



A psychometric evaluation of the Concise Health Risk Tracking Self-Report (CHRT-SR)- a measure of suicidality-in patients with stimulant use disorder



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ABSTRACT

Stimulant use disorders are both common and associated with suicidal ideation and attempts. The psychometric properties of the 12-item Concise Health Risk Tracking Scale Self-Report (CHRT-SR), a measure that was created to assess suicidal thinking and several factors associated with a propensity to act, has been established in persons with mood disorders. This is a secondary analysis to assess the CHRT-SR in 302 stimulant abusing patients that had participated in a clinical trial.

A confirmatory factor analysis (CFA) was conducted to assess the factor validity of the 12-item CHRT-SR model with a second-order Propensity factor. The CHRT-SR total score and 2 factor scores (Propensity and Suicidal Thoughts) demonstrated acceptable internal consistency and test-retest reliabilities. These two subscales and the total score were modestly but significantly associated with measures of depression and life satisfaction, demonstrating construct validity. Two additional items assessing Impulsivity were also analyzed, and demonstrated acceptable internal consistency, test-retest reliability, and construct validity. The CHRT-SR appears to be a reliable and valid tool to assess suicidality in persons with stimulant use disorder.

1. Introduction

Suicide is a leading public health priority with evidence of an increase in the prevalence of suicide attempts (Olfson et al., 2017). Over the past decade, the National Institute of Health and other agencies have emphasized the importance of suicidal assessment and monitoring. From 2007–2008, in response to a research funding announcement (RFA) from NIH, the Suicide Assessment Methodology Study was conducted, with the primary aim of identifying tools to assess change in symptoms of suicidality in patients with major depressive disorder. The Concise Health Risk Tracking Scale Self-Report (CHRT-SR) was developed as a self-report measure to assess not only suicidal ideation and intent, but also common risk factors associated with suicide, such as pessimism/hopelessness, self-worth, and lack of social support that increase suicidal propensity (Trivedi et al., 2011a,b). As a self-report, it may be a more practical measure of suicidal thoughts

and risk factors in large research trials and clinical practice (as opposed to clinician-rated measures).

While there are several suicidality questionnaires and clinician-rated measures, many scales only assess suicidal ideation and past behaviors, and few assess associated symptoms within the same scale. As a self-report, the CHRT-SR may be especially useful for some patients who are likely to be more comfortable disclosing guarded information without being interviewed by the clinician (Trivedi et al., 2011b). The CHRT-SR has demonstrated excellent psychometric properties in samples with major depressive (Ostacher et al., 2015; Trivedi et al., 2011b) and bipolar disorders (Reilly-Harrington et al., 2016; Villegas et al., 2018). The CHRT-SR was originally developed to include 12 items reflecting the following domains: (1) hopelessness, (2) interpersonal attachment/social support, and (3) active suicidal ideation and behavior, with a principal component analysis identifying a 7-item version (Trivedi et al., 2011b). The 7-item and 12-item versions have

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demonstrated acceptable reliability (Cronbach's coefficient alpha of .78 in adults with major depressive disorder [MDD]; Cronbach's coefficient alpha of > .80 in adults with bipolar disorder and suicidal ideation) (Ostacher et al., 2015; Trivedi et al., 2011b). Two additional items were added to assess impulsivity in a sample of 482 adults with bipolar disorder, and the 14-item CHRT-SR had a Cronbach's coefficient alpha of .88 (Reilly-Harrington et al., 2016). This 14-item CHRT-SR was also recently evaluated in 271 adolescents at high risk for suicidal behaviors. The factor structure was modified to account for these new impulsivity items, with three factors identified: Propensity, Impulsivity, and Suicidal Thoughts (Mayes et al., in press).

The psychometric properties of the CHRT-SR have not been evaluated in other patient populations that are at risk of suicide, such as patients with substance use disorders. This report evaluated the psychometric properties in a convenience sample of adults with stimulant use disorder – participants in the multi-site trial Stimulant Reduction Intervention using Dosed Exercise (STRIDE) implemented through the National Institute on Drug Abuse (NIDA) National Drug Abuse Treatment Clinical Trials Network (CTN) (clinicaltrials.gov identifier NCT01141608). STRIDE compared two interventions (exercise and health education) as treatments for stimulant use disorder delivered initially in residential treatment settings (Trivedi et al., 2011a). Specifically, we aim to replicate the results already reported in prior studies to test the psychometric properties of the scale, including factor validity, internal consistency reliability, test-retest reliability, construct validity, and criterion-related validity of the 12-item CHRT-SR (CHRT-SR₁₂). In addition, because impulsivity has also been shown as a risk factor for suicide attempts (Liu et al., 2017) and has been linked to suicidal ideation in adults with substance use disorders (Rodriguez-Cintas et al., 2017), two additional items to assess impulsivity were added to the CHRT, and will be reported on here as part of the 14-item scale (CHRT-SR₁₄).

