

The Columbia Lighthouse Project/Center for Suicide Risk Assessment

# The Columbia Suicide Severity Rating Scale (C-SSRS)

Supporting Evidence

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## The Columbia Suicide Severity Rating Scale (C-SSRS): Psychometric Evidence

**Table 1:** Studies Supporting Specific Psychometric Properties

<b>Psychometric Property</b>		<b>Studies</b>
<b>Clinical Utility</b>	<b>Predictive and/or Incremental Validity</b>	Brent et al., 2009 <sup>^</sup> ; Posner et al., 2011 <sup>*^</sup> ; Mundt et al., 2013 <sup>*</sup> ; Arias et al. 2013 <sup>*</sup> ; Greist et al. 2014 <sup>*</sup> ; Gipson et al., 2015 <sup>^</sup> ; Horwitz et al., 2015 <sup>*</sup> ; Brown et al., 2015 <sup>*</sup> ; Arias et al., 2016 <sup>*</sup> ; Conway et al. 2016 <sup>^</sup>
	<b>Sensitivity to Change</b>	Posner et al., 2011 <sup>*</sup> ; Ionescu et al., 2016 <sup>*</sup>
	<b>Sensitivity and Specificity</b>	Posner et al., 2011 <sup>*</sup> ; Mundt et al., 2013 <sup>*</sup> ; Viguera et al 2015 <sup>*</sup>
	<b>Positive and Negative Predictive Value (PPV &amp; NPV)</b>	Mundt et al 2013 <sup>*</sup> ; Viguera et al 2015 <sup>*</sup>
<b>Reliability (internal consistency)</b>		Posner et al., 2011 <sup>*^</sup> ; Gunes et al. 2015 <sup>^</sup> ; Pai et al. 2015 <sup>*</sup>
<b>Reliability (inter-rater; multi-method agreement)</b>		Kerr et al., 2013 <sup>6</sup> ; Brent et al., 2009 <sup>^</sup> ; Hesdorffer et al., 2013 <sup>*</sup> ; Arias et al., 2013 <sup>*</sup> ; Brown et al. 2015 <sup>*</sup> ; Gunes et al. 2015 <sup>^</sup>
<b>Internal Structure (Factor Analysis)</b>		Al-Halabi et al ., 2016b <sup>*</sup>
<b>Convergent Validity &amp; Accuracy</b>		Posner et al., 2011 <sup>*</sup> ; Kerr et al., 2013 <sup>^</sup> ; Gunes et al. 2015 <sup>^</sup> ; Pai et al. 2015 <sup>*</sup> ; Youngstrom et al. 2015 <sup>*</sup> ; Brown et al ., 2015 <sup>*</sup>
<b>Divergent &amp; Discriminant Validity</b>		Posner et al., 2011 <sup>*</sup> ; Kerr et al., 2013 <sup>^</sup> ; Gunes et al. 2015
<b>Cross-Cultural Validation</b>		Danish (Conway et al. 2016 <sup>^</sup> ); Korean (Pai et al. 2015 <sup>*</sup> ); Turkish (Gunes et al. 2015 <sup>*</sup> ); Spanish (Al-Halabi et al ., 2016ab <sup>*</sup> )

\* studies include adult samples; ^ studies include pediatric samples

**Table 2: Psychometric Properties of C-SSRS Ideation and Behavior Predictors with Coefficients**

<b>Predictive Validity - Suicidal Ideation</b>			
	<b>Predictor</b>	<b>Criterion</b>	<b>Coefficients</b>
<b>Greist et al. 2014</b>	<i>None Reported</i>	Actual, interrupted or aborted attempts	<u>All patients</u> : 0.8% incidence rate, N=4975 <u>Psychiatric patients</u> : 1.1% incidence rate, N=3184
	<i>Wish to Be Dead</i>	Actual, interrupted or aborted attempts	OR= 6.21, 95% CI = 4.18 – 9.23, p <0.001 OR= 4.99, 95% CI = 3.29 – 7.56, p <0.001
	<i>Non-Specific Active Thoughts</i>	Actual, interrupted or aborted attempts	OR= 6.69, 95% CI = 4.16 – 10.76, p <0.001 OR= 5.53, 95% CI = 3.38-9.04, p <0.001
	<i>Active with any methods (not plan) w/o intent to act</i>	Actual, interrupted or aborted attempts	OR= 11.16, 95% CI = 7.43-16.76, p <0.001 OR= 8.36, 95% CI = 5.44-12.84, p <0.001
	<i>Active with Some Intent to Act, without specific plan</i>	Actual, interrupted or aborted attempts	OR= 19.27, 95% CI = 12.97 – 28.63, p <0.001 OR= 15.24, 95% CI = 10.07-23.09, p <0.001
	<i>Active with specific plan and intent</i>	Actual, interrupted or aborted attempts	OR= 25.53, 95% CI = 16.94 – 38.47, p <0.001 OR= 18.70, 95% CI = 12.16 – 28.76, p <0.001
<b>Posner et al. 2011</b>	<i>Baseline worst-point</i>	Attempts	OR=1.45, 95% CI=1.07-1.98, p=0.02
		Actual, interrupted and aborted attempts	OR=1.34, 95% CI=1.05-1.70, p=0.02
	<i>Lifetime severity</i>	Attempts	OR=1.43, 95% CI=0.99-2.05, p=0.05
	<i>Severity 4-5 (any intent to act)</i>	Attempts	OR=3.26, 95% CI=1.02-10.45, p=0.047
		Actual, interrupted and aborted attempts	OR= 3.26, 95% CI=1.07-7.12, p=0.036
<b>Horwitz et al. 2015</b>	<i>Ideation severity 1 to 5</i>	Attempt	OR= 1.51, 95% CI= 1.24-1.84, p<0.001

