment (years): Mean (SD)	14.9 (1.54)	15.1 (1.48)	15.1 (1.47)	15.3 (1.53)	15.3 (1.61)	0.074 ^b
Gender						0.436 ^c
Male	32/395 (8%)	78/395 (20%)	66/395 (17%)	47/395 (12%)	172/395 (44%)	
Female	110/1214 (9%)	264/1214 (22%)	173/1214 (14%)	117/1214 (10%)	550/1214 (45%)	
Race						<.001 ^c
White	84/882 (10%)	219/882 (25%)	134/882 (15%)	72/882 (8%)	373/882 (42%)	
Black or African American	29/356 (8%)	46/356 (13%)	51/356 (14%)	55/356 (15%)	175/356 (49%)	
Other/Unknown	17/246 (7%)	55/246 (22%)	34/246 (14%)	22/246 (9%)	118/246 (48%)	
Ethnicity						0.073 ^{c,d}
Hispanic or Latino	20/340 (6%)	69/340 (20%)	46/340 (14%)	28/340 (8%)	177/340 (52%)	
Not Hispanic or Latino	97/1061 (9%)	229/1061 (22%)	161/1061 (15%)	114/1061 (11%)	460/1061 (43%)	
Unknown	14/99 (14%)	21/99 (21%)	15/99 (15%)	7/99 (7%)	42/99 (42%)	
Education - mother/stepmother						0.211 ^c
High school graduate or less	40/488 (8%)	93/488 (19%)	70/488 (14%)	49/488 (10%)	236/488 (48%)	
Some college/technical	43/437 (10%)	82/437 (19%)	70/437 (16%)	51/437 (12%)	191/437 (44%)	
College graduate/professional	48/571 (8%)	144/571 (25%)	85/571 (15%)	51/571 (9%)	243/571 (43%)	

ADOLESCENT SUICIDE RISK PROFILES

Don't know/Not applicable	5/39 (13%)	8/39 (21%)	3/39 (8%)	2/39 (5%)	21/39 (54%)	
Education - father/stepfather						0.011 ^c
High school graduate or less	58/647 (9%)	113/647 (17%)	102/647 (16%)	66/647 (10%)	308/647 (48%)	
Some college/technical	33/292 (11%)	59/292 (20%)	41/292 (14%)	33/292 (11%)	126/292 (43%)	
College graduate/professional	33/417 (8%)	120/417 (29%)	60/417 (14%)	36/417 (9%)	168/417 (40%)	
Don't know/Not applicable	11/172 (6%)	35/172 (20%)	22/172 (13%)	17/172 (10%)	87/172 (51%)	
Family receives public assistance						0.079 ^c
No	74/826 (9%)	198/826 (24%)	125/826 (15%)	74/826 (9%)	355/826 (43%)	
Yes	62/697 (9%)	129/697 (19%)	100/697 (14%)	75/697 (11%)	331/697 (47%)	

Note: S-STB+AGG= Severe Suicidal Thoughts/Behavior + Aggression; S-STB= Severe Suicidal Thoughts/Behavior; STB= Suicidal Thoughts/Behavior; HX-STB+AGG= History of Suicidal Thoughts/Behavior + Aggression; HX-STB= History of Suicidal Thoughts/Behavior.
^a n's for calculation of percentages vary from 130-142 for S-STB+AGG, 319-342 for S-STB, 219-239 for STB, 149-164 for HX-STB+AGG, 666 to 722 for HX-STB.

^b Kruskal-Wallis test

^c Chi-squared test

^d P-value = .043 if "Unknown" category is not included in analysis.

ADOLESCENT SUICIDE RISK PROFILES

Table S3. Past Month Mental Health Service Utilization in Relation to Demographics and Latent Classes (Adjusted Odds Ratios)

	Psychiatric Hospitalization		Psychiatric Medication		Outpatient Therapy	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Age in years	0.93 (0.79, 1.09)	0.34	1.00 (0.93, 1.09)	0.93	1.01 (0.94, 1.09)	0.75
Sex		0.03		0.50		0.37
Male	(reference)		(reference)		(reference)	
Female	2.08 (1.09, 3.97)		1.10 (0.84, 1.45)		1.13 (0.87, 1.47)	
Race		0.18		<.001		<.001
White	(reference)		(reference)		(reference)	
Black	1.22 (0.66, 2.26)		0.30 (0.22, 0.42)		0.46 (0.34, 0.62)	
Other/Unknown	1.85 (0.96, 3.55)		0.71 (0.49, 1.01)		1.00 (0.70, 1.42)	
Ethnicity		0.19		<.001		0.01
Not Hispanic or Latino	(reference)		(reference)		(reference)	
Hispanic or Latino	0.53 (0.24, 1.17)		0.48 (0.34, 0.68)		0.60 (0.43, 0.84)	
Unknown	0.57 (0.19, 1.72)		0.73 (0.42, 1.27)		0.81 (0.48, 1.37)	
Latent Classes		<.001		<.001		<.001
HX-STB	(reference)		(reference)		(reference)	
HX-STB+AGG	4.41 (1.51, 12.87)		1.82 (1.20, 2.77)		1.87 (1.25, 2.79)	
STB	3.10 (1.07, 9.00)		1.68 (1.17, 2.41)		1.75 (1.24, 2.48)	
S-STB	13.00 (5.67, 29.79)		2.72 (1.99, 3.70)		2.71 (2.00, 3.69)	

ADOLESCENT SUICIDE RISK PROFILES

S-STB+AGG

18.61 (7.63, 45.38)

3.69 (2.39, 5.70)

3.41 (2.22, 5.23)

Note: S-STB+A= Severe Suicidal Thoughts/Behavior with Aggression; S-STB= Severe Suicidal Thoughts/Behavior; M-STB= Mild Suicidal Thoughts/Behavior; A= Aggression; HX-Low= History Suicidal Thoughts/Behavior with Current Low Levels of Risk Indicators.

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