2. Methods

2.1. Design

The rationale and design for STRIDE have been previously published (Trivedi, Greer, 2011a). Conducted at nine geographically diverse, residential substance abuse treatment centers across the United States, the study was approved by the Institutional Review Board (IRB) at the University of Texas Southwestern Medical Center and each local IRB. All participants provided written informed consent. For the current study, baseline data included the CHRT-SR₁₂, to which 2 items to assess impulsivity were added. This report focuses on the 12-item version, but we report as well on these additional 2 impulsivity items for the CHRT-SR₁₄. CHRT-SR₁₂ data from the baseline and Week 1 time-point assessment were analyzed to examine the test-retest reliability of the measure.

2.2. Study sample and procedures

The study sample and overall study outcomes have been reported previously (Trivedi et al., 2017). Participants were adult stimulant users (N = 302), aged 18–65, in residential substance abuse treatment. Participants had to meet DSM-IV criteria for stimulant abuse or dependence within the last 12 months, report illicit stimulant drug use within 30 days prior to admission to residential treatment, and be cleared to exercise by a protocol-defined stress test. Participants with opioid dependence, general medical conditions or medications that contraindicated exercise, pregnancy, and psychosis or other psychiatric conditions that posed a safety risk were excluded (Trivedi et al., 2011a).

Eligible participants were randomized (stratified based on site, the presence of depressive symptoms as defined by the 16-item Quick Inventory of Depressive Symptomatology – Clinician Rated (QIDS-C₁₆), and severity of stimulant use as defined by number of days of substance

use prior to admission) to either: 1) dosed exercised intervention (Exercise) or 2) health education intervention (Health Education). Both interventions included intervention and assessment visits weekly during the 3-month acute phase.

2.3. Measures

Stimulant use disorders were assessed with the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI) (Version 2.1) (Robins et al., 1988; WHO, 1997). Drug, alcohol, and nicotine quantity and frequency were assessed for the 30 days prior to residential treatment admission using the Timeline Followback (TLFB) method (Sobell and Sobell, 1992).

The MINI International Neuropsychiatric Interview (MINI) (Sheehan et al., 1997) was used to obtain diagnostic information at baseline for current DSM-IV Axis I disorders, including depression, suicidality, generalized anxiety disorder, panic disorder, and posttraumatic stress disorder (PTSD). The MINI suicide module was used to assess suicide risk in the last month (yes/no) and to classify risk levels as low, moderate, and high. Symptoms of depression were assessed with the QIDS-C₁₆ (range of 0–27; higher scores indicate more severe depressive symptoms) (Trivedi et al., 2004). The 16-item Quality of Life Enjoyment and Satisfaction Questionnaire Short Form (Q-LES-Q-SF) (Endicott et al., 1993) assessed participants' general quality of life based on their satisfaction with their physical health, feelings, work, household duties, school/course-work, leisure time activities, and social relations (scores range from 0–100; higher scores indicate greater life satisfaction and enjoyment).

Participants completed the CHRT-SR₁₄ within a median of 10 days of admission into residential treatment (interquartile range: 8 to 14), and weekly thereafter. For the proposed analyses, we examined the CHRT-SR₁₂ (derived from the CHRT-SR₁₄) at baseline and week 1 (Time 2). Each item response ranges from 0 (strongly disagree) to 4 (strongly agree) (Trivedi et al., 2011b). The total score for the CHRT-SR₁₂ ranges from 0–48. In addition, we report on the two additional Impulsivity items of the CHRT-SR₁₄ with total scores ranging from 0–56.

2.4. Statistical analyses

Confirmatory factor analysis (CFA) was conducted to assess the fit of the data to the CHRT-SR₁₂ model and tested using the factors and subscales (Fig. 1). Model fit was assessed using Model chi-square value (χ^2) (Kline, 2011), model chi-square statistic per degrees of freedom (χ^2/df) (Bollen, 1989), the root mean square error of approximation (RMSEA) (Kline, 2011) with a 90% confidence interval (90%CI), Bentler Comparative Fit Index (CFI) and Tucker-Lewis index (TLI) (Hu and Bentler, 1999; Kline, 2011), and weighted root-mean-square residual (WRMR) (Yu, 2002). CFA was conducted with Mplus 8.0 (Muthén and Muthén, 2012) using weighted least squares means and variance adjusted (WLSMV) estimation (Brown, 2006). WLSMV is a robust estimator not requiring normally distributed data, therefore optimal for skewed data as expected when measuring a construct such as suicidality.

Cronbach's χ (internal consistency reliability) was calculated for the total CHRT-SR₁₂ and the factors and subscales. Intraclass correlation coefficients (ICC) (Hallgren, 2012) and Standard Error of Measurement (SEM) were used to examine for test-retest reliability (Weir, 2005). The SEM scores were calculated as follows:

$$SEM = \sqrt{MS_e} \times \sqrt{1 - ICC}$$

When testing for SEM, Hopkins (2000) suggested the use of the mean square error (MS_e) calculated within a repeated-measures ANOVA using scores from both time points as a within-subjects factor. This procedure was used for each of the CHRT-SR₁₂ total, factor, and subscale scores.

Spearman's rho rank order correlations were used to test the

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