<b>Arias et al. 2016</b>	<i>Current ideation severity 4 or 5 (with intent to die)</i>	Actual attempt or suicide 6 weeks post-ED visit	OR=1.70 95% CI 1.18-2.44, p =.004
		Actual, interrupted, aborted attempts, suicide or preparatory behavior	OR =1.52 95%CI 1.23-1.86 p <. 001
<b>Predictive Validity - Suicidal Behavior</b>			
<b>Greist et al. 2014</b>	<b>Predictor</b>	<b>Criterion</b>	<b>Coefficients</b>
	<i>Attempt</i>	Actual, interrupted or aborted attempts	OR=4.57, 95% CI = 3.6-5.7, p<0.001
	<i>Interrupted Attempt</i>	Actual, interrupted or aborted attempts	OR=5.55, 95% CI = 4.4-7.0, p<0.001
	<i>Aborted Attempt</i>	Actual, interrupted or aborted attempts	OR=5.09, 95% CI = 4.1-6.4, p<0.001
	<i>Preparatory behavior</i>	Actual, interrupted or aborted attempts	OR=5.69, 95% CI = 4.3-7.5, p<0.001
<b>Horwitz et al. 2015</b>	<i>Attempt</i>	Attempt	OR=4.80, 95% CI = 2.23-10.32, p<0.001
	<i>NSSIB item</i>	Attempt	OR=3.12, 95% CI = 1.36-7.19, p<0.01
<b>Gipson et al. 2014</b>	<i>NSSIB item</i>	Return ER visit	OR = 1.52; 95% CI, 1.08-2.12, p<.05
		Attempt	$\chi^2 = 4.131, df = 1, p = 0.04$

*Also see: Conway et al 2016.*

## Incremental Validity and Accuracy

<b>Brent et al., (2009):</b> Treatment resistant, depressed adolescent suicide attempters (N=334, ages 12-18)	<ul style="list-style-type: none"> <li>Higher rates of suicidal (20.8% vs. 8.8%, chi squared= 9.18, df=1, p&lt;0.002) and non-suicidal self-injury (17.6% vs. 2.2%, chi squared= 23.47, df=1, p&lt;0.001) detected with systematic monitoring</li> </ul>
<b>Brown et al. (2015):</b> psychiatric ER patients (N=250)	<ul style="list-style-type: none"> <li>18% (n=23) of patients with a <u>suicide attempt</u> in the past week misclassified or missed by clinical assessment.</li> <li>Agreement with clinical assessment for <u>suicide attempts</u> (K=0.76, p&lt;.001)</li> <li>Agreement with clinical assessment of <u>non-suicidal self-injurious behavior</u> (K=0.72, p&lt;.001)</li> </ul>
<b>Horwitz et al. (2014):</b> Young adult psychiatric emergency patients (N=473)	<ul style="list-style-type: none"> <li>Suicidal ideation added incremental validity to the prediction of future suicide attempts beyond the past suicide attempt, <math>X^2(1) = 7.54, p = .006</math></li> </ul>
<b>Arias et al. (2013):</b> 497 ER adult patients with suicidal thoughts or attempt(s)	<ul style="list-style-type: none"> <li>41% increase in the detection of <u>suicide attempts</u> compared to chart reviews (59% vs. 18%, difference of 41%, 95% CI= 28-55, p&lt;0.001)</li> </ul>

*Also see: Conway et al 2016.*

## Reliability - Suicidal Ideation (inter-rater and multi-method agreement)

Study	Ideation Type	Coefficients
<b>Brent et al. (2009)</b>	<i>suicidal ideation ranging from 0 to 5 (from no ideation to suicidal ideation with intent and a clear plan) monitored weekly</i>	ICC = .09, p< 0.001
<b>Youngstrom et al. (2015)</b>	<i>Accuracy calibrated against "missing gold standard" latent class-derived ideation and behavior categories</i>	$\kappa > 0.7$

Gunes et al. (2015)	<i>Inter-rater reliability for the <u>most severe ideation scores</u> in the last month and lifetime were good</i>	Lifetime $\kappa = 0.91$ Recent $\kappa = 0.76$
Hesdorffer et al. (2013)	<i>Agreement between the MINI, C-SSRS and eC-SSRS for lifetime <u>suicidal ideation</u></i>	$\kappa = 0.80$ , 95% CI = 0.72-0.89
<b>Reliability - Suicidal Behavior</b>		
Brown et al. (2015)	<i>Agreement with clinical assessment for <u>attempts</u></i>	$\kappa = 0.76$ , $P < .001$
	<i>Agreement with clinical assessment for <u>non-suicidal self-injurious behavior</u></i>	$\kappa = 0.72$ , $P < .001$
Youngstrom et al. (2015)	<i>Accuracy of <u>attempt</u>: calibrated against latent class-derived categories</i>	$\kappa > 0.8$
Brent et al. (2009)	<i>Inter-rater reliability for a rating of <u>suicidal behavior, ranging from 0 to 5</u> (no behavior to multiple attempts during the assessment period) using the Columbia Classification Algorithm of Suicide Assessment</i>	100% agreement
Kerr et al. (2013)	<i>Inter-rater agreement for distinction among <u>actual, aborted, interrupted attempts, preparatory acts and any other act</u></i>	$\kappa = 0.88$
Hesdorffer et al. (2013)	<i>Agreement between the MINI, C-SSRS and eC-SSRS for lifetime <u>suicidal behavior</u></i>	$\kappa = 0.67$ , 95% CI = 0.53-0.80

## The Columbia Suicide Severity Rating Scale (C-SSRS): Suicide and Other Clinical Outcomes

**Table 3:** C-SSRS as Intervention and Measure of Diagnosis and Treatment Response

<b>Decrease in Suicide Rate: C-SSRS as Intervention</b>	<b>Out-Patient Mental Health</b> Esposito, 2015	<ul style="list-style-type: none"> <li>Centerstone - the largest provider of community-based outpatient mental health care in the U.S.</li> <li>The C-SSRS administered to every client at every service delivery point as part of a comprehensive Zero Suicide prevention program.</li> <li>In the first 20 months post-implementation, the Tennessee facilities saw a <b>nearly 65 % reduction in the suicide rate</b>, from 3.1 to 1.1 per 10,000 clients.</li> </ul>
	<b>Active Duty: US Marines</b> Seck, 2015	<ul style="list-style-type: none"> <li>Following training of all support staff in the C-SSRS at 16 USMC installations and implementation of mandatory C-SSRS screening by the non-healthcare personnel, including legal services, suicides in the USMC <b>dropped by 22%</b>, from 45 in 2013 to 34 in 2014.</li> </ul>
	<b>States: Utah</b> US: UT Dept. of Human Services, 2015	<ul style="list-style-type: none"> <li><b>For the first time</b> reversed the rising suicide trend since implementing the C-SSRS as part of the comprehensive Zero Suicide program in 2015.</li> </ul>
	<b>Active Duty: US Army</b> Adam Walsh, CIV DODHRA DSPO (US), (2015, personal communication)	<ul style="list-style-type: none"> <li>At the end of 2-4 months of treatment for PTSD in active duty soldiers (N=1206), those with greater improvement in PTSD had <b>fewer suicidal ideation</b> symptoms on the C-SSRS.</li> </ul>



Table 3: (Continued)

<b>C-SSRS as an Effective Measure for Diagnosis &amp; Treatment</b>	<b>Veterans</b> Legarreta et al., 2015	<ul style="list-style-type: none"> <li>The association of specific PTSD symptoms with suicidal ideation and behavior suggested individual PTSD symptoms as treatment target for reducing suicidal outcomes.</li> </ul>
	<b>Veterans</b> Harvey et al. (2014) (suicide analyses in preparation)	<ul style="list-style-type: none"> <li>Preliminary analyses show higher prevalence of suicidal ideation and behavior among the Vets with Bipolar Disorder than Schizophrenia.</li> <li>Different patterns of association with medical, psychiatric disorders and demographic characteristics between BP and SZ groups</li> </ul>
	<b>Medication Treatment Efficacy</b>  Ionescu et al. (2016)   Prakash et al. (2012)	<ul style="list-style-type: none"> <li>Ketamine treatment effective for suicidal ideation (SI) in <b>adults</b></li> <li>SI severity improved <u>independent</u> of acute decrease in depression and SI intensity improved <u>even if SI severity un-remitted</u></li> <li>Duloxetine was effective in treating suicidal ideation among <b>children ages 7-17</b> with major depression</li> <li>Distinguished children with improvement and deterioration</li> </ul>

## References for Psychometric Evidence and Clinical Outcomes

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## Representative Publications for C-SSRS Use:

### *Demographic and Clinical Populations, Settings, Treatment Response and Assessment Guidelines*

#### Pediatric Populations by Age Group

##### **Ages 5-11**

Glennon, J., Purper-Ouakil, D., Bakker, M., Zuddas, A., Hoekstra, P., Schulze, U., ... & Coghill, D. (2014). Paediatric European Risperidone Studies (PERS): context, rationale, objectives, strategy, and challenges. *European child & adolescent psychiatry*, 23(12), 1149-1160. [also includes 12-17.5 age group]

##### **Ages 6-12**

Buchanan, J., Burke, T., Camacho, K., Yershova, K., Lazzaretto, D., Posner, K. (2013) Preschool Bullying and Victimization as Predictors of Suicidal Ideation in School Age: 6-year Follow-Up of the Preschool Attention Deficit/Hyperactivity Disorder Treatment Study (PATS). *1<sup>st</sup> Annual Meeting of the International Academy for Suicide Research*, Montreal, Canada.

##### **Ages 7-13**

Weinstein, S. M., Henry, D. B., Katz, A. C., Peters, A. T., & West, A. E. (2015). Treatment moderators of child-and family-focused cognitive-behavioral therapy for pediatric bipolar disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 54(2), 116-125.

##### **Ages 6-17**

Glennon, J., Purper-Ouakil, D., Bakker, M., Zuddas, A., Hoekstra, P., Schulze, U., ... & PERS Consortium. (2014). Paediatric European Risperidone Studies (PERS): context, rationale, objectives, strategy, and challenges. *European child & adolescent psychiatry*, 23(12), 1149-1160.

##### **Ages 6-18**

Wigal, S. B., Nordbrock, E., Adjei, A. L., Childress, A., Kupper, R. J., & Greenhill, L. (2015). Efficacy of Methylphenidate Hydrochloride Extended-Release Capsules (Aptensio XR™) in Children and Adolescents with Attention-Deficit/Hyperactivity Disorder: A Phase III, Randomized, Double-Blind Study. *CNS drugs*, 29(4), 331-340.

##### **Ages 7-17**

Prakash, A., Lobo, E., Kratochvil, C. J., Tamura, R. N., Pangallo, B. A., Bullok, K. E., ... & March, J. S. (2012). An open-label safety and pharmacokinetics study of duloxetine in pediatric patients with major depression. *Journal of child and adolescent psychopharmacology*, 22(1), 48-55.

##### **Ages 10-18**

Scott, M., Underwood, M., & Lamis, D. A. (2015). Suicide and Related-Behavior Among Youth Involved in the Juvenile Justice System. *Child and Adolescent Social Work Journal*, 32(6), 517-527.

**Ages 12-17**

Findling, R. L., Cutler, A. J., Saylor, K., Gasior, M., Hamdani, M., Ferreira-Cornwell, M. C., & Childress, A. C. (2013). A long-term open-label safety and effectiveness trial of lisdexamfetamine dimesylate in adolescents with attention-deficit/hyperactivity disorder. *Journal of child and adolescent psychopharmacology*, 23(1), 11-21.

Findling, R.L., A. Robb, and A. Bose, *Escitalopram in the treatment of adolescent depression: a randomized, double-blind, placebo-controlled extension trial.* J Child Adolesc Psychopharmacol, 2013. 23(7): p. 468-80.

**Ages 7-18 (for pediatric sub-sample; study also includes adults)**

Gibbons, R. D., Brown, C. H., Hur, K., Davis, J. M., & Mann, J. J. (2012). Suicidal thoughts and behavior with antidepressant treatment: reanalysis of the randomized placebo-controlled studies of fluoxetine and venlafaxine. *Archives of general psychiatry*, 69(6), 580-587.

**Ages 12-17.5**

Glennon, J., Purper-Ouakil, D., Bakker, M., Zuddas, A., Hoekstra, P., Schulze, U., ... & Coghill, D. (2014). Paediatric European Risperidone Studies (PERS): context, rationale, objectives, strategy, and challenges. *European child & adolescent psychiatry*, 23(12), 1149-1160.

**Ages 12-18**

Posner, K., Brown, G. K., Stanley, B., Brent, D. A., Yershova, K. V., Oquendo, M. A., ... & Mann, J. J. (2011). The Columbia–Suicide Severity Rating Scale: initial validity and internal consistency findings from three multisite studies with adolescents and adults. *American Journal of Psychiatry*, 168(12), 1266-1277.

**Ages 12-18**

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**Ages 12-17**

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**Ages 13-17**

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### Cross-Cultural Settings

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